Groundwater-Surface Water Interface Response Activity Plan Completion Report

Kent County, Michigan

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BGT	Below Groundwater Table
CD	Consent Decree
CSM	Conceptual Site Model
DoD	United States Department of Defense
EDD	Electronic Data Deliverable
EGLE	Michigan Department of Environment, Great Lakes and Energy
FCV	Final Chronic Values
GSI	Groundwater-Surface Water Interface
HNDV	Human Health Non-Drinking Water Values
HSP	House Street Property
MDEQ	Michigan Department of Environmental Quality
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NE	Northeast
ng/L	Nanogram per Liter
NIST	National Institute of Standards and Technology
NKSA	North Kent Study Area
ORP	Oxidation-Reduction Potential
PFAS	Per- and Polyfluoroalkyl Substances
PFBS	Perfluorobutane Sulfonic Acid
PFHxA	Perfluorohexanoic Acid
PFHxS	Perfluorohexane Sulfonic Acid
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PVC	Polyvinyl Chloride
QAPP	Quality Assurance Project Plan [*Former Wolverine Tannery, House Street Disposal Area, and Wolven/Jewell Area, Per- and Polyfluoroalkyl Substances Investigation Program*]
QA/QC	Quality Assurance/Quality Control
QSM	Quality Systems Manual
R&W/GZA	Rose & Westra, a Division of GZA GeoEnvironmental, Inc.
RAP	Response Activity Plan
SOP	Standard Operating Procedures
USGS	United States Geological Survey
VAP	Vertical Aquifer Profiling
Wolverine	Wolverine World Wide, Inc.
WV	Wildlife Values

1.0 INTRODUCTION

On behalf of Wolverine World Wide, Inc. (Wolverine), Rose & Westra, a Division of GZA GeoEnvironmental, Inc. (R&W/GZA), prepared this GSI RAP Completion Report (GSI CR) summarizing the activities completed associated with the *Groundwater-Surface Water Interface Response Activity Plan* dated September 23, 2020 (GSI RAP, **Appendix A)** and the *Revision to Groundwater-Surface Water Interface Investigation Summary and Work Plan* dated December 3, 2021 (Work Plan, **Appendix B**) and associated supplemental documentation. The GSI RAP and subsequent Work Plan were implemented as set forth in the Consent Decree No. 1:18-cv-00039, effective February 19, 2020 (CD).

Section 7.12(a)(viii) of the CD indicates this GSI CR shall be submitted no later than 180 days of completion of response activities and sampling associated with the Work Plan. Four quarters of groundwater sampling required by Section 7.10(d) of the CD was completed in January 2024, and the final laboratory data was received on February 21, 2024. Accordingly, August 19, 2024 is the due date for this GSI CR

The CD indicates the GSI CR:

> *demonstrates that Defendant has completed the Response Activities required by Paragraph 7.10 and analyzes the data collected pursuant to Paragraph 7.10.*

2.0 CONDITIONS OF CD PARAGRAPH 7.10

Section 7.10 of the CD:

(a) Defendant shall conduct a study of the potential for groundwater contamination to discharge to surface water in accordance with Appendix S— Statement of Work for GSI Investigation and the Response Activity Plan in Paragraph 7.4(a) at the following three areas:

- *(i) southeast of the House Street plume(s);*
- *(ii) from the Wolven/Jewell plume(s) and the House Street plume(s) to the northwest; and*
- *(iii) from the Wolven/Jewell plume(s) toward the Rogue River to the northeast and southeast.*

(b) Within ninety (90) Days of completing the work required by Paragraph 7.10(a), Defendant shall submit a work plan for the installation of needed permanent GSI wells to MDEQ for its review and approval. The work plan shall provide for the installation of GSI wells at up to forty (40) locations with 1-3 wells per location with a cap of 80 wells total.

(c) Upon MDEQ's approval for the permanent GSI well work plan submitted hereunder, the Defendant shall initiate the work outlined in the plan in accordance with the approved implementation schedule.

(d) Defendant shall conduct quarterly sampling at the installed GSI wells for one (1) year.

(e) Based on the information gathered from the work conducted under Paragraphs 7.10(b), 7.10(c), and 7.10(d), Defendant may submit a work plan to MDEQ that proposes to install interceptor systems or undertake other Response Activities to stop the venting of contaminated groundwater containing PFAS Compounds above applicable criteria into surface water no later than two (2) years after approval of the Completion Report submitted pursuant to Paragraphs 7.12(a)(vii). Any work undertaken by Defendant under this Paragraph shall be conducted pursuant to a work plan reviewed and approved by MDEQ.

The GSI RAP outlines the implementation of the requirements identified in CD Section 7.10. The GSI RAP was due on and transmitted to EGLE on September 23, 2020. The Work Plan was addressed in Section 7.10(b) of the CD and within the approved Work Plan. A revised, final version of the Work Plan incorporating EGLE's Notice of Approval with Conditions of the Groundwater-Surface Water Interface Investigation Summary and Work Plan dated October 7, 2021 was submitted on December 3, 2021.

3.0 BACKGROUND

Based on interpretation of regional geology and hydrogeology, residential water well sampling data collected in the NKSA, and groundwater investigations performed associated with the HSP and Wolven/Jewell areas, a CSM was provided in the 2020 GSI RAP (R&W/GZA, 2020). Data collected during the implementation of GSI RAP activities and implementation of the Work Plan supports the CSM with only minor revisions associated with groundwater flow interpretation.

Groundwater potentiometric surface elevation contours were interpolated from the static water levels collected during the quarterly monitoring well network gauging. See **Figures 1A** through **D** and **2 A** through **D** for quarterly groundwater potentiometric surface elevation contours in the shallow and deep zones, respectively.

4.0 GSI RAP AND WORKPLAN OBJECTIVES

The purpose of the GSI RAP and Work Plan investigations was to further evaluate PFAS at the GSI. The data compiled under the GSI RAP and Work Plan is focused on the vicinity of identified potential surface water discharge areas for the PFAS-containing groundwater in the HSP and Wolven/Jewell study areas in accordance with the CD.

To fulfil the obligation under the CD to study the potential for groundwater contamination from the HSP to discharge to surface water, additional investigation was conducted as set forward in the Work Plan. In evaluating the potential discharge(s) to the Rogue River, this GSI CR summarizes the work done in accordance with the GSI RAP and Work Plan to address the following objectives:

- Groundwater elevation at the GSI;
- Gradient and flux at the GSI; and,
- PFAS compound concentrations in the groundwater discharging to the Rogue River.

The following sections provide a detailed investigation summary of activities completed to satisfy the project objectives required by Paragraph 7.10(a) and Appendix S of the CD as well as the GSI RAP and Work Plan.

5.0 INVESTIGATION METHODOLOGY

The previously listed objectives were met through investigative activities conducted from December 2020 through January 2024 under EGLE-approved submissions. Those activities included:

- Installation of 16 temporary piezometers to collect gradient and flux data at the GSI;
- Pore-water sampling at 28 locations to monitor the lateral extent of PFAS compound concentrations in the groundwater discharging to the Rogue River;

- Vertical aquifer profiling (VAP) at proposed monitoring well locations to collect geologic and analytical data to determine permanent monitoring well screen depths;
- Installation of 33 overburden groundwater monitoring wells to monitor the lateral extent of PFAS compound concentrations in the groundwater potentially discharging to the Rogue River and, in one instance, the Grand River;
- Quarterly water level measurements to provide data to interpret the groundwater elevation at the GSI; and
- Quarterly groundwater sampling to monitor PFAS compound concentrations in the groundwater potentially discharging to the Rogue River.

Monitoring locations are depicted on **Figure 3.**

5.1 PIEZOMETER INSTALLATION

In accordance with general procedures outlined in the GSI RAP, 1.25-inch diameter, stainless steel temporary piezometers were hand-driven into the groundwater on the riverbank via a fence post driver. The 4-foot stainless steel screens were threaded onto galvanized riser pipe as they were driven below grade. The top of the well screen was driven to an approximate depth of three feet below the bottom of the river sediment, where possible. Refer to **Section 6.1** for a discussion of sampling adjustments. See Appendix A of the Work Plan (**Appendix B)** for piezometer construction details and **Table 1A** for a summary of piezometer screen intervals.

The following GSI piezometers were installed in each study area:

- **Wolven/Jewell Northwest Study Area** (Two locations)
  - Downgradient of the northwest portion of the Wolven/Jewell plume along the Rogue River
    - WVNW-GSI-1 and WVNW-GSI-2
- **Wolven/Childsdale Study Area (Wolven/Jewell Northeast and Southeast)** (Five locations)
  - North Childsdale area, downgradient of the Wolven study area
    - WV/CH-GSI-1 and WV/CH-GSI-2
  - Downgradient of Wolven Northeast plume within the Rogue River
    - Area19-GSI-1 through Area19-GSI-3
- **HSP Study Area** (Nine locations)
  - Southeast downgradient of the HSP along the Rogue River
    - HS-GSI-1 through HS-GSI-5
  - Downgradient of the HSP near the Grand River
    - HS-GSI-6 through HS-GSI-8
  - Northwest of the HSP
    - HS-GSI-9

5.2 PORE-WATER SAMPLING

Pore-water sampling was conducted in accordance with procedures outlined in SOP A27, provided in the GSI RAP. A Henry Tube Sampler (i.e., stainless-steel probe) with 1.5-inch slotted screen was pushed into the sediment at

discrete depths within the river bottom. A shallow-sample interval (minimum of 12 inches below the river bottom) and a deep-sample interval (minimum 6 inches below the shallow interval) were attempted at each pore-water sample location. Once the Henry Tube Sampler was pushed to depth for the shallow-sample interval, a vacuum gauge device (manometer) was connected to the Henry Tube Sampler and a peristaltic pump was used to draw water from the pore space. A second length of tubing was connected to the opposite side of the manometer in which river water was drawn into the tubing. A system of valves were closed to compare the pressure of pore-water to that of the river water. A higher gradient pressure within the pore-water tubing indicated that up-welling was occurring within the pore space and the pore-water was distinguishable from surface water. Upon confirmation, the manometer was removed and a multiparameter meter with a flow-through cell was connected to the Henry Tube Sampler.

Field parameters, including pH, temperature, conductivity, dissolved oxygen, and ORP were recorded and monitored from the river water which was then compared to the real-time readings of pore-water as an additional confirmation that pore-water, not surface water, was being drawn through the sample device. Pore-water readings were considered distinguishable from the river readings when the variance was greater than 10% for collected parameters from the multiparameter meter, with the exception of temperature. Following the stabilization of parameters, the flow-through cell was disconnected, and pore-water was pumped directly into laboratory-provided sampling containers.

As described in the GSI RAP, pore-water samples were collected from the following locations in each study area:

- **Wolven/Jewell Northwest Study Area**
  - Four pore-water sampling locations (WVNW-PW-1 through WVNW-PW-4) immediately downgradient of the Wolven northwest plume, along the Rogue River
- **Wolven/Childsdale Study Area (Wolven/Jewell Northeast and Southeast)**
  - Six pore-water sampling locations (WV/CH-PW-1 through WV/CH-PW-6) downgradient to the southeast of the Wolven study area
  - Seven pore-water sampling locations (Area19-PW-1 through Area19-PW-7) downgradient/northeast of the Area 19 plume within the Rogue River
- **HSP Study Area**
  - Nine pore-water sampling locations (HS-PW-1 through HS-PW-9), southeast downgradient of the HSP plume along the Rogue River
  - Two pore-water sampling locations (HS-PW-10 and HS-PW-11), northwest of the HSP

Piezometers AREA19-GSI 1 through 3, HS-MW-19S/D, HS-MW-29A, and a well from EGLE well series WV-DEQ-MW-9 were sampled concurrently with the pore-water sampling event in Q4 2020. Piezometer sampling was conducted in general accordance with procedures outlined in SOP A29 provided in the GSI RAP.

While not part of the GSI RAP, additional pore-water samples were collected to better delineate PFAS concentrations in HS-PW-3, located at the southeast downgradient portion of the HSP plume. A sample was advanced directly adjacent to the original HS-PW-3 location (HS-PW-3R). HS-PW-2.5 was advanced approximately 130 feet upstream of HS-PW-3; and HS-PW-3.5 was advanced 480 feet downstream of HS-PW-3. The re-sample event was completed eight weeks after the initial sample event. Samples were collected following the previously identified procedures.

To aid in locating step-out VAP locations (see **Section 5.3** below), additional porewater sampling was completed in the Wolven/Jewell Study Area (WVNW-PW-5 through WVNW-PW-7 and Area19-PW-8 through Area19-PW-10). Samples were collected in accordance with the previously identified procedures.

Table 5.2.1 Pore-Water Sample Locations

Area of Investigation	Sample I.D.	Pore-Water (ft)[1] Screen Depth	
		Shallow (A)[2]	Deep (B)[3]
Southeast downgradient of the HSP plume along Rogue River	HS-PW-1	2.00 - 2.13	2.50 -2.63
	HS-PW-2	1.00 - 1.13	NS
	HS-PW-2.5	0.50 - 0.63	1.00 - 1.13
	HS-PW-3	1.33 - 1.46	NS
	HS-PW-3R	0.50 - 0.63	NS
	HS-PW-3.5	0.83 - 0.96	NS
	HS-PW-4	0.75 - 0.88	NS
	HS-PW-5	1.33 - 1.46	NS
	HS-PW-6	1.00 - 1.13	NS
	HS-PW-7	1.50 - 1.63	NS
	HS-PW-8	1.00 - 1.13	NS
	HS-PW-9	1.00 - 1.13	NS
Northwest of the HSP	HS-PW-10	5.00 - 5.13	NS
	HS-PW-11	4.50 - 4.63	NS
Downgradient of Wolven Northeast plume within the Rogue River	Area19-PW-1	1.00 - 1.13	NS
	Area19-PW-2	1.00 - 1.13	1.42 - 1.54
	Area19-PW-3	1.00 - 1.13	NS
	Area19-PW-4	1.00 - 1.13	1.42 - 1.54
	Area19-PW-5	1.00 - 1.13	NS
	Area19-PW-6	1.50 - 1.63	2.00 - 2.13
	Area19-PW-7	5.00 - 5.13	NS
	Area19-PW-8	1.00 – 1.13	NS
	Area19-PW-9	1.00 - 1.13	1.5 – 1.63
	Area19-PW-10	1.00 - 1.13	NS
Downgradient of the northwest portion of the Wolven/Jewell plume along the Rogue River	WVNW-PW-1	3.00 - 3.13	4.00 - 4.13
	WVNW-PW-2	2.33 - 2.46	3.33 - 3.46
	WVNW-PW-3	1.50 - 1.63	NS
	WVNW-PW-4	1.67 - 1.79	NS
	WVNW-PW-5	1.00 – 1.13	NS
	WVNW-PW-6	1.00 – 1.13	1.7 – 1.83
	WVNW-PW-7	1.3 - 1.43	NS
North Childsdale area, downgradient of the Wolven study area	WV/CH-PW-1	0.75 - 0.88	NS
	WV/CH-PW-2	0.75 - 0.88	NS
	WV/CH-PW-3	1.00 - 1.13	NS
	WV/CH-PW-4	1.00 - 1.13	NS
	WV/CH-PW-5	0.83 - 0.96	NS
	WV/CH-PW-6	1.00 -1.13	2.00 - 2.13

[1] – Measured in feet below the ground surface of the river bottom
[2] – "A" represents the shallow interval sample collected at each location which was advanced to a minimum of 12-inches below the sediment where conditions allowed.
[3] – "B" represents the deep interval sample collected at each location which was advanced to a minimum of 6-inches below the shallow sample where conditions allowed.
NS – Not Sampled. See **Section 6.2** for Sampling Deviations

Figure 3 summarizes pore-water sample locations in the NKSA. **Figures 4A** through **4C** provide a smaller scale overview of sample locations in each area.

5.3 VERTICAL AQUIFER PROFILING AND MONITORING WELL INSTALLATION

As stated in the Work Plan, monitoring wells located close to the Rogue River and screened in the shallow groundwater zone were proposed to monitor the GSI. The locations were positioned as close to the Rogue River as possible (i.e., 50 to 500 feet from the Rogue River shoreline) and screened in the top 50 feet of the saturated zone. Additionally, the two wells at HS-MW-266 are situated 690 feet from the Rogue River. This location was proposed to evaluate conditions northeast of the DNR fish ponds and hydraulically upgradient of HS-MW-261. Monitoring well locations are depicted on **Figure 3** (overview) and in detail on **Figures 4A** through **4C**.

GZA oversaw the advancement of the borings drilled by WWW's drilling contractor, Stearns Drilling Company (Stearns) of Dutton, Michigan. Hollow-stem auger drilling methods were utilized, and drilling activities occurred between January 31, 2022 and May 11, 2023. At each location, the soil boring was advanced to approximately 50 feet BGT. VAP sampling, in accordance with SOP A25, included in the project-specific QAPP, was then performed by setting a temporary 2-inch diameter PVC well screen and collecting groundwater samples at 10-foot intervals within the saturated zone. If fine-grained soil were present or groundwater column was discontinuous, the VAP intervals were adjusted based on field observations. Investigation derived waste was handled and disposed in accordance with the Work Plan.

The VAP data collected was evaluated and discussed with EGLE to determine the appropriate depth for permanent monitoring well screen interval placement. Specifically, upon the completion of soil boring and VAP sampling, one 2- inch monitoring well was installed within the top 10 feet of the saturated zone. The screen position of the deeper monitoring well(s), if applicable, were selected based on the distance of the monitoring well to the shoreline, geology, and estimated groundwater flow path. After receiving VAP data, proposed monitoring well screen locations were communicated to EGLE and agreed upon before the monitoring well screens were installed.

As described in the Work Plan, VAP samples were collected from the following locations in each study area:

Table 5.3.1 Proposed Monitoring Location

Area	Well(s)	Purpose
Wolven/Jewell	WVNW-MW-200, 202, 203 and Area19-MW-225, 226	Delineate the lateral extent of PFOS concentrations exceeding the criterion upstream and downstream of the Wolven/Jewell Area
	WVNW-MW-201	Near the highest pore-water PFOS detection in this area (WVNW-PW-3)
Wolven/Childsdale (Wolven/Jewell Northeast and Southeast)	Area19-MW-7 (Area 19 RAP well), Area19-MW-221, 223, and 224, WV/CH-MW-240 and 242	Delineate the lateral extent of PFOS concentrations exceeding the criterion upstream and downstream of the Wolven/Childsdale Area
	Area19-MW-222 and WV/CH-MW-241	Near the highest pore-water PFOS detection in this area (Area19-PW-5 & WV/CH-PW-3)
HSP	HS-MW-260, 262, 263, 264, 265, 266 and HS-MW-29A (existing)	Delineate the lateral extent of PFOS concentrations exceeding the criterion upstream and downstream of the HSP plume area
	HS-MW-260, 261, and 262	Near the highest pore-water PFOS detection in this area (HS-PW-3)

See **Appendix D** for soil boring and monitoring well installation logs and **Table 1B** for a summary of the monitoring well screen intervals. **Figure 3** provides GSI final well installation locations.

5.4 GROUNDWATER AND SURFACE WATER GAUGING

Existing staff gauges of the Rogue River were utilized for water level comparison and groundwater flow evaluation in the following locations in the Rogue River:

- Rockford Dam Seawall;
- East Bridge Street Bridge;
- Rogue River Road Bridge; and,
- Jericho Avenue Bridge.

Additional staff gauge locations (11 Mile Bridge, Algoma Avenue Bridge, and 12 Mile Bridge) were added to pair with GSI piezometer locations where existing staff gauges were not present. The water levels measured from these locations were used in combination with USGS gauging station, USGS04118500, to evaluate surface water levels in the Rogue River.

Prior to pore-water sampling associated with the GSI RAP, water levels were collected from the newly installed piezometers and network of staff gauges. A total of nine groundwater gauging events were completed over a three week period between November 9 and November 27, 2020 and are summarized in the Work Plan.

Groundwater gauging events were also completed prior to quarterly groundwater sampling events (second quarter 2023 through first quarter 2024). Groundwater elevation readings were collected from monitoring wells throughout the NKSA and were not limited to GSI piezometers, wells, and staff gauges.

Groundwater and surface water gauging data and associated elevations for the quarterly gauging events are provided on **Table 2**.

GSI piezometer, monitoring well, and staff gauge locations are provided on **Figure 3.** The locations in each study area are further detailed on **Figures 4A** through **4C**.

5.5 GROUNDWATER SAMPLING

The GSI wells installed as described in **Section 5.3** and existing well HS-MW-29A and Area 19 well AREA19-MW-7A (situated near the Rogue River and screened in the shallow groundwater zone) were included in the GSI quarterly groundwater sampling events. Groundwater sampling was performed using adjustable rate, submersible pumps, peristaltic pumps, or bladder pumps and disposable tubing. For a detailed description of the procedure followed for low flow groundwater sampling, refer to SOP A16 included in the project-specific QAPP. Low-flow groundwater sampling logs are included in **Appendix E**.

5.5.1 GSI RAP Groundwater Sampling

As identified in the GSI RAP, existing well clusters HS-MW-19S/D and HS-MW-29A (located hydraulically downgradient of the House Street plume) and one existing well installed by EGLE (DEQ-MW9-57) were sampled concurrently during the pore-water sampling event. Newly installed piezometers (Area19-GSI-1, Area19-GSI-2, and Area19-GSI-3) were also sampled during the December 2020 pore-water sampling event. Piezometer sampling was conducted in general accordance with procedures outlined in SOP A29 included in the GSI RAP.

5.5.2 Quarterly Groundwater Sampling

Once VAP sampling was completed and monitoring wells were installed, GSI monitoring wells were sampled quarterly per Section 7.10(d) of the CD. GSI sampling events occurred:

- Q2 2023: May 22 through June 1, 2023.
- Q3 2023: August 7 through August 11, 2023.
- Q4 2023: October 16 through October 20, 2023.
- Q1 2024: January 9 through January 25, 2024.

Monitoring well sampling was conducted in general accordance with procedures outlined in SOP A16. Investigation derived waste was handled and disposed in accordance with the Work Plan.

GSI monitoring well locations are provided on **Figure 3.** The locations in each study area are further detailed on **Figures 4A** through **4C**.

6.0 GSI RAP AND WORK PLAN SAMPLING ADJUSTMENTS

The following sections describe adjustments made to the GSI RAP and Work Plan as necessary to complete the approved work under the circumstances and in accordance with standard operating practices and procedures referenced in the EGLE-approved GSI RAP.

6.1 PIEZOMETER INSTALLATION ADJUSTMENTS

The piezometers screens were planned to be installed to a depth of 3 feet below the bottom of the river sediment (**Section 5.1**), and adjustments were made to accommodate subsurface conditions (e.g., rocky substrate). **Table 1A** lists the screen intervals for the piezometers as installed. Eight of the 16 piezometers were installed with the top of screen shallower than 3 feet below ground surface (i.e., WVNW-GSI-1, WVNW-GSI-2, AREA19-GSI-1, AREA19-GSI-2, AREA19-GSI-3, WV/CH-GSI-1, WV/CH-GSI-2, HS-GSI-1, HS-GSI-2, HS-GSI-3, HS-GSI-4, and HS-GSI-5).

6.2 GSI RAP PORE-WATER SAMPLING ADJUSTMENTS

As previously mentioned in **Section 5.2**, in addition to the GSI RAP initial samples, pore-water samples were collected to delineate PFAS in HS-PW-3, located at the southeast downgradient portion of the HSP plume (HS-PW-2.5, 3R and 3.5). To further support the Work Plan VAP investigation, additional porewater sampling was completed in the Wolven/Jewell Study Area (WVNW-PW-5 through WVNW-PW-7 and Area19-PW-8 through Area19-PW-10).

The intervals at which pore-water samples were collected were based upon the results of the vacuum-gauge device and confirmation of up-welling groundwater gradient at each location. In some sample locations, the shallow intervals were at depths less than 12 inches due to refusal from rocky sediment. While certain shallow intervals were less than the minimum that was stated in the GSI RAP, SOP A27 allowed for the sampler inlet to be positioned as shallow as 6 inches below the base of the loose sediment. **Table 5.2.1** shows the depth interval in feet below the river bottom for each sample.

Subsurface conditions (rocky substrate, refusal, etc.) did not allow for the collection of the deep interval at every location. Refusal or inadequate groundwater gradient prevented the sampling deeper intervals at 23 pore-water sampling locations. Table 5.2.1 represents where a deep sample could not be collected as “NS”. Proposed pore-water sample locations in the study area northwest of the HSP (HS-PW-10 and HS-PW-11) were required to be moved further downstream due to impassable conditions of the Rogue River combined with limited private

landowner access. With EGLE's approval these locations were relocated upstream and downstream of GSI piezometer HS-GSI-9.

6.3 GSI VAP SAMPLING ADJUSTMENTS

Two locations (Area19-MW-226 step out in Q1 2023 and Area19-MW-225 step out in Q3 2022) were installed after the additional porewater sampling was conducted. These two step-out locations were placed at the approximate edge of the plume which was determined by evaluating the pore-water PFAS concentrations.

R&W/GZA had several rounds of communication with EGLE regarding possible changes in well locations based on inaccessibility, etc. No changes to the proposed locations identified in the Work Plan were made without EGLE concurrence.

The following wells were relocated:

- WVNW-MW-200: moved 500 ft east away from river
- Area19-MW-221: moved to the parcel north of proposed location
- Area19-MW-223: moved 300 ft southwest and into the Childsdale Avenue right-of-way
- HS-MW-263: moved 750 ft south
- HS-MW-265: moved 550 ft SE along river edge

These changes in location were minor, approved by EGLE, and did not materially affect the implementation of the GSI RAP or Work Plan.

6.4 GSI GROUNDWATER SAMPLING ADJUSTMENTS

There were no deviations or exclusions from the Work Plan during the quarterly groundwater sampling schedule.

7.0 ANALYTICAL METHOD AND PARAMETERS

Analyses of groundwater and porewater samples collected were conducted by Pace Analytical Services (Pace) of West Columbia, South Carolina. The samples were analyzed for PFAS using DoD QSM 5.3 guidelines for PFAS by isotope dilution methodology. The analyte list included the 28 PFAS compounds specified in the CD, and reporting limits are provided in Table A.7.7 of the project-specific QAPP.

8.0 GSI AND APPLICABLE RULE 57 WATER QUALITY STANDARDS

The potential environmental exposure pathways for impacted surface water in the Rogue River and applicable Part 4 Rule 57 Water Quality Values[1] are identified as follows:

- Human exposure via non-drinking water exposure route – Rule 57 HNDV;
- Aquatic life exposure to impacted water in the Rogue River – Rule 57 FCV; and
- Wildlife exposure to impacted water in the Rogue River – Rule 57 WV.

[1] Michigan Part 4, Rule 57 Water Quality Values were last updated October 12, 2023.

Parameter	Units	HNDV	FCV	WV
PFBS	µg/L	670	24,000	Not Applicable
PFHxS	µg/L	0.21	Literature Search Not Conducted	Not Applicable
PFNA	µg/L	0.03	Literature Search Not Conducted	Not Applicable
PFOA	µg/L	0.17	880	Not Applicable
PFOS	µg/L	0.012	140	Not Applicable

The human health drinking water value is not applicable to this GSI investigation. Rather, the applicable criteria are the generic groundwater GSI criteria[2], which are the lesser of HNDV, FCV, and WV. The GSI criteria are derived using surface water concentrations, but for the purpose of this evaluation they were used for the evaluation of pore-water data to aid in evaluating compliance at the surface water compliance point. This does not imply that GSI criteria are necessarily applicable to the pore-water concentrations.

Compound	Threshold Value (µg/L)	Basis for Value
PFBS	670	GSI
PFHxS	0.21	GSI
PFNA	0.03	GSI
PFOA	0.17	GSI
PFOS	0.012	GSI

9.0 SITE SAMPLING RESULTS

The following section provides a summary of the analytical results from pore-water samples collected during the investigation activities.

9.1 PORE-WATER SAMPLING

Pore-water was sampled according to the methods outlined in **Section 5.2**. Based on field observations and pressure differential measurements, there is no indication that surface water intrusion occurred during pore-water sampling. Refer to **Appendix C** for porewater sampling logs.

During pore-water sampling, 47 samples were collected from a total of 37 locations. Of those locations, 0 samples exceeded the GSI criterion for PFOA (0.17 µg/L). For PFOS, 27 samples were greater than the GSI criterion (0.012 µg/L). The PFOS concentrations of samples are further described below by each area:

- **Wolven/Jewell Study Area (downgradient of the Wolven Northwest plume)**

>0.012 µg/L	WVNW-PW-3(A) and WVNW-PW-4(A)
<0.012 µg/L	WVNW-PW-1(A), WVNW-PW-1(B), WVNW-PW-2(A), WVNW-PW-2(B), and WVNW-PW-5A
Non-Detect	WVNW-PW-6A, WVNW-PW-6B, and WVNW-PW-7A

[2] Michigan Part 201 Groundwater Cleanup Criteria are based on "Table 1, Groundwater: Residential and Nonresidential Part 201 Generic Cleanup Criteria and Screening Levels/Part 213 Tier I Risk Based Screening Levels," Michigan Administrative Code, Cleanup Criteria Requirements for Response Activity, Rules 299.44 and 299.49, effective December 30, 2013; last updated October 12, 2023.

- **Wolven/Jewell Study Area (downgradient/northeast of the Wolven plume)**

>0.012 µg/L	Area19-PW-1(A), Area19-PW-2(A), Area19-PW-2(B), Area19-PW-3(A), Area19-PW-4(A), Area19-PW-4(B), Area19-PW-5(A), Area19-PW-6(A), Area19-PW-6(B), Area19-PW-7(A), and Area19-PW-9B
<0.012 µg/L	Area19-PW-8A, Area19-PW-9A, and Area19-PW-10A
Non-Detect	None

- **Wolven/Childsdale Study Area (Wolven/Jewell Northeast and Southeast)**

>0.012 µg/L	WV/CH-PW-1(A), WV/CH-PW-2(A), WV/CH-PW-3(A), WV/CH-PW-4(A), WV/CH-PW-5(A), and WV/CH-PW-6(A)
<0.012 µg/L	None
Non-Detect	WV/CH-PW-6(B)

- **HSP Study Area (South/Southeast, downgradient of the HSP plume along Rogue River)**

>0.012 µg/L	HS-PW-2.5(A), HS-PW-2.5(B), HS-PW-3(A), HS-PW-3R(A), HS-PW-3.5(A), HS-PW-4(A), HS-PW-5(A), and HS-PW-8(A)
<0.012 µg/L	HS-PW-2(A), HS-PW-6(A), HS-PW-7(A), and HS-PW-9(A)
Non-Detect	HS-PW-1(A), HS-PW-1(B)

- **HSP Study Area (Northwest of the HSP)**

>0.012 µg/L	None
<0.012 µg/L	None
Non-Detect	HS-PW-10(A) and HS-PW-11(A)

Pore-water sample results are provided on **Table 3**. **Figures 5A** through **5C** depict pore-water PFOA and PFOS concentrations in each study area. A geological cross section plan view is presented on **Figure 6**. Geological cross sections through the approximate center lines of the plumes (interpolated with data from 2017 through 2019) and parallel to the Rogue River are provided as **Figures 6A** through **6F**. The isoconcentrations presented on **Figure 6** were interpolated from data collected in 2017 thru 2019 and do not represent the current state of groundwater conditions. In lieu of isoconcentration maps, **Figures 5A thru 5C** were prepared to more appropriately summarize the quarterly groundwater sampling events.

9.2 VAP GROUNDWATER SAMPLING

VAP groundwater samples were collected from a total of 20 locations. Each of the locations was sampled according to the methods outlined in **Section 5.3**. Of the 85 GSI VAP samples collected, zero exceeded GSI criterion for PFOA (0.17 µg/L). PFOS was measured over GSI criterion (0.012 µg/L) in 35 samples at 15 locations across the GSI study areas. Likewise, for PFOS, 50 samples were less than 0.012 µg/L or were non-detect in laboratory analysis. The PFOS concentrations per locations are further described below for each area and a summary of the data is presented in **Table 4**:

- **Wolven/Jewell Study Area (downgradient of the Wolven Northwest plume)**

>0.012 µg/L	WVNW-MW-200, WVNW-MW-201, WVNW-MW-202
<0.012 µg/L	None
Non-Detect	None

- **Wolven/Jewell Study Area (downgradient/northeast of the Wolven plume)**

>0.012 µg/L	AREA19-MW-7, AREA19-MW-221, AREA19-MW-222, AREA19-MW-223, AREA19-MW-224, AREA19-MW-225
<0.012 µg/L	AREA19-MW-226
Non-Detect	None

- **Wolven/Childsdale Study Area (Wolven/Jewell Northeast and Southeast)**

>0.012 µg/L	WV/CH-MW-240, WV/CH-MW-241
<0.012 µg/L	None
Non-Detect	WV/CH-MW-242

- **HSP Study Area (South/Southeast, downgradient of the HSP plume along Rogue River)**

>0.012 µg/L	HS-MW-260, HS-MW-261, HS-MW-262
<0.012 µg/L	HS-MW-263, HS-MW-265
Non-Detect	HS-MW-264, HS-MW-266

A geological cross section plan view is presented on **Figure 6**. Geological cross sections through the approximate center lines of the plumes (interpolated with data from 2017 through 2019) and parallel to the Rogue River are shown on **Figures 6A** through **6F**. Note, VAP results are not included on the appended figures (i.e., only permanent well data). Data from the VAP samples are included, however, on the cross sections.

9.3 GROUNDWATER SAMPLING

Groundwater samples were collected from a total of 33 locations in the GSI area once per quarter for four consecutive quarters (refer to **Section 5.5.2** for sample dates). In total there were 132 samples for quarterly GSI groundwater sampling. Additionally, 3 piezometers and 4 existing wells were sampled in Q4 2020, as discussed in **Section 5.1**. With those locations included, there are 39 groundwater sampling locations and 139 samples collected.

Out of the 139 groundwater samples, 1 sample (AREA19-MW-222 during Q2 of 2023) exceeded the GSI criterion for PFOA at a concentration of 0.18 µg/L (versus the GSI criterion of 0.17 µg/L).

PFOS was not detected over its GSI criterion in AREA19-MW-221B Q1 2024. PFOS was detected in 21 wells across the GSI study area. In total, over the 4 quarters, 83 samples were greater than the GSI criterion (0.012 µg/L). With the results from the 2020 sampling included, there were 87 samples above the criterion. 52 samples were less than 0.012 µg/L or were non-detect in laboratory analysis. The PFOS concentrations are further described by each area below based on the maximum value observed at each location:

- **Wolven/Jewell Study Area (downgradient of the Wolven Northwest plume)**

>0.012 µg/L	WVNW-MW-200A, WVNW-MW-200B, WVNW-MW-201A, WVNW-MW-201B, WVNW-MW-201C, WVNW-MW-202A, WVNW-MW-202B,
<0.012 µg/L	WVNW-MW-203
Non-Detect	None

- **Wolven/Jewell Study Area (downgradient/northeast of the Wolven plume)**

>0.012 µg/L	AREA19-GSI-1, AREA19-GSI-2, AREA19-GSI-3, AREA19-MW-221A, AREA19-MW-221B, AREA19-MW-222, AREA19-MW-223, AREA19-MW-224, AREA19-MW-225A, AREA19-MW-7A
<0.012 µg/L	None
Non-Detect	WV-DEQ-MW9-57, AREA19-MW-225B, AREA19-MW-226A, AREA19-MW-226B

- **Wolven/Childsdale Study Area (Wolven/Jewell Northeast and Southeast)**

>0.012 µg/L	WV/CH-MW-240, WV/CH-MW-241A, WV/CH-MW-241B
<0.012 µg/L	None
Non-Detect	WV/CH-MW-242A, WV/CH-MW-242B

- **HSP Study Area (South/Southeast, downgradient of the HSP plume along Rogue River)**

>0.012 µg/L	HS-MW-29A, HS-MW-260, HS-MW-261, HS-MW-262
<0.012 µg/L	HS-MW-263A, HS-MW-263B
Non-Detect	HS-MW-19S, HS-MW-19D, HS-MW-264, HS-MW-265, HS-MW-266A, HS-MW-266B

Groundwater sample results are summarized on **Table 5**. **Figures 5A** through **5C** depict PFOA and PFOS concentrations in each study area. A geological cross section plan view is presented on **Figure 6**. Geological cross sections through the approximate center lines of the plumes (interpolated with data from 2017 through 2019) and parallel to the Rogue River are shown on **Figures 6A** through **6F**.

9.4 RESULTS SUMMARY

Based on the results summarized above (**Sections 9.1-9.3**), the following summarizes the GSI investigation:

The Wolven/Jewel Area pore-water samples furthest upstream and downstream were either non-detect for PFOS or below GSI criteria. The furthest upstream and downstream monitoring wells in the area have PFOS concentrations exceeding GSI criteria (**Figure 5A**).

Wolven/Childsdale Study Area (Wolven/Jewell Northeast and Southeast) is delineated upstream by the consistent non-detection for PFOS in the AREA19-MW-226 monitoring well cluster and the sample results that are less than criteria at pore-water location AREA-19-PW-10. The southern, downstream portion of this area is delineated by the non-detects for PFOS in the WV/CH-MW-242 cluster. However, there was an exceedance of GSI criteria in the shallow sample taken at pore-water location WV/CH-PW-6 (**Figure 5B**).

The HSP area is delineated on the northern, upstream side by consistent non-detects for PFOS in monitoring well cluster HS-MW-19 and the non-detect in both shallow and deep samples at pore-water location HS-PW-1. The southern and downstream end of the HSP area is well delineated for PFOS by monitoring wells and porewater samples that were either non-detects or below GSI criteria. All samples from HS-MW-263 support this (**Figure 5C**).

10.0 DATA QUALITY ASSURANCE AND CONTROL

QC samples (i.e., field blanks, field duplicates, and MS/MSDs) were collected at a rate of one per 20 samples in accordance with the project-specific QAPP and approved Work Plan. QA/QC samples were collected using the methods described in the SOPs and analyzed using the same analytical methods used for the primary sample.

Selected GSI data have been validated according to performance requirements and the QA/QC limits in Table D.1.1 of Revision 2 of the QAPP. In addition, R&W/GZA consulted the general guidance in the EPA Contract Laboratory Program National Functional Guidance for Organic and Inorganic Superfund Data Review and relevant analytical methods to assess data usability. Approximately 5% of all PFAS samples collected are included for data validation. Sample delivery group WA28027 (pore-water sampling), XG22049 (pore-water sampling), and YJ25065 (groundwater sampling) were included within the 5% PFAS samples selected for data validation. Adjustments to data qualifiers identified during data validation have been incorporated into the dataset and are included on the attached tables. Analytical data has been provided to EGLE via EDD. Stage 4 Data Validation Reports for GSI pore-water samples, produced by Environmental Standard, are included in **Appendix F**. YJ25065 Stage 4 data validation is expected to be completed in the fourth quarter of 2024.

10.1 FIELD PARAMETER QUALIFIERS

During validation of quarterly groundwater sampling data, field parameters were qualified for the following reasons:

- Temperature readings collected prior to July 27, 2023 were qualified because the meters were not checked with a NIST-certified thermometer.
- Specific conductivity readings were qualified when the meter was not calibrated and checked with different standards, or, when calibration was not required, the calibration was not verified and checked with different standards.
- The meter failed the end of day calibration check for a specific parameter.
- The parameter was not stable at the time of sampling and the 2-hour time limit was not reached.

Qualified readings may be used to determine stabilization (intended use) but may not be used for other purposes.

11.0 FINANCIAL ASSURANCE MECHANISM

As described above, the Response Activities for GSI under Paragraph 7.10 of the CD have been undertaken in accordance with the EGLE-approved work plans, and those obligations have been completed. Accordingly, no Financial Assurance Mechanism is required under Paragraph 7.12(a)(viii)(b)-(c) for this GSI CR. As provided in Section 7.10(e) of the CD, Wolverine may submit a work plan to EGLE to undertake Response Activities at the GSI within two years of approval of this report. The need for financial assurance for any Long-Term Response Activity Costs will be revisited and addressed as necessary during each five-year review under Paragraph 8.4 of the CD for any Response Activities proposed and undertaken under Paragraph 7.10(e) of the CD.

12.0 REFERENCES

R&W/GZA. 2018. *Conceptual Site Model Update and Status Report, Former House Street Disposal Area, Wolverine World Wide, Inc., Rockford, Michigan*.

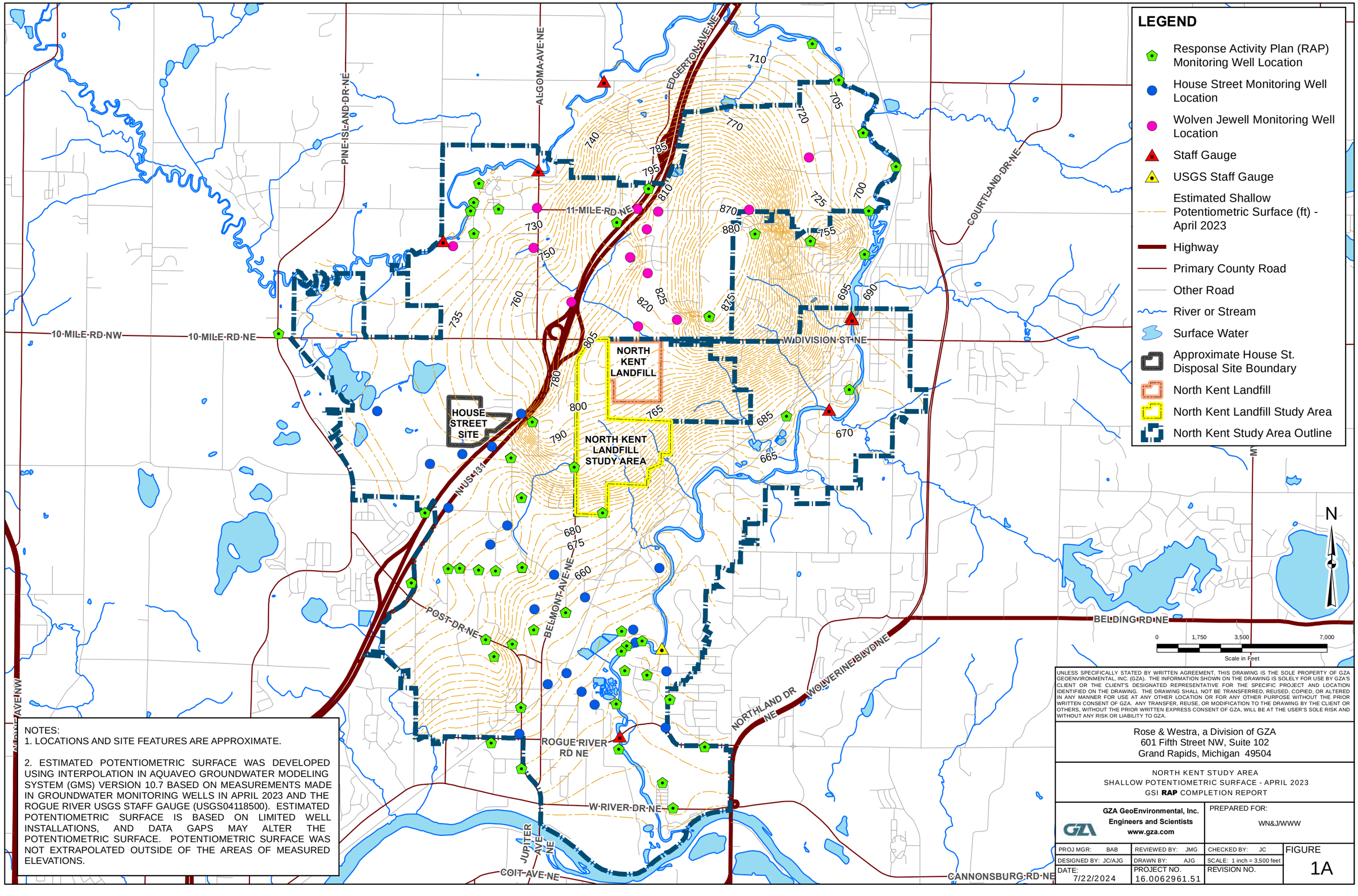
R&W/GZA. 2018. *Quality Assurance Project Plan, Former Wolverine Tannery and House Street Disposal Area, Revision 2.* Submitted to EPA August 29, 2018 with errata pages submitted October 31, 2018 and April 15, 2019.

R&W/GZA. 2019. *Implementation of 2018 Work Plan - Summary Report, Former Wolverine World Wide Tannery Facility*. Submitted to USEPA January 11, 2019.

R&W/GZA. 2020. *Groundwater-Surface Water Interface (GSI) Response Activity Plan, North Kent Study Area*. Submitted to Michigan Department of Environment, Great Lakes, and Energy (EGLE) September 23, 2020.

R&W/GZA. 2021. *Groundwater-Surface Water Interface (GSI) Investigation Summary and Work Plan, North Kent Study Area*. Submitted to Michigan Department of Environment, Great Lakes, and Energy (EGLE) April 26, 2021, revised December 3, 2021.

FIGURES



NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

2. ESTIMATED POTENTIOMETRIC SURFACE WAS DEVELOPED USING INTERPOLATION IN AQUAVEO GROUNDWATER MODELING SYSTEM (GMS) VERSION 10.7 BASED ON MEASUREMENTS MADE IN GROUNDWATER MONITORING WELLS IN APRIL 2023 AND THE ROGUE RIVER USGS STAFF GAUGE (USGS04118500). ESTIMATED POTENTIOMETRIC SURFACE IS BASED ON LIMITED WELL INSTALLATIONS, AND DATA GAPS MAY ALTER THE POTENTIOMETRIC SURFACE. POTENTIOMETRIC SURFACE WAS NOT EXTRAPOLATED OUTSIDE OF THE AREAS OF MEASURED ELEVATIONS.

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NORTH KENT STUDY AREA
SHALLOW POTENTIOMETRIC SURFACE - APRIL 2023
GSI **RAP** COMPLETION REPORT

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Engineers and Scientists
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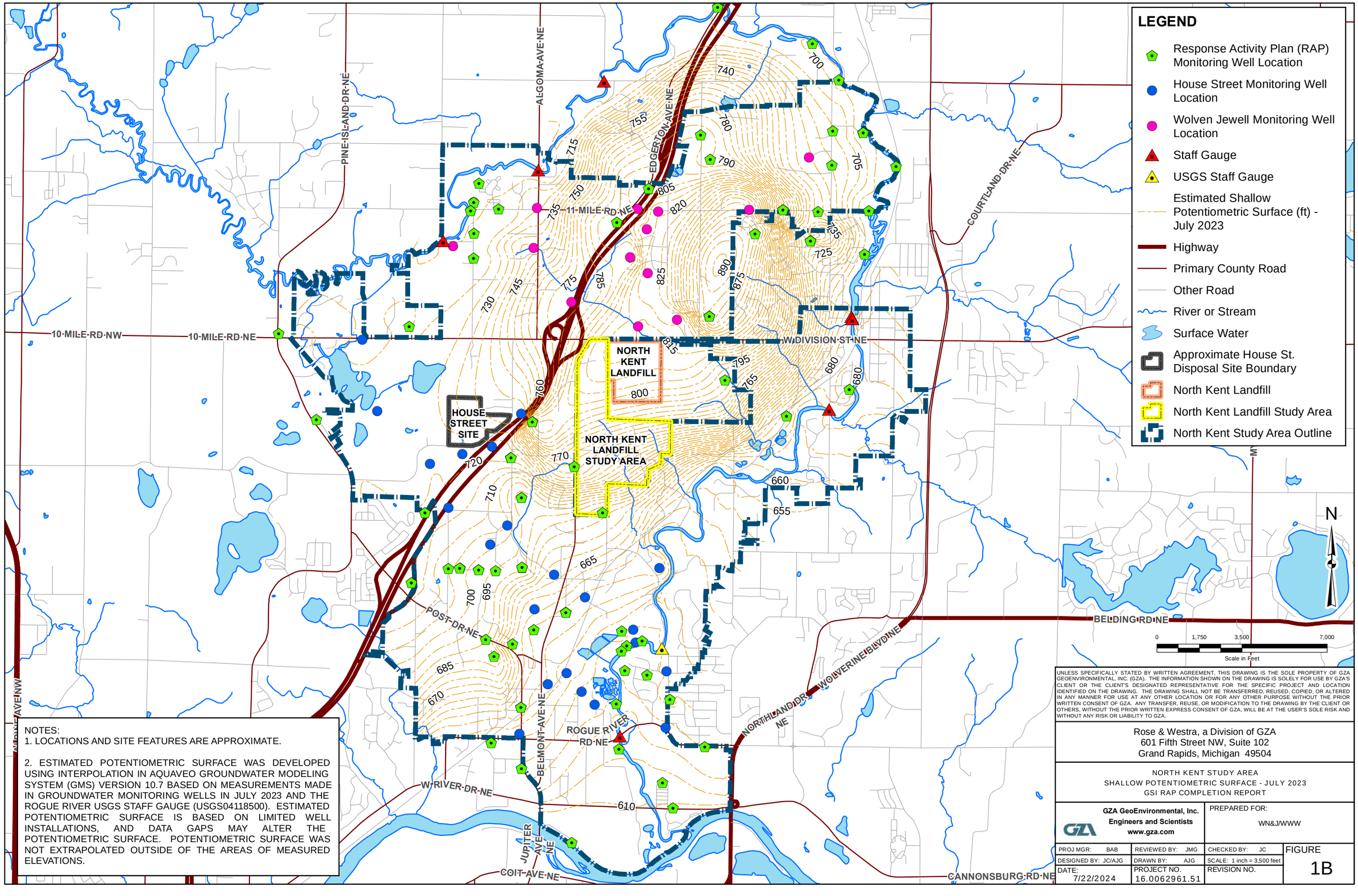
PROJ MGR: BAB	REVIEWED BY: JMG	CHECKED BY: JC	FIGURE 1A
DESIGNED BY: JC/AJG	DRAWN BY: AJG	SCALE: 1 inch = 3,500 feet	
DATE: 7/22/2024	PROJECT NO. 16.0062961.51	REVISION NO.	



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NORTH KENT STUDY AREA
SHALLOW POTENTIOMETRIC SURFACE - JULY 2023
GSI RAP COMPLETION REPORT

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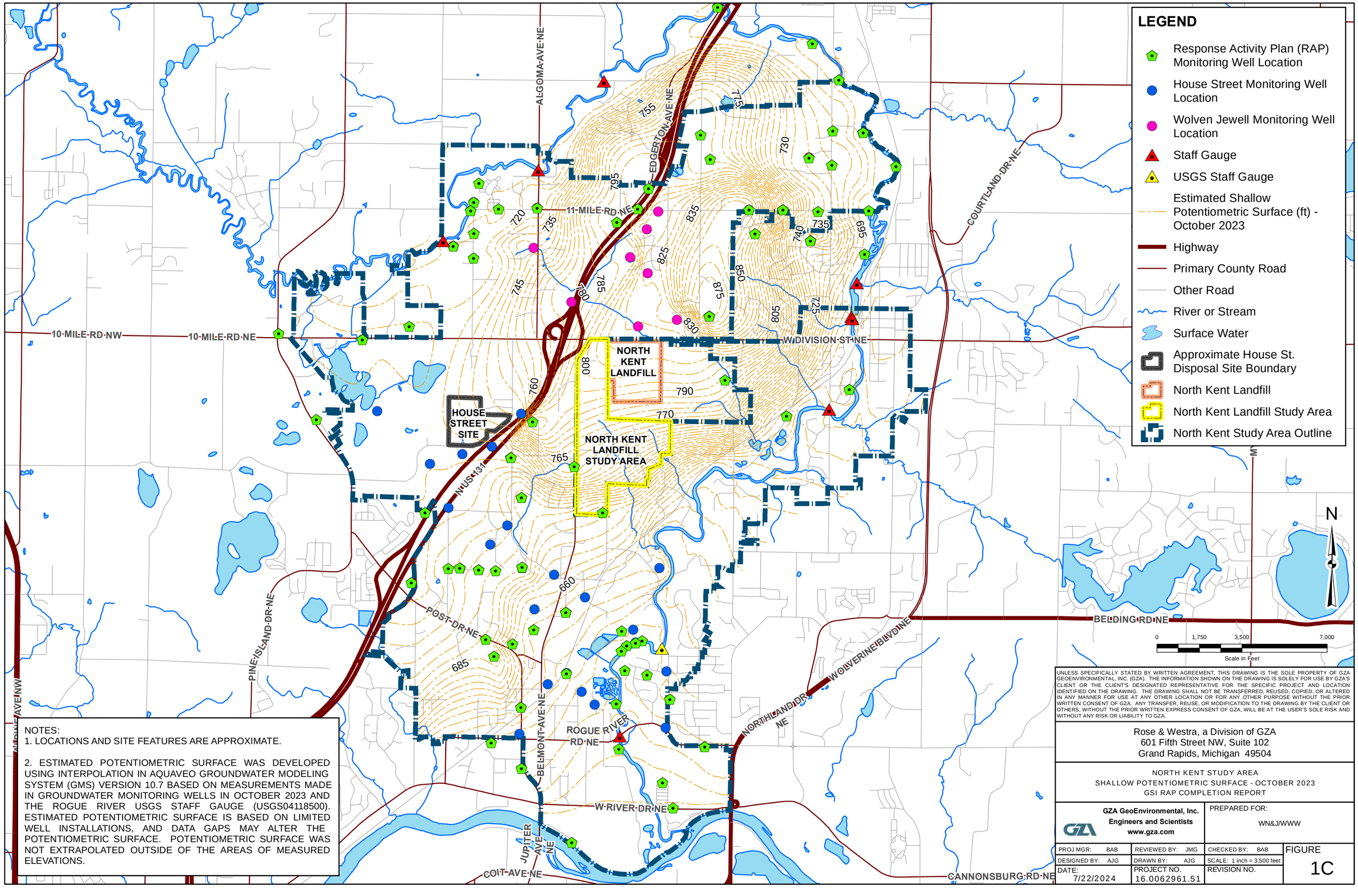
PROJ MGR: BAB	REVIEWED BY: JMG	CHECKED BY: JC	FIGURE 1B
DESIGNED BY: JC/AJG	DRAWN BY: AJG	SCALE: 1 inch = 3,500 feet	
DATE: 7/22/2024	PROJECT NO. 16.0062961.51	REVISION NO.	



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NORTH KENT STUDY AREA
SHALLOW POTENTIOMETRIC SURFACE - OCTOBER 2023
GSI RAP COMPLETION REPORT

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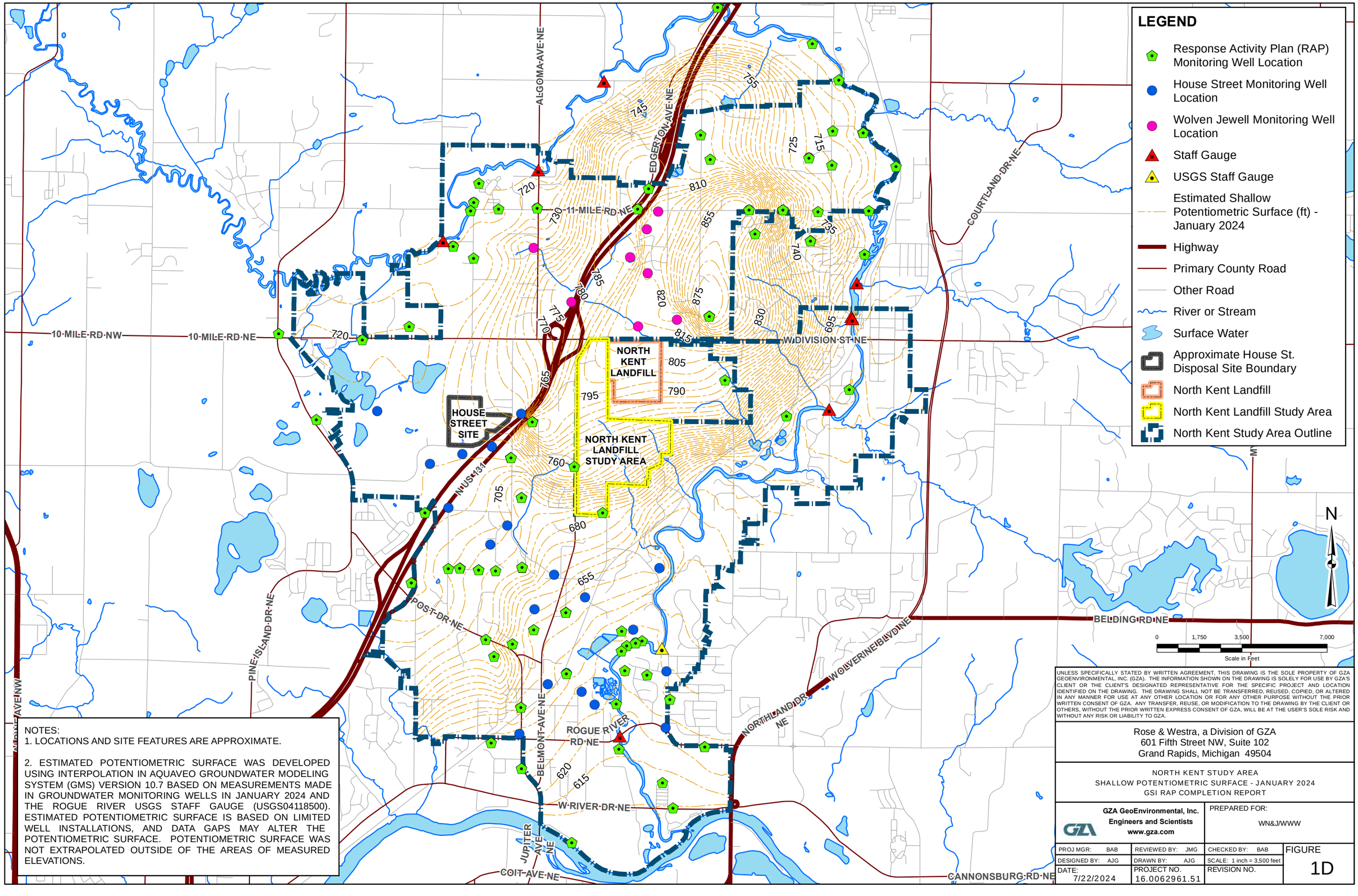
PROJ MGR: BAB	REVIEWED BY: JMG	CHECKED BY: BAB	FIGURE 1C
DESIGNED BY: AJG	DRAWN BY: AJG	SCALE: 1 inch = 3,500 feet	
DATE: 7/22/2024	PROJECT NO. 16.0062961.51	REVISION NO.	



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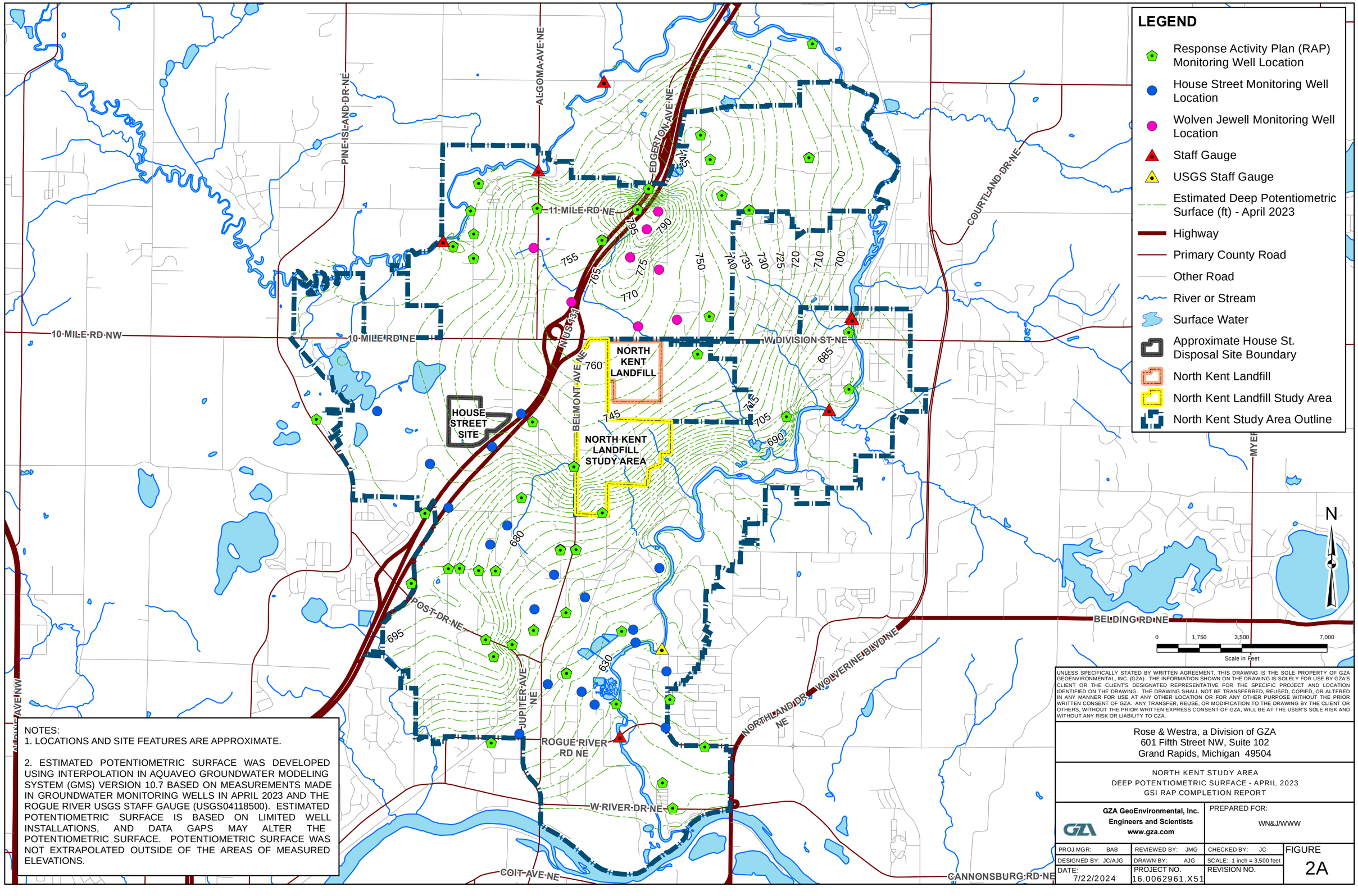
Grand Rapids, Michigan 49504

NORTH KENT STUDY AREA
SHALLOW POTENTIOMETRIC SURFACE - JANUARY 2024
GSI RAP COMPLETION REPORT

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
WN&J/WWW

PROJ MGR: BAB	REVIEWED BY: JMG	CHECKED BY: BAB	FIGURE 1D
DESIGNED BY: AJG	DRAWN BY: AJG	SCALE: 1 inch = 3,500 feet	
DATE: 7/22/2024	PROJECT NO. 16.0062961.51	REVISION NO.	



NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

2. ESTIMATED POTENTIOMETRIC SURFACE WAS DEVELOPED USING INTERPOLATION IN AQUAVEO GROUNDWATER MODELING SYSTEM (GMS) VERSION 10.7 BASED ON MEASUREMENTS MADE IN GROUNDWATER MONITORING WELLS IN APRIL 2023 AND THE ROGUE RIVER USGS STAFF GAUGE (USGS04118500). ESTIMATED POTENTIOMETRIC SURFACE IS BASED ON LIMITED WELL INSTALLATIONS, AND DATA GAPS MAY ALTER THE POTENTIOMETRIC SURFACE. POTENTIOMETRIC SURFACE WAS NOT EXTRAPOLATED OUTSIDE OF THE AREAS OF MEASURED ELEVATIONS.

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NORTH KENT STUDY AREA
DEEP POTENTIOMETRIC SURFACE - APRIL 2023
GSI RAP COMPLETION REPORT

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR: WN&J/WWW

PROJ MGR: BAB	REVIEWED BY: JMG	CHECKED BY: JC	FIGURE 2A
DESIGNED BY: JC/AJG	DRAWN BY: AJG	SCALE: 1 inch = 3,500 feet	
DATE: 7/22/2024	PROJECT NO. 16.0062961.X51	REVISION NO.	

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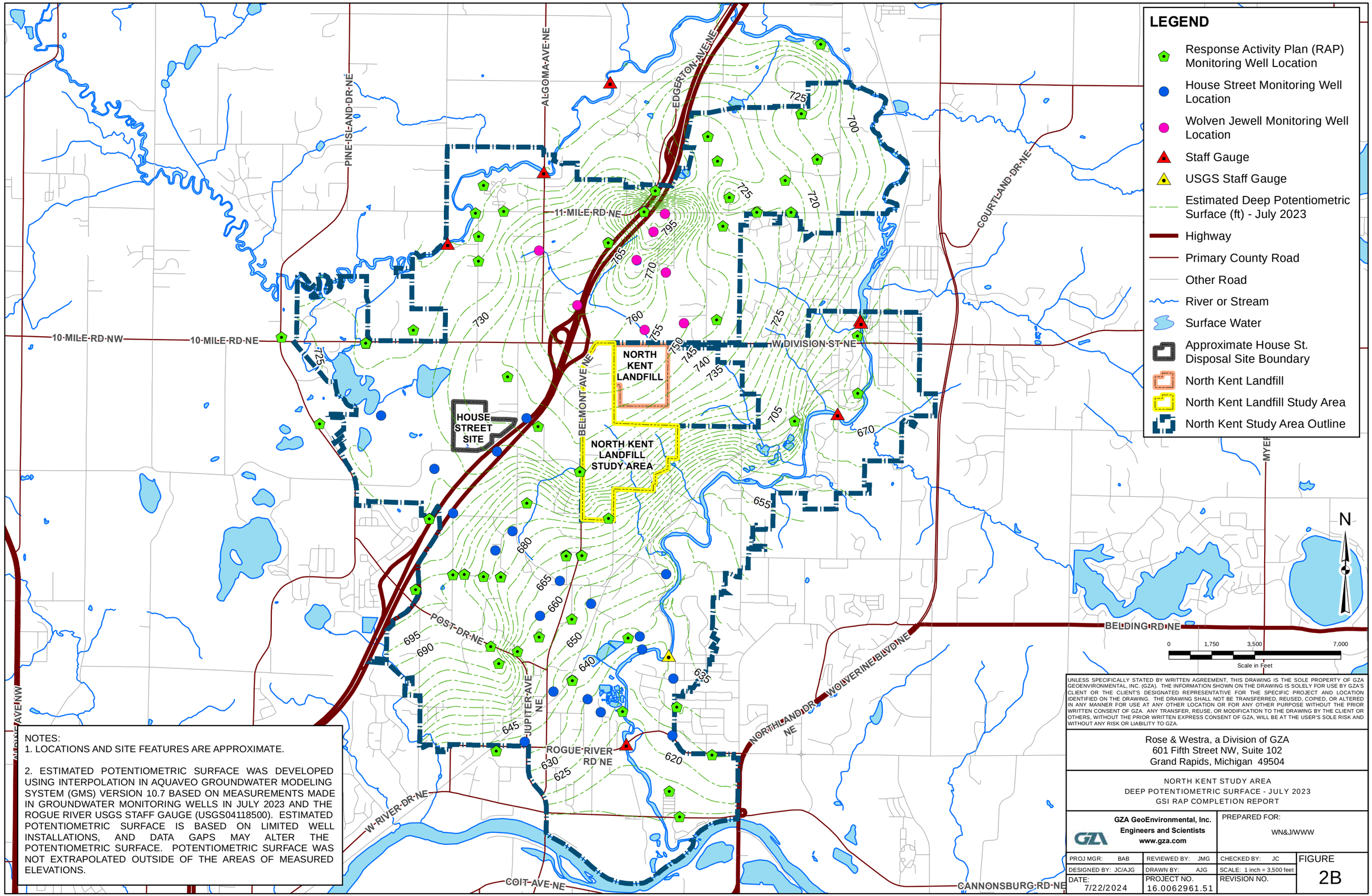

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

2. ESTIMATED POTENTIOMETRIC SURFACE WAS DEVELOPED USING INTERPOLATION IN AQUAVEO GROUNDWATER MODELING SYSTEM (GMS) VERSION 10.7 BASED ON MEASUREMENTS MADE IN GROUNDWATER MONITORING WELLS IN JULY 2023 AND THE ROGUE RIVER USGS STAFF GAUGE (USGS04118500). ESTIMATED POTENTIOMETRIC SURFACE IS BASED ON LIMITED WELL INSTALLATIONS, AND DATA GAPS MAY ALTER THE POTENTIOMETRIC SURFACE. POTENTIOMETRIC SURFACE WAS NOT EXTRAPOLATED OUTSIDE OF THE AREAS OF MEASURED ELEVATIONS.

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NORTH KENT STUDY AREA
DEEP POTENTIOMETRIC SURFACE - JULY 2023
GSI RAP COMPLETION REPORT

GZA GeoEnvironmental, Inc.
Engineers and Scientists
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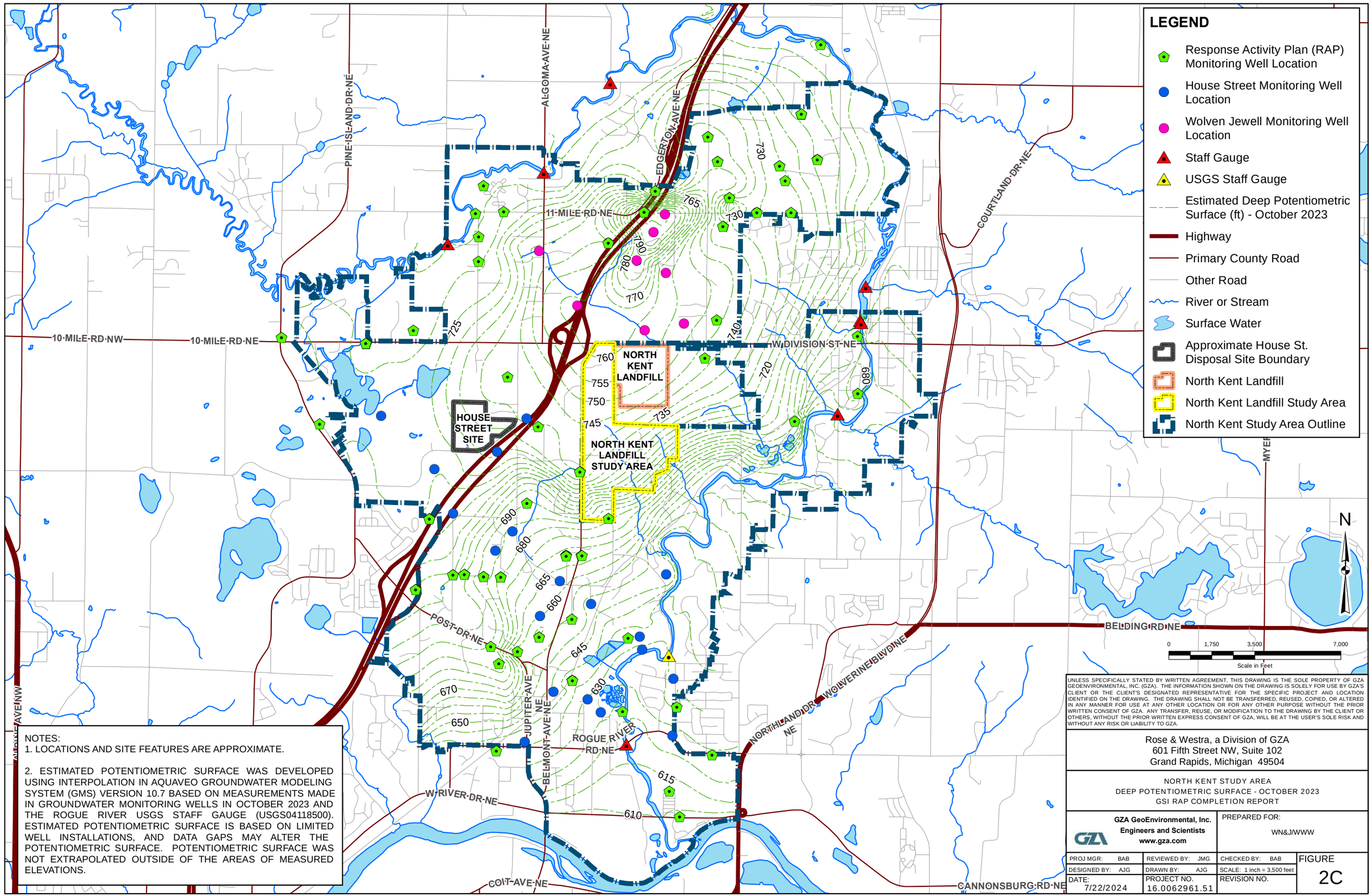
PREPARED FOR: WN&J/WWW

PROJ MGR: BAB	REVIEWED BY: JMG	CHECKED BY: JC	FIGURE 2B
DESIGNED BY: JC/AJG	DRAWN BY: AJG	SCALE: 1 inch = 3,500 feet	
DATE: 7/22/2024	PROJECT NO. 16.0062961.51	REVISION NO.	



NOTES:
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NORTH KENT STUDY AREA
DEEP POTENTIOMETRIC SURFACE - OCTOBER 2023
GSI RAP COMPLETION REPORT

GZA GeoEnvironmental, Inc.
Engineers and Scientists
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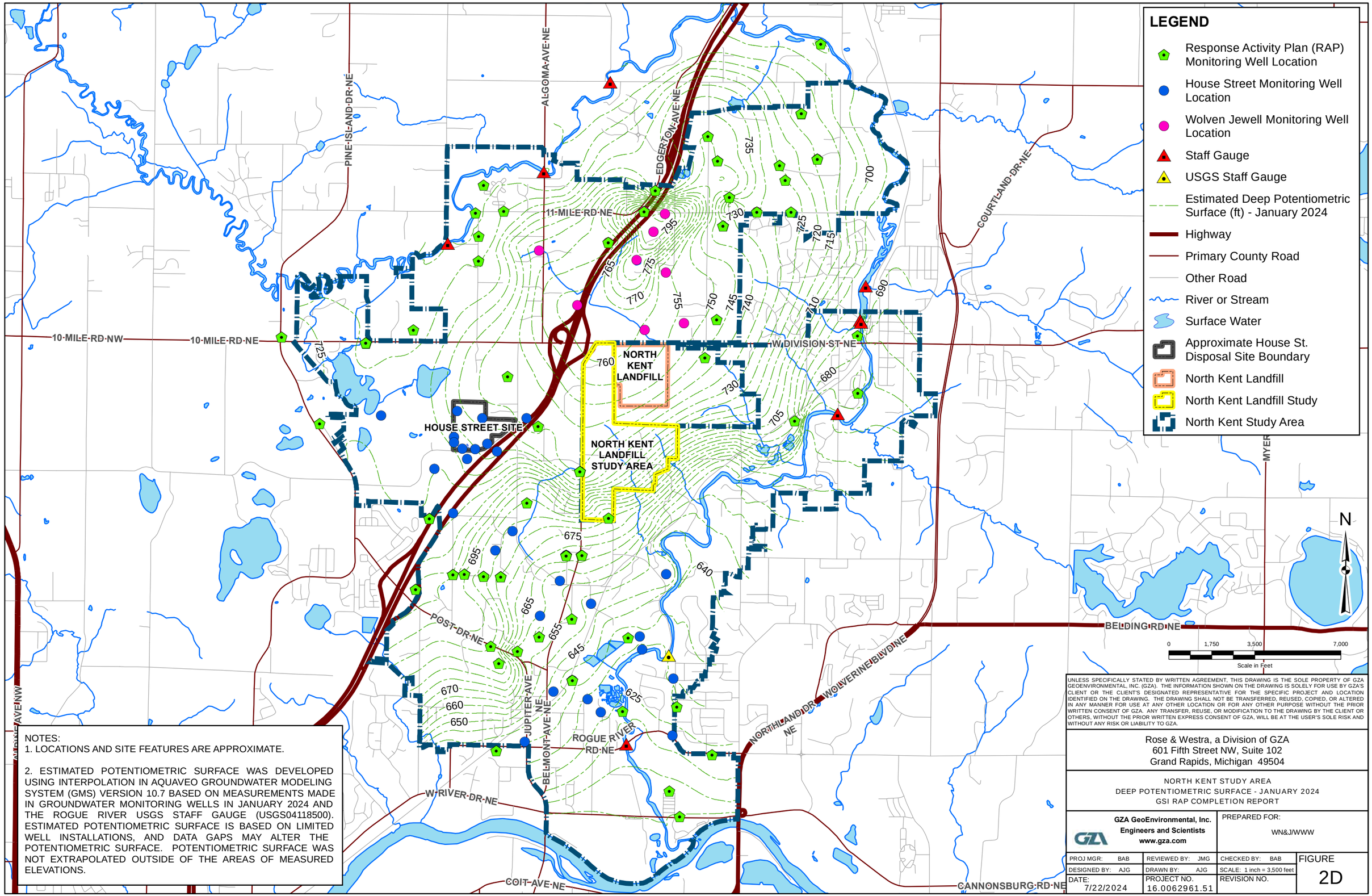
PREPARED FOR:
WN&J/WWW

PROJ MGR: BAB	REVIEWED BY: JMG	CHECKED BY: BAB	FIGURE 2C
DESIGNED BY: AJG	DRAWN BY: AJG	SCALE: 1 inch = 3,500 feet	
DATE: 7/22/2024	PROJECT NO. 16.0062961.51	REVISION NO.	



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NORTH KENT STUDY AREA
DEEP POTENTIOMETRIC SURFACE - JANUARY 2024
GSI RAP COMPLETION REPORT

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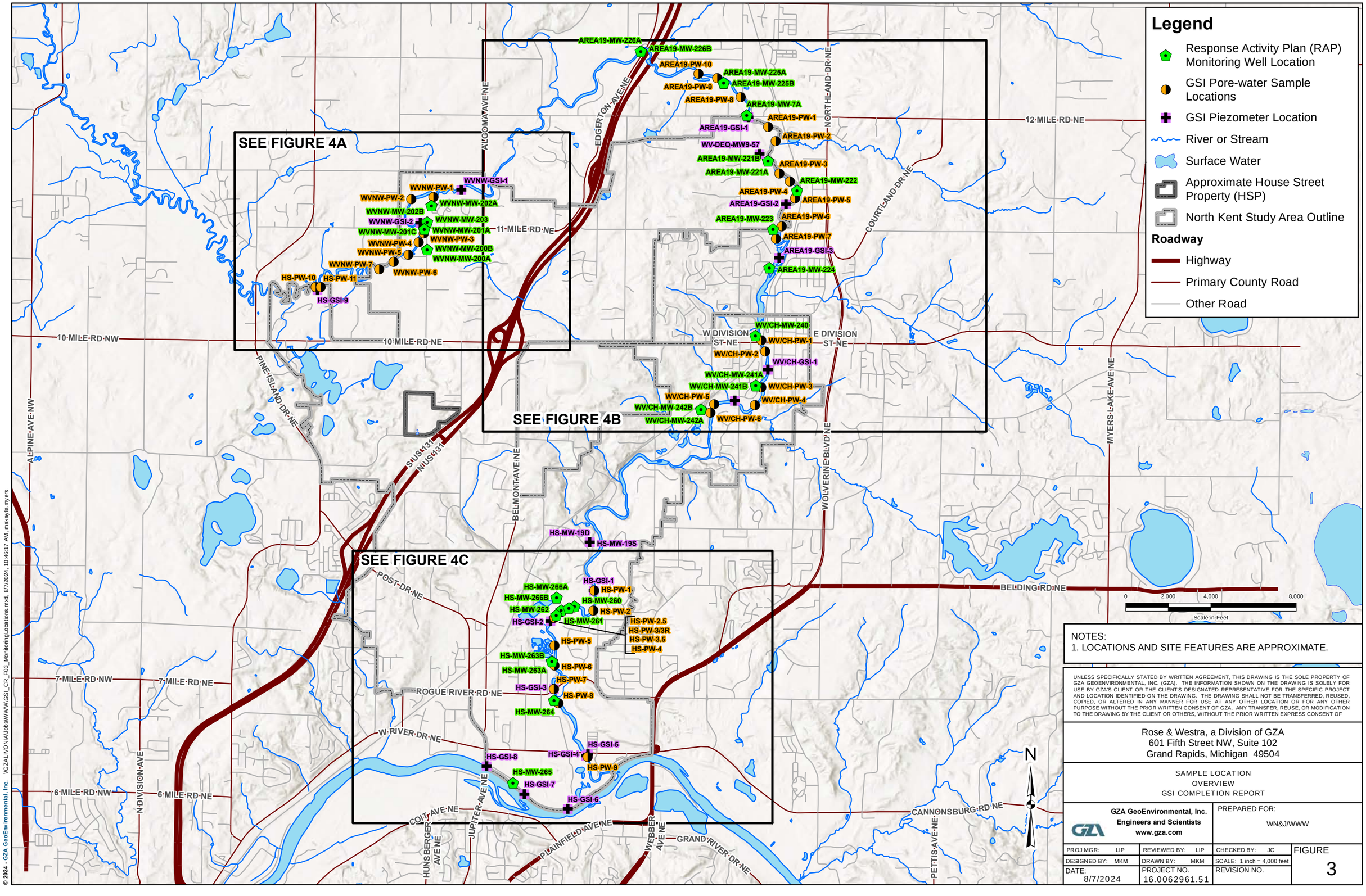
PREPARED FOR: WN&J/WWW

PROJ MGR: BAB	REVIEWED BY: JMG	CHECKED BY: BAB	FIGURE 2D
DESIGNED BY: AJG	DRAWN BY: AJG	SCALE: 1 inch = 3,500 feet	
DATE: 7/22/2024	PROJECT NO. 16.0062961.51	REVISION NO.	



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SAMPLE LOCATION
OVERVIEW
GSI COMPLETION REPORT

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PREPARED FOR: WN&JWWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 3
DESIGNED BY: MKM	DRAWN BY: MKM	SCALE: 1 inch = 4,000 feet	
DATE: 8/7/2024	PROJECT NO. 16.0062961.51	REVISION NO.	

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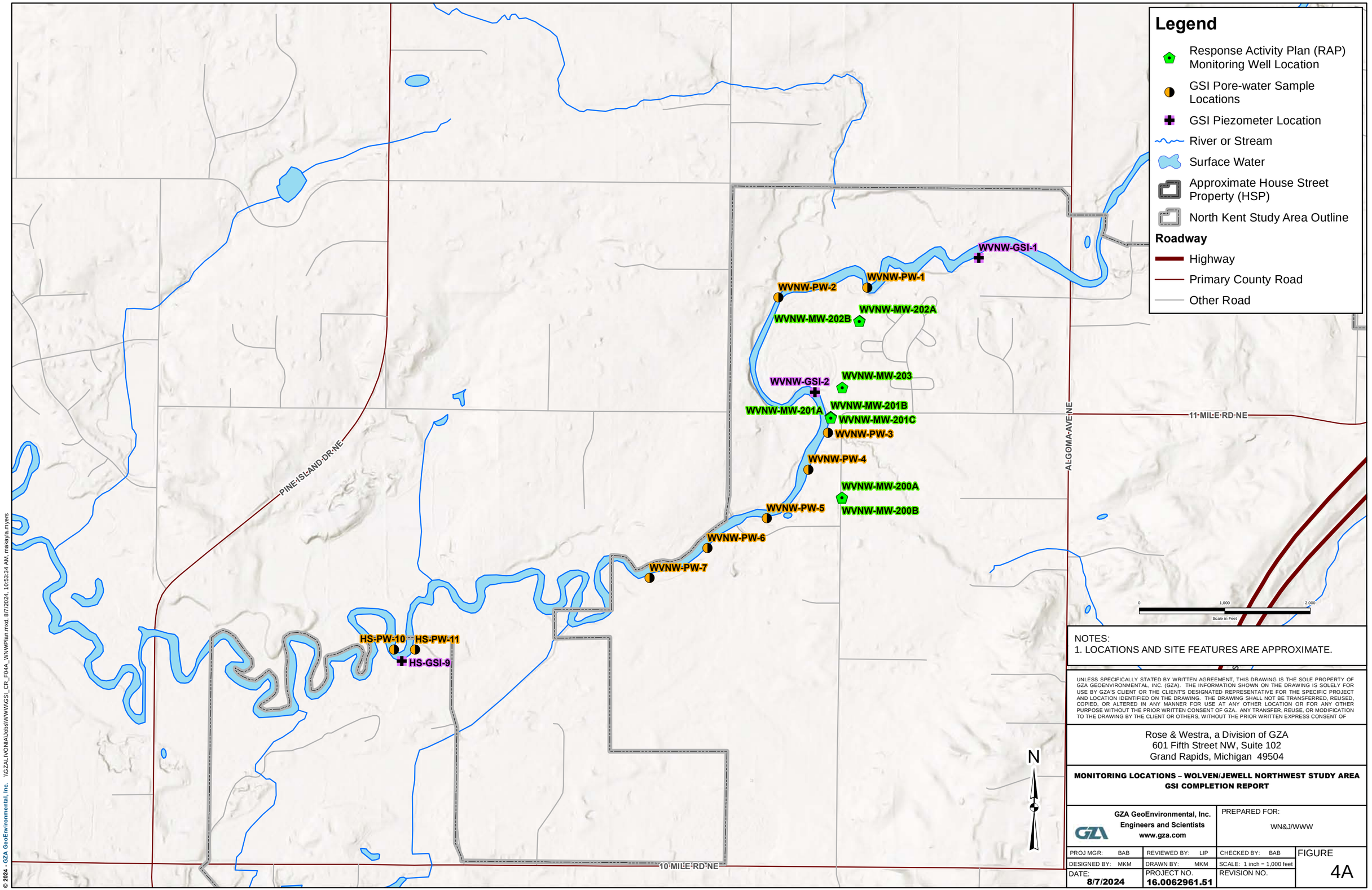

Legend

- Response Activity Plan (RAP) Monitoring Well Location
- GSI Pore-water Sample Locations
- GSI Piezometer Location
- River or Stream
- Surface Water
- Approximate House Street Property (HSP)
- North Kent Study Area Outline

Roadway

- Highway
- Primary County Road
- Other Road

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

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MONITORING LOCATIONS – WOLVEN/JEWELL NORTHWEST STUDY AREA GSI COMPLETION REPORT

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR: WN&J/WWW

PROJ MGR: BAB	REVIEWED BY: LIP	CHECKED BY: BAB	FIGURE 4A
DESIGNED BY: MKM	DRAWN BY: MKM	SCALE: 1 inch = 1,000 feet	
DATE: 8/7/2024	PROJECT NO. 16.0062961.51	REVISION NO.	

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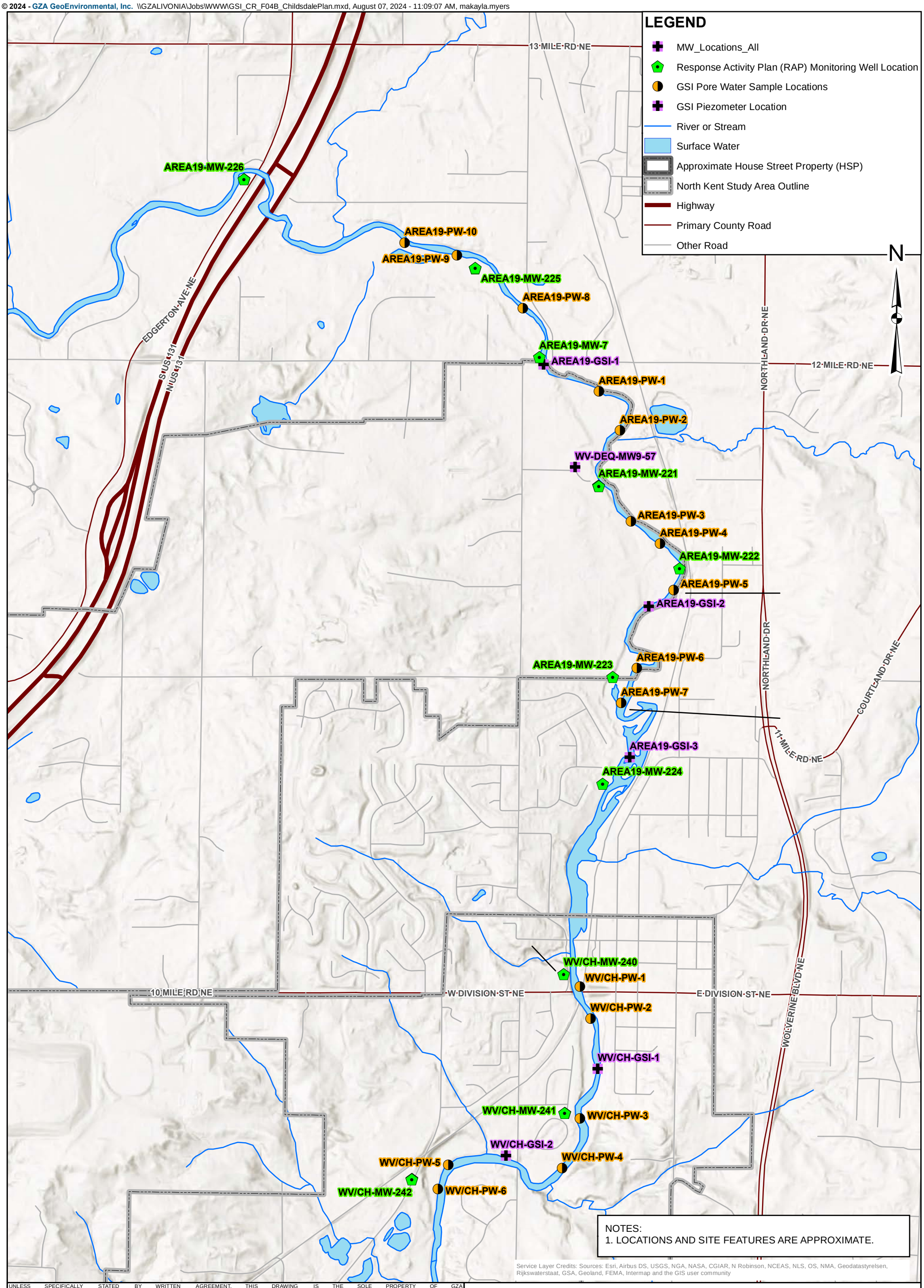

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

Service Layer Credits: Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

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0 700 1,400 2,800
SCALE IN FEET

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PREPARED FOR:
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MONITORING LOCATIONS – WOLVEN/CHILDSDALE STUDY AREA
GSI COMPLETION REPORT

PROJ MGR:	BAB	REVIEWED BY:	LJP	CHECKED BY:	BAB	FIG/DWG	4B
DESIGNED BY:	MKM	DRAWN BY:	MKM	SCALE:	1 in = 1,500 ft		
DATE:	08/07/2024	PROJECT NO:	16.0062961.51	REVISION NO:	REVISION NO	SHEET NO:	XX OF XX

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LEGEND

- Response Activity Plan (RAP) Monitoring Well Location
- GSI Pore-water Sample Locations
- GSI Piezometer Location
- River or Stream
- Surface Water
- Approximate House Street Property (HSP)
- North Kent Study Area Outline
- Highway
- Primary County Road
- Other Road

N

HS-MW-19S
HS-MW-19D
HS-GSI-1
HS-PW-1
HS-MW-266
HS-MW-266
HS-PW-3R
HS-MW-260
HS-MW-29
HS-MW-261
HS-PW-3
HS-PW-2.5
HS-PW-2
HS-MW-262
HS-PW-3.5
HS-PW-4
HS-GSI-2
HS-PW-5
HS-MW-263
HS-PW-6
HS-PW-7
HS-GSI-3
HS-MW-264
HS-PW-8
HS-GSI-5
HS-GSI-4
HS-PW-9
HS-GSI-8
HS-MW-265
HS-GSI-7

BELMONT AVE NE
POST DR NE
ROGUE RIVER RD NE
NORTHLAND DR NE
W RIVER DR NE
CANNONSBURG RD NE
JUPITER AVE NE

NOTES:
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0 500 1,000 2,000
SCALE IN FEET

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Grand Rapids, Michigan 49504

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
WN&J/WWW

MONITORING LOCATIONS – HSP STUDY AREA
GSI COMPLETION REPORT

PROJ MGR:	BAB	REVIEWED BY:	LJP	CHECKED BY:	BAB	FIG	4C
DESIGNED BY:	MKM	DRAWN BY:	MKM	SCALE:	1 in = 1,000 ft		
DATE:	08/07/2024	PROJECT NO:	16.0062961.51	REVISION NO:	REVISION NO	SHEET NO:	

N

WVNW-PW-2	A (2.33 - 2.46 ft bgs)	B (3.33 - 3.46 ft bgs)
PFOS (12/9/2020)	0.01	0.011
PFOA (12/9/2020)	0.012	0.0075

WVNW-PW-1	A (3 - 3.13 ft bgs)	B (4 - 4.13 ft bgs)
PFOS (12/9/2020)	0.007	0.0097
PFOA (12/9/2020)	0.0055	0.0073

WVNW-MW-202A	Result
PFOS (Max Detect)	0.023
PFOA (Max Detect)	0.018

WVNW-MW-202B	Result
PFOS (Max Detect)	0.093
PFOA (Max Detect)	0.029

WVNW-MW-203	Result
PFOS (Max Detect)	0
PFOA (Max Detect)	0.0062

WVNW-PW-3	A (1.5 - 1.63 ft bgs)
PFOS (12/2/2020)	0.26
PFOA (12/2/2020)	0.028

WVNW-PW-4	A (1.67 - 1.79 ft bgs)
PFOS (12/2/2020)	0.1
PFOA (12/2/2020)	0.066

HS-PW-11	A (4.5 - 4.63 ft bgs)
PFOS (12/9/2020)	0
PFOA (12/9/2020)	0

HS-PW-10	A (4.5 - 4.63 ft bgs)
PFOS (12/9/2020)	0
PFOA (12/9/2020)	0

WVNW-PW-7	A (1.3 - 1.43 ft bgs)
PFOS (12/20/2020)	0
PFOA (12/20/2020)	0

WVNW-PW-6	A (1 - 1.13 ft bgs)	B (1.7 - 1.83 ft bgs)
PFOS (12/20/2020)	0	0
PFOA (12/20/2020)	0	0

WVNW-PW-5	A (1 - 1.13 ft bgs)
PFOS (12/20/2020)	0.0085
PFOA (12/20/2020)	0.0077

WVNW-MW-201A	Result
PFOS (Max Detect)	0.53
PFOA (Max Detect)	0.096

WVNW-MW-201B	Result
PFOS (Max Detect)	0.76
PFOA (Max Detect)	0.12

WVNW-MW-201C	Result
PFOS (Max Detect)	0.6
PFOA (Max Detect)	0.1

WVNW-MW-200A	Result
PFOS (Max Detect)	0.075
PFOA (Max Detect)	0.027

WVNW-MW-200B	Result
PFOS (Max Detect)	0.27
PFOA (Max Detect)	0.075

WVNW-PW-1
WVNW-PW-2
WVNW-MW-202
WVNW-MW-203
WVNW-MW-201
WVNW-PW-3
WVNW-PW-4
WVNW-MW-200
WVNW-PW-5
WVNW-PW-6
WVNW-PW-7
HS-PW-10
HS-PW-11

PINE·ISLAND·DR·NE
ALGOMA·AVE·NE
11·MILE·RD·NE
10·MILE·RD·NE
SIUS4131
NIUS4131

Legend

- Response Activity Plan (RAP) Monitoring Well Location
- GSI Pore-water Sample Locations
- GSI Piezometer Location
- River or Stream
- Surface Water
- Approximate House Street Property (HSP)
- North Kent Study Area Outline

Roadway

- Highway
- Primary County Road
- Other Road

0 1,500 3,000
Scale in Feet

Compound	Units	GSI
PFOS	µg/L	0.012
PFOA	µg/L	0.17

NOTES:
GSI = Groundwater Surface Water Interface Criteria
µg/L = Micrograms per Liter
ft bgs = feet below ground surface
Gray Shading Indicates that sample result is greater than GSI
PFOA = Perfluorooctanoic Acid
PFOS = Perfluorooctanesulfonic Acid

NOTES:
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ANALYTICAL RESULTS – WOLVEN/JEWELL NORTHWEST STUDY AREA
GSI COMPLETION REPORT

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
WN&J/WWW

PROJ MGR: BAB	REVIEWED BY: LIP	CHECKED BY: BAB	FIGURE
DESIGNED BY: MKM	DRAWN BY: MKM	SCALE: 1 inch = 1,000 feet	5A
DATE: 9/5/2024	PROJECT NO. 16.0062961.51	REVISION NO.	

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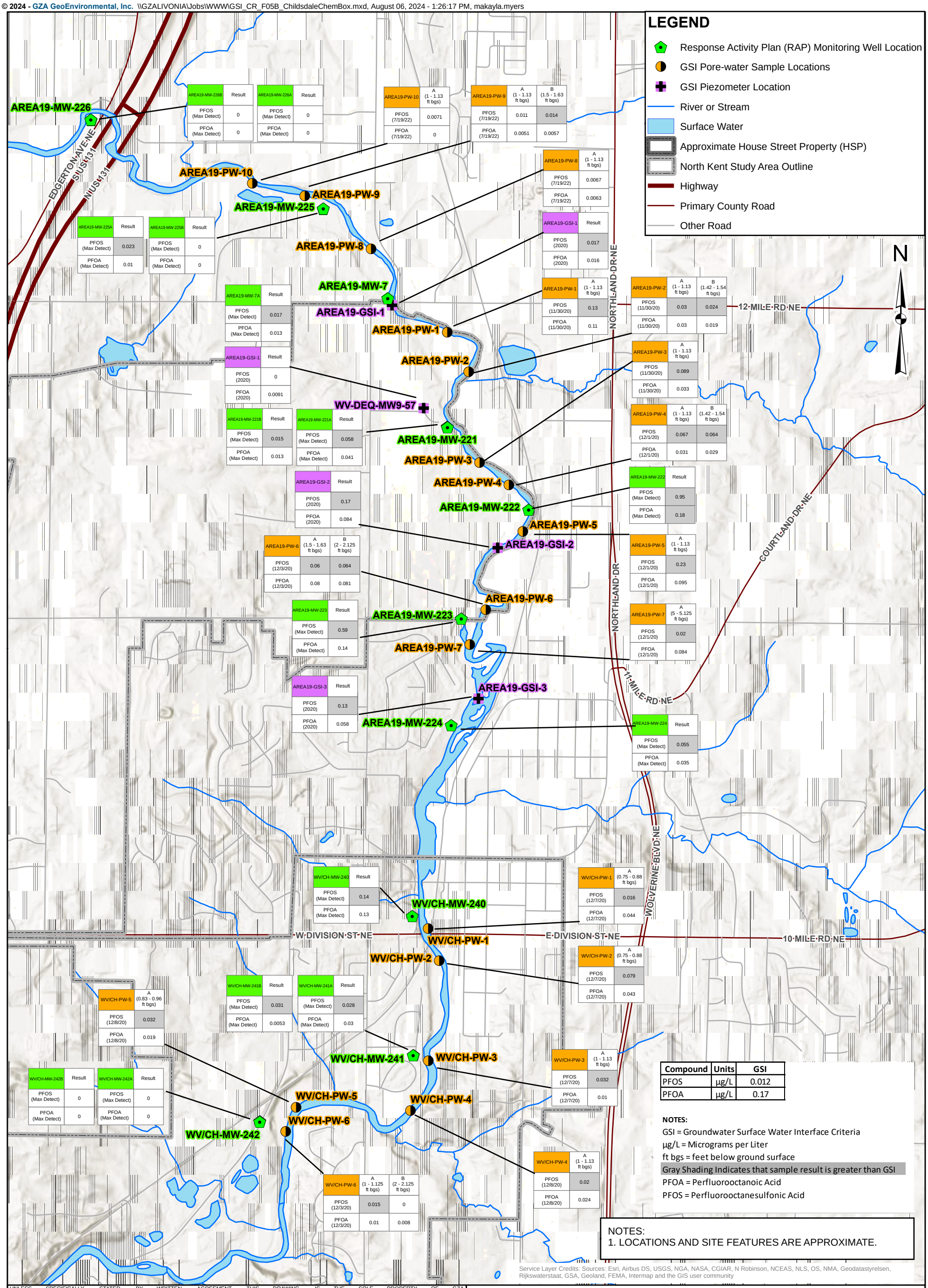

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0 750 1,500 3,000
SCALE IN FEET

Rose & Westra, a Division of GZA
601 Fifth Street NW, Suite 102
Grand Rapids, Michigan 49504

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com

PREPARED FOR: WN&J/WWW

MONITORING LOCATIONS – WOLVEN/CHILDSDALE STUDY AREA
GSI COMPLETION REPORT

PROJ MGR:	BAB	REVIEWED BY:	LJP	CHECKED BY:	BAB	FIG	5B
DESIGNED BY:	MKM	DRAWN BY:	MKM	SCALE:	1 in = 1,500 ft		
DATE:	08/06/2024	PROJECT NO:	16.0062961.51	REVISION NO:	REVISION NO	SHEET NO:	

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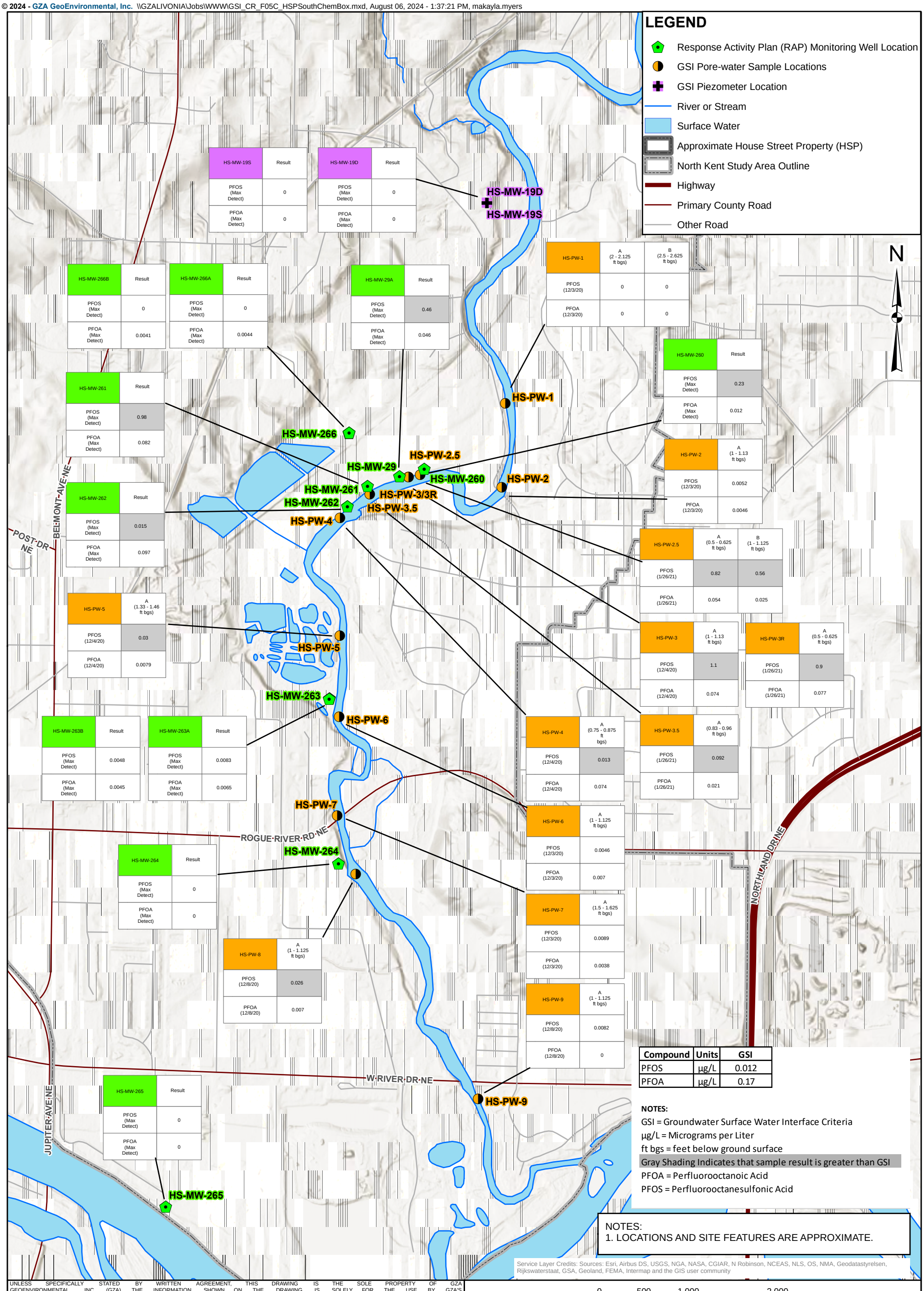

HS-MW-19S	Result
PFOS (Max Detect)	0
PFOA (Max Detect)	0

HS-MW-19D	Result
PFOS (Max Detect)	0
PFOA (Max Detect)	0

HS-PW-1	A (2 - 2.125 ft bgs)	B (2.5 - 2.625 ft bgs)
PFOS (12/3/20)	0	0
PFOA (12/3/20)	0	0

HS-MW-266B	Result
PFOS (Max Detect)	0
PFOA (Max Detect)	0.0041

HS-MW-266A	Result
PFOS (Max Detect)	0
PFOA (Max Detect)	0.0044

HS-MW-29A	Result
PFOS (Max Detect)	0.46
PFOA (Max Detect)	0.046

HS-MW-260	Result
PFOS (Max Detect)	0.23
PFOA (Max Detect)	0.012

HS-MW-261	Result
PFOS (Max Detect)	0.98
PFOA (Max Detect)	0.082

HS-PW-2	A (1 - 1.13 ft bgs)
PFOS (12/3/20)	0.0052
PFOA (12/3/20)	0.0046

HS-MW-262	Result
PFOS (Max Detect)	0.015
PFOA (Max Detect)	0.097

HS-PW-2.5	A (0.5 - 0.625 ft bgs)	B (1 - 1.125 ft bgs)
PFOS (1/26/21)	0.82	0.56
PFOA (1/26/21)	0.054	0.025

HS-PW-5	A (1.33 - 1.46 ft bgs)
PFOS (12/4/20)	0.03
PFOA (12/4/20)	0.0079

HS-PW-3	A (1 - 1.13 ft bgs)
PFOS (12/4/20)	1.1
PFOA (12/4/20)	0.074

HS-PW-3R	A (0.5 - 0.625 ft bgs)
PFOS (1/26/21)	0.9
PFOA (1/26/21)	0.077

HS-MW-263B	Result
PFOS (Max Detect)	0.0048
PFOA (Max Detect)	0.0045

HS-MW-263A	Result
PFOS (Max Detect)	0.0083
PFOA (Max Detect)	0.0065

HS-PW-4	A (0.75 - 0.875 ft bgs)
PFOS (12/4/20)	0.013
PFOA (12/4/20)	0.074

HS-PW-3.5	A (0.83 - 0.96 ft bgs)
PFOS (1/26/21)	0.092
PFOA (1/26/21)	0.021

HS-MW-264	Result
PFOS (Max Detect)	0
PFOA (Max Detect)	0

HS-PW-6	A (1 - 1.125 ft bgs)
PFOS (12/3/20)	0.0046
PFOA (12/3/20)	0.007

HS-PW-8	A (1 - 1.125 ft bgs)
PFOS (12/8/20)	0.026
PFOA (12/8/20)	0.007

HS-PW-7	A (1.5 - 1.625 ft bgs)
PFOS (12/3/20)	0.0089
PFOA (12/3/20)	0.0038

HS-PW-9	A (1 - 1.125 ft bgs)
PFOS (12/8/20)	0.0082
PFOA (12/8/20)	0

HS-MW-265	Result
PFOS (Max Detect)	0
PFOA (Max Detect)	0

Compound	Units	GSI
PFOS	µg/L	0.012
PFOA	µg/L	0.17

NOTES:
GSI = Groundwater Surface Water Interface Criteria
µg/L = Micrograms per Liter
ft bgs = feet below ground surface
Gray Shading Indicates that sample result is greater than GSI
PFOA = Perfluorooctanoic Acid
PFOS = Perfluorooctanesulfonic Acid

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

Service Layer Credits: Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

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0 500 1,000 2,000
SCALE IN FEET

Rose & Westra, a Division of GZA
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Grand Rapids, Michigan 49504

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
WN&J/WWW

MONITORING LOCATIONS – HSP STUDY AREA
GSI COMPLETION REPORT

PROJ MGR:	BAB	REVIEWED BY:	LJP	CHECKED BY:	BAB	FIG/DWG	5C
DESIGNED BY:	MKM	DRAWN BY:	MKM	SCALE:	1 in = 1,000 ft		
DATE:	08/06/2024	PROJECT NO:	16.0062961.51	REVISION NO:	REVISION NO	SHEET NO:	

Legend

- GSI Pore-Water Sample Location
- GSI Piezometer Location
- Residential Water Well
- Monitoring Well
- Cross Section Line
- River or Stream
- Surface Water
- Approximate House Street Property (HSP)
- North Kent Study Area Outline
- Highway
- Primary County Road
- Other Road

Approximate Total PFAS Extent (nanograms per liter [ng/L])

- < 4 ng/L
- 4 - 10 ng/L
- 11 - 70 ng/L
- 71 - 1,000 ng/L
- 1,001 - 127,000 ng/L (MAX)

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

2. ACRONYMS
- (MAX) = MAXIMUM DETECTED CONCENTRATION IN THE SAMPLES.
- ng/L = NANOGRAM PER LITER
- PFAS = PER- AND POLY-FLUOROALKYL SUBSTANCES

3. NO TOTAL PFAS CRITERIA / SCREENING LEVELS.

4. 2017-2019 MAXIMUM CONCENTRATION FROM MONITORING AND RESIDENTIAL WELL SAMPLE RESULTS (INCLUDING THE NORTH KENT LANDFILL STUDY AREA) WERE USED TO DEVELOP CONCENTRATION ISOPLETHS.

5. CONCENTRATION ISOPLETHS WERE DEVELOPED USING NATURAL NEIGHBOR INTERPOLATION IN ARCGIS. CONCENTRATIONS WERE NOT EXTRAPOLATED OUTSIDE OF THE AREA OF KNOWN CONCENTRATIONS.

6. RESIDENTIAL WELL SAMPLES WERE ANALYZED FOR PFAS USEING EPA METHOD 537.1 WHICH REPORTS THE RESULTS FOR 14 COMPOUNDS.

7. MONITORING WELL SAMPLES WERE ANALYZED FOR PFAS USING DOD QSM BY ISOTOPE DILUTION, WHICH REPORTS THE RESULTS FOR 23 COMPOUNDS.

8. THE TOTAL PFAS PRESENTED ON THIS FIGURE ARE CALCULATED FROM THE SUM OF THE 12 PFAS COMPOUNDS THAT ARE COMMON BETWEEN EPA METHOD 537.1 AND THE ISOTOPE DILUTION, DOD QSM METHODOLOGY.

13 MILE RD NE · EDGERTON AVE NE · ALGOMA AVE NE · PINE ISLAND DR NE · 11 MILE RD NE · 10 MILE RD NE · E DIVISION ST NE · NORTHLAND DR NE · COURTLAND DR NE · WOLVERINE BLVD NE · MYERS LAKE AVE NE · BELDING RD NE · US 131 · ALPINE AVE NW · 7 MILE RD NW · 7 MILE RD NE · N DIVISION AVE · 6 MILE RD NW · 6 MILE RD NE · W RIVER DR NE · POST DR NE · COIT AVE NE · HUNSBERGER AVE NE · JUPITER AVE NE · PLAINFIELD AVE NE · WEBBER AVE NE · GRAND RIVER DR NE · CANNONSBURG RD NE · PETTIS AVE NE

A · A' · B · B' · C · C' · D · D' · E · E' · F · F' · G · G'

0 2,000 4,000 8,000
Scale in Feet

N

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601 Fifth Street NW, Suite 102
Grand Rapids, Michigan 49504

CROSS SECTIONS -
OVERVIEW
GSI RAP COMPLETION REPORT

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR: WN&J/WWW

PROJ MGR: BAB	REVIEWED BY: BAB	CHECKED BY: LJP	FIGURE 6
DESIGNED BY: JMG	DRAWN BY: JMG	SCALE: 1 inch = 4,000 feet	
DATE: 8/5/2024	PROJECT NO. 16.0062961.51	REVISION NO.	

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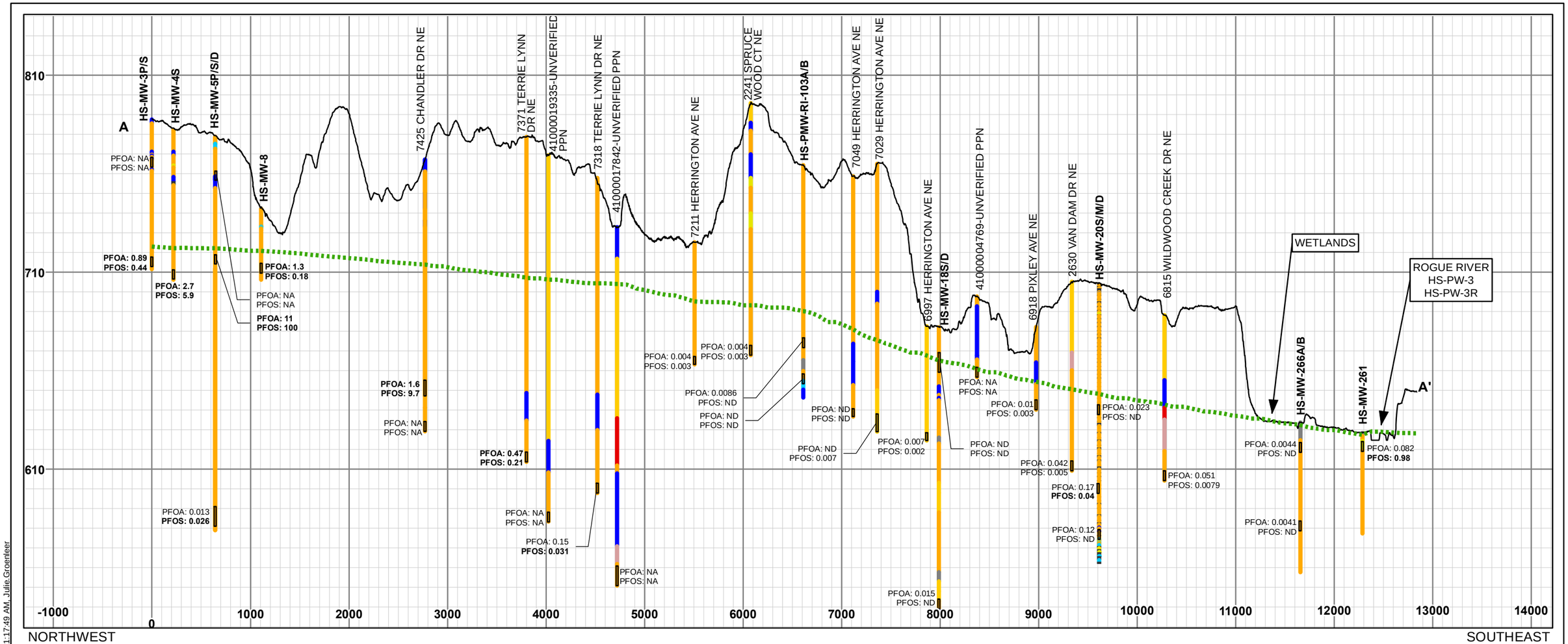


CROSS SECTION LEGEND

- ESTIMATED POTENTIOMETRIC SURFACE (1/2024)
- GROUND SURFACE
- WELL SCREEN

BOREHOLE LITHOLOGY

- GRAVEL
- SAND AND GRAVEL
- SAND
- SAND/GRAVEL WITH CLAY/SILT
- CLAY/SILT WITH SAND/GRAVEL
- SILT
- CLAY AND SILT
- CLAY
- NOT AVAILABLE

OVERVIEW MAP LEGEND

- PORE-WATER SAMPLE LOCATION
- GSI PIEZOMETER LOCATION
- VERTICAL AQUIFER PROFILING BORING
- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
- SURFACE WATER
- APPROXIMATE HOUSE STREET PROPERTY (HSP)
- NORTH KENT LANDFILL

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

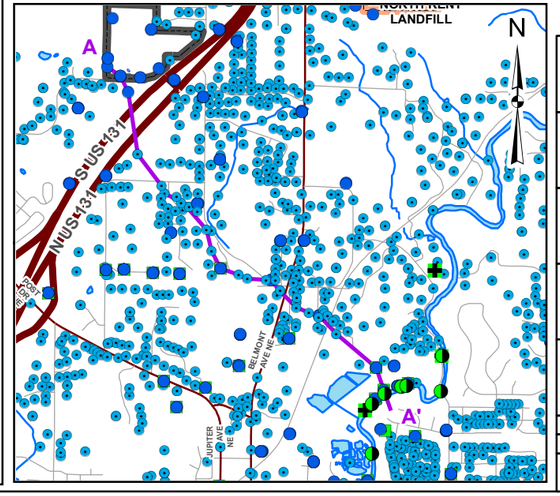
2. GROUND SURFACE ELEVATIONS ARE BASED ON DIGITAL RASTER FILES OF BARE EARTH DIGITAL ELEVATION MODELS (DEMS), GENERATED FROM LIDAR DATA WITH 1-METER HORIZONTAL ACCURACY AND 18.5-CENTIMETER VERTICAL ACCURACY. DIGITAL FILES OF DEMS AND LIDAR DATA WERE PROVIDED BY KENT COUNTY.

3. ESTIMATED POTENTIOMETRIC SURFACE WAS DEVELOPED BASED ON MEASUREMENTS MADE IN GROUNDWATER MONITORING WELLS IN JANUARY 2024. GROUNDWATER ELEVATIONS WERE NOT MEASURED FROM RESIDENTIAL WATER SUPPLY WELLS.

4. WELL SCREEN ELEVATIONS PROVIDED IN FEET ABOVE MEAN SEA LEVEL, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). RESIDENTIAL WELL SCREEN ELEVATIONS AND BOREHOLE LITHOLOGY ELEVATIONS WERE CALCULATED USING WELL INFORMATION PROVIDED BY THE STATE OF MICHIGAN'S WELLOGIC DATABASE AND GROUND SURFACE ELEVATIONS OF THE CENTER OF THE PPN GENERATED FROM LIDAR DATA PROVIDED BY KENT COUNTY. ELEVATIONS ARE ROUNDED TO THE NEAREST FOOT.

5. ONLY RESULTS FROM PERMANENT WELLS ARE SHOWN. RESULTS SHOWN ARE MAXIMUM DETECTIONS OF SAMPLES COLLECTED AT THE INDICATED LOCATION; THEREFORE, PFOA AND PFOS RESULTS SHOWN MAY BE FROM DIFFERENT SAMPLES. RESULTS IN BOLD TEXT ARE GREATER THAN PART 201 GENERIC GROUNDWATER CLEANUP CRITERIA - GROUNDWATER SURFACE WATER INTERFACE.

OVERVIEW MAP



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OVERVIEW MAP SCALE IN FEET

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601 Fifth Street NW, Suite 102
Grand Rapids, Michigan 49504

HOUSE STREET AREA
GEOLOGICAL CROSS SECTION A-A'
GSI RAP COMPLETION REPORT

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: WN&J/WWW	
PROJ MGR: BAB	REVIEWED BY: LJP	CHECKED BY: BAB	FIGURE 6A
DESIGNED BY: JC/JMG	DRAWN BY: JMG	SCALE: 1 in = 4,000 ft	
DATE: 08/05/2024	PROJECT NO: 16.0062961.51	REVISION NO:	

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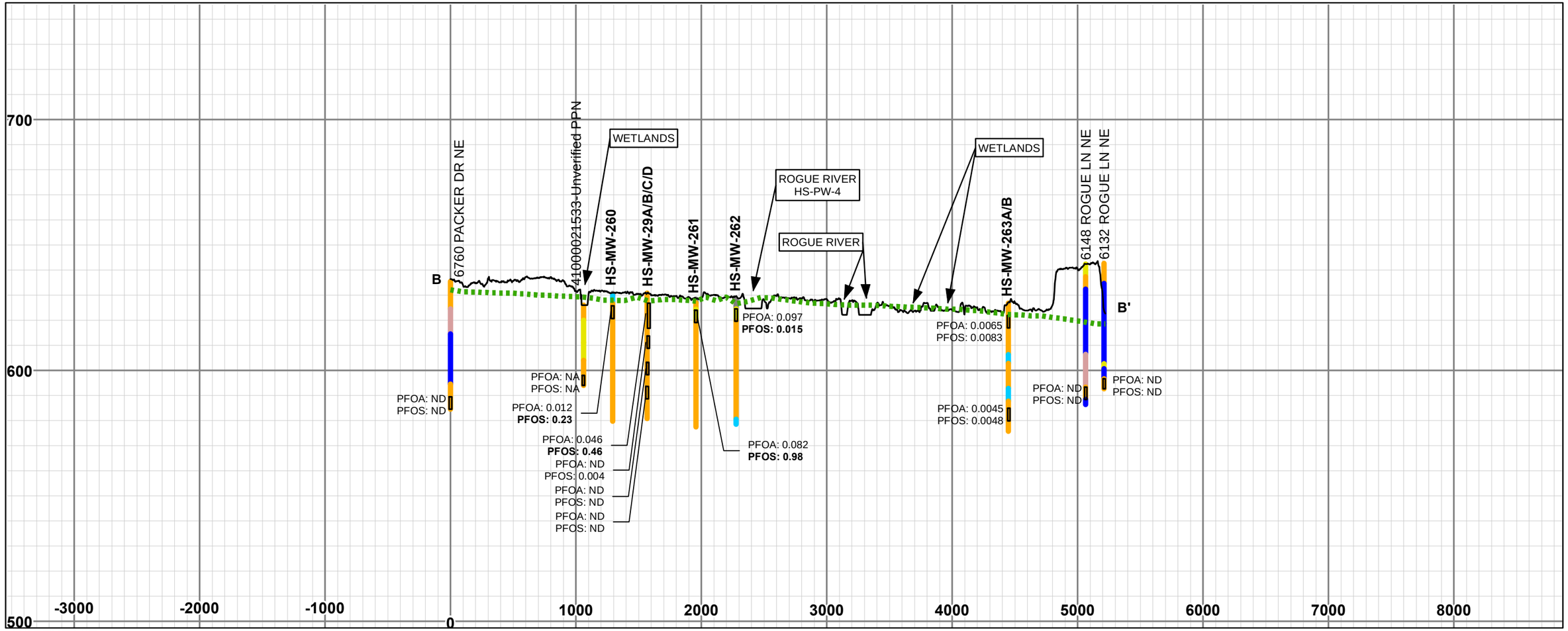

CROSS SECTION LEGEND

- ESTIMATED POTENTIOMETRIC SURFACE (1/2024)
- GROUND SURFACE
- WELL SCREEN

BOREHOLE LITHOLOGY

- GRAVEL
- SAND
- CLAY/SILT WITH SAND/GRAVEL
- SILT
- CLAY AND SILT
- CLAY

OVERVIEW MAP LEGEND

- PORE-WATER SAMPLE LOCATION
- GSI PIEZOMETER LOCATION
- VERTICAL AQUIFER PROFILING BORING
- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
- SURFACE WATER

NOTES:
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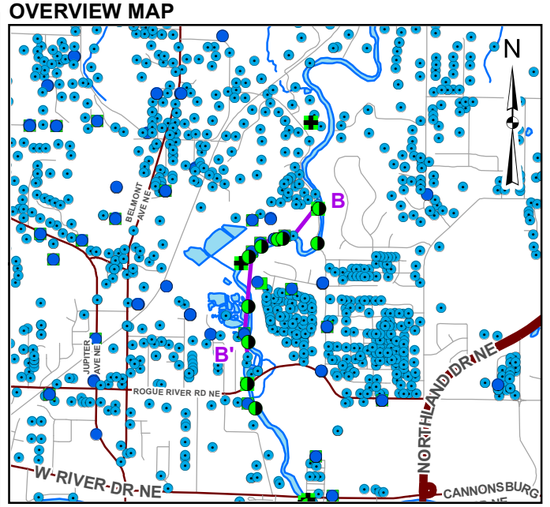
OVERVIEW MAP



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OVERVIEW MAP SCALE IN FEET

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Grand Rapids, Michigan 49504

HOUSE STREET AREA
GEOLOGICAL CROSS SECTION B-B'
GSI RAP COMPLETION REPORT

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		WN&J/WWW	
PROJ MGR: BAB	REVIEWED BY: LJP	CHECKED BY: BAB	FIGURE 6B
DESIGNED BY: JC/JMG	DRAWN BY: JMG	SCALE: 1 in = 4,000 ft	
DATE: 08/05/2024	PROJECT NO: 16.0062961.51	REVISION NO:	

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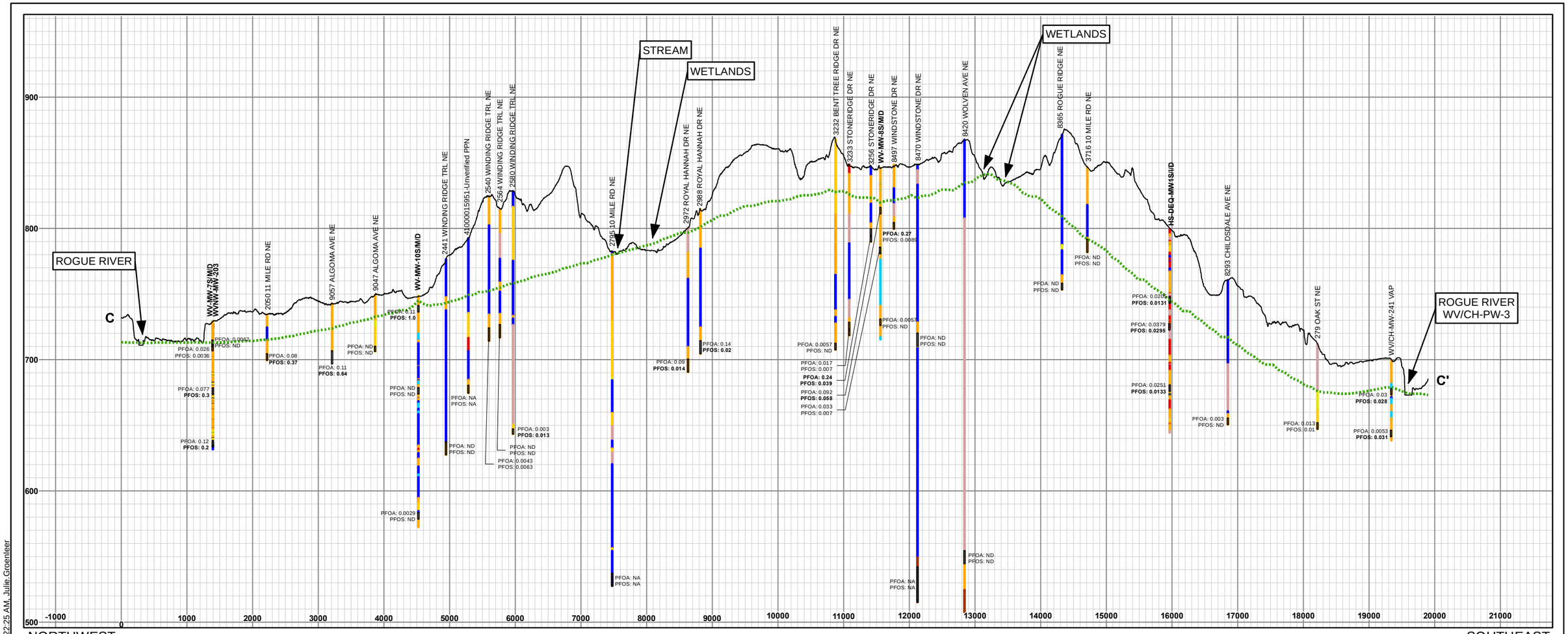

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- GRAVEL
- SAND AND GRAVEL
- SAND
- SAND/GRAVEL WITH CLAY/SILT
- CLAY/SILT WITH SAND/GRAVEL
- SILT
- CLAY AND SILT
- CLAY
- BEDROCK
- NOT AVAILABLE

OVERVIEW MAP LEGEND

- PORE-WATER SAMPLE LOCATION
- GSI PIEZOMETER LOCATION
- VERTICAL AQUIFER PROFILING BORING
- RESIDENTIAL WATER WELL
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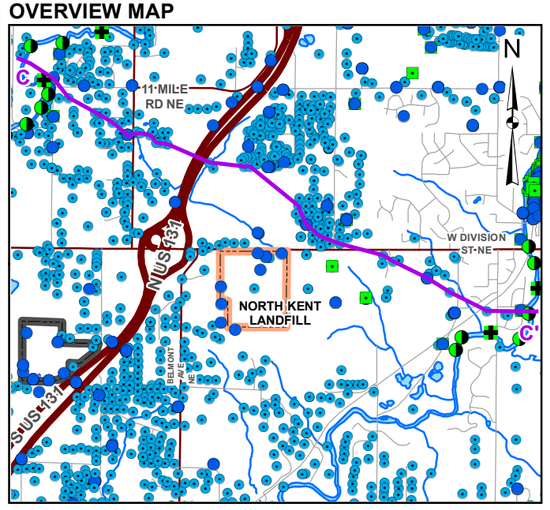
OVERVIEW MAP



0 2,500 5,000 10,000
OVERVIEW MAP SCALE IN FEET

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WOLVEN NORTHWEST AND WOLVEN/CHILDSDALE AREAS
GEOLOGICAL CROSS SECTION C-C'
GSI RAP COMPLETION REPORT

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: WN&J/WWW	
PROJ MGR: BAB	REVIEWED BY: LJP	CHECKED BY: BAB	FIGURE 6C
DESIGNED BY: JC/JMG	DRAWN BY: JMG	SCALE: 1 in = 5,000 ft	
DATE: 08/05/2024	PROJECT NO: 16.0062961.51	REVISION NO:	

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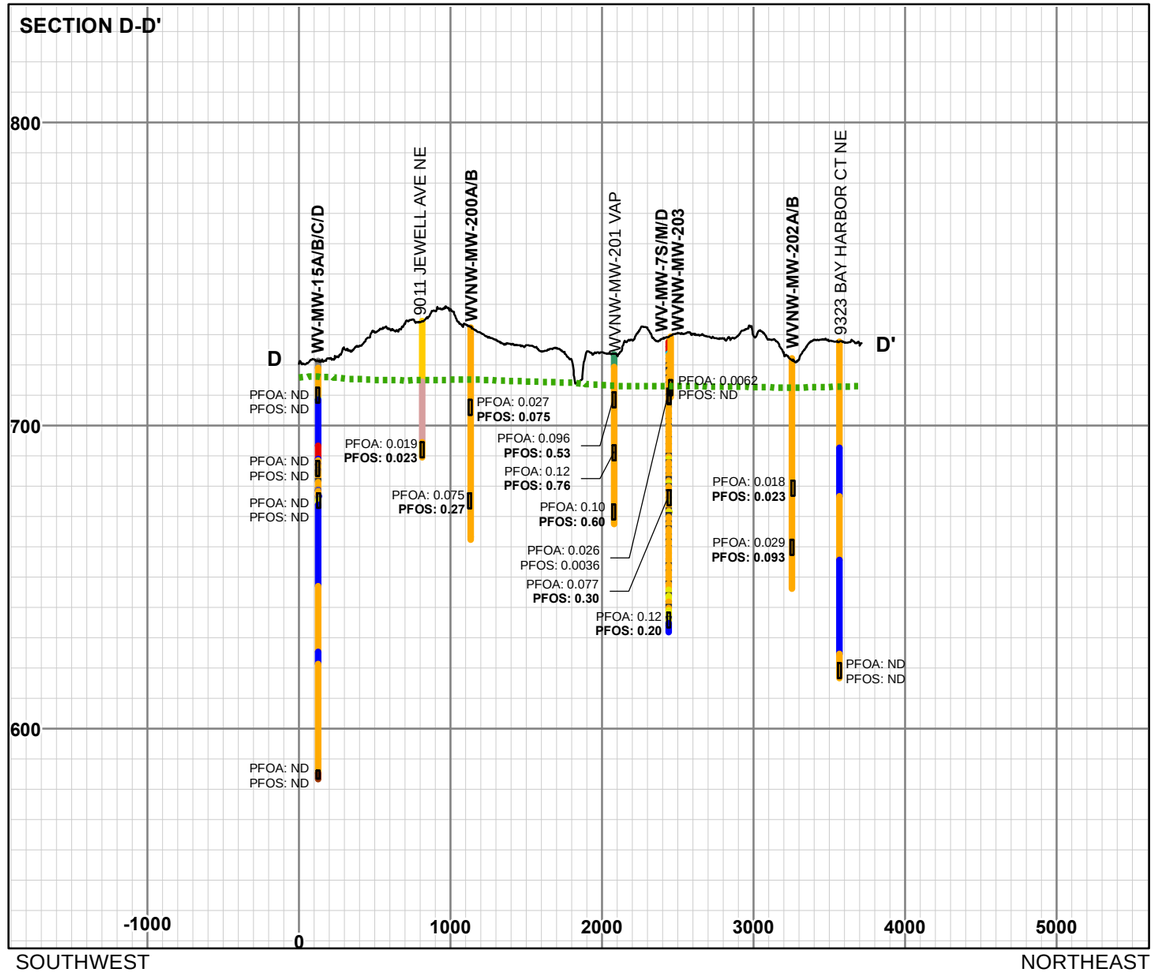
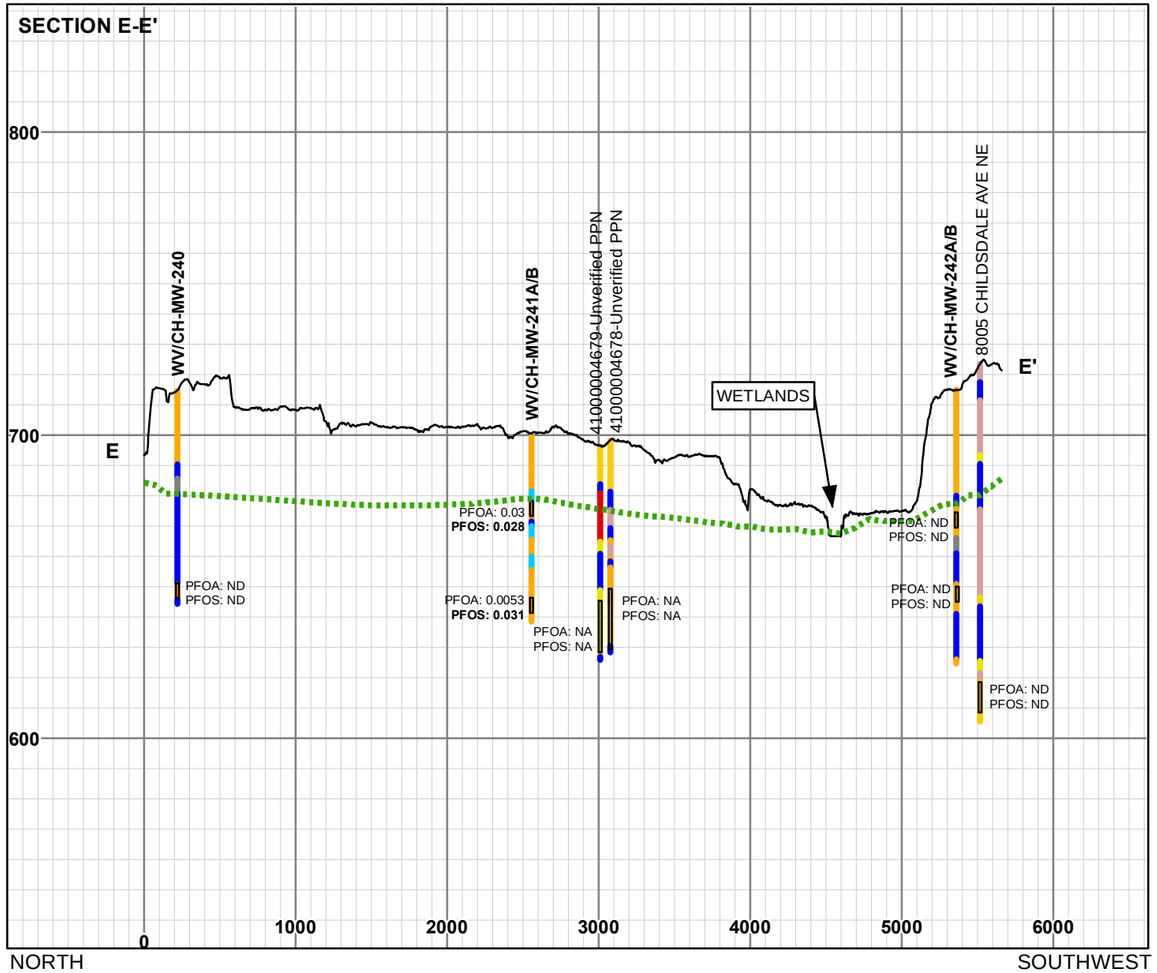
SECTION D-D'



SECTION E-E'



CROSS SECTION LEGEND

- ESTIMATED POTENTIOMETRIC SURFACE (1/2024)
- GROUND SURFACE
- WELL SCREEN

BOREHOLE LITHOLOGY

- GRAVEL
- SAND AND GRAVEL
- SAND
- SAND/GRAVEL WITH CLAY/SILT
- CLAY/SILT WITH SAND/GRAVEL
- SILT
- CLAY AND SILT
- CLAY
- TOP SOIL
- BEDROCK
- NOT AVAILABLE

OVERVIEW MAP LEGEND

- PORE-WATER SAMPLE LOCATION
- GSI PIEZOMETER LOCATION
- VERTICAL AQUIFER PROFILING BORING
- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
- SURFACE WATER
- APPROXIMATE HOUSE STREET PROPERTY (HSP)
- NORTH KENT LANDFILL

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

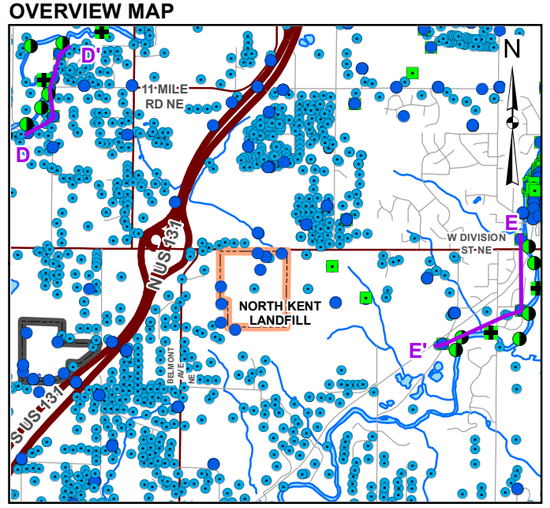
2. GROUND SURFACE ELEVATIONS ARE BASED ON DIGITAL RASTER FILES OF BARE EARTH DIGITAL ELEVATION MODELS (DEMS), GENERATED FROM LIDAR DATA WITH 1-METER HORIZONTAL ACCURACY AND 18.5-CENTIMETER VERTICAL ACCURACY. DIGITAL FILES OF DEMS AND LIDAR DATA WERE PROVIDED BY KENT COUNTY.

3. ESTIMATED POTENTIOMETRIC SURFACE WAS DEVELOPED BASED ON MEASUREMENTS MADE IN GROUNDWATER MONITORING WELLS IN JANUARY 2024. GROUNDWATER ELEVATIONS WERE NOT MEASURED FROM RESIDENTIAL WATER SUPPLY WELLS.

4. WELL SCREEN ELEVATIONS PROVIDED IN FEET ABOVE MEAN SEA LEVEL, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). RESIDENTIAL WELL SCREEN ELEVATIONS AND BOREHOLE LITHOLOGY ELEVATIONS WERE CALCULATED USING WELL INFORMATION PROVIDED BY THE STATE OF MICHIGAN'S WELLOGIC DATABASE AND GROUND SURFACE ELEVATIONS OF THE CENTER OF THE PPN GENERATED FROM LIDAR DATA PROVIDED BY KENT COUNTY. ELEVATIONS ARE ROUNDED TO THE NEAREST FOOT.

5. ONLY RESULTS FROM PERMANENT WELLS ARE SHOWN. RESULTS SHOWN ARE MAXIMUM DETECTIONS OF SAMPLES COLLECTED AT THE INDICATED LOCATION; THEREFORE, PFOA AND PFOS RESULTS SHOWN MAY BE FROM DIFFERENT SAMPLES. RESULTS IN BOLD TEXT ARE GREATER THAN PART 201 GENERIC GROUNDWATER CLEANUP CRITERIA - GROUNDWATER SURFACE WATER INTERFACE.

OVERVIEW MAP



0 2,500 5,000 10,000
OVERVIEW MAP SCALE IN FEET

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Rose & Westra, a Division of GZA
601 Fifth Street NW, Suite 102
Grand Rapids, Michigan 49504

WOLVEN NORTHWEST AND WOLVEN/CHILDSDALE AREAS
GEOLOGICAL CROSS SECTIONS D-D' AND E-E'
GSI RAP COMPLETION REPORT

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: WN&J/WWW	
PROJ MGR: BAB	REVIEWED BY: LJP	CHECKED BY: BAB	FIGURE 6D
DESIGNED BY: JC/JMG	DRAWN BY: JMG	SCALE: 1 in = 5,000 ft	
DATE: 08/05/2024	PROJECT NO: 16.0062961.51	REVISION NO:	

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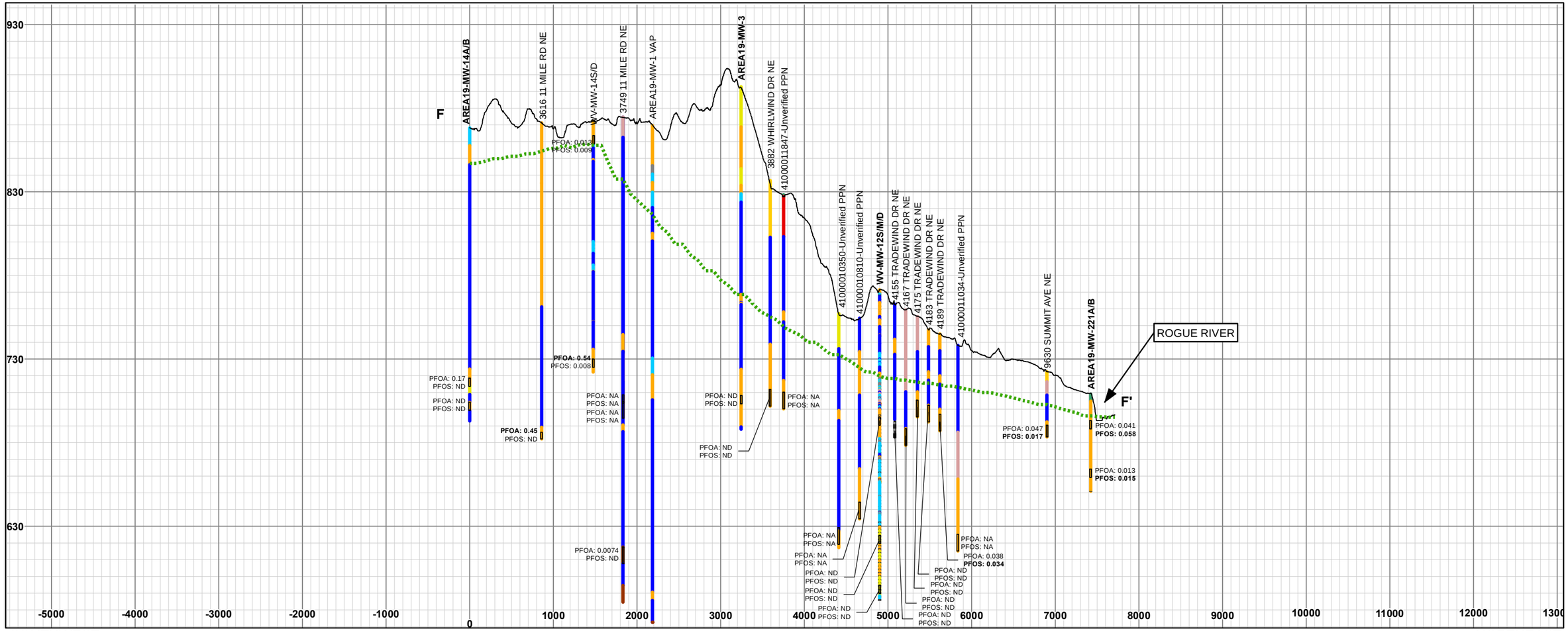

CROSS SECTION LEGEND

- ESTIMATED POTENTIOMETRIC SURFACE (1/2024)
- GROUND SURFACE
- WELL SCREEN

BOREHOLE LITHOLOGY

- GRAVEL
- SAND AND GRAVEL
- SAND
- SAND/GRAVEL WITH CLAY/SILT
- CLAY/SILT WITH SAND/GRAVEL
- SILT
- CLAY AND SILT
- CLAY
- TOP SOIL
- BEDROCK
- NOT AVAILABLE

OVERVIEW MAP LEGEND

- PORE-WATER SAMPLE LOCATION
- GSI PIEZOMETER LOCATION
- VERTICAL AQUIFER PROFILING BORING
- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
- SURFACE WATER

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

2. GROUND SURFACE ELEVATIONS ARE BASED ON DIGITAL RASTER FILES OF BARE EARTH DIGITAL ELEVATION MODELS (DEMS), GENERATED FROM LIDAR DATA WITH 1-METER HORIZONTAL ACCURACY AND 18.5-CENTIMETER VERTICAL ACCURACY. DIGITAL FILES OF DEMS AND LIDAR DATA WERE PROVIDED BY KENT COUNTY.

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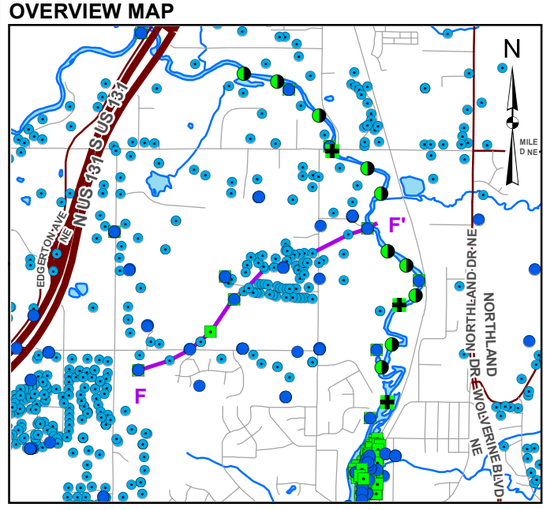
6. TEMPORARY WELLS INSTALLED AT THE AREA19-MW-1 VAP LOCATION PURGED DRY. NO SAMPLES WERE COLLECTED AND PERMANENT WELLS WERE NOT INSTALLED.

OVERVIEW MAP



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OVERVIEW MAP SCALE IN FEET

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601 Fifth Street NW, Suite 102
Grand Rapids, Michigan 49504

WOLVEN NORTHEAST AND AREA 19
GEOLOGICAL CROSS SECTION F-F'
GSI RAP COMPLETION REPORT

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		WN&J/WWW	
PROJ MGR: BAB	REVIEWED BY: LJP	CHECKED BY: BAB	FIGURE
DESIGNED BY: JC/JMG	DRAWN BY: JMG	SCALE: 1 in = 4,000 ft	6E
DATE: 08/05/2024	PROJECT NO: 16.0062961.51	REVISION NO:	

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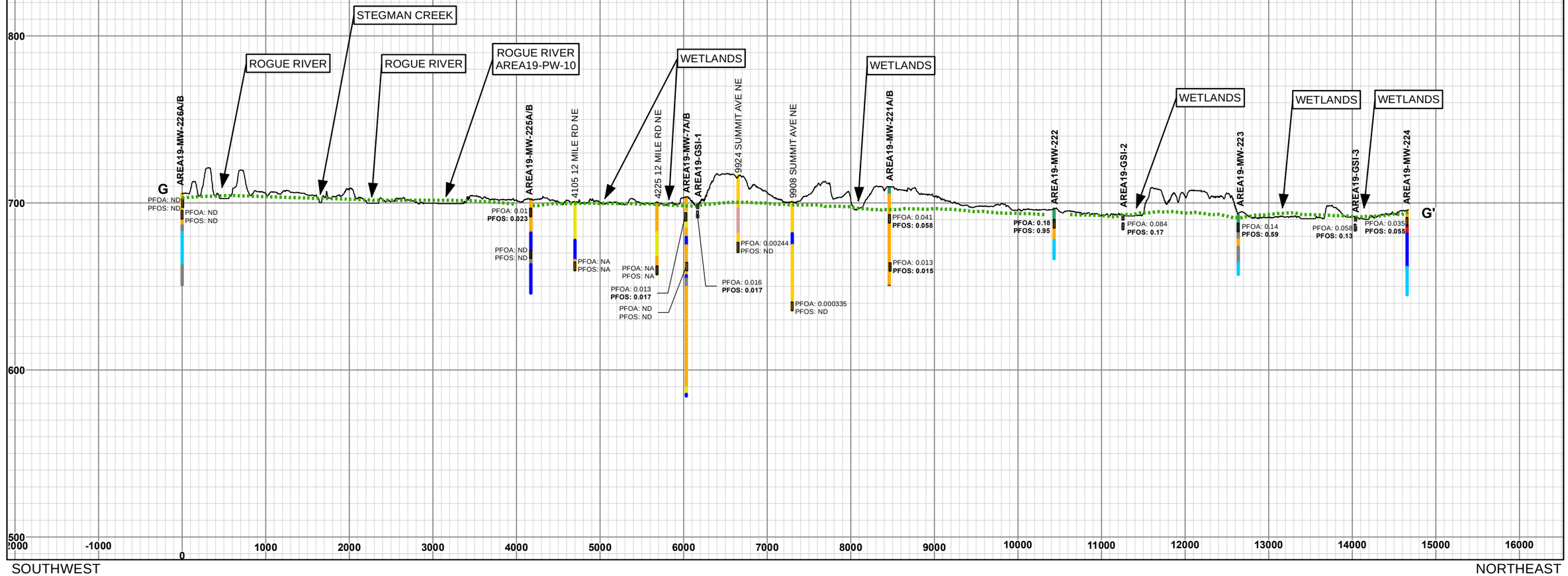

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- GROUND SURFACE
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- CLAY
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- NOT AVAILABLE

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- GSI PIEZOMETER LOCATION
- VERTICAL AQUIFER PROFILING BORING
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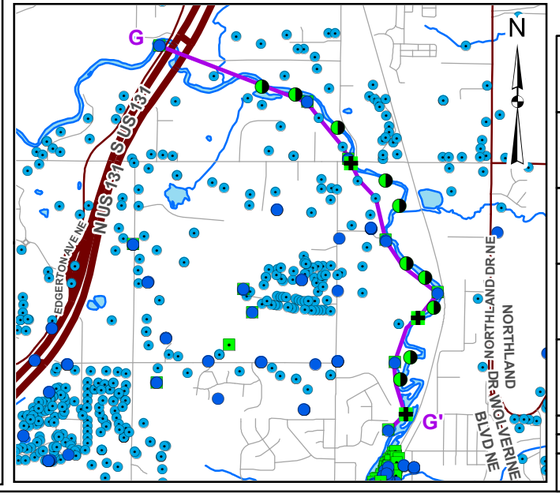
OVERVIEW MAP



0 2,000 4,000 8,000
OVERVIEW MAP SCALE IN FEET

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601 Fifth Street NW, Suite 102
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WOLVEN NORTHEAST AND AREA 19
GEOLOGICAL CROSS SECTION G-G'
GSI RAP COMPLETION REPORT

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		WN&J/WWW	
PROJ MGR: BAB	REVIEWED BY: LJP	CHECKED BY: BAB	FIGURE
DESIGNED BY: JC/JMG	DRAWN BY: JMG	SCALE: 1 in = 4,000 ft	6F
DATE: 08/05/2024	PROJECT NO: 16.0062961.51	REVISION NO:	

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TABLES

TABLE 1A
PIEZOMETER SUMMARY
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Name	Completion Date	Easting (international feet)	Northing (international feet)	Ground Surface Elevation (feet amsl)	Top of Casing Elevation (feet amsl)	Screen Interval (feet bgs)	Screen Elevation (feet amsl)	Approximate Distance to River (feet)
Wolven Northwest	WVNW-GSI-1	10/29/2020	12,790,197.62	598,854.06	711.68	716.38	2.0 - 6.0	709.7 - 705.7	4
Wolven Northwest	WVNW-GSI-2	10/29/2020	12,788,280.45	597,285.30	715.49	719.58	5.8 - 9.8	709.7 - 705.7	6
Wolven Northeast	AREA19-GSI-1	10/29/2020	12,803,671.73	602,250.59	698.71	703.04	3.5 - 7.5	695.2 - 691.2	4
Wolven Northeast	AREA19-GSI-2	10/29/2020	12,805,441.24	598,178.39	692.09	695.90	4.1 - 8.1	688.0 - 684.0	4
Wolven Northeast	AREA19-GSI-3	10/29/2020	12,805,120.16	595,643.55	691.50	695.34	4.2 - 8.2	687.3 - 683.3	6.7
Wolven-North Childsdale	WV/CH-GSI-1	10/27/2020	12,804,580.97	590,400.63	675.75	679.59	1.1 - 5.1	674.7 - 670.7	3
Wolven-North Childsdale	WV/CH-GSI-2	10/27/2020	12,803,034.54	588,938.87	671.95	674.84	1.7 - 5.7	670.3 - 666.3	4
House Street Property South/Southeast	HS-GSI-1	10/27/2020	12,796,409.12	580,037.74	631.76	635.84	2.4 - 6.4	629.4 - 625.4	3
House Street Property South/Southeast	HS-GSI-2	10/27/2020	12,794,382.15	578,575.97	625.68	629.76	2.6 - 6.6	623.1 - 619.1	2
House Street Property South/Southeast	HS-GSI-3	10/27/2020	12,794,540.64	575,395.34	619.47	622.55	2.6 - 6.6	616.9 - 612.9	5
House Street Property South/Southeast	HS-GSI-4	10/26/2020	12,796,056.76	572,277.56	610.72	612.64	1.3 - 5.3	609.4 - 605.4	6.5
House Street Property South/Southeast	HS-GSI-5	10/26/2020	12,796,142.39	572,339.83	612.54	615.42	2.6 - 6.6	609.9 - 605.9	6
House Street Property South/Southeast	HS-GSI-6	10/26/2020	12,795,200.75	569,770.43	608.72	611.34	4.2 - 8.2	604.5 - 600.5	8
House Street Property South/Southeast	HS-GSI-7	10/26/2020	12,793,161.54	570,470.86	608.68	611.68	4.7 - 8.7	604.0 - 600.0	12.8
House Street Property South/Southeast	HS-GSI-8	10/26/2020	12,791,378.50	571,769.65	610.15	612.03	6.0 - 10.0	604.2 - 600.2	12
House Street Property South/Southeast	HS-GSI-9	10/29/2020	12,783,447.92	594,138.68	717.75	722.50	5.1 - 9.1	712.7 - 708.7	13

NOTES:

1) Easting and northing values are in North American Datum of 1983, Michigan State Plane South Zone, International Feet.
2) Abbreviaions Include:
"feet amsl" indicates feet above mean sea level (North American Vertical Datum of 1988).
"feet bgs" indicates approximate feet below ground surface.
3) Northing, easting, ground surface elevation, and top of casing elevation were surveyed by Exxel Engineering, Inc. of Grand Rapids, Michigan.
4) Screen intervals and elevations presented are based on field measurements from 7/11/2024.

TABLE 1B
MONITORING WELL SUMMARY
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Name	Completion Date	Northing (international feet)	Easting (international feet)	Ground Surface Elevation (feet amsl)	Top of Casing Elevation (feet amsl)	Screen Interval (feet bgs)	Screen Elevation (feet amsl)	Approximate Distance to River (feet)
Wolven Northwest	WVNW-MW-200A	7/8/2022	596,050.414	12,788,597.990	732.55	732.22	24.0 - 29.0	708.6 - 703.6	480
Wolven Northwest	WVNW-MW-200B	7/11/2022	596,045.218	12,788,597.970	732.66	732.35	55.1 - 60.1	677.6 - 672.6	480
Wolven Northwest	WVNW-MW-201A	4/8/2022	596,993.111	12,788,464.680	723.49	722.89	12.5 - 17.5	711.0 - 706.0	50
Wolven Northwest	WVNW-MW-201B	7/1/2022	596,993.151	12,788,469.173	723.44	723.09	30.0 - 35.0	693.4 - 688.4	50
Wolven Northwest	WVNW-MW-201C	7/6/2022	596,989.102	12,788,467.207	723.49	723.08	49.5 - 54.5	674.0 - 669.0	50
Wolven Northwest	WVNW-MW-202A	1/31/2023	598,120.564	12,788,806.091	721.93	724.40	40.1 - 45.1	681.8 - 676.8	350
Wolven Northwest	WVNW-MW-202B	1/31/2023	598,115.000	12,788,800.889	722.06	724.57	59.8 - 64.8	662.3 - 657.3	350
Wolven Northwest	WVNW-MW-203	2/2/2022	597,341.413	12,788,600.361	729.32	728.91	14.3 - 19.3	715.0 - 710.0	280
Wolven Northeast	AREA19-MW-7A	9/8/2022	602,370.836	12,803,599.833	703.44	703.09	9.1 - 14.1	694.3 - 689.3	30
Wolven Northeast	AREA19-MW-221A	2/16/2022	600,210.353	12,804,596.532	709.08	708.66	15.9 - 20.9	693.2 - 688.2	70
Wolven Northeast	AREA19-MW-221B	7/8/2022	600,203.621	12,804,600.216	709.30	708.81	45.0 - 50.0	664.3 - 659.3	70
Wolven Northeast	AREA19-MW-222	2/21/2022	598,820.703	12,805,960.401	696.52	699.41	6.4 - 11.4	690.1 - 685.1	25
Wolven Northeast	AREA19-MW-223	2/17/2022	596,990.335	12,804,834.348	692.82	695.85	4.9 - 9.9	687.9 - 682.9	280
Wolven Northeast	AREA19-MW-224	2/11/2022	595,199.272	12,804,662.607	695.46	698.37	4.2 - 9.2	691.3 - 686.3	100
Wolven Northeast	AREA19-MW-225A	2/2/2023	603,866.163	12,802,517.431	702.13	704.40	5.3 - 10.3	696.8 - 691.8	155
Wolven Northeast	AREA19-MW-225B	2/2/2023	603,871.954	12,802,519.658	701.99	704.71	30.2 - 35.2	671.8 - 666.8	155
Wolven Northeast	AREA19-MW-226A	5/11/2023	605,358.844	12,798,631.639	705.73	708.69	3.3 - 8.3	702.4 - 697.4	75
Wolven Northeast	AREA19-MW-226B	3/24/2023	605,364.606	12,798,625.073	705.56	708.32	10.0 - 15.0	695.6 - 690.6	75
Wolven-North Childsdale	WV/CH-MW-240	2/8/2022	591,991.606	12,804,009.774	714.70	714.28	63.4 - 68.4	651.3 - 646.3	135
Wolven-North Childsdale	WV/CH-MW-241A	2/9/2022	589,654.105	12,804,029.724	699.52	702.05	21.2 - 26.2	678.3 - 673.3	180
Wolven-North Childsdale	WV/CH-MW-241B	9/12/2022	589,655.301	12,804,025.721	699.94	702.25	53.6 - 58.6	646.3 - 641.3	180
Wolven-North Childsdale	WV/CH-MW-242A	3/31/2022	588,547.675	12,801,456.069	715.02	714.61	40.4 - 45.4	674.6 - 669.6	465
Wolven-North Childsdale	WV/CH-MW-242B	6/30/2022	588,539.744	12,801,452.219	714.84	714.43	64.8 - 69.8	650.0 - 645.0	465
House Street Property South/Southeast	HS-MW-29A	10/4/2019	579,220.116	12,795,245.435	630.30	633.13	3.5 - 13.5	626.8 - 616.8	40
House Street Property South/Southeast	HS-MW-260	6/21/2022	579,304.284	12,795,521.731	630.64	633.66	5.1 - 10.1	625.5 - 620.5	55
House Street Property South/Southeast	HS-MW-261	6/23/2022	579,110.918	12,794,886.375	628.42	631.19	4.4 - 9.4	624.0 - 619.0	65
House Street Property South/Southeast	HS-MW-262	6/27/2022	578,883.959	12,794,660.698	628.53	631.60	4.0 - 9.0	624.5 - 619.5	20
House Street Property South/Southeast	HS-MW-263A	2/24/2022	576,721.174	12,794,459.393	626.74	630.00	4.9 - 9.9	621.8 - 616.8	80
House Street Property South/Southeast	HS-MW-263B	7/13/2022	576,718.275	12,794,456.356	626.95	629.18	42.1 - 47.1	584.9 - 579.9	80
House Street Property South/Southeast	HS-MW-264	2/24/2022	574,868.368	12,794,561.297	638.61	638.18	25.4 - 30.4	613.2 - 608.2	100
House Street Property South/Southeast	HS-MW-265	2/1/2022	571,010.263	12,792,622.224	612.20	614.96	10.5 - 15.5	601.7 - 596.7	90
House Street Property South/Southeast	HS-MW-266A	6/20/2022	579,706.416	12,794,679.017	633.73	636.69	10.2 - 15.2	623.5 - 618.5	690
House Street Property South/Southeast	HS-MW-266B	9/14/2022	579,711.529	12,794,680.081	633.71	636.69	50.0 - 55.0	583.7 - 578.7	690

NOTES:
1) Northing and easting values are in North American Datum of 1983, Michigan State Plane South Zone, International Feet.
2) Abbreviaions Include:
"feet amsl" indicates feet above mean sea level (North American Vertical Datum of 1988).
"feet bgs" indicates approximate feet below ground surface.
3) Northing, easting, ground surface elevation, and top of casing elevation were surveyed by Exxel Engineering, Inc. of Grand Rapids, Michigan.
4) Screen intervals presented are based on field measurements of the completed monitoring well to the nearest tenth of a foot; therefore, readings may differ from the approximate depth interval recorded on the soil boring log.

TABLE 2
QUARTERLY GROUNDWATER AND SURFACE WATER GAUGING ELEVATIONS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Well	Q2 2023 4/10/2023	Q3 2023 7/10/2023	Q4 2023 10/2/2023	Q1 2024 1/8/2024
AREA11-RI-1A	624.02	[1]	623.52	622.82
AREA11-RI-1B	624.04	625.20	624.28	623.71
AREA11-RI-1C	624.09	625.17	624.26	623.70
AREA12-RI-1	626.41	625.20	624.92	625.03
AREA12-RI-3	629.68	629.00	628.58	628.35
AREA19-GSI-1	[2]	697.60	697.32	697.56
AREA19-GSI-2	[2]	691.19	690.77	691.04
AREA19-GSI-3	[2]	690.87	690.51	690.65
AREA19-MW-11C	[5]	714.93	714.25	714.23
AREA19-MW-12C	[5]	710.13	709.55	709.71
AREA19-MW-13A	759.82	761.05	761.29	760.48
AREA19-MW-13B	732.53	733.01	732.54	731.72
AREA19-MW-13C	732.43	732.91	732.45	731.62
AREA19-MW-14A	[4]	735.55	736.43	737.02
AREA19-MW-14B	[4]	758.95	736.49	737.20
AREA19-MW-15A	[4]	793.75	793.14	792.60
AREA19-MW-15B	[4]	738.36	742.19	744.64
AREA19-MW-15C	751.18	738.21	742.03	744.63
AREA19-MW-16A	[4]	783.54	781.99	781.92
AREA19-MW-16B	[4]	779.25	777.78	777.77
AREA19-MW-16C	[4]	728.76	727.84	727.86
AREA19-MW-2	874.39	869.61	869.63	870.95
AREA19-MW-221A	697.49	695.17	694.81	695.23
AREA19-MW-221B	697.64	695.97	695.76	695.98
AREA19-MW-222	693.43	691.62	691.41	692.00
AREA19-MW-223	693.46	691.02	690.63	690.93
AREA19-MW-224	695.15	693.19	692.65	694.00
AREA19-MW-225A	700.06	698.17	697.93	698.27
AREA19-MW-225B	700.84	699.01	698.74	699.13
AREA19-MW-226A	[4]	702.37	702.14	702.59
AREA19-MW-226B	704.24	702.46	702.27	702.67
AREA19-MW-3	[4]	726.24	725.86	725.43
AREA19-MW-4A	[4]	[4]	725.17	724.66
AREA19-MW-4B	[4]	[4]	725.20	724.70
AREA19-MW-5C	[5]	727.48	726.92	726.32
AREA19-MW-6A	[4]	714.91	713.97	713.13
AREA19-MW-6B	[4]	714.08	713.19	712.76
AREA19-MW-6C	[4]	713.93	713.06	712.72
AREA19-MW-7A	700.07	698.29	697.92	698.19
AREA19-MW-7B	706.67	Artesian	Artesian	Artesian
AREA19-MW-8A	[4]	800.96	799.73	799.08
AREA19-MW-8B	[4]	738.57	740.08	741.65
AREA19-MW-8C	725.71	717.98	719.93	722.55
AREA19-MW-9A	[4]	790.78	790.06	790.77
AREA19-MW-9B	[4]	738.66	742.46	744.90
AREA19-MW-9C	748.02	739.48	743.04	745.18
AREA5-RI-10A	701.46	702.27	702.25	701.79
AREA5-RI-10B	703.04	703.83	703.76	703.29
AREA5-RI-10C	693.78	694.40	694.18	693.78
AREA5-RI-10D	693.71	694.37	694.13	693.71
AREA5-RI-11A	696.56	697.37	697.29	697.24
AREA5-RI-11B	696.93	697.74	697.65	696.89
AREA5-RI-11C	687.75	688.28	688.00	687.65
AREA5-RI-11D	686.88	687.37	687.10	686.76
AREA5-RI-1A	649.51	649.10	648.16	648.26
AREA5-RI-1B	653.80	653.36	652.68	652.69
AREA5-RI-1C	659.09	658.62	658.18	657.94
AREA5-RI-2A	691.26	689.39	688.81	689.36
AREA5-RI-2B	691.48	689.60	689.02	689.57
AREA5-RI-3A	660.77	658.47	659.71	659.47
AREA5-RI-3B	659.40	658.96	658.44	658.25
AREA5-RI-4A	693.45	689.72	688.67	689.71
AREA5-RI-4B	692.28	689.39	688.68	689.44
AREA5-RI-5A	652.21	649.38	647.60	646.91

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GSI Investigation
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Well	Q2 2023 4/10/2023	Q3 2023 7/10/2023	Q4 2023 10/2/2023	Q1 2024 1/8/2024
AREA5-RI-5B	648.64	644.81	642.52	641.59
AREA5-RI-6	629.20	628.64	627.53	627.46
AREA5-RI-7A	636.18	635.03	633.43	632.69
AREA5-RI-7B	638.56	636.69	635.25	634.81
AREA5-RI-8A	704.72	705.56	705.49	704.99
AREA5-RI-8B	704.60	705.43	705.34	704.84
AREA5-RI-8C	700.62	701.35	701.20	700.71
AREA5-RI-9A	717.84	718.66	718.51	717.69
AREA5-RI-9B	703.63	704.41	704.29	703.73
AREA5-RI-9C	703.79	704.55	704.43	703.88
AREA6-RI-1A	681.02	681.46	681.18	680.56
AREA6-RI-1B	680.45	680.89	680.57	679.94
AREA6-RI-3A	708.88	709.06	708.67	708.27
AREA6-RI-3B	666.62	666.62	666.76	666.23
AREA6-RI-3C	666.64	667.06	666.79	666.26
AREA6-RI-3D	667.06	667.48	667.19	666.68
AREA6-RI-4A	757.95	757.27	757.35	756.47
AREA6-RI-4B	739.81	736.34	738.98	739.59
AREA6-RI-4C	735.18	736.19	738.82	739.43
AREA6-RI-4D	740.73	736.12	738.67	739.45
HS-GSI-1	631.40	630.57	630.40	630.58
HS-GSI-2	[2]	625.09	624.92	625.04
HS-GSI-3	618.60	617.79	617.65	617.84
HS-GSI-4	[2]	608.84	608.68	608.86
HS-GSI-5	[2]	608.95	608.77	609.05
HS-GSI-6	[2]	606.01	605.82	607.01
HS-GSI-7	[2]	605.74	605.52	606.80
HS-GSI-8	[2]	606.11	605.56	606.98
HS-GSI-9	[2]	716.25	715.83	716.78
HS-MW-10D	731.05	729.56	730.37	730.64
HS-MW-10M	722.47	723.09	722.66	722.19
HS-MW-10S	722.46	723.11	722.66	722.18
HS-MW-11D	716.03	716.65	716.33	715.83
HS-MW-11M	716.00	716.65	716.31	715.86
HS-MW-11S	716.89	717.36	717.02	716.57
HS-MW-12A	705.97	705.75	705.02	704.44
HS-MW-12B	702.38	702.16	701.63	701.12
HS-MW-12C	683.10	683.69	683.35	682.86
HS-MW-12D	683.45	684.04	683.69	683.20
HS-MW-12E	683.37	683.29	683.72	683.38
HS-MW-13A	667.80	668.24	667.88	667.43
HS-MW-13B	667.85	668.29	667.95	667.46
HS-MW-13C	668.36	668.78	668.44	667.97
HS-MW-14D	659.57	659.30	658.97	658.79
HS-MW-14M	655.73	660.43	660.06	660.01
HS-MW-14S	656.63	656.04	655.80	655.81
HS-MW-15D	635.57	634.74	634.34	634.38
HS-MW-15M	634.38	633.60	633.16	632.51
HS-MW-15S	630.89	629.61	629.21	629.38
HS-MW-17D	686.50	687.09	686.75	686.33
HS-MW-17M	686.57	687.14	686.83	686.39
HS-MW-17S	700.28	701.05	700.93	700.50
HS-MW-18D	662.26	662.37	661.92	656.61
HS-MW-18S	667.28	666.68	665.87	665.52
HS-MW-19D	652.51	649.95	649.11	649.25
HS-MW-19S	653.83	651.89	651.01	651.27
HS-MW-20D	648.62	648.73	648.24	647.81
HS-MW-20M	648.72	648.82	648.35	647.90
HS-MW-20S	648.74	648.86	648.38	647.94
HS-MW-21D	638.67	638.09	637.60	637.17
HS-MW-21M	637.56	637.31	636.83	636.46
HS-MW-21S	637.81	637.56	637.16	636.77
HS-MW-23A	720.62	721.10	720.74	720.32
HS-MW-23B	720.58	721.06	720.72	720.29

TABLE 2
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Well	Q2 2023 4/10/2023	Q3 2023 7/10/2023	Q4 2023 10/2/2023	Q1 2024 1/8/2024
HS-MW-23C	720.65	721.10	720.76	720.34
HS-MW-23D	720.57	721.02	720.68	720.26
HS-MW-24A	722.85	721.61	721.37	721.36
HS-MW-24B	721.81	721.57	721.32	721.33
HS-MW-25D	628.73	627.18	626.59	626.48
HS-MW-25S	628.83	627.28	626.67	626.57
HS-MW-260	628.37	627.46	627.28	627.45
HS-MW-261	627.67	626.91	626.73	626.87
HS-MW-262	626.74	626.21	625.03	626.14
HS-MW-263A	622.81	622.17	622.11	622.18
HS-MW-263B	623.78	622.62	622.39	622.54
HS-MW-264	617.98	616.18	615.94	616.04
HS-MW-265	[2]	605.77	605.58	606.81
HS-MW-266A	632.63	632.68	632.40	632.33
HS-MW-266B	632.70	632.76	632.45	632.40
HS-MW-26D	640.30	638.15	636.07	635.39
HS-MW-26M	640.18	637.97	635.90	635.20
HS-MW-26S	635.88	635.61	633.61	633.18
HS-MW-27A	Dry	Dry	Dry	Dry
HS-MW-27B	644.25	643.11	642.68	641.96
HS-MW-27C	645.28	643.94	643.59	642.87
HS-MW-27D	645.67	644.16	643.82	643.43
HS-MW-27E	645.63	644.17	643.77	643.07
HS-MW-28A	629.45	629.09	628.66	628.44
HS-MW-28B	629.48	629.12	[7]	628.47
HS-MW-28C	629.41	629.05	628.62	628.42
HS-MW-28D	630.37	629.94	629.43	629.18
HS-MW-28E	630.46	630.07	629.55	629.27
HS-MW-29A	627.70	626.88	626.69	626.83
HS-MW-29B	627.93	627.10	626.92	[5]
HS-MW-29C	627.79	626.97	626.78	626.91
HS-MW-29D	627.72	626.90	626.73	[5]
HS-MW-30A	630.85	630.53	630.04	629.78
HS-MW-30B	630.87	630.53	630.05	629.75
HS-MW-30C	631.14	631.02	630.55	630.18
HS-MW-30D	631.26	631.20	630.72	630.35
HS-MW-30E	631.24	631.22	630.74	630.34
HS-MW-31A	623.01	623.54	623.06	622.30
HS-MW-31B	623.22	623.77	622.85	622.30
HS-MW-31C	623.01	623.54	623.07	622.54
HS-MW-31D	622.87	623.40	622.52	622.18
HS-MW-31E	622.90	623.46	622.77	622.21
HS-MW-32A	[3]	719.35	719.05	719.47
HS-MW-32B	[3]	719.35	719.07	719.46
HS-MW-32C	[3]	719.49	719.22	719.64
HS-MW-32D	[3]	719.27	719.00	719.41
HS-MW-8	721.02	721.56	721.17	720.75
HS-MW-9D	741.47	737.52	740.28	740.88
HS-MW-9M	741.31	737.35	740.11	740.72
HS-MW-9S	793.28	792.74	792.84	792.50
HS-PMW-16A	691.94	693.01	692.61	691.97
HS-PMW-16B	692.13	693.20	692.79	692.14
HS-PMW-16C	689.29	690.19	689.96	689.22
HS-PMW-22	[4]	739.47	741.21	741.48
HS-PMW-RI-101A	[4]	720.14	719.65	720.21
HS-PMW-RI-101B	[4]	719.16	718.87	719.33
HS-PMW-RI-102A	718.29	718.58	718.22	717.79
HS-PMW-RI-102B	718.03	718.56	718.21	717.75
HS-PMW-RI-102C	718.01	718.55	718.20	717.74
HS-PMW-RI-102D	718.02	718.55	718.22	717.75
HS-PMW-RI-103A	691.16	691.58	691.35	691.11
HS-PMW-RI-103B	690.31	690.77	690.56	690.29
HS-PMW-RI-104A	648.81	648.67	648.23	647.86
HS-PMW-RI-104B	646.82	648.68	648.25	647.86

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HS-PMW-RI-104C	648.85	648.73	648.28	647.93
HS-PMW-RI-104D	655.16	654.99	654.59	654.33
HS-PMW-RI-105A	[4]	720.93	720.62	720.98
HS-PMW-RI-105B	732.13	730.68	729.50	731.61
HS-PMW-RI-106A	[4]	723.73	723.54	723.53
HS-PMW-RI-106B	723.17	722.97	722.77	722.80
HS-PMW-RI-107A	694.02	694.70	694.53	694.15
HS-PMW-RI-107B	680.12	680.48	680.18	679.84
HS-PMW-RI-107C	680.09	680.47	680.13	679.81
HS-PMW-RI-107D	678.44	678.81	678.50	678.17
HS-PMW-RI-108A	799.77	799.85	799.45	798.62
HS-PMW-RI-108B	740.50	737.36	[7]	740.55
HS-PMW-RI-108C	[6]	[6]	[6]	[6]
HS-PMW-RI-108D	741.43	737.51	740.16	740.81
HS-PMW-RI-109A	777.32	776.69	776.26	776.81
HS-PMW-RI-109B	720.82	721.85	721.38	720.86
HS-PMW-RI-109C	721.08	722.06	721.62	719.10
HS-PMW-RI-110A	630.21	631.00	630.45	629.82
HS-PMW-RI-110B	630.08	630.88	630.32	629.67
HS-PMW-RI-111A	616.04	613.44	612.99	613.14
HS-PMW-RI-111B	616.25	613.65	613.20	613.38
HS-PMW-RI-112A	616.30	609.52	609.20	609.74
HS-PMW-RI-112B	616.19	609.50	609.20	609.74
WV/CH-GSI-1	675.47	675.00	674.85	674.97
WV/CH-GSI-2	672.16	671.36	671.15	671.16
WV/CH-MW-240	684.56	683.27	682.92	682.73
WV/CH-MW-241A	685.05	682.31	681.39	679.63
WV/CH-MW-241B	684.54	682.13	681.29	679.83
WV/CH-MW-242A	678.89	678.23	677.76	677.77
WV/CH-MW-242B	697.74	695.95	696.71	696.79
WV-MW-1	757.30	754.20	755.89	755.76
WV-MW-10D	747.91	743.89	745.92	746.85
WV-MW-10M	746.75	743.00	744.99	745.60
WV-MW-10S	741.04	738.64	738.22	737.37
WV-MW-11D	743.96	Artesian	Artesian	Artesian
WV-MW-11S	724.46	724.54	723.16	722.60
WV-MW-12D	716.77	714.81	714.32	714.59
WV-MW-12M	716.71	714.74	714.29	714.52
WV-MW-12S	721.49	720.84	719.76	719.16
WV-MW-13D	800.15	801.14	800.63	800.03
WV-MW-13M	820.93	819.36	818.42	818.52
WV-MW-13S	820.73	819.32	818.44	818.66
WV-MW-14D	730.55	730.69	730.53	730.57
WV-MW-14S	861.84	859.80	859.45	859.95
WV-MW-15A	718.67	716.34	715.87	716.27
WV-MW-15B	718.50	716.18	715.74	716.11
WV-MW-15C	718.42	716.12	715.66	716.03
WV-MW-15D	729.09	Artesian	Artesian	Artesian
WV-MW-16D	759.83	756.81	758.35	759.14
WV-MW-16S	815.33	814.77	814.57	814.59
WV-MW-2D	784.65	783.73	783.90	783.98
WV-MW-2S	790.03	789.95	789.92	789.92
WV-MW-3D	799.00	799.89	799.41	798.87
WV-MW-3S	819.03	817.62	817.01	817.42
WV-MW-4	752.90	747.06	749.93	751.66
WV-MW-5D	799.24	800.35	799.82	799.22
WV-MW-5S	799.38	800.50	799.97	799.37
WV-MW-6D	764.06	759.83	760.38	760.88
WV-MW-6S	780.63	778.55	778.09	778.18
WV-MW-7D	715.07	713.03	712.49	713.06
WV-MW-7M	715.07	712.99	712.49	713.07
WV-MW-7S	715.07	712.98	712.46	713.02
WV-MW-8D	753.43	750.99	752.24	752.94
WV-MW-8M	819.81	820.58	820.12	819.31

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WV-MW-8S	819.77	820.56	820.08	819.27
WV-MW-9	822.51	822.48	822.27	821.28
WVNW-GSI-1	711.90	710.64	710.49	710.94
WVNW-GSI-2	[2]	712.09	711.67	712.42
WVNW-MW-200A	717.75	715.59	715.10	715.38 [8]
WVNW-MW-200B	717.69	715.56	715.04	715.25
WVNW-MW-201A	714.79	712.64	712.19	712.84
WVNW-MW-201B	714.79	712.61	712.15	712.81
WVNW-MW-201C	714.76	712.61	712.15	712.80
WVNW-MW-202A	714.32	712.37	711.89	712.46
WVNW-MW-202B	714.29	712.42	711.93	712.49
WVNW-MW-203	714.89	712.84	712.31	712.89
WV-PMW-RI-101A	801.26	802.41	801.73	801.04
WV-PMW-RI-101B	729.71	720.10	723.73	728.02
WV-PMW-RI-102	797.76	798.85	798.27	[5]
WV-PMW-RI-104A	[4]	715.65	714.98	715.13
WV-PMW-RI-104B	721.63	719.85	719.70	719.97
WV-PMW-RI-105A	[4]	716.81	716.25	716.52
WV-PMW-RI-105B	721.68	720.08	719.63	719.80
WV-PMW-RI-106A	880.89	878.53	877.72	878.85
WV-PMW-RI-106B	881.51	879.16	878.40	879.48
WV-PMW-RI-106C	881.48	879.14	878.34	879.41
WV-PMW-RI-106D	877.58	871.50	869.50	870.42
WV-PMW-RI-106E	747.15	746.05	746.47	747.07
WV-PMW-RI-107	743.87	740.37	742.12	743.39
WV-PMW-RI-108	[4]	789.39	788.19	787.88

Staff Gauge	Q2 2023 4/10/2023	Q3 2023 7/10/2023	Q4 2023 10/2/2023	Q1 2024 1/8/2024
11 Mile Road Bridge	714.85	712.97	712.72	713.13
12 Mile Road Bridge	707.44	705.84	705.62	706.02
Algoma Avenue Bridge	710.99	709.44	709.15	709.56
Jerico Avenue Bridge	671.11	670.23	670.03	670.23
Rogue River Road Bridge	617.95	617.50	617.34	617.45
Dam Seawall	680.16	679.04	678.80	679.06
East Bridge Street Bridge	679.72	678.86	678.64	678.83
TA-SG-RC	[5]	691.97	691.48	691.49
USGS04118500	629.75 [9]	628.49 [9]	628.21 [9]	629.18 [9]

Notes:

[1] indicates could not locate due to LGPA tour activity.
[2] indicates inaccessable due to high river level.
[3] inaccessalbe due to road closure.
[4] indicates not installed at time of measurement event.
[5] indicates not measured.
[6] indicates not measured because the well was damaged when grout blew into the screen.
[7] indicates recorded water depth was anomalous and was usable for contouring.
[8] indicates reading from 1/9/2024 because the reading entered during 1/8/2024 measurement event was anomalous.
[9] indicates readings were provided by the United States Geological Survey:
https://waterdata.usgs.gov/monitoring-location/04118500/#parameterCode=00065&period=P7D&showMedian=false

TABLE 3
SUMMARY OF PORE-WATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Study Area	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast
Location		WVNW-PW-1	WVNW-PW-1	WVNW-PW-2	WVNW-PW-2	WVNW-PW-3	WVNW-PW-4	WVNW-PW-4	WVNW-PW-5	WVNW-PW-5	WVNW-PW-6	WVNW-PW-6	WVNW-PW-7	AREA19-PW-1	AREA19-PW-2	AREA19-PW-2	AREA19-PW-3
Sample Name		WVNW-PW-1(A)	WVNW-PW-1(B)	WVNW-PW-2(A)	WVNW-PW-2(B)	WVNW-PW-3(A)	WVNW-PW-4(A)	WVNW-PW-4(A)-DUP	WVNW-PW-5A	WVNW-PW-5A DUP	WVNW-PW-6A	WVNW-PW-6B	WVNW-PW-7A	Area19-PW-1(A)	Area19-PW-2(A)	Area19-PW-2(B)	Area19-PW-3(A)
Sample Depth (feet below the ground surface of the river bottom)		3.00- 3.13	4.00 - 4.13	2.33 - 2.46	3.33 - 3.46	1.50 - 1.63	1.67 - 1.79	1.67 - 1.79	1.00 - 1.13	1.00 - 1.13	1.00 - 1.13	1.70 - 1.83	1.30 - 1.43	1.00 - 1.13	1.00 - 1.13	1.42 - 1.54	1.00 - 1.13
Laboratory Sample ID		VL11053-012	VL11053-014	VL11053-010	VL11053-011	VL06012-013	VL06012-011	VL06012-012	XG22049-005	XG22049-006	XG22049-007	XG22049-008	XG22049-009	VL06012-001	VL06012-002	VL06012-003	VL06012-004
Sample Date		12/09/2020	12/09/2020	12/09/2020	12/09/2020	12/02/2020	12/02/2020	12/02/2020	07/20/2022	07/20/2022	07/20/2022	07/20/2022	07/20/2022	11/30/2020	11/30/2020	11/30/2020	11/30/2020
Parameter (µg/L)																	
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0069	<0.0074	<0.0075	<0.0074	<0.0074	<0.0073	<0.011	<0.0077	<0.0075
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0069	<0.0074	<0.0075	<0.0074	<0.0074	<0.0073	<0.011	<0.0077	<0.0075
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0069	<0.0074	<0.0075	<0.0074	<0.0074	<0.0073	<0.011	<0.0077	<0.0075
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0069	<0.0074	<0.0075	<0.0074	<0.0074	<0.0073	<0.011	<0.0077	<0.0075
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0069	<0.0074	<0.0075	<0.0074	<0.0074	<0.0073	<0.011	<0.0077	<0.0075
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0069	<0.0074	<0.0075	<0.0074	<0.0074	<0.0073	<0.011	<0.0077	<0.0075
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0069	<0.0074	<0.0075	<0.0074	<0.0074	<0.0073	<0.011	<0.0077	<0.0075
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0069	<0.0074	<0.0075	<0.0074	<0.0074	<0.0073	<0.011	<0.0077	<0.0075
Perfluorobutane sulfonic acid (PFBS)	670	0.0038	0.0045	0.0046	<0.0037	0.0051	0.01	0.011	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	0.013	0.016	0.012	0.015
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0054	<0.0038	<0.0037
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	0.0054	0.0069	0.0061	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	0.0093	<0.0054	<0.0038	0.0041
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0054	<0.0038	<0.0037
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0054	<0.0038	<0.0037
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	0.0053	0.0042	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0054	<0.0038	<0.0037
Perfluorohexane sulfonic acid (PFHxS)	0.21	<0.0038	<0.0038	<0.0039	<0.0037	0.0092	0.019	0.019	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	0.017	0.011	0.0083	0.011
Perfluorobutanoic acid (PFBA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	0.0063	0.0057	0.0041	0.0043	<0.0037	<0.0037	<0.0037	0.012	0.011	0.0075	0.0039
Perfluorodecanoic acid (PFDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0054	<0.0038	<0.0037
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0054	<0.0038	<0.0037
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	0.0088	0.0092	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	0.015	<0.0054	<0.0038	0.004
Perfluorohexanoic acid (PFHxA)	NA	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	0.0068	0.0076	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	0.013	0.0069	0.0053	<0.0037
Perfluorononanoic acid (PFNA)	0.03	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0054	<0.0038	<0.0037
Perfluorooctanoic acid (PFOA)	0.17	0.0055	0.0073	0.012	0.0075	0.028	0.066	0.065	0.0073	0.0077	<0.0037	<0.0037	<0.0037	0.11	0.03	0.019	0.033
Perfluorooctane sulfonic acid (PFOS)	0.012	0.007	0.0097	0.01	0.011	***0.26***	***0.1***	***0.094***	0.0075	0.0085	<0.0037	<0.0037	<0.0037	***0.13***	***0.03***	***0.024***	***0.089***
PFOA + PFOS (Calculated)	NCL	0.013	0.017	0.022	0.019	0.29	0.17	0.16	0.015	0.016	ND	ND	ND	0.24	0.06	0.043	0.12
Perfluoropentanoic acid (PFPeA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	0.004	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	0.0055	<0.0054	<0.0038	<0.0037
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0054	<0.0038	<0.0037
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0054	<0.0038	<0.0037
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0054	<0.0038	<0.0037
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0069	<0.0074	<0.0075	<0.0074	<0.0074	<0.0073	<0.011	<0.0077	<0.0075
Total PFAS (Calculated)	NCL	0.016	0.022	0.027	0.019	0.31	0.23	0.22	0.019	0.021	ND	ND	ND	0.32	0.1	0.076	0.16

TABLE 3
SUMMARY OF PORE-WATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Study Area	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale
Location		AREA19-PW-4	AREA19-PW-4	AREA19-PW-5	AREA19-PW-6	AREA19-PW-6	AREA19-PW-7	AREA19-PW-8	AREA19-PW-9	AREA19-PW-9	AREA19-PW-10	WV/CH-PW-1	WV/CH-PW-2	WV/CH-PW-3	WV/CH-PW-4	WV/CH-PW-5	WV/CH-PW-6
Sample Name		Area19-PW-4(A)	Area19-PW-4(B)	Area19-PW-5(A)	Area19-PW-6(A)	Area19-PW-6(B)	Area19-PW-7(A)	Area19-PW-8A	Area19-PW-9A	Area19-PW-9B	Area19-PW-10A	WV/CH-PW-1(A)	WV/CH-PW-2(A)	WV/CH-PW-3(A)	WV/CH-PW-4(A)	WV/CH-PW-5(A)	WV/CH-PW-6(A)
Sample Depth (feet below the ground surface of the river bottom)		1.00 - 1.13	1.42 - 1.54	1.00 - 1.13	1.50 - 1.63	2.00 - 2.13	5.00 - 5.13	1.00 - 1.13	1.00 - 1.13	1.50 - 1.63	1.00 - 1.13	0.75 - 0.88	0.75 - 0.88	1.00 - 1.13	1.00 - 1.13	0.83 - 0.96	1.00 - 1.13
Laboratory Sample ID		VL06012-005	VL06012-006	VL06012-007	VL06012-008	VL06012-009	VL06012-010	XG22049-001	XG22049-002	XG22049-003	XG22049-004	VL11053-001	VL11053-002	VL11053-003	VL11053-004	VL11053-005	VL11053-006
Sample Date		12/01/2020	12/01/2020	12/01/2020	12/01/2020	12/01/2020	12/01/2020	07/19/2022	07/19/2022	07/19/2022	07/19/2022	12/07/2020	12/07/2020	12/07/2020	12/07/2020	12/08/2020	12/08/2020
Parameter (µg/L)																	
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0073	<0.0071	<0.0075	<0.0069	<0.0078	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0073	<0.0071	<0.0075	<0.0069	<0.0078	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0073	<0.0071	<0.0075	<0.0069	<0.0078	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0073	<0.0071	<0.0075	<0.0069	<0.0078	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0073	<0.0071	<0.0075	<0.0069	<0.0078	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0073	<0.0071	<0.0075	<0.0069	<0.0078	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0073	<0.0071	<0.0075	<0.0069	<0.0078	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0073	<0.0071	<0.0075	<0.0069	<0.0078	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076
Perfluorobutane sulfonic acid (PFBS)	670	0.015	0.013	0.022	0.017	0.016	0.022	0.0073	0.0081	0.0099	0.0039	0.031	0.011	0.0045	0.015	0.017	0.0098
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0036	<0.0036	<0.0038	<0.0035	<0.0039	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038
Perfluoroheptane sulfonic acid (PFHpS)	NCL	0.0053	0.0054	0.013	0.0083	0.0086	0.0052	<0.0036	<0.0036	<0.0038	<0.0035	<0.0039	0.0054	<0.0038	<0.0039	<0.0038	<0.0038
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0036	<0.0036	<0.0038	<0.0035	<0.0039	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0036	<0.0036	<0.0038	<0.0035	<0.0039	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0037	<0.0037	0.0043	0.0038	<0.0037	0.0049	<0.0036	<0.0036	<0.0038	<0.0035	0.014	<0.0038	<0.0038	0.0041	0.0038	<0.0038
Perfluorohexane sulfonic acid (PFHxS)	0.21	0.016	0.013	0.022	0.014	0.014	0.021	0.0068	0.0064	0.0077	<0.0035	0.018	0.011	<0.0038	0.012	0.012	0.0087
Perfluorobutanoic acid (PFBA)	NCL	<0.0037	<0.0037	0.0083	0.0053	0.0051	0.0071	<0.0036	0.0036	<0.0038	<0.0035	<0.0039	<0.0038	<0.0038	0.0059	<0.0038	<0.0038
Perfluorodecanoic acid (PFDA)	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0036	<0.0036	<0.0038	<0.0035	<0.0039	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0036	<0.0036	<0.0038	<0.0035	<0.0039	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0037	<0.0037	0.0076	0.01	0.0093	0.013	<0.0036	<0.0036	<0.0038	<0.0035	0.0086	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038
Perfluorohexanoic acid (PFHxA)	NA	<0.0037	<0.0037	0.009	0.0084	0.0087	0.011	<0.0036	<0.0036	<0.0038	<0.0035	0.0068	0.0041	<0.0038	<0.0039	<0.0038	<0.0038
Perfluorononanoic acid (PFNA)	0.03	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0036	<0.0036	<0.0038	<0.0035	<0.0039	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038
Perfluorooctanoic acid (PFOA)	0.17	0.031	0.029	0.095	0.08	0.081	0.084	0.0063	0.0051	0.0057	<0.0035	0.044	0.043	0.01	0.024	0.019	0.01
Perfluorooctane sulfonic acid (PFOS)	0.012	***0.067***	***0.064***	***0.23***	***0.06***	***0.064***	***0.02***	0.0067	0.011	***0.014***	0.0071	***0.016***	***0.079***	***0.032***	***0.02***	***0.032***	***0.015***
PFOA + PFOS (Calculated)	NCL	0.098	0.093	0.33	0.14	0.15	0.1	0.013	0.016	0.02	0.0071	0.06	0.12	0.042	0.044	0.051	0.025
Perfluoropentanoic acid (PFPeA)	NCL	<0.0037	<0.0037	0.0041	<0.0037	<0.0037	0.0051	<0.0036	<0.0036	<0.0038	<0.0035	<0.0039	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0036	<0.0036	<0.0038	<0.0035	<0.0039	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0036	<0.0036	<0.0038	<0.0035	<0.0039	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0036	<0.0036	<0.0038	<0.0035	<0.0039	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0073	<0.0071	<0.0075	<0.0069	<0.0078	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076
Total PFAS (Calculated)	NCL	0.13	0.12	0.42	0.21	0.21	0.19	0.027	0.034	0.037	0.011	0.14	0.15	0.047	0.081	0.084	0.044

TABLE 3
SUMMARY OF PORE-WATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Study Area	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	Wolven-North Childsdale	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast
Location		WV/CH-PW-6	HS-PW-1	HS-PW-1	HS-PW-2	HS-PW-2.5	HS-PW-2.5	HS-PW-3	HS-PW-3R	HS-PW-3R	HS-PW-3.5	HS-PW-4	HS-PW-5	HS-PW-6	HS-PW-7	HS-PW-8	HS-PW-9
Sample Name		WV/CH-PW-6(B)	HS-PW-1(A)	HS-PW-1(B)	HS-PW-2(A)	HS-PW-2.5 (A)	HS-PW-2.5 (B)	HS-PW-3(A)	HS-PW-3 (A)	HS-PW-3 (A) DUP	HS-PW-3.5 (A)	HS-PW-4(A)	HS-PW-5(A)	HS-PW-6(A)	HS-PW-7(A)	HS-PW-8(A)	HS-PW-9(A)
Sample Depth (feet below the ground surface of the river bottom)		2.00 - 2.13	2.00 - 2.13	2.50 - 2.63	1.00 - 1.13	0.50 - 0.63	1.00 - 1.13	1.33 - 1.46	0.50 - 0.63	0.50 - 0.63	0.83 - 0.96	0.75 - 0.88	1.33 - 1.46	1.00 - 1.13	1.50 - 1.63	1.00 - 1.13	1.00 - 1.13
Laboratory Sample ID		VL11053-007	VL06031-001	VL06031-002	VL06031-003	WA28027-001	WA28027-002	VL06031-006	WA28027-003	WA28027-004	WA28027-005	VL06031-007	VL06031-008	VL06031-009	VL06031-004	VL11053-008	VL11070-001
Sample Date		12/08/2020	12/03/2020	12/03/2020	12/03/2020	01/26/2021	01/26/2021	12/04/2020	01/26/2021	01/26/2021	01/26/2021	12/04/2020	12/04/2020	12/04/2020	12/03/2020	12/08/2020	12/08/2020
Parameter (µg/L)																	
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0077	<0.0076	<0.0073	<0.0077	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076	<0.0075	<0.0072	<0.0072
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0077	<0.0076	<0.0073	<0.0077	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076	<0.0075	<0.0072	<0.0072
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0077	<0.0076	<0.0073	<0.0077	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076	<0.0075	<0.0072	<0.0072
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0077	<0.0076	<0.0073	<0.0077	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076	<0.0075	<0.0072	<0.0072
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0077	<0.0076	<0.0073	<0.0077	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076	<0.0075	<0.0072	<0.0072
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0077	<0.0076	<0.0073	<0.0077	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076	<0.0075	<0.0072	<0.0072
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0077	<0.0076	<0.0073	<0.0077	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076	0.078	0.044	<0.0072
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0077	<0.0076	<0.0073	<0.0077	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076	<0.0075	<0.0072	<0.0072
Perfluorobutane sulfonic acid (PFBS)	670	0.0095	0.0087	0.0083	<0.0038	<0.018	0.0075	0.011	<0.019	<0.017	0.032	0.05	<0.0039	<0.0038	0.0095	<0.0036	<0.0036
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0038	<0.0038	<0.0036	<0.0038	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038	<0.0037	<0.0036	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0038	<0.0038	<0.0036	<0.0038	<0.018	0.0074	0.023	0.019	0.018	<0.0036	<0.0037	<0.0039	<0.0038	<0.0037	<0.0036	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0038	<0.0038	<0.0036	<0.0038	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038	<0.0037	<0.0036	<0.0036
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0038	<0.0038	<0.0036	<0.0038	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038	<0.0037	<0.0036	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0038	<0.0038	<0.0036	<0.0038	<0.018	0.0056	0.0068	<0.019	<0.017	0.017	0.035	<0.0039	<0.0038	<0.0037	<0.0036	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	0.21	0.0099	<0.0038	<0.0036	<0.0038	0.025	0.02	0.042	0.028	0.026	0.019	0.056	<0.0039	<0.0038	0.0058	<0.0036	<0.0036
Perfluorobutanoic acid (PFBA)	NCL	<0.0038	<0.0038	<0.0036	<0.0038	0.021	0.0091	0.022	0.021	0.02	0.0095	0.015	<0.0039	<0.0038	0.0047	<0.0036	<0.0036
Perfluorodecanoic acid (PFDA)	NCL	<0.0038	<0.0038	<0.0036	<0.0038	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038	<0.0037	<0.0036	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0038	<0.0038	<0.0036	<0.0038	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038	<0.0037	<0.0036	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0038	<0.0038	<0.0036	<0.0038	<0.018	0.0056	0.016	<0.019	<0.017	0.0072	0.022	<0.0039	<0.0038	<0.0037	<0.0036	<0.0036
Perfluorohexanoic acid (PFHxA)	NA	<0.0038	<0.0038	<0.0036	<0.0038	0.033	0.015	0.045	0.041	0.038	0.012	0.027	<0.0039	<0.0038	<0.0037	<0.0036	<0.0036
Perfluorononanoic acid (PFNA)	0.03	<0.0038	<0.0038	<0.0036	<0.0038	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038	<0.0037	<0.0036	<0.0036
Perfluorooctanoic acid (PFOA)	0.17	0.008	<0.0038	<0.0036	0.0046	0.054	0.025	0.074	0.077	0.071	0.021	0.074	0.0079	0.007	0.0038	0.007	<0.0036
Perfluorooctane sulfonic acid (PFOS)	0.012	<0.0038	<0.0038	<0.0036	0.0052	***0.82***	***0.56***	***1.1***	***0.9***	***0.9***	***0.092***	***0.013***	***0.03***	0.0046	0.0089	***0.026***	0.0082
PFOA + PFOS (Calculated)	NCL	0.008	ND	ND	0.0098	0.87	0.59	1.2	0.98	0.97	0.11	0.087	0.038	0.012	0.013	0.033	0.0082
Perfluoropentanoic acid (PFPeA)	NCL	<0.0038	<0.0038	<0.0036	<0.0038	0.027	0.011	0.027	0.023	0.022	0.006	0.015	<0.0039	<0.0038	<0.0037	<0.0036	<0.0036
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0038	<0.0038	<0.0036	<0.0038	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038	<0.0037	<0.0036	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0038	<0.0038	<0.0036	<0.0038	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038	<0.0037	<0.0036	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0038	<0.0038	<0.0036	<0.0038	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038	<0.0037	<0.0036	<0.0036
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0077	<0.0076	<0.0073	<0.0077	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076	<0.0075	<0.0072	<0.0072
Total PFAS (Calculated)	NCL	0.027	0.0087	0.0083	0.0098	0.98	0.67	1.4	1.1	1.1	0.22	0.31	0.038	0.012	0.11	0.077	0.0082

TABLE 3
SUMMARY OF PORE-WATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Study Area	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	House Street Property Northwest	House Street Property Northwest
Location		HS-PW-10	HS-PW-11
Sample Name		HS-PW-10(A)	HS-PW-11(A)
Sample Depth (feet below the ground surface of the river bottom)		5.00 - 5.13	4.50 - 4.63
Laboratory Sample ID		VL11070-010	VL11053-009
Sample Date		12/09/2020	12/09/2020
Parameter (µg/L)			
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0073	<0.0075
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0073	<0.0075
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0073	<0.0075
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0073	<0.0075
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0073	<0.0075
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0073	<0.0075
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0073	<0.0075
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0073	<0.0075
Perfluorobutane sulfonic acid (PFBS)	670	<0.0036	<0.0038
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0036	<0.0038
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0036	<0.0038
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0036	<0.0038
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0036	<0.0038
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0036	<0.0038
Perfluorohexane sulfonic acid (PFHxS)	0.21	<0.0036	<0.0038
Perfluorobutanoic acid (PFBA)	NCL	<0.0036	<0.0038
Perfluorodecanoic acid (PFDA)	NCL	<0.0036	<0.0038
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0036	<0.0038
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0036	<0.0038
Perfluorohexanoic acid (PFHxA)	NA	<0.0036	<0.0038
Perfluorononanoic acid (PFNA)	0.03	<0.0036	<0.0038
Perfluorooctanoic acid (PFOA)	0.17	<0.0036	<0.0038
Perfluorooctane sulfonic acid (PFOS)	0.012	<0.0036	<0.0038
PFOA + PFOS (Calculated)	NCL	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	<0.0036	<0.0038
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0036	<0.0038
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0036	<0.0038
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0036	<0.0038
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0073	<0.0075
Total PFAS (Calculated)	NCL	ND	ND

TABLE 3 NOTES
GSI Investigation
Algoma Township, Kent County, MI

NOTES:

1. Concentration and criteria units are micrograms per Liter (µg/L) or parts per billion (ppb). Calculated criteria and concentrations are rounded to two significant digits.
2. Michigan Part 201 Groundwater Cleanup Criteria are based on "Table 1, Groundwater: Residential and Nonresidential Part 201 Generic Cleanup Criteria and Screening Levels/Part 213 Tier I Risk Based Screening Levels," Michigan Administrative Code, Cleanup Criteria Requirements for Response Activity, Rules 299.44 and 299.49, effective December 30, 2013; last updated October 12, 2023.
   Abbreviations Include:
   "NCL" indicates no criterion listed in Michigan Part 201 Table 1.
   "NA" indicates not available.
3. The Groundwater Surface Water Interface (GSI) criteria are derived using surface water concentrations, but for the purpose of this evaluation they were used for the evaluation of pore-water data to aid in evaluating compliance at the surface water compliance point. This does not imply that GSI criteria are necessarily applicable to the pore-water concentrations.
4. Bold, italic number with thick line border or italic parameter name indicates that parameter was detected above the Michigan Part 201 Groundwater Cleanup Criteria listed.
5. Abbreviations include:
   "< LOQ" indicates the parameter was analyzed for but not detected above the limit of quantitation (LOQ).
   "DUP" indicates a duplicate sample.
   "ND" indicates the parameters used in the calculation were not detected.
6. Screen interval presented is the top of the screen to the bottom of the screen in feet below ground surface.

TABLE 4
SUMMARY OF VAP GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest
Vertical Aquifer Profiling (VAP) Location		WVNW-MW-200	WVNW-MW-200	WVNW-MW-200	WVNW-MW-200	WVNW-MW-200	WVNW-MW-200	WVNW-MW-200	WVNW-MW-201	WVNW-MW-201	WVNW-MW-201	WVNW-MW-201	WVNW-MW-201	WVNW-MW-202	WVNW-MW-202	WVNW-MW-202	WVNW-MW-202
Sample Name		WVNW-MW-200 (14-19)	WVNW-MW-200 (14-19)DUP	WVNW-MW-200 (24-29)	WVNW-MW-200 (34-39)	WVNW-MW-200 (44-49)	WVNW-MW-200 (54-59)	WVNW-MW-200 (64-69)	WVNW-MW-201 (19-24)	WVNW-MW-201 (9-14)	WVNW-MW-201 (29-34)	WVNW-MW-201 (39-44)	WVNW-MW-201 (49-54)	WVNW-MW-202 (10-15)	WVNW-MW-202 (20-25)	WVNW-MW-202 (30-35)	WVNW-MW-202 (40-45)
Screen Interval (feet below ground surface)		14-19	14-19	24-29	34-39	44-49	54-59	64-69	19-24	9-14	29-34	39-44	49-54	10-15	20-25	30-35	40-45
Laboratory Sample ID		XD11006-001	XD11006-003	XD11006-004	XD11006-005	XD11006-006	XD11006-007	XD11006-008	XD11006-010	XD11006-009	XD11006-011	XD11006-012	XD11006-013	XI10007-001	XI10007-002	XI10007-003	XI10007-004
Sample Date		04/04/2022	04/04/2022	04/04/2022	04/04/2022	04/05/2022	04/05/2022	04/05/2022	04/06/2022	04/06/2022	04/07/2022	04/07/2022	04/07/2022	09/06/2022	09/06/2022	09/06/2022	09/07/2022
Parameter (µg/L)																	
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0078	<0.0076	<0.0072	<0.0076	<0.0074	<0.0078	<0.0072	<0.0072	<0.0077	<0.0078	<0.0074	<0.0079	<0.0069	<0.0071	<0.0071	<0.0073 [H]
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0078	<0.0076	<0.0072	<0.0076	<0.0074	<0.0078	<0.0072	<0.0072	<0.0077	<0.0078	<0.0074	<0.0079	<0.0069	<0.0071	<0.0071	<0.0073 [H]
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0078	<0.0076	<0.0072	<0.0076	<0.0074	<0.0078	<0.0072	<0.0072	<0.0077	<0.0078	<0.0074	<0.0079	<0.0069	<0.0071	<0.0071	<0.0073 [H]
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0078	<0.0076	<0.0072	<0.0076	<0.0074	<0.0078	<0.0072	<0.0072	<0.0077	<0.0078	<0.0074	<0.0079	<0.0069	<0.0071	<0.0071	<0.0073 [H]
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0078	<0.0076	<0.0072	<0.0076	<0.0074	<0.0078	<0.0072	<0.0072	<0.0077	<0.0078	<0.0074	<0.0079	<0.0069	<0.0071	<0.0071	<0.0073 [H]
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0078	<0.0076	<0.0072	<0.0076	<0.0074	<0.0078	<0.0072	<0.0072	<0.0077	<0.0078	<0.0074	<0.0079	<0.0069	<0.0071	<0.0071	<0.0073 [H]
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0078	<0.0076	<0.0072	<0.0076	<0.0074	<0.0078	<0.0072	<0.0072	<0.0077	<0.0078	<0.0074	<0.0079	<0.0069	<0.0071	<0.0071	<0.0073 [H]
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0078	<0.0076	<0.0072	<0.0076	<0.0074	<0.0078	<0.0072	<0.0072	<0.0077	<0.0078	<0.0074	<0.0079	<0.0069	<0.0071	<0.0071	<0.0073 [H]
Perfluorobutane sulfonic acid (PFBS)	670	<0.0039	<0.0038	0.0048	0.0085	0.0099	0.0097	0.0095	0.011	0.0068	0.0086	0.01	0.01	<0.0034	0.047	0.033	0.0052 [H]
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0039	<0.0038	<0.0036	<0.0038	<0.0037	<0.0039	<0.0036	<0.0036	<0.0038	<0.0039	<0.0037	<0.004	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0039	<0.0038	<0.0036	0.0046	0.007	0.01	0.0059	0.014	<0.0038	0.024	0.019	0.018	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0039	<0.0038	<0.0036	<0.0038	<0.0037	<0.0039	<0.0036	<0.0036	<0.0038	<0.0039	<0.0037	<0.004	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0039	<0.0038	<0.0036	<0.0038	<0.0037	<0.0039	<0.0036	<0.0036	<0.0038	<0.0039	<0.0037	<0.004	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0039	<0.0038	<0.0036	<0.0038	<0.0037	0.0044	<0.0036	0.006	<0.0038	0.0048	0.0061	0.0058	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Perfluorohexane sulfonic acid (PFHxS)	0.21	<0.0039	<0.0038	0.0066	0.01	0.014	0.019	0.013	0.031	0.015	0.031	0.029	0.037	<0.0034	<0.0036	<0.0035	0.0049 [H]
Perfluorobutanoic acid (PFBA)	NCL	<0.0039	<0.0038	<0.0036	0.0045	0.0062	0.009	0.0047	0.011	<0.0038	0.0063	<0.0037	0.0068	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Perfluorodecanoic acid (PFDA)	NCL	<0.0039	<0.0038	<0.0036	<0.0038	<0.0037	<0.0039	<0.0036	<0.0036	<0.0038	<0.0039	<0.0037	<0.004	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0039	<0.0038	<0.0036	<0.0038	<0.0037	<0.0039	<0.0036	<0.0036	<0.0038	<0.0039	<0.0037	<0.004	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0039	<0.0038	<0.0036	0.0064	0.0088	0.011	0.0066	0.019	0.0077	0.0088	0.0061	0.01	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Perfluorohexanoic acid (PFHxA)	NA	<0.0039	<0.0038	<0.0036	0.0068	0.0092	0.012	0.0056	0.011	0.0044	0.011	0.0053	0.0091	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Perfluorononanoic acid (PFNA)	0.03	<0.0039	<0.0038	<0.0036	<0.0038	<0.0037	<0.0039	<0.0036	<0.0036	<0.0038	<0.0039	<0.0037	<0.004	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Perfluorooctanoic acid (PFOA)	0.17	<0.0039	<0.0038	0.027	0.046	0.057	0.085	0.049	0.14	0.066	0.12	0.076	0.1	<0.0034	<0.0036	<0.0035	0.01 [H]
Perfluorooctane sulfonic acid (PFOS)	0.012	0.009	0.0093	***0.089***	***0.11***	***0.15***	***0.23***	***0.14***	***0.43***	***0.073***	***0.6***	***0.59***	***0.55***	<0.0034	<0.0036	<0.0035	***0.013 [H]***
PFOA + PFOS (Calculated)	NCL	0.009	0.0093	0.12	0.16	0.21	0.32	0.19	0.57	0.14	0.72	0.67	0.65	ND	ND	ND	0.023
Perfluoropentanoic acid (PFPeA)	NCL	<0.0039	<0.0038	<0.0036	0.0039	0.0061	0.0082	0.0036	0.0071	<0.0038	0.0065	<0.0037	0.0042	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0039	<0.0038	<0.0036	<0.0038	<0.0037	<0.0039	<0.0036	<0.0036	<0.0038	<0.0039	<0.0037	<0.004	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0039	<0.0038	<0.0036	<0.0038	<0.0037	<0.0039	<0.0036	<0.0036	<0.0038	<0.0039	<0.0037	<0.004	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0039	<0.0038	<0.0036	<0.0038	<0.0037	<0.0039	<0.0036	<0.0036	<0.0038	<0.0039	<0.0037	<0.004	<0.0034	<0.0036	<0.0035	<0.0036 [H]
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0078	<0.0076	<0.0072	<0.0076	<0.0074	<0.0078	<0.0072	<0.0072	<0.0077	<0.0078	<0.0074	<0.0079	<0.0069	<0.0071	<0.0071	<0.0073 [H]
Total PFAS (Calculated)	NCL	0.009	0.0093	0.13	0.2	0.27	0.4	0.24	0.68	0.17	0.82	0.74	0.75	ND	0.047	0.033	0.033

TABLE 4
SUMMARY OF VAP GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast
Vertical Aquifer Profiling (VAP) Location		WVNW-MW-202	WVNW-MW-202	WVNW-MW-202	AREA19-MW-7	AREA19-MW-7	AREA19-MW-7	AREA19-MW-7	AREA19-MW-7	AREA19-MW-7	AREA19-MW-7	AREA19-MW-7	AREA19-MW-7	AREA19-MW-7	AREA19-MW-7	AREA19-MW-221	AREA19-MW-221
Sample Name		WVNW-MW-202 (50-55)	WVNW-MW-202 (60-65)	WVNW-MW-202 (70-75)	Area 19-MW-7 (9-14)	Area 19-MW-7 (19-24)	Area 19-MW-7 (29-34)	Area 19-MW-7 (39-44)	Area 19-MW-7 (54-59)	Area 19-MW-7 (64-69)	Area 19-MW-7 (74-79)	Area 19-MW-7 (84-89)	Area 19-MW-7 (94-99)	Area 19-MW-7 (104-109)	Area 19-MW-7 (114-119)	Area 19-MW-221 (14-19)	Area 19-MW-221 (24-29)
Screen Interval (feet below ground surface)		50-55	60-65	70-75	9-14	19-24	29-34	39-44	54-59	64-69	74-79	84-89	94-99	104-109	114-119	14-19	24-29
Laboratory Sample ID		XI10007-005	XI10007-006	XI10007-007	XD02008-001	XD02008-002	XD02008-003	XD02008-004	XD11008-001	XD11008-002	XD11008-003	XD11008-004	XD11008-005	XD11008-006	XD11008-007	XB19008-001	XB19008-002
Sample Date		09/07/2022	09/07/2022	09/07/2022	03/29/2022	03/29/2022	03/31/2022	03/31/2022	04/06/2022	04/06/2022	04/06/2022	04/07/2022	04/07/2022	04/07/2022	04/08/2022	02/14/2022	02/14/2022
Parameter (µg/L)																	
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.008 [H]	<0.0074 [H]	<0.0073 [H]	<0.0071	<0.0071	<0.0071	<0.0072	<0.01	<0.007	<0.0073	<0.0072	<0.0075	<0.0071	<0.0072	<0.008	<0.0078
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.008 [H]	<0.0074 [H]	<0.0073 [H]	<0.0071	<0.0071	<0.0071	<0.0072	<0.01	<0.007	<0.0073	<0.0072	<0.0075	<0.0071	<0.0072	<0.008	<0.0078
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.008 [H]	<0.0074 [H]	<0.0073 [H]	<0.0071	<0.0071	<0.0071	<0.0072	<0.01	<0.007	<0.0073	<0.0072	<0.0075	<0.0071	<0.0072	<0.008	<0.0078
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.008 [H]	<0.0074 [H]	<0.0073 [H]	<0.0071	<0.0071	<0.0071	<0.0072	<0.01	<0.007	<0.0073	<0.0072	<0.0075	<0.0071	<0.0072	<0.008	<0.0078
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.008 [H]	<0.0074 [H]	<0.0073 [H]	<0.0071	<0.0071	<0.0071	<0.0072	<0.01	<0.007	<0.0073	<0.0072	<0.0075	<0.0071	<0.0072	<0.008	<0.0078
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.008 [H]	<0.0074 [H]	<0.0073 [H]	<0.0071	<0.0071	<0.0071	<0.0072	<0.01	<0.007	<0.0073	<0.0072	<0.0075	<0.0071	<0.0072	<0.008	<0.0078
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.008 [H]	<0.0074 [H]	<0.0073 [H]	<0.0071	<0.0071	<0.0071	<0.0072	<0.01	<0.007	<0.0073	<0.0072	<0.0075	<0.0071	<0.0072	<0.008	<0.0078
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.008 [H]	<0.0074 [H]	<0.0073 [H]	<0.0071	<0.0071	<0.0071	<0.0072	<0.01	<0.007	<0.0073	<0.0072	<0.0075	<0.0071	<0.0072	<0.008	<0.0078
Perfluorobutane sulfonic acid (PFBS)	670	0.0084 [H]	0.009 [H]	0.0086 [H]	0.011	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	0.0055	0.0068
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	<0.0035	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	<0.0035	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Perfluorononane sulfonic acid (PFNS)	NCL	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	<0.0035	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Perfluorooctane sulfonamide (FOSA)	NCL	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	<0.0035	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	0.0036	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Perfluorohexane sulfonic acid (PFHxS)	0.21	0.0077 [H]	0.0091 [H]	0.0084 [H]	0.0079	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	0.0058	0.0061
Perfluorobutanoic acid (PFBA)	NCL	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	0.0042	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Perfluorodecanoic acid (PFDA)	NCL	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	<0.0035	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Perfluorododecanoic acid (PFDoDA)	NCL	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	<0.0035	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Perfluoroheptanoic acid (PFHpA)	NCL	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	0.0044	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Perfluorohexanoic acid (PFHxA)	NA	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	0.0047	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Perfluorononanoic acid (PFNA)	0.03	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	<0.0035	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Perfluorooctanoic acid (PFOA)	0.17	0.021 [H]	0.023 [H]	0.023 [H]	0.04	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	0.025	0.03
Perfluorooctane sulfonic acid (PFOS)	0.012	***0.06 [H]***	***0.085 [H]***	***0.082 [H]***	***0.099***	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	***0.042***	***0.026***
PFOA + PFOS (Calculated)	NCL	0.081	0.11	0.11	0.14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.067	0.056
Perfluoropentanoic acid (PFPeA)	NCL	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	<0.0035	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	<0.0035	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	<0.0035	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.004 [H]	<0.0037 [H]	<0.0036 [H]	<0.0035	<0.0035	<0.0036	<0.0036	<0.0052	<0.0035	<0.0037	<0.0036	<0.0038	<0.0035	<0.0036	<0.004	<0.0039
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.008 [H]	<0.0074 [H]	<0.0073 [H]	<0.0071	<0.0071	<0.0071	<0.0072	<0.01	<0.007	<0.0073	<0.0072	<0.0075	<0.0071	<0.0072	<0.008	<0.0078
Total PFAS (Calculated)	NCL	0.097	0.13	0.12	0.17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.078	0.069

TABLE 4
SUMMARY OF VAP GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	North Childsdale	North Childsdale	North Childsdale
Vertical Aquifer Profiling (VAP) Location		AREA19-MW-221	AREA19-MW-221	AREA19-MW-221	AREA19-MW-222	AREA19-MW-222	AREA19-MW-223	AREA19-MW-223	AREA19-MW-224	AREA19-MW-225	AREA19-MW-225	AREA19-MW-225	AREA19-MW-226	AREA19-MW-226	WV/CH-MW-240	WV/CH-MW-241	WV/CH-MW-241
Sample Name		Area 19-MW-221 (34-39)	Area 19-MW-221 (44-49)	Area 19-MW-221 (53-58)	Area 19-MW-222 (4-9)	Area 19-MW-222 (14-19)	Area 19-MW-223 (4-9)	Area 19-MW-223 (14-19)	Area19-MW-224 (4-9)	Area19-MW-225 (5-10)	Area19-MW-225 (12.5-17.5)	Area19-MW-225 (30-35)	AREA 19-MW-226 (3-8)	AREA 19-MW-226 (13-18)	WV/CH-MW-240 (63-68)	WV/CH-MW-241 (18-23)	WV/CH-MW-241 (34-39)
Screen Interval (feet below ground surface)		34-39	44-49	53-58	4-9	14-19	4-9	14-19	4-9	5-10	12.5-17.5	30-35	3-8	13-18	63-68	18-23	34-39
Laboratory Sample ID		XB19008-003	XB19008-004	XB19008-005	XB19008-008	XB19008-009	XB19008-006	XB19008-007	XB12008-003	XI17015-001	XI17015-002	XI17015-003	YC25008-001	YC25008-002	XB12008-001	XB12008-002	XG01035-005
Sample Date		02/15/2022	02/15/2022	02/15/2022	02/18/2022	02/18/2022	02/16/2022	02/16/2022	02/10/2022	09/16/2022	09/16/2022	09/16/2022	03/23/2023	03/23/2023	02/07/2022	02/08/2022	06/29/2022
Parameter (µg/L)																	
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0075	<0.0088	<0.0079	<0.0083	<0.0097	<0.0084	<0.0075	<0.0076	<0.0078	<0.0072	<0.0075	<0.0074	<0.007	<0.0085	<0.0076	<0.0074
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0075	<0.0088	<0.0079	<0.0083	<0.0097	<0.0084	<0.0075	<0.0076	<0.0078	<0.0072	<0.0075	<0.0074	<0.007	<0.0085	<0.0076	<0.0074
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0075	<0.0088	<0.0079	<0.0083	<0.0097	<0.0084	<0.0075	<0.0076	<0.0078	<0.0072	<0.0075	<0.0074	<0.007	<0.0085	<0.0076	<0.0074
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0075	<0.0088	<0.0079	<0.0083	<0.0097	<0.0084	<0.0075	<0.0076	<0.0078	<0.0072	<0.0075	<0.0074	<0.007	<0.0085	<0.0076	<0.0074
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0075	<0.0088	<0.0079	<0.0083	<0.0097	<0.0084	<0.0075	<0.0076	<0.0078	<0.0072	<0.0075	<0.0074	<0.007	<0.0085	<0.0076	<0.0074
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0075	<0.0088	<0.0079	<0.0083	<0.0097	<0.0084	<0.0075	<0.0076	<0.0078	<0.0072	<0.0075	<0.0074	<0.007	<0.0085	<0.0076	<0.0074
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0075	<0.0088	<0.0079	<0.0083	<0.0097	<0.0084	<0.0075	<0.0076	<0.0078	<0.0072	<0.0075	<0.0074	<0.007	<0.0085	<0.0076	<0.0074
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0075	<0.0088	<0.0079	<0.0083	<0.0097	<0.0084	<0.0075	<0.0076	<0.0078	<0.0072	<0.0075	<0.0074	<0.007	<0.0085	<0.0076	<0.0074
Perfluorobutane sulfonic acid (PFBS)	670	0.0062	0.0072	0.0058	0.011	<0.0049	0.028	0.013	0.027	0.0071	0.0037	<0.0038	0.0065	<0.0035	0.034	0.0063	<0.0037
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0038	<0.0044	<0.004	<0.0041	<0.0049	<0.0042	<0.0037	<0.0038	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	<0.0042	<0.0038	<0.0037
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0038	<0.0044	<0.004	0.0074	<0.0049	0.0095	<0.0037	0.0093	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	0.018	<0.0038	<0.0037
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0038	<0.0044	<0.004	<0.0041	<0.0049	<0.0042	<0.0037	<0.0038	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	<0.0042	<0.0038	<0.0037
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0038	<0.0044	<0.004	<0.0041	<0.0049	<0.0042	<0.0037	<0.0038	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	<0.0042	<0.0038	<0.0037
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0038	<0.0044	<0.004	<0.0041	<0.0049	0.01	0.0046	0.012	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	0.0071	<0.0038	<0.0037
Perfluorohexane sulfonic acid (PFHxS)	0.21	0.0047	0.0044	<0.004	0.012	<0.0049	0.036	0.013	0.027	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	0.029	<0.0038	<0.0037
Perfluorobutanoic acid (PFBA)	NCL	<0.0038	<0.0044	<0.004	<0.0041	<0.0049	0.0048	<0.0037	0.0087	0.0042	0.004	<0.0038	<0.0037	<0.0035	0.0065	<0.0038	<0.0037
Perfluorodecanoic acid (PFDA)	NCL	<0.0038	<0.0044	<0.004	<0.0041	<0.0049	<0.0042	<0.0037	<0.0038	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	<0.0042	<0.0038	<0.0037
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0038	<0.0044	<0.004	<0.0041	<0.0049	<0.0042	<0.0037	<0.0038	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	<0.0042	<0.0038	<0.0037
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0038	<0.0044	<0.004	0.0048	<0.0049	0.015	0.0079	0.012	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	0.013	<0.0038	<0.0037
Perfluorohexanoic acid (PFHxA)	NA	<0.0038	<0.0044	<0.004	0.0061	<0.0049	0.011	0.0059	0.012	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	0.014	<0.0038	<0.0037
Perfluorononanoic acid (PFNA)	0.03	<0.0038	<0.0044	<0.004	<0.0041	<0.0049	<0.0042	<0.0037	<0.0038	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	<0.0042	<0.0038	<0.0037
Perfluorooctanoic acid (PFOA)	0.17	0.0065	0.0096	0.0076	0.061	0.018	0.14	0.038	0.09	0.0071	0.0067	<0.0038	<0.0037	<0.0035	0.13	0.021	0.0073
Perfluorooctane sulfonic acid (PFOS)	0.012	***0.019***	***0.024***	***0.019***	***0.14***	***0.03***	***0.11***	***0.035***	***0.6***	***0.028***	***0.023***	<0.0038	0.0037	<0.0035	***0.11***	***0.028***	***0.021***
PFOA + PFOS (Calculated)	NCL	0.026	0.034	0.027	0.2	0.048	0.25	0.073	0.69	0.035	0.03	ND	0.0037	ND	0.24	0.049	0.028
Perfluoropentanoic acid (PFPeA)	NCL	<0.0038	<0.0044	<0.004	<0.0041	<0.0049	<0.0042	<0.0037	<0.0038	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	<0.0042	<0.0038	<0.0037
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0038	<0.0044	<0.004	<0.0041	<0.0049	<0.0042	<0.0037	<0.0038	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	<0.0042	<0.0038	<0.0037
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0038	<0.0044	<0.004	<0.0041	<0.0049	<0.0042	<0.0037	<0.0038	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	<0.0042	<0.0038	<0.0037
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0038	<0.0044	<0.004	<0.0041	<0.0049	<0.0042	<0.0037	<0.0038	<0.0039	<0.0036	<0.0038	<0.0037	<0.0035	<0.0042	<0.0038	<0.0037
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0075	<0.0088	<0.0079	<0.0083	<0.0097	<0.0084	<0.0075	<0.0076	<0.0078	<0.0072	<0.0075	<0.0074	<0.007	<0.0085	<0.0076	<0.0074
Total PFAS (Calculated)	NCL	0.036	0.045	0.032	0.24	0.048	0.36	0.12	0.8	0.046	0.037	ND	0.01	ND	0.36	0.055	0.028

TABLE 4
SUMMARY OF VAP GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	North Childsdale	North Childsdale	North Childsdale	North Childsdale	North Childsdale	North Childsdale	North Childsdale	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast
Vertical Aquifer Profiling (VAP) Location		WV/CH-MW-241	WV/CH-MW-241	WV/CH-MW-242	WV/CH-MW-242	WV/CH-MW-242	WV/CH-MW-242	WV/CH-MW-242	HS-MW-260	HS-MW-260	HS-MW-260	HS-MW-260	HS-MW-260	HS-MW-261	HS-MW-261	HS-MW-261	HS-MW-261
Sample Name		WV/CH-MW-241 (44-49)	WV/CH-MW-241 (54-59)	WV/CH-MW-242 (38-43)	WV/CH-MW-242 (48-53)	WV/CH-MW-242 (63-68)	WV/CH-MW-242 (73-78)	WV/CH-MW-242 (83-88)	HS-MW 260 (5-10)	HS-MW 260 (15-20)	HS-MW 260 (25-30)	HS-MW 260 (35-40)	HS-MW 260 (45-50)	HS-MW 261 (5-10)	HS-MW 261 (15-20)	HS-MW 261 (25-30)	HS-MW 261 (35-40)
Screen Interval (feet below ground surface)		44-49	54-59	38-43	48-53	63-68	73-78	83-88	5-10	15-20	25-30	35-40	45-50	5-10	15-20	25-30	35-40
Laboratory Sample ID		XG01035-006	XG01035-007	XD01011-001	XD01011-002	XD01011-003	XD01011-004	XD01011-005	XF25018-001	XF25018-002	XF25018-003	XF25018-004	XF25018-005	XF25018-006	XF25018-007	XF25014-001	XF25014-002
Sample Date		06/29/2022	06/29/2022	03/29/2022	03/29/2022	03/29/2022	03/30/2022	03/30/2022	06/20/2022	06/20/2022	06/21/2022	06/21/2022	06/21/2022	06/22/2022	06/22/2022	06/22/2022	06/23/2022
Parameter (µg/L)																	
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0071	<0.0073	<0.0079	<0.0079	<0.0077	<0.0075	<0.0075	<0.0069	<0.0072	<0.0071	<0.0069	<0.0071	<0.007	<0.007	<0.007	<0.0071
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0071	<0.0073	<0.0079	<0.0079	<0.0077	<0.0075	<0.0075	<0.0069	<0.0072	<0.0071	<0.0069	<0.0071	<0.007	<0.007	<0.007	<0.0071
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0071	<0.0073	<0.0079	<0.0079	<0.0077	<0.0075	<0.0075	<0.0069	<0.0072	<0.0071	<0.0069	<0.0071	<0.007	<0.007	<0.007	<0.0071
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0071	<0.0073	<0.0079	<0.0079	<0.0077	<0.0075	<0.0075	<0.0069	<0.0072	<0.0071	<0.0069	<0.0071	<0.007	<0.007	<0.007	<0.0071
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0071	<0.0073	<0.0079	<0.0079	<0.0077	<0.0075	<0.0075	<0.0069	<0.0072	<0.0071	<0.0069	<0.0071	<0.007	<0.007	<0.007	<0.0071
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0071	<0.0073	<0.0079	<0.0079	<0.0077	<0.0075	<0.0075	<0.0069	<0.0072	<0.0071	<0.0069	<0.0071	<0.007	<0.007	<0.007	<0.0071
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0071	<0.0073	<0.0079	<0.0079	<0.0077	<0.0075	<0.0075	<0.0069	<0.0072	<0.0071	<0.0069	<0.0071	<0.007	<0.007	<0.007	<0.0071
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0071	<0.0073	<0.0079	<0.0079	<0.0077	<0.0075	<0.0075	<0.0069	<0.0072	<0.0071	<0.0069	<0.0071	<0.007	<0.007	<0.007	<0.0071
Perfluorobutane sulfonic acid (PFBS)	670	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	0.0051	0.0067	0.0059	0.027	0.0077	0.012	0.01	0.016	0.045
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	0.004	<0.0036	<0.0036	<0.0035	<0.0035	0.016	<0.0035	<0.0035	<0.0035
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	0.018	<0.0035	0.01	<0.0035	0.011	0.039
Perfluorohexane sulfonic acid (PFHxS)	0.21	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	0.0071	<0.0036	<0.0036	0.017	<0.0035	0.045	<0.0035	0.014	0.039
Perfluorobutanoic acid (PFBA)	NCL	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	0.0052	<0.0035	0.0062	<0.0035	0.0052	0.0098
Perfluorodecanoic acid (PFDA)	NCL	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	0.0082	<0.0035	0.0071	0.02
Perfluorohexanoic acid (PFHxA)	NA	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	0.0063	<0.0036	<0.0036	<0.0035	<0.0035	0.0095	<0.0035	0.0078	0.025
Perfluorononanoic acid (PFNA)	0.03	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluorooctanoic acid (PFOA)	0.17	0.0058	0.0091	0.0095	0.004	<0.0038	<0.0037	<0.0037	0.011	<0.0036	<0.0036	0.012	<0.0035	0.051	<0.0035	0.031	0.048
Perfluorooctane sulfonic acid (PFOS)	0.012	***0.026***	***0.034***	<0.004	<0.004	<0.0038	<0.0037	<0.0037	***0.31***	<0.0036	<0.0036	0.009	<0.0035	***0.39***	<0.0035	0.0051	0.0046
PFOA + PFOS (Calculated)	NCL	0.032	0.043	0.0095	0.004	ND	ND	ND	0.32	ND	ND	0.021	ND	0.44	ND	0.036	0.053
Perfluoropentanoic acid (PFPeA)	NCL	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	0.0063	<0.0035	0.0059	0.011
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0036	<0.0036	<0.004	<0.004	<0.0038	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0071	<0.0073	<0.0079	<0.0079	<0.0077	<0.0075	<0.0075	<0.0069	<0.0072	<0.0071	<0.0069	<0.0071	<0.007	<0.007	<0.007	<0.0071
Total PFAS (Calculated)	NCL	0.032	0.043	0.0095	0.004	ND	ND	ND	0.34	0.0067	0.0059	0.088	0.0077	0.55	0.01	0.1	0.24

TABLE 4
SUMMARY OF VAP GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/South	House Street Property/South	House Street Property/South	House Street Property/South	House Street Property/South
Vertical Aquifer Profiling (VAP) Location		HS-MW-261	HS-MW-262	HS-MW-262	HS-MW-262	HS-MW-262	HS-MW-262	HS-MW-262	HS-MW-263	HS-MW-263	HS-MW-263	HS-MW-264	HS-MW-265	HS-MW-265	HS-MW-265	HS-MW-265	HS-MW-265
Sample Name		HS-MW-261 (45-50)	HS-MW-262 (5-10)	HS-MW-262 (15-20)	HS-MW-262 (25-30)	HS-MS-262 (35-40)	HS-MS-262 (43-48)	HS-MS-262 (43-48)DUP	HS-MW-263 (3-8)	HS-MW-263 (13-18)	HS-MW-263 (42-47)	HS-MW-264 (24-29)	HS-MW-265 (4-9)	HS-MW-265 (14-19)	HS-MW-265 (24-29)	HS-MW-265 (34-39)	HS-MW-265 (44-49)
Screen Interval (feet below ground surface)		45-50	5-10	15-20	25-30	35-40	43-48	43-48	3-8	13-18	42-47	24-29	4-9	14-19	24-29	34-39	44-49
Laboratory Sample ID		XF25014-003	XF25014-004	XF25014-005	XF25014-006	XG01035-001	XG01035-002	XG01035-003	XB26003-001	XB26003-002	XB26003-003	XB26003-004	XB05003-001	XB05003-002	XB05003-003	XB05003-004	XB05003-005
Sample Date		06/23/2022	06/24/2022	06/24/2022	06/24/2022	06/27/2022	06/27/2022	06/27/2022	02/22/2022	02/23/2022	02/23/2022	02/24/2022	01/31/2022	01/31/2022	01/31/2022	02/01/2022	02/01/2022
Parameter (µg/L)																	
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0072	<0.0072	<0.0072	<0.0075	<0.0077	<0.0086	<0.0071	<0.0074	<0.0078	<0.0076	<0.0071	<0.0072	<0.0076	<0.0084	<0.007	<0.0073
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0072	<0.0072	<0.0072	<0.0075	<0.0077	<0.0086	<0.0071	<0.0074	<0.0078	<0.0076	<0.0071	<0.0072	<0.0076	<0.0084	<0.007	<0.0073
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0072	<0.0072	<0.0072	<0.0075	<0.0077	<0.0086	<0.0071	<0.0074	<0.0078	<0.0076	<0.0071	<0.0072	<0.0076	<0.0084	<0.007	<0.0073
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0072	<0.0072	<0.0072	<0.0075	<0.0077	<0.0086	<0.0071	<0.0074	<0.0078	<0.0076	<0.0071	<0.0072	<0.0076	<0.0084	<0.007	<0.0073
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0072	<0.0072	<0.0072	<0.0075	<0.0077	<0.0086	<0.0071	<0.0074	<0.0078	<0.0076	<0.0071	<0.0072	<0.0076	<0.0084	<0.007	0.015
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0072	<0.0072	<0.0072	<0.0075	<0.0077	<0.0086	<0.0071	<0.0074	<0.0078	<0.0076	<0.0071	<0.0072	<0.0076	<0.0084	<0.007	<0.0073
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0072	<0.0072	<0.0072	<0.0075	<0.0077	<0.0086	<0.0071	<0.0074	<0.0078	<0.0076	<0.0071	<0.0072	<0.0076	<0.0084	<0.007	<0.0073
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0072	<0.0072	<0.0072	<0.0075	<0.0077	<0.0086	<0.0071	<0.0074	<0.0078	<0.0076	<0.0071	<0.0072	<0.0076	<0.0084	<0.007	<0.0073
Perfluorobutane sulfonic acid (PFBS)	670	0.055	0.055	0.071	0.07	0.073	0.09	0.078	<0.0037	<0.0039	0.0075	0.004	0.0052	0.0071	0.0091	0.0088	0.0069
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0036	<0.0036	<0.0036	<0.0038	<0.0038	<0.0043	<0.0036	<0.0037	<0.0039	<0.0038	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0036	<0.0036	0.0038	<0.0038	<0.0038	<0.0043	<0.0036	<0.0037	<0.0039	<0.0038	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0036	<0.0036	<0.0036	<0.0038	<0.0038	<0.0043	<0.0036	<0.0037	<0.0039	<0.0038	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0036	<0.0036	<0.0036	<0.0038	<0.0038	<0.0043	<0.0036	<0.0037	<0.0039	<0.0038	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	0.037	0.05	0.061	0.062	0.062	0.071	0.069	<0.0037	<0.0039	<0.0038	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	0.21	0.028	0.071	0.076	0.083	0.08	0.085	0.066	<0.0037	<0.0039	0.0039	<0.0036	<0.0036	<0.0038	0.005	0.0036	<0.0036
Perfluorobutanoic acid (PFBA)	NCL	0.014	0.013	0.017	0.017	0.018	0.022	0.018	<0.0037	<0.0039	<0.0038	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Perfluorodecanoic acid (PFDA)	NCL	<0.0036	<0.0036	<0.0036	<0.0038	<0.0038	<0.0043	<0.0036	<0.0037	<0.0039	<0.0038	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0036	<0.0036	<0.0036	<0.0038	<0.0038	<0.0043	<0.0036	<0.0037	<0.0039	<0.0038	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	0.025	0.02	0.034	0.034	0.036	0.035	0.03	<0.0037	<0.0039	<0.0038	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Perfluorohexanoic acid (PFHxA)	NA	0.029	0.025	0.035	0.037	0.038	0.039	0.036	<0.0037	<0.0039	0.0048	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Perfluorononanoic acid (PFNA)	0.03	<0.0036	<0.0036	<0.0036	<0.0038	<0.0038	<0.0043	<0.0036	<0.0037	<0.0039	<0.0038	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Perfluorooctanoic acid (PFOA)	0.17	0.05	0.062	0.091	0.1	0.11	0.11	0.091	<0.0037	<0.0039	0.0086	0.0085	0.0042	<0.0038	<0.0042	<0.0035	<0.0036
Perfluorooctane sulfonic acid (PFOS)	0.012	0.0038	***0.017***	0.011	0.011	0.0091	0.0084	0.0066	0.0049	<0.0039	0.0075	<0.0036	0.0097	<0.0038	<0.0042	<0.0035	<0.0036
PFOA + PFOS (Calculated)	NCL	0.054	0.079	0.1	0.11	0.12	0.12	0.098	0.0049	ND	0.016	0.0085	0.014	ND	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	0.014	0.01	0.016	0.018	0.018	0.023	0.017	<0.0037	<0.0039	0.0039	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0036	<0.0036	<0.0036	<0.0038	<0.0038	<0.0043	<0.0036	<0.0037	<0.0039	<0.0038	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0036	<0.0036	<0.0036	<0.0038	<0.0038	<0.0043	<0.0036	<0.0037	<0.0039	<0.0038	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0036	<0.0036	<0.0036	<0.0038	<0.0038	<0.0043	<0.0036	<0.0037	<0.0039	<0.0038	<0.0036	<0.0036	<0.0038	<0.0042	<0.0035	<0.0036
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0072	<0.0072	<0.0072	<0.0075	<0.0077	<0.0086	<0.0071	<0.0074	<0.0078	<0.0076	<0.0071	<0.0072	<0.0076	<0.0084	<0.007	<0.0073
Total PFAS (Calculated)	NCL	0.26	0.32	0.42	0.43	0.44	0.48	0.41	0.0049	ND	0.036	0.013	0.019	0.0071	0.014	0.012	0.022

TABLE 4
SUMMARY OF VAP GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast	House Street Property/Southeast
Vertical Aquifer Profiling (VAP) Location		HS-MW-266	HS-MW-266	HS-MW-266	HS-MW-266	HS-MW-266	HS-MW-266	HS-MW-266	HS-MW-266
Sample Name		HS-MW-266 (10-15)	HS-MW-266 (10-15)DUP	HS-MW-266 (20-25)	HS-MW-266 (30-35)	HS-MW-266 (40-45)	HS-MW-266 (50-55)	HS-MW-266 (60-65)	HS-MW-266 (70-75)
Screen Interval (feet below ground surface)		10-15	10-15	20-25	30-35	40-45	50-55	60-65	70-75
Laboratory Sample ID		XF20011-001	XF20011-002	XF20011-004	XF20011-005	XF20011-006	XF20011-007	XF20011-008	XF20011-009
Sample Date		06/15/2022	06/15/2022	06/15/2022	06/15/2022	06/16/2022	06/16/2022	06/16/2022	06/16/2022
Parameter (µg/L)									
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0071	<0.0072	<0.0069	<0.0071	<0.0067	<0.0078	<0.007	<0.007
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0071	<0.0072	<0.0069	<0.0071	<0.0067	<0.0078	<0.007	<0.007
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0071	<0.0072	<0.0069	<0.0071	<0.0067	<0.0078	<0.007	<0.007
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0071	<0.0072	<0.0069	<0.0071	<0.0067	<0.0078	<0.007	<0.007
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0071	<0.0072	<0.0069	<0.0071	<0.0067	<0.0078	<0.007	<0.007
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0071	<0.0072	<0.0069	<0.0071	<0.0067	<0.0078	<0.007	<0.007
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0071	<0.0072	<0.0069	<0.0071	<0.0067	<0.0078	<0.007	<0.007
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0071	<0.0072	<0.0069	<0.0071	<0.0067	<0.0078	<0.007	<0.007
Perfluorobutane sulfonic acid (PFBS)	670	0.011	0.011	0.011	0.01	0.0096	0.015	0.0097	<0.0035
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0033	<0.0039	<0.0035	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0033	<0.0039	<0.0035	<0.0035
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0033	<0.0039	<0.0035	<0.0035
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0033	<0.0039	<0.0035	<0.0035
Perfluoropentane sulfonic acid (PFPeS)	NCL	0.0062	0.0057	0.0065	0.0052	0.0049	0.0077	<0.0035	<0.0035
Perfluorohexane sulfonic acid (PFHxS)	0.21	0.0049	0.0049	0.0056	0.0049	0.0049	0.0052	<0.0035	<0.0035
Perfluorobutanoic acid (PFBA)	NCL	0.0039	0.0039	0.004	0.0038	0.0039	0.0059	0.0059	<0.0035
Perfluorodecanoic acid (PFDA)	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0033	<0.0039	<0.0035	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0033	<0.0039	<0.0035	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	0.0038	0.0042	<0.0035	<0.0036	<0.0033	0.0045	<0.0035	<0.0035
Perfluorohexanoic acid (PFHxA)	NA	0.005	0.0051	0.0051	0.0046	0.0048	0.0082	0.0043	<0.0035
Perfluorononanoic acid (PFNA)	0.03	<0.0036	<0.0036	<0.0035	<0.0036	<0.0033	<0.0039	<0.0035	<0.0035
Perfluorooctanoic acid (PFOA)	0.17	0.0047	0.0049	0.0045	0.0038	<0.0033	0.0051	<0.0035	<0.0035
Perfluorooctane sulfonic acid (PFOS)	0.012	<0.0036	<0.0036	<0.0035	<0.0036	<0.0033	<0.0039	<0.0035	<0.0035
PFOA + PFOS (Calculated)	NCL	0.0047	0.0049	0.0045	0.0038	ND	0.0051	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0033	0.005	0.0037	<0.0035
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0033	<0.0039	<0.0035	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0033	<0.0039	<0.0035	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0033	<0.0039	<0.0035	<0.0035
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0071	<0.0072	<0.0069	<0.0071	<0.0067	<0.0078	<0.007	<0.007
Total PFAS (Calculated)	NCL	0.04	0.04	0.037	0.032	0.028	0.057	0.024	ND

TABLE 4 NOTES
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

NOTES:

1. Concentration and criteria units are micrograms per Liter (µg/L) or parts per billion (ppb). Calculated criteria and concentrations are rounded to two significant digits.
2. Michigan Part 201 Groundwater Cleanup Criteria are based on "Table 1, Groundwater: Residential and Nonresidential Part 201 Generic Cleanup Criteria and Screening Levels/Part 213 Tier I Risk Based Screening Levels," Michigan Administrative Code, Cleanup Criteria Requirements for Response Activity, Rules 299.44 and 299.49, effective December 30, 2013; last updated October 12, 2023.
   Abbreviations Include:
   "NCL" indicates no criterion listed in Michigan Part 201 Table 1.
   "NA" indicates not available.
3. Bold, italic number with thick line border or italic parameter name indicates that parameter was detected above the Michigan Part 201 Groundwater Cleanup Criteria listed.
4. Abbreviations include:
   "< LOQ" indicates the parameter was analyzed for but not detected above the limit of quantitation (LOQ).
   "DUP" indicates a duplicate sample.
   "H" indicates the parameter was analyzed out of hold time.
   "ND" indicates the parameters used in the calculation were not detected.
5. Screen interval presented is the top of the screen to the bottom of the screen in feet below ground surface.

TABLE 5
SUMMARY OF MONITORING WELL GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest
Monitoring Well		WVNW-MW-200A	WVNW-MW-200A	WVNW-MW-200A	WVNW-MW-200A	WVNW-MW-200A	WVNW-MW-200B	WVNW-MW-200B	WVNW-MW-200B	WVNW-MW-200B	WVNW-MW-201A	WVNW-MW-201A	WVNW-MW-201A	WVNW-MW-201A	WVNW-MW-201A	WVNW-MW-201B
Sample Name		WVNW-MW-200A	WVNW-MW-200A	WVNW-MW-200A-DUP	WVNW-200A	WVNW-MW-200A	WVNW-MW-200B	WVNW-MW-200B	WVNW-200B	WVNW-MW-200B	WVNW-MW-201A	WVNW-MW-201A	WVNW-201A	WVNW-MW-201A	WVNW-MW-201A DUP	WVNW-MW-201B
Screen Interval (feet below ground surface)		24-29	24-29	24-29	24-29	24-29	55.1-60.1	55.1-60.1	55.1-60.1	55.1-60.1	12.5-17.5	12.5-17.5	12.5-17.5	12.5-17.5	12.5-17.5	30-35
Laboratory Sample ID		YE24026-005	YH09033-007	YH09033-008	YJ19021-001	ZA22017-001	YE24026-004	YH09033-005	YJ19021-002	ZA22017-002	YE24026-002	YH11018-003	YJ19021-003	ZA22017-006	ZA22017-007	YE24026-003
Sample Date		05/22/2023	08/08/2023	08/08/2023	10/16/2023	01/09/2024	05/22/2023	08/08/2023	10/16/2023	01/09/2024	05/22/2023	08/09/2023	10/16/2023	01/10/2024	01/10/2024	05/22/2023
Parameter (µg/L)																
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.007	<0.007	<0.0069	<0.0078	<0.008 [H]	<0.007	<0.0069	<0.0076	<0.0072 [H]	<0.0072	<0.0068	<0.0077	<0.0078	<0.0075	<0.0071
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.007	<0.007	<0.0069	<0.0078	<0.008 [H]	<0.007	<0.0069	<0.0076	<0.0072 [H]	<0.0072	<0.0068	<0.0077	<0.0078	<0.0075	<0.0071
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.007	<0.007	<0.0069	<0.0078	<0.008 [H]	<0.007	<0.0069	<0.0076	<0.0072 [H]	<0.0072	<0.0068	<0.0077	<0.0078	<0.0075	<0.0071
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.007	<0.007	<0.0069	<0.0078	<0.008 [H]	<0.007	<0.0069	<0.0076	<0.0072 [H]	<0.0072	<0.0068	<0.0077	<0.0078	<0.0075	<0.0071
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.007	<0.007	<0.0069	<0.0078	<0.008 [H]	<0.007	<0.0069	<0.0076	<0.0072 [H]	<0.0072	<0.0068	<0.0077	<0.0078	<0.0075	<0.0071
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.007	<0.007	<0.0069	<0.0078	<0.008 [H]	<0.007	<0.0069	<0.0076	<0.0072 [H]	<0.0072	<0.0068	<0.0077	<0.0078	<0.0075	<0.0071
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.007	<0.007	<0.0069	<0.0078	<0.008 [H]	<0.007	<0.0069	<0.0076	<0.0072 [H]	<0.0072	<0.0068	<0.0077	<0.0078	<0.0075	<0.0071
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.007	<0.007	<0.0069	<0.0078	<0.008 [H]	<0.007	<0.0069	<0.0076	<0.0072 [H]	<0.0072	<0.0068	<0.0077	<0.0078	<0.0075	<0.0071
Perfluorobutane sulfonic acid (PFBS)	670	0.0068	0.0077	0.008	0.0078	0.0069 [H]	0.0093	0.0093	0.0094	0.0084 [H]	0.01	0.0065	0.01	0.01	0.0097	0.0088
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0035	<0.0035	<0.0035	<0.0039	<0.004 [H]	<0.0035	<0.0034	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0038	<0.0039	<0.0038	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0035	<0.0035	<0.0035	<0.0039	<0.004 [H]	0.0093	0.0094	0.0081	0.0059 [H]	0.014	0.0081	0.0071	0.0089	0.0077	0.019
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0035	<0.0035	<0.0035	<0.0039	<0.004 [H]	<0.0035	<0.0034	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0038	<0.0039	<0.0038	<0.0035
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0035	<0.0035	<0.0035	<0.0039	<0.004 [H]	<0.0035	<0.0034	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0038	<0.0039	<0.0038	<0.0035
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0035	<0.0035	<0.0035	<0.0039	<0.004 [H]	<0.0035	<0.0034	<0.0038	<0.0036 [H]	0.0052	<0.0034	0.0057	0.0048	0.0045	<0.0035
Perfluorohexane sulfonic acid (PFHxS)	0.21	0.0077	0.0083	0.0077	0.009	0.0075 [H]	0.018	0.017	0.014	0.014 [H]	0.025	0.014	0.028	0.025	0.025	0.029
Perfluorobutanoic acid (PFBA)	NCL	<0.0035	<0.0035	<0.0035	<0.0039	<0.004 [H]	0.0074	0.0049	0.0054	0.006 [H]	0.0041	<0.0034	<0.0038	0.015	0.015	0.0048
Perfluorodecanoic acid (PFDA)	NCL	<0.0035	<0.0035	<0.0035	<0.0039	<0.004 [H]	<0.0035	<0.0034	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0038	<0.0039	<0.0038	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0035	<0.0035	<0.0035	<0.0039	<0.004 [H]	<0.0035	<0.0034	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0038	<0.0039	<0.0038	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0035	<0.0035	0.0036	<0.0039	<0.004 [H]	0.009	0.0065	0.0058	0.0063 [H]	0.005	<0.0034	<0.0038	0.018	0.018	0.0051
Perfluorohexanoic acid (PFHxA)	NA	<0.0035	0.0038	<0.0035	<0.0039	<0.004 [H]	0.0099	0.0075	0.0055	0.0052 [H]	0.0037	<0.0034	<0.0038	0.018	0.018	0.0046
Perfluorononanoic acid (PFNA)	0.03	<0.0035	<0.0035	<0.0035	<0.0039	<0.004 [H]	<0.0035	<0.0034	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0038	<0.0039	<0.0038	<0.0035
Perfluorooctanoic acid (PFOA)	0.17	0.025	0.025	0.027	0.026	0.026 [H]	0.075	0.059	0.054	0.048 [H]	0.062	0.018	0.035	0.092	0.096	0.074
Perfluorooctane sulfonic acid (PFOS)	0.012	***0.066***	***0.067***	***0.075***	***0.07***	***0.065 [H]***	***0.23***	***0.27***	***0.25***	***0.22 [H]***	***0.39***	***0.31***	***0.43***	***0.53***	***0.53***	***0.76***
PFOA + PFOS (Calculated)	NCL	0.091	0.092	0.1	0.096	0.091	0.31	0.33	0.3	0.27	0.45	0.33	0.47	0.62	0.63	0.83
Perfluoropentanoic acid (PFPeA)	NCL	<0.0035	<0.0035	<0.0035	<0.0039	<0.004 [H]	0.0062	0.005	<0.0038	0.0037 [H]	<0.0036	<0.0034	<0.0038	0.0089	0.0088	<0.0035
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0035	<0.0035	<0.0035	<0.0039	<0.004 [H]	<0.0035	<0.0034	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0038	<0.0039	<0.0038	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0035	<0.0035	<0.0035	<0.0039	<0.004 [H]	<0.0035	<0.0034	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0038	<0.0039	<0.0038	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0035	<0.0035	<0.0035	<0.0039	<0.004 [H]	<0.0035	<0.0034	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0038	<0.0039	<0.0038	<0.0035
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.007	<0.007	<0.0069	<0.0078	<0.008 [H]	<0.007	<0.0069	<0.0076	<0.0072 [H]	<0.0072	<0.0068	<0.0077	<0.0078	<0.0075	<0.0071
Total PFAS (Calculated)	NCL	0.11	0.11	0.12	0.11	0.11	0.37	0.39	0.35	0.32	0.52	0.36	0.52	0.73	0.73	0.91

TABLE 5
SUMMARY OF MONITORING WELL GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest
Monitoring Well		WVNW-MW-201B	WVNW-MW-201B	WVNW-MW-201B	WVNW-MW-201C	WVNW-MW-201C	WVNW-MW-201C	WVNW-MW-201C	WVNW-MW-202A	WVNW-MW-202A	WVNW-MW-202A	WVNW-MW-202A	WVNW-MW-202B	WVNW-MW-202B	WVNW-MW-202B	WVNW-MW-202B
Sample Name		WVNW-MW-201B	WVNW-201B	WVNW-MW-201B	WVNW-MW-201C	WVNW-MW-201C	WVNW-201C	WVNW-MW-201C	WVNW-MW-202A	WVNW-MW-202A	WVNW-MW-202A	WVNW-MW-202A	WVNW-MW-202B	WVNW-MW-202B	WVNW-MW-202B	WVNW-MW-202B
Screen Interval (feet below ground surface)		30-35	30-35	30-35	49.5-54.5	49.5-54.5	49.5-54.5	49.5-54.5	40.1-45.1	40.1-45.1	40.1-45.1	40.1-45.1	59.8-64.8	59.8-64.8	59.8-64.8	59.8-64.8
Laboratory Sample ID		YH11018-006	YJ19021-004	ZA22017-005	YE24026-001	YH11018-005	YJ19021-005	ZA22017-004	YE26014-016	YH11018-007	YJ19021-010	ZA22017-017	YE26014-014	YH11018-004	YJ19021-009	ZA22017-018
Sample Date		08/09/2023	10/16/2023	01/10/2024	05/22/2023	08/09/2023	10/16/2023	01/10/2024	05/24/2023	08/09/2023	10/17/2023	01/11/2024	05/24/2023	08/09/2023	10/17/2023	01/11/2024
Parameter (µg/L)																
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0072	<0.0077	<0.0074	<0.007	<0.0072	<0.0071	<0.0076	<0.0079	<0.0068	<0.0073	<0.0073	<0.0077	<0.0072	<0.0073	<0.0078
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0072	<0.0077	<0.0074	<0.007	<0.0072	<0.0071	<0.0076	<0.0079	<0.0068	<0.0073	<0.0073	<0.0077	<0.0072	<0.0073	<0.0078
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0072	<0.0077	<0.0074	<0.007	<0.0072	<0.0071	<0.0076	<0.0079	<0.0068	<0.0073	<0.0073	<0.0077	<0.0072	<0.0073	<0.0078
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0072	<0.0077	<0.0074	<0.007	<0.0072	<0.0071	<0.0076	<0.0079	<0.0068	<0.0073	<0.0073	<0.0077	<0.0072	<0.0073	<0.0078
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0072	<0.0077	<0.0074	<0.007	<0.0072	<0.0071	<0.0076	<0.0079	<0.0068	<0.0073	<0.0073	<0.0077	<0.0072	<0.0073	<0.0078
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0072	<0.0077	<0.0074	<0.007	<0.0072	<0.0071	<0.0076	<0.0079	<0.0068	<0.0073	<0.0073	<0.0077	<0.0072	<0.0073	<0.0078
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0072	<0.0077	<0.0074	<0.007	<0.0072	<0.0071	<0.0076	<0.0079	<0.0068	<0.0073	<0.0073	<0.0077	<0.0072	<0.0073	<0.0078
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0072	<0.0077	<0.0074	<0.007	<0.0072	<0.0071	<0.0076	<0.0079	<0.0068	<0.0073	<0.0073	<0.0077	<0.0072	<0.0073	<0.0078
Perfluorobutane sulfonic acid (PFBS)	670	0.013	0.01	0.011	0.011	0.0096	0.011	0.01	0.007	0.0056	0.0071	0.0043	0.0085	0.0081	0.0082	0.0081
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0036	<0.0038	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0039	<0.0034	<0.0037	<0.0036	<0.0038	<0.0036	<0.0036	<0.0039
Perfluoroheptane sulfonic acid (PFHpS)	NCL	0.01	0.013	0.012	0.017	0.016	0.014	0.014	<0.0039	<0.0034	<0.0037	<0.0036	<0.0038	<0.0036	<0.0036	<0.0039
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0036	<0.0038	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0039	<0.0034	<0.0037	<0.0036	<0.0038	<0.0036	<0.0036	<0.0039
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0036	<0.0038	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0039	<0.0034	<0.0037	<0.0036	<0.0038	<0.0036	<0.0036	<0.0039
Perfluoropentane sulfonic acid (PFPeS)	NCL	0.0074	0.0046	0.0049	0.0061	0.0054	0.0055	0.0056	<0.0039	<0.0034	<0.0037	<0.0036	<0.0038	<0.0036	<0.0036	<0.0039
Perfluorohexane sulfonic acid (PFHxS)	0.21	0.031	0.026	0.025	0.03	0.027	0.027	0.028	0.0066	0.0048	0.0067	0.0052	0.01	0.0081	0.0078	0.0069
Perfluorobutanoic acid (PFBA)	NCL	<0.0036	0.022	0.011	0.01	0.0082	0.005	0.0039	<0.0039	<0.0034	<0.0037	<0.0036	<0.0038	<0.0036	<0.0036	<0.0039
Perfluorodecanoic acid (PFDA)	NCL	<0.0036	<0.0038	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0039	<0.0034	<0.0037	<0.0036	<0.0038	<0.0036	<0.0036	<0.0039
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0036	<0.0038	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0039	<0.0034	<0.0037	<0.0036	<0.0038	<0.0036	<0.0036	<0.0039
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0036	0.01	0.016	0.01	0.011	0.0083	0.0062	<0.0039	<0.0034	<0.0037	<0.0036	<0.0038	<0.0036	<0.0036	<0.0039
Perfluorohexanoic acid (PFHxA)	NA	<0.0036	0.004	0.018	0.011	0.013	0.0091	0.0063	<0.0039	<0.0034	<0.0037	<0.0036	0.0038	<0.0036	<0.0036	<0.0039
Perfluorononanoic acid (PFNA)	0.03	<0.0036	<0.0038	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0039	<0.0034	<0.0037	<0.0036	<0.0038	<0.0036	<0.0036	<0.0039
Perfluorooctanoic acid (PFOA)	0.17	0.038	0.12	0.12	0.1	0.097	0.086	0.068	0.018	0.01	0.014	0.015	0.029	0.021	0.022	0.02
Perfluorooctane sulfonic acid (PFOS)	0.012	***0.66***	***0.72***	***0.56***	***0.6***	***0.48***	***0.53***	***0.49***	***0.018***	***0.015***	***0.021***	***0.023***	***0.093***	***0.075***	***0.078***	***0.079***
PFOA + PFOS (Calculated)	NCL	0.7	0.84	0.68	0.7	0.58	0.62	0.56	0.036	0.025	0.035	0.038	0.12	0.096	0.1	0.099
Perfluoropentanoic acid (PFPeA)	NCL	<0.0036	<0.0038	0.011	0.0048	0.0059	0.0044	0.0038	<0.0039	<0.0034	<0.0037	<0.0036	<0.0038	<0.0036	<0.0036	<0.0039
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0036	<0.0038	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0039	<0.0034	<0.0037	<0.0036	<0.0038	<0.0036	<0.0036	<0.0039
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0036	<0.0038	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0039	<0.0034	<0.0037	<0.0036	<0.0038	<0.0036	<0.0036	<0.0039
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0036	<0.0038	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0039	<0.0034	<0.0037	<0.0036	<0.0038	<0.0036	<0.0036	<0.0039
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0072	<0.0077	<0.0074	<0.007	<0.0072	<0.0071	<0.0076	<0.0079	<0.0068	<0.0073	<0.0073	<0.0077	<0.0072	<0.0073	<0.0078
Total PFAS (Calculated)	NCL	0.76	0.93	0.79	0.8	0.67	0.7	0.64	0.05	0.035	0.049	0.048	0.14	0.11	0.12	0.11

TABLE 5
SUMMARY OF MONITORING WELL GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast
Monitoring Well		WVNW-MW-203	WVNW-MW-203	WVNW-MW-203	WVNW-MW-203	AREA19-GSI-1	AREA19-GSI-2	AREA19-GSI-3	WV-DEQ-MW9-57	AREA19-MW-221A	AREA19-MW-221A	AREA19-MW-221A	AREA19-MW-221A	AREA19-MW-221B	AREA19-MW-221B	AREA19-MW-221B
Sample Name		WVNW-MW-203	WVNW-MW-203	WVNW-MW-203	WVNW-MW-203	AREA19-GSI-1	AREA19-GSI-2	AREA19-GSI-3	DEQ-MW-9-57	Area19-MW-221A	Area19-MW-221A	AREA19-MW-221A	AREA19-MW-221A	Area19-MW-221B	Area19-MW-221B	AREA19-MW-221B
Screen Interval (feet below ground surface)		14.3-19.3	14.3-19.3	14.3-19.3	14.3-19.3	3.7-7.7	4-8	4.2-8.2	51.85-56.85	15.9-20.9	15.9-20.9	15.9-20.9	15.9-20.9	45-50	45-50	45-50
Laboratory Sample ID		YE26014-012	YH11018-010	YJ25065-014	ZA22017-010	VL11070-002	VL11070-003	VL11070-004	VL11070-007	YE26014-011	YH09033-003	YJ25065-002	ZA27002-020	YE26014-010	YH09033-001	YJ25065-003
Sample Date		05/24/2023	08/10/2023	10/19/2023	01/10/2024	12/08/2020	12/08/2020	12/08/2020	12/09/2020	05/24/2023	08/08/2023	10/18/2023	01/25/2024	05/24/2023	08/08/2023	10/18/2023
Parameter (µg/L)																
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0072	<0.0073	<0.0077	<0.008	<0.0071	<0.0073	<0.0074	<0.0069	<0.0069	<0.0073	<0.0077	<0.0078	<0.0075	<0.0072	<0.0078
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0072	<0.0073	<0.0077	<0.008	<0.0071	<0.0073	<0.0074	<0.0069	<0.0069	<0.0073	<0.0077	<0.0078	<0.0075	<0.0072	<0.0078
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0072	<0.0073	<0.0077	<0.008	<0.0071	<0.0073	<0.0074	<0.0069	<0.0069	<0.0073	<0.0077	<0.0078	<0.0075	<0.0072	<0.0078
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0072	<0.0073	<0.0077	<0.008	<0.0071	<0.0073	<0.0074	<0.0069	<0.0069	<0.0073	<0.0077	<0.0078	<0.0075	<0.0072	<0.0078
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0072	<0.0073	<0.0077	<0.008	<0.0071	<0.0073	<0.0074	<0.0069	<0.0069	<0.0073	<0.0077	<0.0078	<0.0075	<0.0072	<0.0078
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0072	<0.0073	<0.0077	<0.008	<0.0071	<0.0073	<0.0074	<0.0069	<0.0069	<0.0073	<0.0077	<0.0078	<0.0075	<0.0072	<0.0078
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0072	<0.0073	<0.0077	<0.008	<0.0071	<0.0073	<0.0074	<0.0069	<0.0069	<0.0073	<0.0077	<0.0078	<0.0075	<0.0072	<0.0078
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0072	<0.0073	<0.0077	<0.008	<0.0071	<0.0073	<0.0074	<0.0069	<0.0069	<0.0073	<0.0077	<0.0078	<0.0075	<0.0072	<0.0078
Perfluorobutane sulfonic acid (PFBS)	670	<0.0036	<0.0036	<0.0038	<0.004	0.012	0.021	0.017	0.0067	0.0062	0.007	0.0081	0.0058	0.0066	0.0056	0.0075
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	0.0079	0.0046	<0.0035	0.0037	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	0.0044	<0.0037	<0.0035	<0.0035	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Perfluorohexane sulfonic acid (PFHxS)	0.21	<0.0036	<0.0036	<0.0038	<0.004	0.0076	0.018	0.013	0.0053	0.0045	0.0047	0.0048	0.0041	0.0049	0.0041	<0.0039
Perfluorobutanoic acid (PFBA)	NCL	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	0.012	0.0052	<0.0035	<0.0035	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Perfluorodecanoic acid (PFDA)	NCL	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	0.0075	0.0074	<0.0035	0.0052	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Perfluorohexanoic acid (PFHxA)	NA	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	0.011	0.0074	<0.0035	0.0057	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Perfluorononanoic acid (PFNA)	0.03	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Perfluorooctanoic acid (PFOA)	0.17	<0.0036	0.0041	0.0062	0.004	0.016	0.084	0.058	0.0091	0.041	0.024	0.016	0.0096	0.013	0.01	0.0083
Perfluorooctane sulfonic acid (PFOS)	0.012	<0.0036	<0.0036	<0.0038	<0.004	***0.017***	***0.17***	***0.13***	<0.0035	***0.05***	***0.039***	***0.058***	***0.044***	***0.015***	0.012	***0.014***
PFOA + PFOS (Calculated)	NCL	ND	0.0041	0.0062	0.004	0.033	0.25	0.19	0.0091	0.091	0.063	0.074	0.054	0.028	0.022	0.022
Perfluoropentanoic acid (PFPeA)	NCL	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	0.0054	0.0039	<0.0035	<0.0035	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0036	<0.0036	<0.0038	<0.004	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0036	<0.0039	<0.0039	<0.0038	<0.0036	<0.0039
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0072	<0.0073	<0.0077	<0.008	<0.0071	<0.0073	<0.0074	<0.0069	<0.0069	<0.0073	<0.0077	<0.0078	<0.0075	<0.0072	<0.0078
Total PFAS (Calculated)	NCL	ND	0.0041	0.0062	0.004	0.053	0.34	0.25	0.021	0.12	0.075	0.087	0.064	0.04	0.032	0.03

TABLE 5
SUMMARY OF MONITORING WELL GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast
Monitoring Well		AREA19-MW-221B	AREA19-MW-222	AREA19-MW-222	AREA19-MW-222	AREA19-MW-222	AREA19-MW-223	AREA19-MW-223	AREA19-MW-223	AREA19-MW-223	AREA19-MW-224	AREA19-MW-224	AREA19-MW-224	AREA19-MW-224	AREA19-MW-225A
Sample Name		AREA19-MW-221B	Area19-MW-222	Area19-MW-222	AREA19-MW-222	AREA19-MW-222	Area19-MW-223	Area19-MW-223	AREA19-MW-223	AREA19-MW-223	Area19-MW-224	Area19-MW-224 DUP	AREA19-MW-224	AREA19-MW-224	Area19-MW-225A
Screen Interval (feet below ground surface)		45-50	6.4-11.4	6.4-11.4	6.4-11.4	6.4-11.4	4.9-9.9	4.9-9.9	4.9-9.9	4.9-9.9	4.2-9.2	4.2-9.2	4.2-9.2	4.2-9.2	5.3-10.3
Laboratory Sample ID		ZA27003-005	YF02023-001	YH15005-001	YJ25065-005	ZA27003-013	YF02023-002	YH15005-002	YJ25065-004	ZA27003-003	YE26014-009	YE26014-015	YH11018-014	YJ25065-001	ZA27003-004	YE31016-002
Sample Date		01/25/2024	05/31/2023	08/11/2023	10/18/2023	01/25/2024	05/31/2023	08/11/2023	10/18/2023	01/24/2024	05/24/2023	05/24/2023	08/10/2023	10/18/2023	01/25/2024	05/26/2023
Parameter (µg/L)																
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0077	<0.0083	<0.0076	<0.0078	<0.0076	<0.0073	<0.0072	<0.0078	<0.0079	<0.0071	<0.0071	<0.0075	<0.0073	<0.0073	<0.0072
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0077	<0.0083	<0.0076	<0.0078	<0.0076	<0.0073	<0.0072	<0.0078	<0.0079	<0.0071	<0.0071	<0.0075	<0.0073	<0.0073	<0.0072
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0077	<0.0083	<0.0076	<0.0078	<0.0076	<0.0073	<0.0072	<0.0078	<0.0079	<0.0071	<0.0071	<0.0075	<0.0073	<0.0073	<0.0072
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0077	<0.0083	<0.0076	<0.0078	<0.0076	<0.0073	<0.0072	<0.0078	<0.0079	<0.0071	<0.0071	<0.0075	<0.0073	<0.0073	<0.0072
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0077	<0.0083	<0.0076	<0.0078	<0.0076	<0.0073	<0.0072	<0.0078	<0.0079	<0.0071	<0.0071	<0.0075	<0.0073	<0.0073	<0.0072
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0077	<0.0083	<0.0076	<0.0078	<0.0076	<0.0073	<0.0072	<0.0078	<0.0079	<0.0071	<0.0071	<0.0075	<0.0073	<0.0073	<0.0072
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0077	<0.0083	<0.0076	<0.0078	<0.0076	<0.0073	<0.0072	<0.0078	<0.0079	<0.0071	<0.0071	<0.0075	<0.0073	<0.0073	<0.0072
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0077	<0.0083	<0.0076	<0.0078	<0.0076	<0.0073	<0.0072	<0.0078	<0.0079	<0.0071	<0.0071	<0.0075	<0.0073	<0.0073	<0.0072
Perfluorobutane sulfonic acid (PFBS)	670	0.0057	0.019	0.0055	0.0076	0.0049	0.0072	0.022	0.028	0.013	0.011	0.012	0.01	0.013	0.0095	0.0077
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0039	<0.0041	<0.0038	<0.0039	<0.0038	<0.0036	<0.0036	<0.0039	<0.004	<0.0035	<0.0036	<0.0038	<0.0036	<0.0036	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0039	0.032	0.0051	0.0057	<0.0038	0.0051	0.014	0.014	0.017	<0.0035	<0.0036	<0.0038	<0.0036	<0.0036	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0039	<0.0041	<0.0038	<0.0039	<0.0038	<0.0036	<0.0036	<0.0039	<0.004	<0.0035	<0.0036	<0.0038	<0.0036	<0.0036	<0.0036
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0039	<0.0041	<0.0038	<0.0039	<0.0038	<0.0036	<0.0036	<0.0039	<0.004	<0.0035	<0.0036	<0.0038	<0.0036	<0.0036	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0039	0.0058	<0.0038	<0.0039	<0.0038	<0.0036	0.0082	0.0094	<0.004	0.0074	0.0072	0.0065	0.0082	0.0057	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	0.21	<0.0039	0.027	0.007	0.0075	0.0045	0.0079	0.03	0.041	0.019	0.023	0.019	0.019	0.024	0.016	0.004
Perfluorobutanoic acid (PFBA)	NCL	<0.0039	0.0068	<0.0038	<0.0039	<0.0038	<0.0036	0.0051	0.0055	0.0082	<0.0035	<0.0036	<0.0038	<0.0036	<0.0036	0.0068
Perfluorodecanoic acid (PFDA)	NCL	<0.0039	<0.0041	<0.0038	<0.0039	<0.0038	<0.0036	<0.0036	<0.0039	<0.004	<0.0035	<0.0036	<0.0038	<0.0036	<0.0036	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0039	<0.0041	<0.0038	<0.0039	<0.0038	<0.0036	<0.0036	<0.0039	<0.004	<0.0035	<0.0036	<0.0038	<0.0036	<0.0036	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0039	0.019	<0.0038	<0.0039	<0.0038	<0.0036	0.014	0.016	0.017	0.0052	0.0044	0.0043	0.0048	<0.0036	<0.0036
Perfluorohexanoic acid (PFHxA)	NA	<0.0039	0.017	<0.0038	0.0042	<0.0038	0.0051	0.011	0.012	0.016	<0.0035	0.0037	<0.0038	<0.0036	<0.0036	<0.0036
Perfluorononanoic acid (PFNA)	0.03	<0.0039	0.0055	<0.0038	<0.0039	<0.0038	<0.0036	<0.0036	<0.0039	<0.004	<0.0035	<0.0036	<0.0038	<0.0036	<0.0036	<0.0036
Perfluorooctanoic acid (PFOA)	0.17	0.006	***0.18***	0.03	0.047	0.024	0.046	0.13	0.13	0.14	0.035	0.031	0.025	0.029	0.023	0.0073
Perfluorooctane sulfonic acid (PFOS)	0.012	0.011	***0.95***	***0.1***	***0.12***	***0.069***	***0.11***	***0.4***	***0.28***	***0.59***	***0.055***	***0.05***	***0.036***	***0.045***	***0.027***	***0.021***
PFOA + PFOS (Calculated)	NCL	0.017	1.1	0.13	0.17	0.093	0.16	0.53	0.41	0.73	0.09	0.081	0.061	0.074	0.05	0.028
Perfluoropentanoic acid (PFPeA)	NCL	<0.0039	<0.0041	<0.0038	<0.0039	<0.0038	<0.0036	<0.0036	<0.0039	<0.004	<0.0035	<0.0036	<0.0038	<0.0036	<0.0036	<0.0036
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0039	<0.0041	<0.0038	<0.0039	<0.0038	<0.0036	<0.0036	<0.0039	<0.004	<0.0035	<0.0036	<0.0038	<0.0036	<0.0036	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0039	<0.0041	<0.0038	<0.0039	<0.0038	<0.0036	<0.0036	<0.0039	<0.004	<0.0035	<0.0036	<0.0038	<0.0036	<0.0036	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0039	<0.0041	<0.0038	<0.0039	<0.0038	<0.0036	<0.0036	<0.0039	<0.004	<0.0035	<0.0036	<0.0038	<0.0036	<0.0036	<0.0036
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0077	<0.0083	<0.0076	<0.0078	<0.0076	<0.0073	<0.0072	<0.0078	<0.0079	<0.0071	<0.0071	<0.0075	<0.0073	<0.0073	<0.0072
Total PFAS (Calculated)	NCL	0.023	1.3	0.15	0.19	0.1	0.18	0.63	0.54	0.82	0.14	0.13	0.1	0.12	0.081	0.047

TABLE 5
SUMMARY OF MONITORING WELL GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast
Monitoring Well		AREA19-MW-225A	AREA19-MW-225A	AREA19-MW-225A	AREA19-MW-225A	AREA19-MW-225B	AREA19-MW-225B	AREA19-MW-225B	AREA19-MW-225B	AREA19-MW-226A	AREA19-MW-226A	AREA19-MW-226A	AREA19-MW-226A	AREA19-MW-226B	AREA19-MW-226B	AREA19-MW-226B
Sample Name		AREA19-MW-225A	AREA19-MW-225A	AREA19-MW-225A DUP	AREA19-MW-225A	Area19-MW-225B	AREA19-MW-225B	AREA19-MW-225B	AREA19-MW-225B	Area19-MW-226A	AREA19-MW-226A	AREA19-MW-226A	AREA19-MW-226A	Area19-MW-226B	AREA19-MW-226B	AREA19-MW-226B
Screen Interval (feet below ground surface)		5.3-10.3	5.3-10.3	5.3-10.3	5.3-10.3	30.2-35.2	30.2-35.2	30.2-35.2	30.2-35.2	3.3-8.3	3.3-8.3	3.3-8.3	3.3-8.3	10-15	10-15	10-15
Laboratory Sample ID		YH11018-009	YJ25065-009	YJ25065-010	ZA27003-002	YE31016-001	YH11018-002	YJ25065-013	ZA27003-012	YE31016-003	YH09029-004	YJ25065-007	ZA22017-013	YE31016-004	YH09029-003	YJ25065-008
Sample Date		08/09/2023	10/19/2023	10/19/2023	01/25/2024	05/26/2023	08/09/2023	10/19/2023	01/25/2024	05/30/2023	08/07/2023	10/19/2023	01/11/2024	05/30/2023	08/07/2023	10/19/2023
Parameter (µg/L)																
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0072	<0.0078	<0.008	<0.0076	<0.007	<0.0074	<0.007	<0.0078	<0.0075	<0.0075	<0.0081	<0.0074	<0.0072	<0.007	<0.0077
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0072	<0.0078	<0.008	<0.0076	<0.007	<0.0074	<0.007	<0.0078	<0.0075	<0.0075	<0.0081	<0.0074	<0.0072	<0.007	<0.0077
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0072	<0.0078	<0.008	<0.0076	<0.007	<0.0074	<0.007	<0.0078	<0.0075	<0.0075	<0.0081	<0.0074	<0.0072	<0.007	<0.0077
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0072	<0.0078	<0.008	<0.0076	<0.007	<0.0074	<0.007	<0.0078	<0.0075	<0.0075	<0.0081	<0.0074	<0.0072	<0.007	<0.0077
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0072	<0.0078	<0.008	<0.0076	<0.007	<0.0074	<0.007	<0.0078	<0.0075	<0.0075	<0.0081	<0.0074	<0.0072	<0.007	<0.0077
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0072	<0.0078	<0.008	<0.0076	<0.007	<0.0074	<0.007	<0.0078	<0.0075	<0.0075	<0.0081	<0.0074	<0.0072	<0.007	<0.0077
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0072	<0.0078	<0.008	<0.0076	<0.007	<0.0074	<0.007	<0.0078	<0.0075	<0.0075	<0.0081	<0.0074	<0.0072	<0.007	<0.0077
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0072	<0.0078	<0.008	<0.0076	<0.007	<0.0074	<0.007	<0.0078	<0.0075	<0.0075	<0.0081	<0.0074	<0.0072	<0.007	<0.0077
Perfluorobutane sulfonic acid (PFBS)	670	0.012	0.0095	0.0095	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	0.0049	0.004	0.0046
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0036	<0.0039	<0.004	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0036	<0.0039	<0.004	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0036	<0.0039	<0.004	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0036	<0.0039	<0.004	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0036	<0.0039	<0.004	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluorohexane sulfonic acid (PFHxS)	0.21	0.006	0.0063	0.0054	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluorobutanoic acid (PFBA)	NCL	0.0075	0.011	0.01	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluorodecanoic acid (PFDA)	NCL	<0.0036	<0.0039	<0.004	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0036	<0.0039	<0.004	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0036	<0.0039	<0.004	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluorohexanoic acid (PFHxA)	NA	<0.0036	<0.0039	<0.004	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluorononanoic acid (PFNA)	0.03	<0.0036	<0.0039	<0.004	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluorooctanoic acid (PFOA)	0.17	0.0062	0.01	0.0088	0.0039	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluorooctane sulfonic acid (PFOS)	0.012	***0.022***	***0.023***	***0.021***	***0.015***	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
PFOA + PFOS (Calculated)	NCL	0.028	0.033	0.03	0.019	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	<0.0036	<0.0039	<0.004	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0036	<0.0039	<0.004	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0036	<0.0039	<0.004	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0036	<0.0039	<0.004	<0.0038	<0.0035	<0.0037	<0.0035	<0.0039	<0.0037	<0.0037	<0.0041	<0.0037	<0.0036	<0.0035	<0.0039
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0072	<0.0078	<0.008	<0.0076	<0.007	<0.0074	<0.007	<0.0078	<0.0075	<0.0075	<0.0081	<0.0074	<0.0072	<0.007	<0.0077
Total PFAS (Calculated)	NCL	0.054	0.06	0.055	0.019	ND	ND	ND	ND	ND	ND	ND	ND	0.0049	0.004	0.0046

TABLE 5
SUMMARY OF MONITORING WELL GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale
Monitoring Well		AREA19-MW-226B	AREA19-MW-7A	AREA19-MW-7A	AREA19-MW-7A	AREA19-MW-7A	WV/CH-MW-240	WV/CH-MW-240	WV/CH-MW-240	WV/CH-MW-240	WV/CH-MW-241A	WV/CH-MW-241A	WV/CH-MW-241A	WV/CH-MW-241A	WV/CH-MW-241B	WV/CH-MW-241B
Sample Name		AREA19-MW-226B	Area19-MW-7A	AREA19-MW-7A	AREA19-MW-7A	Area19-MW-7A	WV/CH-MV-240	WV/CH-MW-240	WV/CH-MW-240	WV/CH-MW-240	WV/CH-MW-241A	WV/CH-MW-241A	WV/CH-MW-241A	WV/CH-MW-241A	WV/CH-MW-241B	WV/CH-MW-241B
Screen Interval (feet below ground surface)		10-15	9.1-14.1	9.1-14.1	9.1-14.1	9.1-14.1	63.4-68.4	63.4-68.4	63.4-68.4	63.4-68.4	21.2-26.2	21.2-26.2	21.2-26.2	21.2-26.2	53.6-58.6	53.6-58.6
Laboratory Sample ID		ZA22017-014	YE26014-013	YH11018-011	YJ25065-006	ZA22017-003	YF02023-007	YH15005-004	YJ25065-019	ZA22017-020	YE24026-009	YH09033-004	YJ25065-012	ZA22017-021	YE24026-008	YH09033-002
Sample Date		01/11/2024	05/24/2023	08/10/2023	10/18/2023	01/09/2024	06/01/2023	08/11/2023	10/20/2023	01/11/2024	05/23/2023	08/08/2023	10/19/2023	01/17/2024	05/23/2023	08/08/2023
Parameter (µg/L)																
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0074	<0.0071	<0.0074	<0.0075	<0.0073 [H]	<0.0072	<0.0067	<0.0074	<0.0077	<0.0084	<0.0072	<0.0079	<0.0079	<0.0072	<0.0069
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0074	<0.0071	<0.0074	<0.0075	<0.0073 [H]	<0.0072	<0.0067	<0.0074	<0.0077	<0.0084	<0.0072	<0.0079	<0.0079	<0.0072	<0.0069
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0074	<0.0071	<0.0074	<0.0075	<0.0073 [H]	<0.0072	<0.0067	<0.0074	<0.0077	<0.0084	<0.0072	<0.0079	<0.0079	<0.0072	<0.0069
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0074	<0.0071	<0.0074	<0.0075	<0.0073 [H]	<0.0072	<0.0067	<0.0074	<0.0077	<0.0084	<0.0072	<0.0079	<0.0079	<0.0072	<0.0069
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0074	<0.0071	<0.0074	<0.0075	<0.0073 [H]	<0.0072	<0.0067	<0.0074	<0.0077	<0.0084	<0.0072	<0.0079	<0.0079	<0.0072	<0.0069
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0074	<0.0071	<0.0074	<0.0075	<0.0073 [H]	<0.0072	<0.0067	<0.0074	<0.0077	<0.0084	<0.0072	<0.0079	<0.0079	<0.0072	<0.0069
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0074	<0.0071	<0.0074	<0.0075	<0.0073 [H]	<0.0072	<0.0067	<0.0074	<0.0077	<0.0084	<0.0072	<0.0079	<0.0079	<0.0072	<0.0069
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0074	<0.0071	<0.0074	<0.0075	<0.0073 [H]	<0.0072	<0.0067	<0.0074	<0.0077	<0.0084	<0.0072	<0.0079	<0.0079	<0.0072	<0.0069
Perfluorobutane sulfonic acid (PFBS)	670	0.0042	0.011	0.008	0.0098	0.0085 [H]	0.024	0.022	0.027	0.02	0.0057	0.0043	0.0057	0.0044	<0.0036	<0.0034
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0037	<0.0035	<0.0037	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0037	<0.0038	<0.0042	<0.0036	<0.004	<0.0039	<0.0036	<0.0034
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0037	<0.0035	<0.0037	<0.0038	<0.0036 [H]	0.02	0.017	0.023	0.018	<0.0042	<0.0036	<0.004	<0.0039	<0.0036	<0.0034
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0037	<0.0035	<0.0037	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0037	<0.0038	<0.0042	<0.0036	<0.004	<0.0039	<0.0036	<0.0034
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0037	<0.0035	<0.0037	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0037	<0.0038	<0.0042	<0.0036	<0.004	<0.0039	<0.0036	<0.0034
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0037	0.0062	<0.0037	<0.0038	<0.0036 [H]	0.0044	0.0038	0.0047	0.004	<0.0042	<0.0036	<0.004	<0.0039	<0.0036	<0.0034
Perfluorohexane sulfonic acid (PFHxS)	0.21	<0.0037	0.0052	0.0044	0.0048	0.0037 [H]	0.022	0.019	0.023	0.019	0.0043	0.0037	0.0052	<0.0039	<0.0036	<0.0034
Perfluorobutanoic acid (PFBA)	NCL	<0.0037	<0.0035	<0.0037	<0.0038	<0.0036 [H]	0.0045	0.0045	0.0061	0.0043	<0.0042	<0.0036	<0.004	<0.0039	<0.0036	<0.0034
Perfluorodecanoic acid (PFDA)	NCL	<0.0037	<0.0035	<0.0037	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0037	<0.0038	<0.0042	<0.0036	<0.004	<0.0039	<0.0036	<0.0034
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0037	<0.0035	<0.0037	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0037	<0.0038	<0.0042	<0.0036	<0.004	<0.0039	<0.0036	<0.0034
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0037	<0.0035	<0.0037	<0.0038	<0.0036 [H]	0.0092	0.0078	0.0092	0.009	<0.0042	0.0036	<0.004	<0.0039	<0.0036	<0.0034
Perfluorohexanoic acid (PFHxA)	NA	<0.0037	<0.0035	<0.0037	<0.0038	<0.0036 [H]	0.011	0.0081	0.0098	0.009	<0.0042	<0.0036	<0.004	<0.0039	<0.0036	<0.0034
Perfluorononanoic acid (PFNA)	0.03	<0.0037	<0.0035	<0.0037	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0037	<0.0038	<0.0042	<0.0036	<0.004	<0.0039	<0.0036	<0.0034
Perfluorooctanoic acid (PFOA)	0.17	<0.0037	0.013	0.012	0.013	0.0099 [H]	0.12	0.11	0.13	0.096	0.028	0.023	0.03	0.019	0.0053	0.0036
Perfluorooctane sulfonic acid (PFOS)	0.012	<0.0037	***0.013***	***0.014***	***0.017***	0.012 [H]	***0.13***	***0.12***	***0.14***	***0.12***	***0.026***	***0.023***	***0.028***	***0.023***	***0.031***	***0.025***
PFOA + PFOS (Calculated)	NCL	ND	0.026	0.026	0.03	0.022	0.25	0.23	0.27	0.22	0.054	0.046	0.058	0.042	0.036	0.029
Perfluoropentanoic acid (PFPeA)	NCL	<0.0037	<0.0035	<0.0037	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0037	<0.0038	<0.0042	<0.0036	<0.004	<0.0039	<0.0036	<0.0034
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0037	<0.0035	<0.0037	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0037	<0.0038	<0.0042	<0.0036	<0.004	<0.0039	<0.0036	<0.0034
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0037	<0.0035	<0.0037	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0037	<0.0038	<0.0042	<0.0036	<0.004	<0.0039	<0.0036	<0.0034
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0037	<0.0035	<0.0037	<0.0038	<0.0036 [H]	<0.0036	<0.0034	<0.0037	<0.0038	<0.0042	<0.0036	<0.004	<0.0039	<0.0036	<0.0034
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0074	<0.0071	<0.0074	<0.0075	<0.0073 [H]	<0.0072	<0.0067	<0.0074	<0.0077	<0.0084	<0.0072	<0.0079	<0.0079	<0.0072	<0.0069
Total PFAS (Calculated)	NCL	0.0042	0.048	0.038	0.045	0.034	0.35	0.31	0.37	0.3	0.064	0.058	0.069	0.046	0.036	0.029

TABLE 5
SUMMARY OF MONITORING WELL GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast
Monitoring Well		WV/CH-MW-241B	WV/CH-MW-241B	WV/CH-MW-242A	WV/CH-MW-242A	WV/CH-MW-242A	WV/CH-MW-242A	WV/CH-MW-242B	WV/CH-MW-242B	WV/CH-MW-242B	WV/CH-MW-242B	HS-MW-19S	HS-MW-19D	HS-MW-29A	HS-MW-29A	HS-MW-29A
Sample Name		WV/CH-MW-241B	WV/CH-MW-241B	WV/CH-MW-242A	WV/CHW-MW-242A	WV/CH-MW-242A	WV/CH-MW-242A	WV/CH-MW-242B	WV/CH-MW-242B	WV/CH-MW-242B	WV/CH-MW-242B	HS-MW-19S	HS-MW-19D	HS-MW-29A	HS-MW-29A-DUP	HS-MW-29A
Screen Interval (feet below ground surface)		53.6-58.6	53.6-58.6	40.4-45.4	40.4-45.4	40.4-45.4	40.4-45.4	64.8-69.8	64.8-69.8	64.8-69.8	64.8-69.8	58.4-61.4	85.9-95.9	3.5-13.5	3.5-13.5	3.5-13.5
Laboratory Sample ID		YJ25065-011	ZA22017-022	YE24026-006	YH11018-008	YJ19021-017	ZA22017-011	YE24026-007	YH11018-001	YJ19021-018	ZA22017-012	VL11070-008	VL11070-009	VL11070-005	VL11070-006	YE26014-004
Sample Date		10/19/2023	01/17/2024	05/23/2023	08/09/2023	10/18/2023	01/10/2024	05/23/2023	08/09/2023	10/18/2023	01/10/2024	12/09/2020	12/09/2020	12/09/2020	12/09/2020	05/25/2023
Parameter (µg/L)																
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0079	<0.008	<0.007	<0.0072	<0.0069	<0.0078	<0.0076	<0.0072	<0.0072	<0.0074	<0.007	<0.0067	<0.0072	<0.0072	<0.0078
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0079	<0.008	<0.007	<0.0072	<0.0069	<0.0078	<0.0076	<0.0072	<0.0072	<0.0074	<0.007	<0.0067	<0.0072	<0.0072	<0.0078
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0079	<0.008	<0.007	<0.0072	<0.0069	<0.0078	<0.0076	<0.0072	<0.0072	<0.0074	<0.007	<0.0067	<0.0072	<0.0072	<0.0078
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0079	<0.008	<0.007	<0.0072	<0.0069	<0.0078	<0.0076	<0.0072	<0.0072	<0.0074	<0.007	<0.0067	<0.0072	<0.0072	<0.0078
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0079	<0.008	<0.007	<0.0072	<0.0069	<0.0078	<0.0076	<0.0072	<0.0072	<0.0074	<0.007	<0.0067	<0.0072	<0.0072	<0.0078
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0079	<0.008	<0.007	<0.0072	<0.0069	<0.0078	<0.0076	<0.0072	<0.0072	<0.0074	<0.007	<0.0067	<0.0072	<0.0072	<0.0078
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0079	<0.008	<0.007	<0.0072	<0.0069	<0.0078	<0.0076	<0.0072	<0.0072	<0.0074	<0.007	<0.0067	<0.0072	<0.0072	<0.0078
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0079	<0.008	<0.007	<0.0072	<0.0069	<0.0078	<0.0076	<0.0072	<0.0072	<0.0074	<0.007	<0.0067	<0.0072	<0.0072	<0.0078
Perfluorobutane sulfonic acid (PFBS)	670	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	0.012	0.012	0.011
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0036	<0.0036	<0.0039
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	0.0066	0.0058	0.013
Perfluorononane sulfonic acid (PFNS)	NCL	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0036	<0.0036	<0.0039
Perfluorooctane sulfonamide (FOSA)	NCL	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0036	<0.0036	<0.0039
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	0.0036	0.0036	0.0064
Perfluorohexane sulfonic acid (PFHxS)	0.21	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	0.02	0.023	0.035
Perfluorobutanoic acid (PFBA)	NCL	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	0.01	0.01	0.0082
Perfluorodecanoic acid (PFDA)	NCL	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0036	<0.0036	<0.0039
Perfluorododecanoic acid (PFDoDA)	NCL	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0036	<0.0036	<0.0039
Perfluoroheptanoic acid (PFHpA)	NCL	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	0.0056	0.0053	0.0063
Perfluorohexanoic acid (PFHxA)	NA	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	0.017	0.017	0.015
Perfluorononanoic acid (PFNA)	0.03	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0036	<0.0036	<0.0039
Perfluorooctanoic acid (PFOA)	0.17	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	0.03	0.029	0.046
Perfluorooctane sulfonic acid (PFOS)	0.012	***0.023***	***0.022***	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	***0.28***	***0.29***	***0.46***
PFOA + PFOS (Calculated)	NCL	0.023	0.022	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.31	0.32	0.51
Perfluoropentanoic acid (PFPeA)	NCL	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	0.0099	0.011	0.0078
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0036	<0.0036	<0.0039
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0036	<0.0036	<0.0039
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.004	<0.004	<0.0035	<0.0036	<0.0035	<0.0039	<0.0038	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0036	<0.0036	<0.0039
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0079	<0.008	<0.007	<0.0072	<0.0069	<0.0078	<0.0076	<0.0072	<0.0072	<0.0074	<0.007	<0.0067	<0.0072	<0.0072	<0.0078
Total PFAS (Calculated)	NCL	0.023	0.022	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.39	0.41	0.61

TABLE 5
SUMMARY OF MONITORING WELL GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast
Monitoring Well		HS-MW-29A	HS-MW-29A	HS-MW-29A	HS-MW-260	HS-MW-260	HS-MW-260	HS-MW-260	HS-MW-261	HS-MW-261	HS-MW-261	HS-MW-261	HS-MW-262	HS-MW-262	HS-MW-262	HS-MW-262
Sample Name		HS-MW-29A	HS-MW-29A	HS-MW-29A	HS-MW-260	HS-MW-260	HS-MW-260	HS-MW-260	HS-MW-261	HS-MW-261	HS-MW-261	HS-MW-261	HS-MW-262	HS-MW-262	HS-MW-262	HS-MW-262
Screen Interval (feet below ground surface)		3.5-13.5	3.5-13.5	3.5-13.5	5.1-10.1	5.1-10.1	5.1-10.1	5.1-10.1	4.4-9.4	4.4-9.4	4.4-9.4	4.4-9.4	4-9	4-9	4-9	4-9
Laboratory Sample ID		YH11018-012	YJ25065-015	ZA22017-019	YE26014-003	YH11018-013	YJ19021-013	ZA22017-016	YE26014-005	YH11018-015	YJ19021-011	ZA27003-009	YE26014-006	YH11018-016	YJ19021-012	ZA27003-006
Sample Date		08/10/2023	10/19/2023	01/11/2024	05/25/2023	08/10/2023	10/17/2023	01/11/2024	05/25/2023	08/10/2023	10/17/2023	01/22/2024	05/25/2023	08/10/2023	10/17/2023	01/22/2024
Parameter (µg/L)																
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0068	<0.0077	<0.0077	<0.007	<0.007	<0.0077	<0.0073	<0.0071	<0.0068	<0.0073	<0.0076	<0.0071	<0.0071	<0.0073	<0.0079
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0068	<0.0077	<0.0077	<0.007	<0.007	<0.0077	<0.0073	<0.0071	<0.0068	<0.0073	<0.0076	<0.0071	<0.0071	<0.0073	<0.0079
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0068	<0.0077	<0.0077	<0.007	<0.007	<0.0077	<0.0073	<0.0071	<0.0068	<0.0073	<0.0076	<0.0071	<0.0071	<0.0073	<0.0079
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0068	<0.0077	<0.0077	<0.007	<0.007	<0.0077	<0.0073	<0.0071	<0.0068	<0.0073	<0.0076	<0.0071	<0.0071	<0.0073	<0.0079
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0068	<0.0077	<0.0077	<0.007	<0.007	<0.0077	<0.0073	<0.0071	<0.0068	<0.0073	<0.0076	<0.0071	<0.0071	<0.0073	<0.0079
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0068	<0.0077	<0.0077	<0.007	<0.007	<0.0077	<0.0073	<0.0071	<0.0068	<0.0073	<0.0076	<0.0071	<0.0071	<0.0073	<0.0079
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0068	<0.0077	<0.0077	<0.007	<0.007	<0.0077	<0.0073	<0.0071	<0.0068	<0.0073	<0.0076	<0.0071	<0.0071	<0.0073	<0.0079
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0068	<0.0077	<0.0077	<0.007	<0.007	<0.0077	<0.0073	<0.0071	<0.0068	<0.0073	<0.0076	<0.0071	<0.0071	<0.0073	<0.0079
Perfluorobutane sulfonic acid (PFBS)	670	0.01	0.012	0.0097	0.0072	0.0069	0.0067	0.01	0.015	0.019	0.021	0.018	0.06	0.065	0.074	0.044
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0034	<0.0039	<0.0038	<0.0035	<0.0035	<0.0039	<0.0036	<0.0036	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036	<0.0037	<0.0039
Perfluoroheptane sulfonic acid (PFHpS)	NCL	0.0096	0.0093	0.0062	<0.0035	<0.0035	<0.0039	0.0048	0.035	0.013	0.019	0.023	<0.0035	<0.0036	<0.0037	<0.0039
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0034	<0.0039	<0.0038	<0.0035	<0.0035	<0.0039	<0.0036	<0.0036	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036	<0.0037	<0.0039
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0034	<0.0039	<0.0038	<0.0035	<0.0035	<0.0039	<0.0036	<0.0036	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036	<0.0037	<0.0039
Perfluoropentane sulfonic acid (PFPeS)	NCL	0.0068	0.0076	0.0064	<0.0035	0.0036	0.0039	0.004	0.014	0.015	0.016	0.015	0.057	0.062	0.061	0.04
Perfluorohexane sulfonic acid (PFHxS)	0.21	0.03	0.035	0.027	0.0095	0.0064	0.014	0.013	0.099	0.048	0.057	0.064	0.082	0.078	0.072	0.061
Perfluorobutanoic acid (PFBA)	NCL	0.0074	0.0077	0.006	<0.0035	<0.0035	0.0043	<0.0036	0.0085	0.0066	0.0079	0.0079	0.016	0.016	0.016	0.012
Perfluorodecanoic acid (PFDA)	NCL	<0.0034	<0.0039	<0.0038	<0.0035	<0.0035	<0.0039	<0.0036	<0.0036	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036	<0.0037	<0.0039
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0034	<0.0039	<0.0038	<0.0035	<0.0035	<0.0039	<0.0036	<0.0036	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036	<0.0037	<0.0039
Perfluoroheptanoic acid (PFHpA)	NCL	0.0057	0.0049	0.005	<0.0035	<0.0035	<0.0039	<0.0036	0.011	0.0063	0.0071	0.0097	0.028	0.035	0.031	0.023
Perfluorohexanoic acid (PFHxA)	NA	0.012	0.012	0.0091	0.0072	0.0053	0.0077	0.0048	0.017	0.0098	0.012	0.014	0.029	0.034	0.036	0.022
Perfluorononanoic acid (PFNA)	0.03	<0.0034	<0.0039	<0.0038	<0.0035	<0.0035	<0.0039	<0.0036	<0.0036	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036	<0.0037	<0.0039
Perfluorooctanoic acid (PFOA)	0.17	0.041	0.036	0.034	0.0082	0.0049	0.011	0.012	0.082	0.036	0.044	0.056	0.081	0.097	0.09	0.084
Perfluorooctane sulfonic acid (PFOS)	0.012	***0.39***	***0.36***	***0.31***	***0.19***	***0.1***	***0.17***	***0.23***	***0.98***	***0.4***	***0.64***	***0.71***	***0.014***	0.012	0.012	***0.015***
PFOA + PFOS (Calculated)	NCL	0.43	0.4	0.34	0.2	0.1	0.18	0.24	1.1	0.44	0.68	0.77	0.095	0.11	0.1	0.099
Perfluoropentanoic acid (PFPeA)	NCL	0.0066	0.0066	0.006	<0.0035	<0.0035	0.0039	<0.0036	0.009	0.0049	0.0056	0.0078	0.013	0.018	0.017	0.013
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0034	<0.0039	<0.0038	<0.0035	<0.0035	<0.0039	<0.0036	<0.0036	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036	<0.0037	<0.0039
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0034	<0.0039	<0.0038	<0.0035	<0.0035	<0.0039	<0.0036	<0.0036	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036	<0.0037	<0.0039
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0034	<0.0039	<0.0038	<0.0035	<0.0035	<0.0039	<0.0036	<0.0036	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036	<0.0037	<0.0039
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0068	<0.0077	<0.0077	<0.007	<0.007	<0.0077	<0.0073	<0.0071	<0.0068	<0.0073	<0.0076	<0.0071	<0.0071	<0.0073	<0.0079
Total PFAS (Calculated)	NCL	0.52	0.49	0.42	0.22	0.13	0.22	0.28	1.3	0.56	0.83	0.93	0.38	0.42	0.41	0.31

TABLE 5
SUMMARY OF MONITORING WELL GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast
Monitoring Well		HS-MW-263A	HS-MW-263A	HS-MW-263A	HS-MW-263A	HS-MW-263B	HS-MW-263B	HS-MW-263B	HS-MW-263B	HS-MW-264	HS-MW-264	HS-MW-264	HS-MW-264	HS-MW-264	HS-MW-265	HS-MW-265
Sample Name		HS-MW-263A	HS-MW-263A	HS-MW-263A	HS-MW-263A	HS-MW-263B	HS-MW-263B	HS-MW-263B	HS-MW-263B	HS-MW-264	HS-MW-264	HS-MW-264	HS-MW-264	HS-MW-264-DUP	HS-MW-265	HS-MW-265
Screen Interval (feet below ground surface)		4.9-9.9	4.9-9.9	4.9-9.9	4.9-9.9	42.1-47.1	42.1-47.1	42.1-47.1	42.1-47.1	25.4-30.4	25.4-30.4	25.4-30.4	25.4-30.4	25.4-30.4	10.5-15.5	10.5-15.5
Laboratory Sample ID		YE31016-005	YH09033-009	YJ25065-017	ZA27002-030	YE31016-006	YH09033-006	YJ25065-018	ZA27003-001	YE24026-010	YH15005-003	YJ19021-007	ZA27003-011	ZA27003-007	YE31016-007	YH11018-017
Sample Date		05/30/2023	08/08/2023	10/20/2023	01/24/2024	05/30/2023	08/08/2023	10/20/2023	01/24/2024	05/23/2023	08/11/2023	10/17/2023	01/25/2024	01/25/2024	05/30/2023	08/10/2023
Parameter (µg/L)																
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0081	<0.0071	<0.0075	<0.0074	<0.0068	<0.0074	<0.0081	<0.0076	<0.0071	<0.0072	<0.0077	<0.0073	<0.0072	<0.0075	<0.0072
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0081	<0.0071	<0.0075	<0.0074	<0.0068	<0.0074	<0.0081	<0.0076	<0.0071	<0.0072	<0.0077	<0.0073	<0.0072	<0.0075	<0.0072
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0081	<0.0071	<0.0075	<0.0074	<0.0068	<0.0074	<0.0081	<0.0076	<0.0071	<0.0072	<0.0077	<0.0073	<0.0072	<0.0075	<0.0072
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0081	<0.0071	<0.0075	<0.0074	<0.0068	<0.0074	<0.0081	<0.0076	<0.0071	<0.0072	<0.0077	<0.0073	<0.0072	<0.0075	<0.0072
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0081	<0.0071	<0.0075	<0.0074	<0.0068	<0.0074	<0.0081	<0.0076	<0.0071	<0.0072	<0.0077	<0.0073	<0.0072	<0.0075	<0.0072
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0081	<0.0071	<0.0075	<0.0074	<0.0068	<0.0074	<0.0081	<0.0076	<0.0071	<0.0072	<0.0077	<0.0073	<0.0072	<0.0075	<0.0072
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0081	<0.0071	<0.0075	<0.0074	<0.0068	<0.0074	<0.0081	<0.0076	<0.0071	<0.0072	<0.0077	<0.0073	<0.0072	<0.0075	<0.0072
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0081	<0.0071	<0.0075	<0.0074	<0.0068	<0.0074	<0.0081	<0.0076	<0.0071	<0.0072	<0.0077	<0.0073	<0.0072	<0.0075	<0.0072
Perfluorobutane sulfonic acid (PFBS)	670	0.0044	0.005	0.0042	<0.0037	0.0065	0.0051	0.0062	0.0052	0.0039	0.0039	0.0042	0.0037	0.0043	0.011	0.0071
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluorooctane sulfonamide (FOSA)	NCL	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	0.21	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	0.0052	0.0039	0.0039	<0.0037	<0.0036	<0.0038	<0.0036
Perfluorobutanoic acid (PFBA)	NCL	0.004	<0.0036	<0.0038	<0.0037	<0.0034	0.0037	0.0046	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluorodecanoic acid (PFDA)	NCL	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluorohexanoic acid (PFHxA)	NA	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluorononanoic acid (PFNA)	0.03	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluorooctanoic acid (PFOA)	0.17	<0.004	0.0065	0.0041	<0.0037	0.0045	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluorooctane sulfonic acid (PFOS)	0.012	0.0064	0.0083	0.0081	0.0051	0.0048	0.0038	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
PFOA + PFOS (Calculated)	NCL	0.0064	0.015	0.012	0.0051	0.0093	0.0038	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.004	<0.0036	<0.0038	<0.0037	<0.0034	<0.0037	<0.004	<0.0038	<0.0035	<0.0036	<0.0038	<0.0037	<0.0036	<0.0038	<0.0036
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0081	<0.0071	<0.0075	<0.0074	<0.0068	<0.0074	<0.0081	<0.0076	<0.0071	<0.0072	<0.0077	<0.0073	<0.0072	<0.0075	<0.0072
Total PFAS (Calculated)	NCL	0.015	0.02	0.016	0.0051	0.016	0.013	0.011	0.0052	0.0091	0.0078	0.0081	0.0037	0.0043	0.011	0.0071

TABLE 5
SUMMARY OF MONITORING WELL GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Groundwater Cleanup Criteria - Groundwater Surface Water Interface[2]	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast
Monitoring Well		HS-MW-265	HS-MW-265	HS-MW-266A	HS-MW-266A	HS-MW-266A	HS-MW-266A	HS-MW-266B	HS-MW-266B	HS-MW-266B	HS-MW-266B
Sample Name		HS-MW-265	HS-MW-265	HS-MW-266A	HS-MW-266A	HS-MW-266A	HS-MW-266A	HS-MW-266B	HS-MW-266B	HS-MW-266B	HS-MW-266B
Screen Interval (feet below ground surface)		10.5-15.5	10.5-15.5	10.2-15.2	10.2-15.2	10.2-15.2	10.2-15.2	50-55	50-55	50-55	50-55
Laboratory Sample ID		YJ25065-020	ZA22017-015	YE26014-002	YH09029-001	YJ19021-006	ZA27003-008	YE26014-001	YH09029-002	YJ19021-008	ZA27003-010
Sample Date		10/20/2023	01/11/2024	05/25/2023	08/07/2023	10/17/2023	01/23/2024	05/25/2023	08/07/2023	10/17/2023	01/23/2024
Parameter (µg/L)											
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0075	<0.0079	<0.0072	<0.0073	<0.0073	<0.007	<0.0072	<0.007	<0.0075	<0.007
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0075	<0.0079	<0.0072	<0.0073	<0.0073	<0.007	<0.0072	<0.007	<0.0075	<0.007
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0075	<0.0079	<0.0072	<0.0073	<0.0073	<0.007	<0.0072	<0.007	<0.0075	<0.007
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0075	<0.0079	<0.0072	<0.0073	<0.0073	<0.007	<0.0072	<0.007	<0.0075	<0.007
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0075	<0.0079	<0.0072	<0.0073	<0.0073	<0.007	<0.0072	<0.007	<0.0075	<0.007
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0075	<0.0079	<0.0072	<0.0073	<0.0073	<0.007	<0.0072	<0.007	<0.0075	<0.007
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0075	<0.0079	<0.0072	<0.0073	<0.0073	<0.007	<0.0072	<0.007	<0.0075	<0.007
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0075	<0.0079	<0.0072	<0.0073	<0.0073	<0.007	<0.0072	<0.007	<0.0075	<0.007
Perfluorobutane sulfonic acid (PFBS)	670	0.01	0.0085	0.01	0.0097	0.0095	0.0099	0.0085	0.011	0.0096	0.008
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0038	<0.004	<0.0036	<0.0037	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0038	<0.004	<0.0036	<0.0037	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0035
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0038	<0.004	<0.0036	<0.0037	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0035
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0038	<0.004	<0.0036	<0.0037	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0035
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0038	<0.004	0.0052	0.0053	0.0048	0.0057	0.0045	0.0057	0.005	0.004
Perfluorohexane sulfonic acid (PFHxS)	0.21	<0.0038	<0.004	0.0047	0.0045	0.004	<0.0035	0.0046	0.0041	0.0038	0.0038
Perfluorobutanoic acid (PFBA)	NCL	<0.0038	<0.004	0.004	<0.0037	<0.0036	<0.0035	<0.0036	0.0044	<0.0037	<0.0035
Perfluorodecanoic acid (PFDA)	NCL	<0.0038	<0.004	<0.0036	<0.0037	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0038	<0.004	<0.0036	<0.0037	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0038	<0.004	0.0038	<0.0037	<0.0036	<0.0035	<0.0036	0.0042	<0.0037	<0.0035
Perfluorohexanoic acid (PFHxA)	NA	<0.0038	<0.004	0.0057	0.0048	0.0044	0.0046	0.0044	0.0071	0.0049	<0.0035
Perfluorononanoic acid (PFNA)	0.03	<0.0038	<0.004	<0.0036	<0.0037	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0035
Perfluorooctanoic acid (PFOA)	0.17	<0.0038	<0.004	0.0044	0.0039	<0.0036	0.0038	<0.0036	0.0041	<0.0037	<0.0035
Perfluorooctane sulfonic acid (PFOS)	0.012	<0.0038	<0.004	<0.0036	<0.0037	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0035
PFOA + PFOS (Calculated)	NCL	ND	ND	0.0044	0.0039	ND	0.0038	ND	0.0041	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	<0.0038	<0.004	<0.0036	<0.0037	<0.0036	<0.0035	<0.0036	0.0037	<0.0037	<0.0035
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0038	<0.004	<0.0036	<0.0037	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0038	<0.004	<0.0036	<0.0037	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0038	<0.004	<0.0036	<0.0037	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0035
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0075	<0.0079	<0.0072	<0.0073	<0.0073	<0.007	<0.0072	<0.007	<0.0075	<0.007
Total PFAS (Calculated)	NCL	0.01	0.0085	0.038	0.028	0.023	0.024	0.022	0.044	0.023	0.016

TABLE 5 NOTES
GSI Investigation
Algoma and Plainfield Townships, Kent County, MI

NOTES:

1. Concentration and criteria units are micrograms per Liter (µg/L) or parts per billion (ppb). Calculated criteria and concentrations are rounded to two significant digits.
2. Michigan Part 201 Groundwater Cleanup Criteria are based on "Table 1, Groundwater: Residential and Nonresidential Part 201 Generic Cleanup Criteria and Screening Levels/Part 213 Tier I Risk Based Screening Levels," Michigan Administrative Code, Cleanup Criteria Requirements for Response Activity, Rules 299.44 and 299.49, effective December 30, 2013; last updated October 12, 2023.
   Abbreviations Include:
   "NCL" indicates no criterion listed in Michigan Part 201 Table 1.
   "NA" indicates not available.
3. Bold, italic number with thick line border or italic parameter name indicates that parameter was detected above the Michigan Part 201 Groundwater Cleanup Criteria listed.
4. Abbreviations include:
   "< LOQ" indicates the parameter was analyzed for but not detected above the limit of quantitation (LOQ).
   "DUP" indicates a duplicate sample.
   "H" indicates the parameter was analyzed out of hold time.
   "ND" indicates the parameters used in the calculation were not detected.
5. Screen interval presented is the top of the screen to the bottom of the screen in feet below ground surface.

APPENDIX A

GROUNDWATER-SURFACE WATER INTERFACE

RESPONSE ACTIVITY PLAN

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A Division of GZA

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GROUNDWATER-SURFACE WATER INTERFACE (GSI) RESPONSE ACTIVITY PLAN

North Kent Study Area

September 23, 2020
File No. 16.0062961.50

PREPARED FOR:
Wolverine World Wide, Inc.
Rockford, Michigan

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ACRONYMS

CD	Consent Decree
CFS	Cubic Feet per Second
CSM	Conceptual Site Model
DoD	United States Department of Defense
EGLE	Michigan Department of Environmental, Great Lakes and Energy
FAV	Final Acute Values
FCV	Final Chronic Values
GIS	Geographic Information Systems
GSI	Groundwater-Surface Water Interface
HNDV	Human Health Non-Drinking Water Values
HSDS	House Street Disposal Site
ID	Identification
MDEQ	Michigan Department of Environmental Quality
MDOT	Michigan Department of Transportation
MGDL	Michigan GIS Data Library
ml/min	Milliliters per Minute
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NE	Northeast
ng/L	Nanogram per Liter
NKSA	North Kent Study Area
ORP	Oxidation-Reduction Potential
PDF	Portable Document Format
PFAS	Per- and Polyfluoroalkyl Substances
PFBS	Perfluorobutane Sulfonic Acid
PFHxA	Perfluorohexanoic Acid
PFHxS	Perfluorohexane Sulfonic Acid
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PVC	Polyvinyl Chloride
QAPP	Quality Assurance Project Plan [*Former Wolverine Tannery, House Street Disposal Area, and Wolven/Jewell Area, Per- and Polyfluoroalkyl Substances Investigation Program]*
QA/QC	Quality Assurance/Quality Control
QSM	Quality Systems Manual
R&W/GZA	Rose & Westra, a Division of GZA GeoEnvironmental, Inc.
RAP	Response Activity Plan
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedures
USGS	United States Geological Survey
VAP	Vertical Aquifer Profiling
Wolverine	Wolverine World Wide, Inc,
WV	Wildlife Values

1.0 INTRODUCTION

On behalf of Wolverine, R&W/GZA, prepared this RAP for the proposed GSI investigation in the NKSA. The objective of this RAP is to investigate potential environmental risks to the GSI in the Rogue River, due to regulated PFAS in groundwater, originating from the former HSDS and the Wolven/Jewell area. Based on the flow and PFAS distribution assessment, the following locations are identified as potential surface water discharge areas for the PFAS-containing groundwater in the HSDS and Wolven-Jewell study areas:

- Southeast downgradient of the HSDS primary plume;
- Downgradient of the HSDS, near the confluence of the Rogue River and the Grand River;
- Downgradient of the HSDS, near the Freska Lake area;
- Wolven Northeast study area;
- Wolven Northwest study area; and
- North Childsdale study area, downgradient of the Wolven study area.

This RAP is prepared pursuant to CD No. 1:18-cv-00039-JTN-SJB, effective February 19, 2020. Specifically, this scope of work is established in Sections 7.4, 7.10, and Appendix S of the CD. This RAP is organized into the following sections:

- Introduction
- CSM
- Proposed Statement of Work
- Investigation Methodologies
- Sampling and Analysis Methods and Procedures
- Data Quality Objectives
- Data Quality Control and Assurance
- Project Schedule for Field Sampling and Analysis
- Project Schedule for Data Evaluation and Report Submittals

The information obtained during the implementation of this RAP will be used as provided in Section 7.10(e) of the CD.

2.0 CONCEPTUAL SITE MODEL

The development of the CSM (as defined in Section 4.4 of the CD) was based on interpretation of regional geology and hydrogeology, residential water well sampling data in the NKSA, and groundwater investigations performed associated with the former HSDS and Wolven/Jewell areas. **Figure 1** is a layout of the NKSA and the PFAS Investigation Areas. For the purpose of this RAP, the CSM is focused on the groundwater flow from the source areas to the Rogue River, PFAS distribution in groundwater, and the fate and transport of PFAS in groundwater.

The following sections provide discussions of source areas, hydrology, geology and hydrogeology, PFAS distribution in groundwater, groundwater flow, and PFAS transport.

2.01 HOUSE STREET DISPOSAL SITE

The HSDS, located at 1855 House Street NE, Plainfield Township, Kent County, Michigan, encompasses approximately 76 acres (**Figure 1**). The HSDS is currently undeveloped and, according to available information, no buildings were previously present. An electric utility right-of-way and associated high-voltage transmission lines cross the northern portion of the HSDS, and an access road from House Street runs south to north across the HSDS.

The properties surrounding the HSDS are primarily undeveloped or residential. Properties to the northwest are undeveloped extending to Clear Bottom Lake and Freska Lake. Properties to the west, southwest, and northeast are primarily residential. House Street NE abuts the HSDS to the south and southeast. Portions of the eastern HSDS boundary are formed by Herrington Avenue NE. Land owned by MDOT is present south and southeast of the HSDS (US-131 right-of-way), and additional residential properties are located westward along House Street.

The HSDS was a State of Michigan licensed and regulated disposal facility from the mid-1960s through 1978. Until 1970, the HSDS received leather tanning byproducts over a portion of time. EGLE Remediation and Redevelopment Division files indicated that HSDS's waste disposal license expired in 1978, but it appears no waste was disposed after 1970. It has been determined that the byproducts contained PFOS and PFOA and their precursors, which are part of a larger group of PFAS. PFAS were in Scotchgard™, a waterproofing material manufactured by 3M Company, that was applied to some leather goods manufactured at the former Wolverine Tannery site in Rockford, Michigan. Based on past investigation data at Wolverine's Tannery Site (R&W/GZA, 2019), the byproducts also contained other substances. However, the data indicates that only PFOS and PFOA appear to be migrating to the GSI areas of interest.

Prior to Wolverine acquiring the HSDS in 1964 and Michigan's first disposal area licensing statute (PA 87 of 1965), Wolverine and other entities disposed of materials on the HSDS (perhaps as early as the 1940s) and also possibly on nearby real estate currently identified as the south adjoining MDOT property and nearby Imperial Pine parcel.

2.02 WOLVEN AND JEWELL AREAS

Certain PFAS were detected in wells in the Wellington Ridge neighborhood, located between 10 and 11 Mile Roads, west of Wolven Avenue, and east of US-131. In addition, certain PFAS were also detected in the groundwater monitoring wells near the North Kent Landfill area. No evidence of waste materials was detected during investigations conducted to date in this area. Historical aerial photographs suggest a portion of a gravel pit was previously located in the area of the Lady Lauren cul-de-sac of the Wellington Ridge Development. Aerial photographs suggest disturbances in the gravel pit area ceased by 1965. **Figure 1** identifies the locations of the Wolven/Jewell Areas and the North Kent Landfill Area.

2.03 TOPOGRAPHY

As shown in **Figure 1**, the terrain is generally hilly in the region. The ground surface elevation at HSDS ranges from 740 to 800 feet. The HSDS is flanked by higher ground to the northeast and southwest, but ground surface generally dips to the northwest toward the Clear Bottom Lake and Freska Lake, and to the southeast toward the Rogue River. Ground surface elevations for the area east of the HSDS range from 800 to more than 900 feet; ground surface elevations for the west to southwest of the HSDS range from 800 to 820 feet, with lower terrains to the northwest and southeast.

Ground surface elevations in the eastern portion of the Wolven/Jewell study area, where the Wellington Ridge neighborhood is located, range from approximately 780 to more than 930 feet. Most of the neighborhoods in the eastern portion of the Wolven/Jewell study area sit on relatively high ground, and the lowland areas are generally between the hills, acting as surface water drainage pathways. Ground surface generally dips in various directions, to the west and northwest areas of the Wolven/Jewell study area, and northeast toward Wolven Northeast, toward the Rogue River. The portion of the Wolven/Jewell study area located west of US-131 has ground surface elevations ranging from approximately 710 to 850 feet. The Wolven northeast study area has ground surface elevations ranging from approximately 720 to 910 feet.

2.04 REGIONAL HYDROLOGY

The regional hydrology, geology (Section 2.05) and hydrogeology (Section 2.06) are used to assist in determination of groundwater conditions within the NKSA and specifically as it interacts with the Rogue River for this GSI evaluation.

The NKSA is situated within the Rogue River Basin (Basin No. 14F), which is part of the Lower Grand River watershed (HUC 0405006). Based on the Michigan's Major Watersheds – Sub-basins GIS data (Michigan Department of Environmental Quality, 2011) downloaded from MGDL, the HSDS and Wolven/Jewell study areas are situated within the Rogue River Basin (Basin No. 14F), which is part of the Lower Grand River watershed (HUC 0405006). The Rogue River Basin consists of 12 sub-basins, four of which are near the Site area. The HSDS is situated on the water divide of two sub-basins: HUC 405006040080 and HUC 405006040120; the Wolven/Jewell study areas are situated in sub-basins HUC 405006040080 and HUC 405006040110. All of these three sub-basins drain to the Rogue River, which discharges to the Grand River. The HSDA is also near sub-basin HUC 45006050050, which is part of the Grand River basin.

The 2016 National Oceanic and Atmospheric Administration climate data report[1] for Grand Rapids, Michigan, indicates that the mean annual precipitation for the 80-year record period is approximately 36 inches. Based on the state-wide GIS data for the estimated annual groundwater recharge (Michigan State University, 2005), the estimated precipitation at the NKSA ranged from 9 to 15 inches.

From 1989 to 2016, the average annual streamflow rate at USGS Gaging Station No. 04118500 in Rockford, Michigan, is approximately 260 CFS, and the average baseflow rate approximately 210 CFS. The gaging station measures the flow for the sub-basin, HUC 405006040110, and all the upstream sub-basins, representing a drainage area of approximately 234 square miles, according to the USGS record.

2.05 REGIONAL GEOLOGY

Overburden in Kent County is a thick sequence of Pleistocene glacial deposits. The thickness of glacial deposits ranges from 11 to 800 feet in Kent County; however, the majority of glacial deposits range from 200 to 400 feet in thickness (Western Michigan University, 1981; Farrand, 1982). The glacial deposits in the county include till, outwash and lacustrine deposits. Till occurs in end and ground moraines (till plains), interspersed on the surface throughout the County (Stramel, Wisler, & Laird, 1954). For the area near the City of Rockford and Plainfield Township, the Michigan Glacial Land Systems (Michigan State University, 2015) indicates that proglacial outwash plain is present along the Rogue River, and end moraines are present on either side of the Rogue River extending to the "wide" near the Grand River. At the Site and its vicinity, end moraines of medium-textured till are present. The ground (till plain) and end moraine belong to the unstratified group of deposits, composed of fine- to coarse-grained material, including silt, sand, gravel and boulders.

[1] https://www.ncdc.noaa.gov/cdo-web/search

Based upon bedrock maps for the area (MDEQ, 1987), the bedrock beneath the NKSA includes the Michigan basin series. Based on GIS data from EGLE (MDEQ, 1987), Jurassic "red beds" are present in most of the site area and its vicinity, with small areas of Saginaw formation outcrops. The Jurassic "red beds" are often poorly consolidated or unconsolidated and consist primarily of clay, mudstone, siltstone, sandstone, shale and gypsum. The "red beds" are of low permeability and are considered a confining unit. However, locally in the county, the "red beds" have been documented to supply small quantities of water (Apple & Reeves, 2007). Beneath the "red beds," bedrock in the region consists of the Mississippian-aged sandstone (Marshall formation), shale (Michigan formation), and the Bayport limestone as well as the Pennsylvanian-aged Saginaw formation. The regional dip is northeasterly toward the center of the Michigan basin.

Based on the Hydrogeologic Atlas of Michigan (Western Michigan University, 1981), the top of bedrock elevation ranges from 500 to 550 feet near the City of Rockford. The top of bedrock elevations at the HSDS area were estimated to range from 540 to 580 feet (R&W/GZA, 2018).

2.06 REGIONAL HYDROGEOLOGY

The direction of regional groundwater flow is influenced by the primary surface water features of the Rogue River and the Grand River. Streamflow data from the USGS Gaging Station indicates that the Rogue River is gaining stream, acting as a groundwater discharge zone. Based on the static groundwater level in the Wellogic - Statewide Wells GIS Data for Kent County (Michigan State University, 2005a through 2005d), regional groundwater contours were interpolated by R&W/GZA. The regional groundwater contours also indicate regional groundwater flow pattern generally follows the topography, discharging to the Rogue River and the Grand River.

2.07 GROUNDWATER INVESTIGATIONS

R&W/GZA retained drilling contractors to perform subsurface exploration and monitoring well installation to continue delineation of the extent of PFOA and PFOS both vertically and laterally in the NKSA. Since 2017, R&W/GZA oversaw the installation of 84 groundwater monitoring wells at 29 locations in the HSDS study area, and 36 groundwater monitoring wells at 16 locations in the Wolven/Jewell study areas. At most of the locations, multi-depth cluster wells were installed. The borings were drilled using either hollow-stem auguring or rotosonic techniques. Soil samples were collected and logged every 5 feet. VAP groundwater samples were collected every 10 feet in the saturated zone and submitted to an independent laboratory for the PFAS analysis using isotope dilution method in accordance with the most recent version of the DoD QSM procedures.

Monitoring well screen intervals were selected based on PFAS VAP sampling results and geological conditions. Each monitoring well was constructed of factory-slotted, 0.010-inch, 5-foot-long PVC screen (in a few cases, 10 feet), and flush-threaded well casing. The annular space surrounding the well screen was filled with sand filter pack to approximately 3 feet above the top of the well screen, followed by a one-to-one and one-half foot-thick hydrated bentonite seal. The remaining annulus was filled with cement and bentonite grout to approximately one foot bgs. The wells were finished with a steel protective casing set in a concrete pad. A locking expansion cap was placed in the top of the PVC casing. **Appendix A** includes the soil boring and well installation logs. See **Table 1** for well completion information and **Table 2** for static water level measurements. See **Figure 2** for the groundwater monitoring well locations.

Following installation, the newly installed wells were developed to remove sediment from the sand-filter pack and well casing. The wells were developed using a 12-volt Mini-Typhoon® submersible pump equipped with dedicated tubing for each well. The pump was decontaminated between wells using a water and Alconox® wash with a water rinse. The wells were developed until the water ran clear. The development water was containerized and staged prior to proper disposal. The tubing and other disposable materials used during the well development were placed in a separate drum and stored for proper disposal.

In addition, surface water level measurement gauges were installed in the following locations in the Rogue River:

- Rockford Dam Seawall;
- East Bridge Street Bridge;
- Rogue River Road Bridge; and
- Jericho Avenue Bridge

The water levels measured from these locations were used in combination with available gaging height data at USGS gaging station, USGS04118500, to evaluate surface water levels in the Rogue River.

2.08 GROUNDWATER SAMPLING

Groundwater sampling was conducted quarterly throughout 2018 and 2019 using low-flow purging and sampling procedures. The wells were purged using either a GeoTech Peristaltic Pump or a GeoTech Bladder Pump and control box. Static water levels in the monitoring wells were measured to maintain stabilized drawdowns during purging. Field indicator parameters, temperature, pH, dissolved oxygen, specific conductance, ORP and turbidity, were monitored using a YSI PRO and field turbidity meters in accordance with the low-flow sampling SOP in the project QAPP. Once the field parameters stabilized, a groundwater sample was collected by disconnecting the tubing from the flow-through cell and collecting the sample directly from the tubing.

Groundwater samples were collected in laboratory-supplied sample containers labeled with the well ID, sample time and date, and analytes. The samples were packed in coolers with ice and shipped to the laboratory under chain-of-custody control via overnight express shipping.

Groundwater PFAS analytical data for the HSDS area and the Wolven/Jewell areas are summarized on **Tables 3** and **4**, respectively. As the subsurface exploration and monitoring well installation progressed, the newly installed wells were added to the sampling list in the quarter following their installation and development.

2.09 SITE GEOLOGY

This section provides a summary of the geology in the NKSA, based on borehole data collected during the subsurface exploration and groundwater monitoring well installation described in **Section 2.07**, and the residential water well construction information and lithology data downloaded from the online Wellogic System.[2] The Wellogic System made available individual well logs in PDF, GIS shapefiles of county-wide well locations and construction information, and database files of lithology data for some of the wells. R&W/GZA has attempted to verify the well locations by comparing the well addresses to the Kent County Parcel GIS shapefiles and found that some of the well locations in the Wellogic GIS shapefiles are incorrect. To rectify, the Kent County parcel center coordinates are used for the residential well locations if the well addresses are verified with the Kent County Parcel GIS shapefiles. The majority of the well addresses in the Wellogic System GIS shapefiles were verified, and the parcel center locations were used as their coordinates. For some well locations, the addresses of which were not verifiable, the locations in the Wellogic System GIS files were kept and qualified with a note. In addition, lithology data for some of the wells in the Wellogic System GIS shapefiles were not available, and R&W/GZA downloaded the PDF well logs, and compiled the available lithology data into the well lithology database.

The monitoring well locations and the residential water wells with lithology data are shown in **Figure 3.** Geologic cross-sections A-A', B-B', C-C', D-D', and E-E' are created in the HSDS study area, and geologic cross-sections F-F',

[2] https://secure1.state.mi.us/wellogic/Login.aspx?ReturnUrl=%2fwellogic%2fdefault.aspx

G-G', H-H' and I-I' in the Wolven/Jewell study areas to show the lithology in the study areas. See **Figures 4** through **12** for the geological cross-sections.

HSDS Study Area

In the HSDS study area, cross-section A-A' is constructed along the primary plume center line, following the paleo-channel on the Lidar Bare Earth Elevation image on **Figure 3**. Cross-section B-B' is immediately southwest of cross-section A-A'. The lithologies of both A-A' and B-B' are predominantly coarse-grained soil, with the presence of fine-grained soil in a few borings with limited thickness.

Cross-section C-C' is located north-south toward the Grand River. Except for HS-MW-17, where the soil encountered was sand from ground surface to an elevation of approximately 560 feet above mean sea level, fine-grained soil was encountered in all boreholes on this cross-section, with thickness ranging from less than 10 to approximately 80 feet. However, water bearing units were encountered in all wells on the cross-section. The presence of fine-grained soil is expected to affect the flow path locally, but not the primary groundwater flow toward the Rogue River or the Grand River.

Cross-section D-D' is located east of the Rogue River, near the confluence to the Grand River, where proglacial outwash is present. The lithologies of the wells on cross-section D-D' are generally coarse-grained soil, sand or gravel, with the presence of clay of limited thickness in a few boreholes. It is consistent with the regional geology.

Cross-section E-E' is constructed from the HSDS toward the Freska Lake area. The lithologies of the boreholes are similar to cross-section A-A' and cross-section B-B'. Coarse-grained soils are generally predominant. Fine-grained soils are present in some boreholes in thickness ranging from less than 10 to approximately 70 feet. However, water bearing units were encountered in all of these wells.

In general, coarse-grained soil predominates in most of the soil borings and water well logs in the HSDS study area. The presence and thickness of clay and silt deposits varies horizontally and vertically without stratified correlation between borings. The lithologies shown on the cross-sections in the HSDS study area are characteristics of glacial outwash, and end moraines, to a lesser extent, as documented in regional geology.

Wolven/Jewell Study Areas

Cross-section F-F' is constructed from the Wellington Ridge neighborhood to the Wolven Northeast study area. Fine-grained soil, clay, or silt is predominant in the boreholes on cross-section F-F'. Water bearing units were encountered below the clay stratum or between clay strata. The thickness of fine-grained soil varies from approximately 20 to more than 100 feet. In most of the boreholes on cross-section F-F', the top of the clay stratum was shallow, except the well at 3616 11 Mile Road, where more than 100 feet of sand were present above the top of the clay stratum, presenting a potential pathway for surface/shallow contamination to migrate to the deeper zone.

Cross-sections G-G' and H-H' are located from the Wellington Ridge area to the west or northwest toward the portions of the study area located west of US-131. For the boreholes located east of US-131, fine-grained soil is predominant in the boreholes while, for the boreholes located west of US-131, more coarse-grained soil is present. The thickness of fine-grained soil varies from less than 10 to more than 100 feet. Similar to cross-section F-F', water bearing units were encountered below the clay stratum or between clay strata.

Cross-section I-I' is constructed from the Wellington Ridge area to the southeast toward the Rogue River. Fine-grained soil, clay, or silt is generally predominant in the boreholes on cross-section I-I. The fine-grained soil

strata observed in the borings from 3260 Bent Tree Ridge to 8497 Windstone Road are not as thick when compared to other borings in the NKSA. Overall, the thickness of fine-grained soil varies from approximately 10 to approximately 200 feet. Water bearing units were encountered below the clay stratum or between clay strata.

In general, fine-grained soil predominates in most of the soil borings and water well logs in the Wolven/Jewell study area. In the soil borings located west of US-131 or closer to the Rogue River, coarse-grained soils are present in greater thickness and are even dominant in some locations. In addition, individual borings containing only coarse-grained soil exist even in the areas where fine-grained soils are predominant. These locations provide potential migration pathways from the surface/shallow to the deeper zone. The presence and thickness of clay and slit deposits varies horizontally and vertically. They appear to be unstratified and discontinuous in the area. In the soil borings where fine-grained soils are predominant, water bearing units were encountered below the clay stratum or between clay strata. In rare cases, water wells were screened in the bedrock. The lithologies shown on the cross-sections in the Wolven/Jewell study area are characteristic of end moraines as documented in regional geology. The presence of a relatively large volume of fine-grained soil limits the hydraulically conductive saturated zone, and therefore affects groundwater flow and contaminant transport pathway.

2.10 GROUNDWATER FLOW

Static water levels were collected from the monitoring wells and the staff gauges. Groundwater and surface water elevations were calculated from the surveyed elevations of the top of casing for the monitoring wells or reference points for the staff gauges. In addition, surface water elevations recorded at USGS04118500 were also downloaded and converted to the same datum as the monitoring well survey. See **Table 2** for a summary of the static groundwater water level measurements.

In addition to the R&W/GZA installed groundwater monitoring wells, EGLE also collected static water level data from the monitoring wells installed by EGLE during the November 2019 monitoring event, and requested North Kent County Landfill collect and provide static water level data in November 2019. In combination, the November 2019 static water level data provided the most complete set of static water levels and elevations for the NKSA.

For the locations where multiple wells were installed at different intervals, R&W/GZA grouped the wells into shallow and deep aquifers by borehole lithologies, screen intervals, and static water elevations. See **Table 1** for the well grouping designations.

Based on the November 2019 data set, groundwater elevation contours were interpolated from the static water level data. See **Figure 13** for the groundwater elevation contours in the shallow zone and **Figure 14** for the deep zone.

As shown on **Figure 13**, groundwater in the NKSA flows to the Rogue River. The HSDS is situated at or near a groundwater divide. Groundwater predominantly flows from the HSDS to the southeast to the Rogue River. But a portion of the flow is to the northwest. Because of Freska Lake and Clear Bottom Lake, the hydraulic gradient to the southwest appears to be flat as compared to the southeast. The Wellington Ridge is situated at a groundwater mounding area, and groundwater flows to the northwest, north, northeast and southeast. The hydraulic gradient in the Wolven/Jewell area appears to be steep due to the presence of relatively significant volumes of fine-grain soil.

As shown on **Figure 14**, the deep zone groundwater contours are similar to the shallow zone with a few localized variations. Groundwater flow directions are generally similar to the shallow zone as well.

2.11 PFAS DISTRIBUTION IN GROUNDWATER

PFAS analytical data from the groundwater monitoring wells, VAP samples, and residential water well samples collected until December 2019 were combined and used for the interpolation of isoconcentration maps. Where data from multiple sampling depths or sampling events are available at one location, the maximum concentrations were used during interpolation. It is important to note that the isoconcentration maps were geostatistically interpolated from spatially distributed point data; therefore, they may overestimate the concentrations or extents in areas where data points were relatively sparse. As implied by the method, the isoconcentration maps are estimations only and are not intended to represent measured or true conditions. **Figures 15, 16,** and **17** present the interpolated isoconcentration maps for total PFOS, PFOA and PFAS, respectively. Analytical data for the groundwater monitoring wells are provided on **Tables 3** and **4**.

PFAS isoconcentration map indicated PFAS migrated from the HSDS toward the Rogue River, primarily in the southeast direction, along the plume centerline. A portion of the PFAS plume appeared to migrate from the HSDS to the northwest toward the Freska Lake area and the Rogue River, but the plume transport appeared to be slowed as the plume reached the area of the Freska Lake and Clear Bottom Lake, where the groundwater gradient is relatively flat and groundwater flow pattern is affected by the surface water bodies. The PFAS isoconcentration map also indicated a PFAS plume with relatively low concentration near the confluence of the Rogue River and the Grand River.

In the Wolven/Jewell study areas, the PFAS isoconcentration map indicated that PFAS-containing groundwater migrated from the Wellington Ridge neighborhood, where PFOS, PFOA, and total PFAS were detected, to the Wolven Northeast study area, the Wolven Northwest study area, and the North Childsdale area. Based on the groundwater flow evaluation, the PFAS-impacted groundwater is expected to continue migrating to the Rogue River from these areas. It is important to note that the PFAS isoconcentration extent at the northeast corner of US-131 and 10 Mile Road and southwest of the Wellington Ridge neighborhood was a result of interpolation, due to lack of data points in that area.

The PFOA and PFOS isoconcentration maps indicated a similar distribution to the total PFAS isoconcentration map, but their extents and the concentration ranges are less than that of total PFAS because the total PFAS isoconcentration map included other detected compounds, such as PFBS, PFHxA, PFHxS, and PFNA. Furthermore, the mapping indicates distribution of lower chain compound such as PFBS is spatially greater than PFOS and PFOA, likely due to its relatively low sorption coefficient to soil matrix[3]. In comparison, the extent of PFOS distribution isoconcentration map is slightly less than that of PFOA, likely because PFOS has eight fluorine atoms in the tail, and PFOA has seven fluorine atoms in the tail, and the longer chain PFOS is more strongly sorbed to the soil matrix than PFOA[4].

2.12 GSI AND APPLICABLE RULE 57 WATER QUALITY STANDARDS

The groundwater flow evaluation and total PFAS, PFOS and PFOA distribution analysis indicate that PFOA and PFOS have migrated toward the Rogue River or will migrate toward the Rogue River. Based on EGLE's Part 201 Administrative Rules, Part 31 Administrative Rules, Part 4 – Water Quality Standards, the potential environmental

[3] See Section 5.2.3: https://pfas-1.itrcweb.org/5-environmental-fate-and-transport-processes/#5_2
[4] See Section 5.2.3: https://pfas-1.itrcweb.org/5-environmental-fate-and-transport-processes/#5_2

exposure pathways for impacted surface water in the Rogue River and applicable Part 4 Rule 57 Water Quality Values are identified as follows:

- Human exposure via non-drinking water exposure route – Rule 57 HNDV;
- Aquatic life exposure to impacted water in the Rogue River – Rule 57 FCV; and
- Wildlife exposure to impacted water in the Rogue River – Rule 57 WV.

The generic Part 201 GSI criteria are the lesser of HNDV, FCV, and WV. It is important to note that the human health drinking water value is not applicable.

Parameter	Units	HNDV	FCV	WV
PFOA	ng/L	12,000	880,000	Not Available
PFOS	ng/L	12	140,000	Not Available

2.13 DATA GAPS

Based on the flow and total PFAS, PFOS and PFOA distribution assessment, the following locations are identified as potential discharge areas for the PFOS- and PFOA-containing groundwater in the HSDS and Wolven-Jewell study areas:

- Southeast downgradient of the HSDS primary plume;
- Downgradient of the HSDS, near the confluence of the Rogue River and the Grand River;
- Downgradient of the HSDS, near the Freska Lake area;
- Wolven Northeast study area;
- Wolven Northwest study area; and
- North Childsdale study area, downgradient of the Wolven study area.

In evaluating the potential risks to the Rogue River, the following data gaps are identified:

- Groundwater elevation and flux at the GSI to evaluate whether groundwater discharges to the Rogue River;
- Groundwater elevation and flux data at the GSI to evaluate the gradient and flux at the GSI, if it is determined groundwater discharges to the Rogue River;
- PFOS, PFOA and PFAS concentrations of the groundwater discharging to the Rogue River; and
- Identification of the proper locations for GSI monitoring wells.

3.0 PROPOSED STATEMENT OF WORK

The following provides a summary of the proposed investigations, based on the identified data gaps. The proposed sampling locations are shown on **Figure 18**. Actual piezometer and pore-water sampling locations may vary slightly from the proposed locations of **Figure 18** during installation. While the target locations are shown, limitations for access on private properties, river bank conditions, and utilities may require moving piezometer locations.

3.01 HSDS STUDY AREA

Based on the groundwater flow, analytical data, and our evaluation, the following pore-water sampling and GSI piezometer locations are proposed:

- Nine pore-water sampling locations (HS-PW-1 through HS-PW-9) and five GSI piezometer locations (HS-GSI-1 through HS-GSI-5) downgradient of the primary House Street plume, along the Rogue River, to monitor potential PFOA and PFOS venting to the surface water.
- Three GSI piezometer locations (HS-GSI-6 through HS-GSI-8) downgradient of the primary House Street plume, along the Grand River, to measure potential venting to the surface water.
- Two pore-water sampling locations (HS-PW-10 and HS-PW-11) and one GSI piezometer location (HS-GSI-9) northwest of the House Street Site, downgradient of the Freska Lake area, along the Rogue River, to monitor potential PFOA and PFOS venting to the surface water.

In addition, existing well cluster HS-MW-19S/D and HS-MW-29A (located hydraulically downgradient of the primary House Street plume) are also considered to be GSI monitoring points to monitor potential PFOA and PFOS venting to the Rogue River. As identified in the GSI SOW, these wells will be sampled during the pore-water sampling event.

3.02 WOLVEN/JEWELL STUDY AREA

Based on the groundwater flow, analytical data, and our evaluation, the following pore-water sampling and GSI piezometer locations are proposed:

- Seven pore-water sampling locations (Area19-PW-1 through Area19-PW-7) downgradient/northeast of the Area 19 plume within the Rogue River to monitor potential venting to the surface water. These pore-water sample locations are located hydraulically downgradient of Wellington Ridge, immediately downgradient of the apparent extent of PFOA+PFOS exceeding 10 ng/L.
- Three GSI piezometer locations (Area19-GSI-1 through Area19-GSI-3) downgradient of the Area 19 plume to the northeast. Staff gauges (as shown on **Figures 18** and **18B**) in the river will be paired with these piezometer locations. These locations along the Rogue River will be used to measure and compare the groundwater elevations to the pore-water and surface-water elevations. In addition, these locations will to be used to monitor potential venting to the surface water at the north and south edges of this portion of the plume along with the center of the plume. As identified in the GSI SOW, these piezometers will be sampled during the pore-water sampling event. Additionally, one existing well installed by EGLE (DEQ-MW-9 well series) is also considered to be a GSI monitoring point.

- Four pore-water sampling locations (WVNW-PW-1 through WVNW-PW-4) and two GSI piezometer locations (WVNW-GSI-1 through WVNW-GSI-2) immediately downgradient of the Wolven Northwest plume, along the Rogue River to monitor potential PFOA and PFOS venting to the surface water. Two staff gauges (as shown on **Figures 18** and **18A**) in the river will be paired with these two piezometer locations.
- Six pore-water sampling locations (WV/CH-PW-1 through WV/CH-PW-6) and two GSI piezometer locations (WV/CH-GSI-1 through WV/CH-GSI-2) are proposed immediately downgradient/southeast of the Wolven-North Childsdale plume, along the Rogue River to monitor potential venting to the surface water. The existing staff gauges in this segment of the Rogue River will be utilized for water level comparison and groundwater flow evaluation.

4.0 INVESTIGATION METHODOLOGY

Pore-water sampling will be performed using the same techniques previously used at the former Wolverine Tannery site. Therefore, two weeks of piezometer- and staff-gauge measurements will be made to establish groundwater flows to the surface water before any pore-water samples will be collected. Piezometer- and staff-gauge measurements will be made Monday, Wednesday, and Friday of each week. If these measurements do not demonstrate groundwater flow to the River, the two-week monitoring will be repeated until it does. The lack of demonstration and need to extend the monitoring period will be discussed with EGLE, if needed.

Relevant tasks completed under this RAP will be completed in accordance with the most recent revision of the QAPP prepared for Wolverine by R&W/GZA.

4.01 PIEZOMETERS INSTALLATION AND SAMPLING

The proposed piezometers will be hand-driven into the groundwater on the river bank. The top of the piezometer will be installed above the estimated flood elevation based on observations of vegetation and deposition. The piezometer will be finished with a one-foot-thick bentonite seal, followed by a two-inch concreate pad at the surface. An elevational survey will also be conducted upon completion of the piezometer installations.

The piezometers will be installed following SOP A28 (**Appendix B**). Piezometers slated for sampling as established in the GSI SOW (Area19-GSI-1 through Area19-GSI-3) will be sampled following SOP A29 (**Appendix B**). These piezometers will be sampled a minimum of two weeks after installation and in conjunction with the pore-water sampling event in this RAP.

4.02 PORE-WATER SAMPLING

After demonstrating the groundwater is flowing to the River, pore-water samples will be collected using a temporary well point (i.e., stainless-steel probe) driven to discrete depths within the river bottom. A shroud may be used if river bottom conditions allow, to further minimize any short-circuiting during pore-water sampling. The pore-water sampling will be attempted at 6-inch intervals beginning at 12 inches below the surface of the bottom sediment. Two pore-water samples will be attempted following procedures similar to that described below. R&W/GZA's experience indicates that pore-water sampling methodology can vary from sampling location to location given physical conditions of the stream bed, etc. Step outs may be necessary if refusal is encountered. These will be documented in the field. As such, the following is proposed only as a guide.

- A 6-foot (or appropriate length) stainless-steel probe with a 6-inch screen will be advanced to the desired depth. The top of the screen in the shallowest depth interval will be 12 inches below the surface of the sediment in the river bottom. Screen intervals are expected to be: 12 to 18 inches and 18 to 24 inches.
- A peristaltic pump with dedicated tubing will be used to purge the screen at a flow rate less than 100 ml/min.
- Using a multiparameter meter (as specified in the QAPP) with a flow-through cell, R&W/GZA will measure pH, temperature, conductivity, dissolved oxygen and ORP from the pore-water interval and will compare it to measurements collected concurrently from the river. Both readings will be documented on a field data sheet. DO and ORP will be collected for information purposes only.
- Once the field readings from the pore water have stabilized and the pore-water readings are distinguishable from the river readings (i.e., >10% difference for parameters except for temperature), the pore water will be sampled.

- Pore water will be pumped directly into laboratory-provided sampling containers maintaining the flow rate of less than 100 ml/min. R&W/GZA will submit samples to Pace Analytical of Columbia, South Carolina for PFAS analysis using the DoD QSM (which includes isotope dilution.)
- This is further detailed in SOP A27 (**Appendix B**).

5.0 SAMPLING AND ANALYTICAL PROCEDURES

This section provides a generalized SAP for the piezometer- and pore-water sampling. Specific information regarding sampling procedures and analytical methods is provided in the site-specific QAPP.

5.01 SAMPLING LOCATIONS

As discussed in **Section 3.0**, the following pore-water sampling and GSI piezometer locations are proposed:

Area of Investigation	Pore Water	Piezometers	Wells
Southeast downgradient of the HSDS primary plume along Rogue River	HS-PW-1 through HS-PW-9	HS GSI-1 through HS-GSI-5	HS-MW-19S/D and HS-MW-29A
Downgradient of the HSDS near Grand River	--	HS-GSI-6 through HS-GSI-8	--
Northwest of the HSDS, Downgradient of the Freska Lake area	HS-PW-10 and HS-PW-11	HS-GSI-9	--
Downgradient of Wolven Northeast plume within the Rogue River	Area19-PW-1 through Area19-PW-7	Area19-GSI-1 through Area19-GSI-3, paired staff gauges	One EGLE well (DEQ-MW-9 well series)
Downgradient of the northwest portion of the Wolven/Jewell plume along the Rogue River	WVNW-PW-1 through WVNW-PW-4	WVNW-GSI-1 through WVNW-GSI-2, paired staff gauges	
North Childsdale area, downgradient of the Wolven study area	WV/CH-PW-1 through WV/CH-PW-6	WV/CH-GSI-1 through WV/CH-GSI-2, existing staff gauges	

5.02 SAMPLE COLLECTION AND LABELING

Samples will be collected for PFAS analysis following the methods summarized in **Section 4.0** and detailed in the sampling SOPs for Pore Water, Piezometers, and Groundwater Monitoring Wells provided in **Appendix B**. Detailed field and laboratory requirements are provided in the site-specific QAPP.

Sample identification will consist of nomenclatures that include the unique location identification (see reference table above). If applicable, sample identification for each sample will be repeated for each sampling event with consistent spelling.

To prevent misidentification of samples, legible labels will be affixed to each sample container. The labels will be sufficiently durable to remain legible even when wet. At a minimum, the labels will contain the following information:

- Location ID;
- Name or initials of collector; and
- Date and time of collection.

5.03 SAMPLE SHIPPING

Sample bottles will be placed into the cooler and packed with double-bagged wet ice immediately following collection. Packing material will be used as necessary. A temperature blank will be placed in the cooler prior to shipment. The cooler shall be addressed to the appropriate laboratory and dispatched as soon as practical to ensure timely arrival.

5.04 ANALYTICAL METHOD AND PARAMETERS

PFAS will be analyzed using DoD QSM 5.3 guidelines for PFAS by isotope dilution methodology. The analyte list will include the 28 PFAS compounds specified by EGLE, and reporting limits are provided in Table A.7.7 of the project-specific QAPP.

6.0 DATA QUALITY ASSURANCE AND CONTROL

The following field quality control samples will be collected at a rate of one per 20 samples in accordance with the project-specific QAPP: Field blanks, field duplicates, and MS/MSDs.

- Field blanks will be collected by pouring laboratory-supplied certified PFAS-free water into a sample container at the point of sample collection. The purpose of field blanks is to assess potential contamination at the sample point.

- Field duplicates will be collected by filling one additional sample container with water from the sample point. The purpose of field duplicates is to assess variability in sample composition. Field duplicates are not intended to be blind duplicates.

- MS/MSD will be collected by filling two additional sets of sample bottles with water from the sample point. MS/MSD analyses are conducted by the analytical laboratory after samples have been collected and submitted. Analysis of known concentrations of analytes spiked in the MS/MSD samples indicate if matrix interference effects are occurring.

- QA/QC samples will be collected using the methods described in **Section 5.0** and the SOPs in **Appendix B**. Samples will be labeled described in **Section 5.0.** The location of QA/QC samples will be entered into the Monitoring Checklist. QA/QC samples will be analyzed using the same analytical methods used for the primary sample.

7.0 INVESTIGATION DERIVED WASTE

Pore-water pumped during the sampling and development and sampling purge water from the piezometers and monitoring wells are the only investigation derived wastes anticipated. The pumped water from sampling for pore water will be discharged back to the surface water body after the PFAS aliquot is collected. The piezometer and monitoring well development and purge water will managed as follows:

- For locations where PFAS concentrations are below Part 201 GRCC, the water can be discharged to the ground surface in accordance with EGLE interoffice communication regarding purge-water disposal from well sampling and development (EGLE, 1999).

- For locations where PFAS concentrations are unknown or known to exceed Part 201 GRCC, the water will be disposed of appropriately in accordance with the EGLE interoffice communication regarding purge water disposal from well sampling and development (EGLE, 1999), and not discharged to the ground surface.

8.0 ANTICIPATED SCHEDULE

The schedule for piezometer installation will depend greatly on R&W/GZA's ability to procure access to the desired locations and the potential impact of coronavirus disease 2019 (COVID-19). Piezometers will be installed and developed prior to collecting the two weeks of piezometer- and staff-gage measurements. After demonstrating groundwater flow toward the Rogue River, the pore-water sampling will be conducted. Assuming access for all piezometers and river access is obtained expeditiously and there are no COVID-19-related delays, R&W/GZA currently anticipates collecting pore-water samples during fall 2020 low-flow conditions (through early October). If access issues do arise, the protocol laid out in **Section 9.0** of the CD will be implemented.

R&W/GZA will summarize the findings from this investigation and submit a work plan for installation of permanent monitoring well locations needed for GSI monitoring within 90 days following receipt of all analytical data.

9.0 REFERENCES

Apple, Beth A. and Howard W. Reeves. 2007. *Summary of Hydrogeologic Conditions by County for the State of Michigan*. https://pubs.usgs.gov/of/2007/1236/pdf/OFR2007-1236.pdf.

Farrand, W.R. 1982. *Quaternary Geology of Michigan.* http://www.michigan.gov/documents/deq/1982_Quaternary_Geology_Map_301467_7.pdf.

Michigan Department of Environmental Quality. 1987. *Bedrock Geology Map of Michigan*. 1:500,000 scale. https://www.michigan.gov/documents/deq/1987_Bedrock_Geology_Map_301466_7.pdf.

Michigan Department of Environmental Quality, Water Bureau, United States Geological Survey Michigan Water Science Center, and Michigan State University – Institute of Water Research, RS&GIS, and Biosystems and Agricultural Engineering. 2005. Wellogic – Statewide Wells Groundwater Inventory and Mapping Project (Michigan State University, 2005a).

Michigan Department of Environmental Quality. 1999. *Interoffice Communication, Operation Memo Gen-10*, *Re: Purge Water Disposal from Well Sampling and Development.* https://www.michigan.gov/documents/deq/deq-whm-hwp-Op-Memo-Gen-10-Rev1_235127_7.pdf

Michigan State University. 2015. Groundwater Inventory and Mapping Project. Michigan Glacial Landsystems.

Michigan State University. 2005, June 30. Groundwater Inventory and Mapping Project. Estimate of Annual Groundwater Recharge. (Michigan State University, 2005b)

Michigan State University. 2005, October 28. Groundwater Inventory and Mapping Project Glacial Deposits - Estimated Transmissivity. Lansing, Michigan, United States of America (Michigan State University 2005c).

Michigan State University. 2005, June 30. Groundwater Inventory and Mapping Project Wellogic - Well Hydraulic Properties. Lansing, Michigan, United States of America (Michigan State University, 2005d).

Michigan State University. 2005, June 30. Groundwater Inventory and Mapping Project Wellogic -Statewide Wells. Lansing, Michigan, United States of America.

R&W/GZA. 2018. *Conceptual Site Model Update and Status Report, Former House Street Disposal Area, Wolverine World Wide, Inc., Rockford, Michigan*.

R&W/GZA. 2019. *Implementation of 2018 Work Plan - Summary Report, Former Wolverine World Wide Tannery Facility*. Submitted to USEPA January 11, 2019.

Stramel, G.J., C.O. Wisler, and L.B. Laird. 1954. *Water Resources of the Grand Rapids Area, Michigan.* https://pubs.usgs.gov/circ/1954/0323/report.pdf.

Western Michigan University. (1981). Hydrogeologic Atlas of Michigan: U.S. Environmental Protection Agency Underground Injection Control Program. Kalamazoo, Michigan, United States of America.

TABLES

TABLE 1
EXISTING MONITORING WELL CONSTRUCTION INFORMATION
Algoma and Plainfield Townships, Kent County, MI

Site Location	Well Ownership/ Data Provider	Well Field ID	Top of Casing Elevation (ft)	Ground Surface Elevation (ft)	Top of Screen Depth (ft bgs)	Bottom of Screen Depth (ft bgs)	Casing Diameter (in)	Casing Type	Aquifer Zone	Protective Casing Type
House Street	EGLE	HS-DEQ-MW1D	799.43	799.7	*ND*	123.82	*ND*	*ND*	*D*	*ND*
House Street	EGLE	HS-DEQ-MW1I	799.83	800.2	*ND*	77.58	*ND*	*ND*	*S*	*ND*
House Street	EGLE	HS-DEQ-MW1S	799.42	799.7	*ND*	56.56	*ND*	*ND*	*S*	*ND*
House Street	EGLE	HS-DEQ-MW3D	857.29	857.9	*ND*	177.41	*ND*	*ND*	*D*	*ND*
House Street	EGLE	HS-DEQ-MW3S	857.40	857.9	*ND*	106.45	*ND*	*ND*	*S*	*ND*
House Street	EGLE	HS-DEQ-MW4-102	733.80	734.4	*ND*	102.8	*ND*	*ND*	*D*	*ND*
House Street	EGLE	HS-DEQ-MW4-16	734.23	734.7	*ND*	16.04	*ND*	*ND*	*S*	*ND*
House Street	EGLE	HS-DEQ-MW4-53	734.33	734.7	*ND*	53.85	*ND*	*ND*	*D*	*ND*
House Street	EGLE	HS-DEQ-MW4-80	734.33	734.7	*ND*	80.09	*ND*	*ND*	*D*	*ND*
House Street	EGLE	HS-DEQ-MW4-85	733.61	734.4	*ND*	85.79	*ND*	*ND*	*D*	*ND*
House Street	EGLE	HS-DEQ-MW4-90	733.99	734.4	*ND*	89.68	*ND*	*ND*	*D*	*ND*
House Street	EGLE	HS-DEQ-MW4-97	733.71	734.4	*ND*	98.81	*ND*	*ND*	*D*	*ND*
House Street	EGLE	HS-DEQ-MW5D	812.95	813.5	*ND*	130.16	*ND*	*ND*	*S*	*ND*
House Street	EGLE	HS-DEQ-MW5S	813.12	813.5	*ND*	47.28	*ND*	*ND*	*S*	*ND*
House Street	EGLE	HS-DEQ-MW6D	795.59	796.4	*ND*	176.36	*ND*	*ND*	*D*	*ND*
House Street	EGLE	HS-DEQ-MW6S	796.09	796.4	*ND*	45.71	*ND*	*ND*	*S*	*ND*
House Street	EGLE	HS-DEQ-MW7-102	775.04	775.4	*ND*	102.11	*ND*	*ND*	*S*	*ND*
House Street	EGLE	HS-DEQ-MW7-33	775.15	775.4	*ND*	33.33	*ND*	*ND*	*S*	*ND*
House Street	EGLE	HS-DEQ-MW7-87	775.02	775.4	*ND*	87.71	*ND*	*ND*	*S*	*ND*
House Street	EGLE	HS-DEQ-MW7-94	775.16	775.4	*ND*	94.32	*ND*	*ND*	*S*	*ND*
House Street	EGLE	HS-DEQ-MW8D	677.86	678.2	*ND*	33.37	*ND*	*ND*	*S*	*ND*
House Street	EGLE	HS-DEQ-MW8S	677.87	678.2	*ND*	28.28	*ND*	*ND*	*S*	*ND*
House Street	R&W/GZA	HS-MW-10D	780.94	778.1	188.2	193.2	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-10M	780.64	777.7	126.4	131.4	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-10S	780.06	777.2	48.3	58.3	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-11D	744.75	742.1	153.6	158.6	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-11M	744.96	742.3	96.4	101.4	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-11S	744.78	742.1	21.2	31.2	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-12A	716.50	716.8	15.4	20.4	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-12B	716.36	716.8	51.5	56.5	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-12C	716.17	716.9	127.7	132.7	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-12D	716.48	717.0	158.7	163.7	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-12E	716.29	716.8	187.5	192.5	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-13A	*ND*	*ND*	79.0	84.0	2	PVC	ND	*ND*
House Street	R&W/GZA	HS-MW-13B	*ND*	*ND*	149.0	154.0	2	PVC	ND	*ND*
House Street	R&W/GZA	HS-MW-13C	*ND*	*ND*	199.5	114.5	2	PVC	ND	*ND*
House Street	R&W/GZA	HS-MW-14D	673.20	670.7	109.0	114.0	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-14M	673.53	671.0	68.1	73.1	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-14S	673.64	671.2	13.0	23.0	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-15D	642.86	639.7	108.6	118.6	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-15M	640.98	638.0	44.8	49.8	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-15S	640.71	637.5	6.9	16.9	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-17D	784.64	782.3	222.1	227.1	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-17M	784.17	781.9	167.3	172.3	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-17S	784.77	782.0	105.8	110.8	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-18D	684.73	682.0	140.6	145.6	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-18S	683.93	682.0	12.8	22.8	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-19D	680.79	677.7	85.9	95.9	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-19S	680.83	677.8	58.4	61.4	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-1D	790.73	788.7	172.3	176.9	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-1S	791.01	788.8	67.4	72.1	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-20D	706.64	703.9	126.1	131.1	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-20M	706.90	704.2	101.5	106.5	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-20S	706.72	703.9	61.1	66.1	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-21D	648.38	645.7	76.2	86.2	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-21M	648.85	645.9	59.0	64.0	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-21S	648.67	645.8	9.8	19.8	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-23A	791.23	791.7	72.1	77.1	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-23B	791.21	791.5	137.9	142.8	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-23C	791.09	791.4	210.2	215.0	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-23D	791.47	792.0	238.9	243.9	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-24A	776.01	776.3	55.6	60.4	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-24B	775.72	776.2	225.2	230.0	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-25D	650.61	651.1	65.7	70.7	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-25S	650.83	651.2	51.1	56.1	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-26D	651.75	652.1	79.6	84.6	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-26M	651.31	651.7	61.7	66.7	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-26S	651.88	652.0	25.8	30.8	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-27A	668.44	668.7	21.6	26.2	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-27B	668.49	668.9	35.4	38.0	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-27C	668.64	669.0	41.3	45.9	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-27D	668.54	668.9	52.4	56.4	2	PVC	D	Flush

TABLE 1
EXISTING MONITORING WELL CONSTRUCTION INFORMATION
Algoma and Plainfield Townships, Kent County, MI

Site Location	Well Ownership/ Data Provider	Well Field ID	Top of Casing Elevation (ft)	Ground Surface Elevation (ft)	Top of Screen Depth (ft bgs)	Bottom of Screen Depth (ft bgs)	Casing Diameter (in)	Casing Type	Aquifer Zone	Protective Casing Type
House Street	R&W/GZA	HS-MW-27E	668.56	668.9	58.5	62.5	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-28A	665.88	666.2	39.1	43.7	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-28B	666.14	666.4	43.3	47.9	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-28C	666.16	666.5	49.2	53.8	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-28D	665.89	666.3	62.2	66.8	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-28E	665.61	666.0	82.7	87.3	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-29A	633.13	630.3	3.5	13.5	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-29B	633.89	630.5	16.8	21.8	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-29C	633.60	630.4	27.2	32.2	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-29D	633.19	630.7	37.1	42.1	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-2S	799.66	797.6	77.9	82.5	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-30A	672.78	673.0	46.9	51.5	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-30B	673.09	673.4	51.5	56.1	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-30C	672.90	673.1	77.4	82.0	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-30D	673.37	673.6	112.7	117.3	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-30E	672.32	672.9	123.2	127.7	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-31A	639.30	639.5	17.1	21.6	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-31B	639.27	639.3	26.0	30.5	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-31C	639.27	639.4	41.3	45.8	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-31D	638.96	639.1	48.8	53.4	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-31E	638.95	639.2	64.1	68.7	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-32A	727.36	724.8	60.9	65.5	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-32B	727.85	725.1	79.1	83.7	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-32C	727.72	725.1	108.8	113.4	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-32D	727.55	725.0	142.3	146.9	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-3P	790.15	787.7	19.3	24.3	2	PVC	P	Stickup
House Street	R&W/GZA	HS-MW-3S	790.69	788.1	70.1	75.0	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-4S	784.88	782.3	70.2	74.8	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-5D	781.99	779.3	190.5	200.5	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-5P	781.55	779.1	17.7	22.4	2	PVC	P	Stickup
House Street	R&W/GZA	HS-MW-5S	781.79	779.2	60.3	65.0	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-6D	773.44	771.0	157.5	162.5	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-6S	773.34	770.7	58.2	62.9	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-7S	791.09	788.9	69.9	74.5	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-8	745.09	742.2	30.0	35.0	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-9D	820.88	818.2	204.3	209.3	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-9M	820.66	817.9	126.8	131.8	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-9S	820.20	817.8	26.2	31.2	2	PVC	P	Stickup
North Kent Landfill	NKL	NKLF-MW-35	900.23	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-48	901.64	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-53	893.99	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-54	912.79	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-55	893.11	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-56	867.88	866.4	*ND*	43.97	*ND*	*ND*	*S*	*ND*
North Kent Landfill	NKL	NKLF-MW-57	894.35	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-60	844.35	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-61	841.14	839.8	*ND*	28.47	*ND*	*ND*	*S*	*ND*
North Kent Landfill	NKL	NKLF-MW-63	840.81	839.1	*ND*	102.41	*ND*	*ND*	*D*	*ND*
North Kent Landfill	NKL	NKLF-MW-65	835.27	834.2	*ND*	21.87	*ND*	*ND*	*S*	*ND*
North Kent Landfill	NKL	NKLF-MW-66	874.57	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-67	902.72	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-68	900.98	899.2	*ND*	92.79	*ND*	*ND*	*S*	*ND*
North Kent Landfill	NKL	NKLF-MW-69	893.04	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-70	897.8	895.6	*ND*	63.33	*ND*	*ND*	*S*	*ND*
North Kent Landfill	NKL	NKLF-MW-71	894.71	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-72	882.18	879.5	*ND*	26.98	*ND*	*ND*	*S*	*ND*
North Kent Landfill	NKL	NKLF-MW-73	900.19	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-74	880.34	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-75	881.23	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-76	849.47	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-77	837.14	834.2	*ND*	22.8	*ND*	*ND*	*S*	*ND*
North Kent Landfill	NKL	NKLF-MW-78	883.89	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-80	888.05	887.4	*ND*	42.44	*ND*	*ND*	*S*	*ND*
North Kent Landfill	NKL	NKLF-MW-81	834.71	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-MW-82	896.26	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-TW-02	900.95	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-TW-04	858.20	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-TW-05	838.64	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
North Kent Landfill	NKL	NKLF-TW-06	883.99	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
Wolven	EGLE	WV-DEQ-MW10-121	764.74	763.865	*ND*	120.72	*ND*	*ND*	*D*	*ND*
Wolven	EGLE	WV-DEQ-MW10-177	764.934	763.865	*ND*	177.63	*ND*	*ND*	*D*	*ND*
Wolven	EGLE	WV-DEQ-MW10-55	764.909	763.376	*ND*	55.21	*ND*	*ND*	*S*	*ND*

TABLE 1
EXISTING MONITORING WELL CONSTRUCTION INFORMATION
Algoma and Plainfield Townships, Kent County, MI

Site Location	Well Ownership/ Data Provider	Well Field ID	Top of Casing Elevation (ft)	Ground Surface Elevation (ft)	Top of Screen Depth (ft bgs)	Bottom of Screen Depth (ft bgs)	Casing Diameter (in)	Casing Type	Aquifer Zone	Protective Casing Type
Wolven	EGLE	WV-DEQ-MW10-84	764.442	763.376	*ND*	84.14	*ND*	*ND*	*D*	*ND*
Wolven	EGLE	WV-DEQ-MW10-95	764.931	763.376	*ND*	95.25	*ND*	*ND*	*D*	*ND*
Wolven	EGLE	WV-DEQ-MW11-130	859.121	855.95	*ND*	130.22	*ND*	*ND*	*D*	*ND*
Wolven	EGLE	WV-DEQ-MW11-137	859.212	855.763	*ND*	136.65	*ND*	*ND*	*D*	*ND*
Wolven	EGLE	WV-DEQ-MW11-145	859.14	855.95	*ND*	145.71	*ND*	*ND*	*D*	*ND*
Wolven	EGLE	WV-DEQ-MW11-57	858.794	855.95	*ND*	56.99	*ND*	*ND*	*S*	*ND*
Wolven	EGLE	WV-DEQ-MW11-95	859.129	855.763	*ND*	95.47	*ND*	*ND*	*S*	*ND*
Wolven	EGLE	WV-DEQ-MW2D	877.53	877.80	*ND*	168.72	*ND*	*ND*	*D*	*ND*
Wolven	EGLE	WV-DEQ-MW2S	877.57	877.80	*ND*	58.04	*ND*	*ND*	*S*	*ND*
Wolven	EGLE	WV-DEQ-MW9-114	712.079	712.402	*ND*	114.07	*ND*	*ND*	*D*	*ND*
Wolven	EGLE	WV-DEQ-MW9-131	712.031	712.402	*ND*	130.97	*ND*	*ND*	*D*	*ND*
Wolven	EGLE	WV-DEQ-MW9-57	712.128	712.562	*ND*	56.85	*ND*	*ND*	*ND*	*ND*
Wolven	EGLE	WV-DEQ-MW9-73	712.096	712.562	*ND*	73.34	*ND*	*ND*	*D*	*ND*
Wolven	EGLE	WV-DEQ-MW9-94	711.979	712.562	*ND*	94.09	*ND*	*ND*	*D*	*ND*
Wolven	R&W/GZA	WV-MW-1	859.24	859.2	137.8	142.8	2	PVC	D	Stickup
Wolven	R&W/GZA	WV-MW-10D	751.00	748.6	165	170	2	PVC	D	Stickup
Wolven	R&W/GZA	WV-MW-10M	751.19	748.7	69.9	74.9	2	PVC	S	Stickup
Wolven	R&W/GZA	WV-MW-10S	751.26	748.4	7.0	12.0	2	PVC	S	Stickup
Wolven	R&W/GZA	WV-MW-11D	735.96	733.0	158.9	163.9	2	PVC	D	Stickup
Wolven	R&W/GZA	WV-MW-11S	735.89	732.8	29.4	34.4	2	PVC	S	Stickup
Wolven	R&W/GZA	WV-MW-12D	771.12	771.4	179.2	184.2	2	PVC	D	Flush
Wolven	R&W/GZA	WV-MW-12M	770.75	771.3	146.6	151.6	2	PVC	D	Flush
Wolven	R&W/GZA	WV-MW-12S	771.06	771.3	75.8	80.8	2	PVC	S	Flush
Wolven	R&W/GZA	WV-MW-13D	823.91	821.3	58.8	63.8	2	PVC	D	Stickup
Wolven	R&W/GZA	WV-MW-13M	823.75	821.6	18.1	23.1	2	PVC	S	Stickup
Wolven	R&W/GZA	WV-MW-13S	823.68	821.3	1.7	6.7	2	PVC	S	Stickup
Wolven	R&W/GZA	WV-MW-14D	872.05	872.3	142.3	147.3	2	PVC	D	Flush
Wolven	R&W/GZA	WV-MW-14S	872.18	872.5	8.9	13.9	2	PVC	S	Flush
Wolven	R&W/GZA	WV-MW-15A	721.25	721.5	9.0	14	2	PVC	P	Flush
Wolven	R&W/GZA	WV-MW-15B	721.07	721.4	33.1	38.1	2	PVC	S	Flush
Wolven	R&W/GZA	WV-MW-15C	720.84	721.3	43.7	48.5	2	PVC	S	Flush
Wolven	R&W/GZA	WV-MW-15D	721.09	721.3	135.1	137.8	2	PVC	D	Flush
Wolven	R&W/GZA	WV-MW-16D	823.45	820.9	91.7	96.7	2	PVC	D	Stickup
Wolven	R&W/GZA	WV-MW-16S	823.42	820.9	17.5	22.5	2	PVC	S	Stickup
Wolven	R&W/GZA	WV-MW-2D	791.36	790.5	30.2	35.2	2	PVC	D	Stickup
Wolven	R&W/GZA	WV-MW-2S	793.39	790.6	20.2	25.2	2	PVC	S	Stickup
Wolven	R&W/GZA	WV-MW-3D	823.28	820.7	57.5	62.5	2	PVC	D	Stickup
Wolven	R&W/GZA	WV-MW-3S	823.31	820.6	5.1	10.1	2	PVC	S	Stickup
Wolven	R&W/GZA	WV-MW-4	854.99	852.5	130.2	135.2	2	PVC	D	Stickup
Wolven	R&W/GZA	WV-MW-5D	865.07	862.0	68.7	73.7	2	PVC	D	Stickup
Wolven	R&W/GZA	WV-MW-5S	865.01	862.1	61.5	66.5	2	PVC	S	Stickup
Wolven	R&W/GZA	WV-MW-6D	786.51	784.1	99.1	104.1	2	PVC	D	Stickup
Wolven	R&W/GZA	WV-MW-6S	786.62	784.6	13.3	18.3	2	PVC	S	Stickup
Wolven	R&W/GZA	WV-MW-7D	727.36	727.8	89.5	94.5	2	PVC	S	Flush
Wolven	R&W/GZA	WV-MW-7M	728.19	728.5	49.9	54.9	2	PVC	S	Flush
Wolven	R&W/GZA	WV-MW-7S	727.61	728.0	16.1	21.1	2	PVC	S	Flush
Wolven	R&W/GZA	WV-MW-8D	845.81	846.0	117.2	122.2	2	PVC	D	Flush
Wolven	R&W/GZA	WV-MW-8M	845.74	845.9	60.0	65.0	2	PVC	S	Flush
Wolven	R&W/GZA	WV-MW-8S	845.55	846.0	30.0	35.0	2	PVC	S	Flush
Wolven	R&W/GZA	WV-MW-9	859.86	857.4	92.3	97.3	2	PVC	S	Stickup

Abbreviations

ND = No data provided/ available
ft = feet
bgs = below ground surface
in = inches
NKL = Kent County North Kent Landfill
EGLE = Michigan Department of Environment, Great Lakes, and Energy
R&W/GZA = Rose & Westra, a Division of GZA
P = perched zone
S = shallow zone
D = deep zone

Notes

1) Elevations are provided in North American Vertical Datum of 1988 (NAVD 88).
2) North Kent Landfill elevations converted from NGVD29 to NAVD88 by R&W/GZA by subtracting 0.43 feet from provided elevation.

TABLE 2
STATIC WATER LEVEL MEASUREMENTS
Algoma and Plainfield Townships, Kent County, MI

Site Location	Well Field ID	November 4, 2019 Static Water Level Elevation (ft)
House Street	HS-DEQ-MW1D	739.09
House Street	HS-DEQ-MW1I	748.63
House Street	HS-DEQ-MW1S	749.96
House Street	HS-DEQ-MW3D	748.76
House Street	HS-DEQ-MW3S	839.76
House Street	HS-DEQ-MW4-102	687.91
House Street	HS-DEQ-MW4-16	729.17
House Street	HS-DEQ-MW4-53	688.26
House Street	HS-DEQ-MW4-80	688.11
House Street	HS-DEQ-MW4-85	688.07
House Street	HS-DEQ-MW4-90	688.00
House Street	HS-DEQ-MW4-97	687.77
House Street	HS-DEQ-MW5D	740.83
House Street	HS-DEQ-MW5S	*Dry*
House Street	HS-DEQ-MW6D	650.30
House Street	HS-DEQ-MW6S	*Dry*
House Street	HS-DEQ-MW7-102	751.35
House Street	HS-DEQ-MW7-33	751.20
House Street	HS-DEQ-MW7-87	751.33
House Street	HS-DEQ-MW7-94	751.36
House Street	HS-DEQ-MW8D	652.76
House Street	HS-DEQ-MW8S	653.68
House Street	HS-MW-10D	734.19
House Street	HS-MW-10M	726.19
House Street	HS-MW-10S	726.18
House Street	HS-MW-11D	719.37
House Street	HS-MW-11M	719.35
House Street	HS-MW-11S	720.13
House Street	HS-MW-12A	*ND*
House Street	HS-MW-12B	*ND*
House Street	HS-MW-12C	*ND*
House Street	HS-MW-12D	*ND*
House Street	HS-MW-12E	*ND*
House Street	HS-MW-13A	*ND*
House Street	HS-MW-13B	*ND*
House Street	HS-MW-13C	*ND*
House Street	HS-MW-14D	660.09
House Street	HS-MW-14M	661.24
House Street	HS-MW-14S	656.70
House Street	HS-MW-15D	635.56
House Street	HS-MW-15M	634.13
House Street	HS-MW-15S	630.84
House Street	HS-MW-17D	689.38
House Street	HS-MW-17M	689.45
House Street	HS-MW-17S	703.64
House Street	HS-MW-18D	663.55
House Street	HS-MW-18S	670.37
House Street	HS-MW-19D	649.16
House Street	HS-MW-19S	651.59
House Street	HS-MW-1D	727.41
House Street	HS-MW-1S	728.00
House Street	HS-MW-20D	648.97
House Street	HS-MW-20M	649.07
House Street	HS-MW-20S	649.12
House Street	HS-MW-21D	638.75
House Street	HS-MW-21M	637.58
House Street	HS-MW-21S	637.79
House Street	HS-MW-23A	723.53
House Street	HS-MW-23B	723.47
House Street	HS-MW-23C	723.48
House Street	HS-MW-23D	723.45
House Street	HS-MW-24A	723.25
House Street	HS-MW-24B	723.21
House Street	HS-MW-25D	627.83
House Street	HS-MW-25S	627.93
House Street	HS-MW-26D	640.12
House Street	HS-MW-26M	639.96
House Street	HS-MW-26S	636.05
House Street	HS-MW-27A	644.51
House Street	HS-MW-27B	644.58
House Street	HS-MW-27C	645.51
House Street	HS-MW-27D	645.74

TABLE 2
STATIC WATER LEVEL MEASUREMENTS
Algoma and Plainfield Townships, Kent County, MI

Site Location	Well Field ID	November 4, 2019 Static Water Level Elevation (ft)
House Street	HS-MW-27E	645.61
House Street	HS-MW-28A	629.35
House Street	HS-MW-28B	629.37
House Street	HS-MW-28C	629.30
House Street	HS-MW-28D	630.25
House Street	HS-MW-28E	630.35
House Street	HS-MW-29A	*ND*
House Street	HS-MW-29B	*ND*
House Street	HS-MW-29C	*ND*
House Street	HS-MW-29D	*ND*
House Street	HS-MW-2S	725.55
House Street	HS-MW-30A	631.99
House Street	HS-MW-30B	632.00
House Street	HS-MW-30C	632.35
House Street	HS-MW-30D	632.53
House Street	HS-MW-30E	632.54
House Street	HS-MW-31A	624.83
House Street	HS-MW-31B	625.05
House Street	HS-MW-31C	624.83
House Street	HS-MW-31D	624.69
House Street	HS-MW-31E	624.77
House Street	HS-MW-32A	720.65
House Street	HS-MW-32B	720.67
House Street	HS-MW-32C	720.90
House Street	HS-MW-32D	720.75
House Street	HS-MW-3P	763.67
House Street	HS-MW-3S	724.86
House Street	HS-MW-4S	724.49
House Street	HS-MW-5D	724.82
House Street	HS-MW-5P	758.61
House Street	HS-MW-5S	724.82
House Street	HS-MW-6D	725.47
House Street	HS-MW-6S	725.44
House Street	HS-MW-7S	726.43
House Street	HS-MW-8	724.19
House Street	HS-MW-9D	744.72
House Street	HS-MW-9M	744.56
House Street	HS-MW-9S	793.72
North Kent Landfill	NKLF-MW-35	867.33
North Kent Landfill	NKLF-MW-48	870.29
North Kent Landfill	NKLF-MW-53	872.08
North Kent Landfill	NKLF-MW-54	877.50
North Kent Landfill	NKLF-MW-55	867.98
North Kent Landfill	NKLF-MW-56	845.56
North Kent Landfill	NKLF-MW-57	862.99
North Kent Landfill	NKLF-MW-60	834.09
North Kent Landfill	NKLF-MW-61	834.67
North Kent Landfill	NKLF-MW-63	752.97
North Kent Landfill	NKLF-MW-65	834.86
North Kent Landfill	NKLF-MW-66	871.83
North Kent Landfill	NKLF-MW-67	863.70
North Kent Landfill	NKLF-MW-68	867.15
North Kent Landfill	NKLF-MW-69	855.72
North Kent Landfill	NKLF-MW-70	848.12
North Kent Landfill	NKLF-MW-71	862.76
North Kent Landfill	NKLF-MW-72	856.81
North Kent Landfill	NKLF-MW-73	895.07
North Kent Landfill	NKLF-MW-74	871.50
North Kent Landfill	NKLF-MW-75	870.84
North Kent Landfill	NKLF-MW-76	848.24
North Kent Landfill	NKLF-MW-77	832.26
North Kent Landfill	NKLF-MW-78	836.08
North Kent Landfill	NKLF-MW-80	867.52
North Kent Landfill	NKLF-MW-81	831.74
North Kent Landfill	NKLF-MW-82	863.27
North Kent Landfill	NKLF-TW-02	863.72
North Kent Landfill	NKLF-TW-04	846.15
North Kent Landfill	NKLF-TW-05	835.50
North Kent Landfill	NKLF-TW-06	854.24
Wolven	WV-DEQ-MW10-121	719.14
Wolven	WV-DEQ-MW10-177	721.88
Wolven	WV-DEQ-MW10-55	723.29

TABLE 2
STATIC WATER LEVEL MEASUREMENTS
Algoma and Plainfield Townships, Kent County, MI

Site Location	Well Field ID	November 4, 2019 Static Water Level Elevation (ft)
Wolven	WV-DEQ-MW10-84	720.09
Wolven	WV-DEQ-MW10-95	715.81
Wolven	WV-DEQ-MW11-130	757.03
Wolven	WV-DEQ-MW11-137	757.20
Wolven	WV-DEQ-MW11-145	756.95
Wolven	WV-DEQ-MW11-57	815.57
Wolven	WV-DEQ-MW11-95	810.62
Wolven	WV-DEQ-MW2D	753.80
Wolven	WV-DEQ-MW2S	826.21
Wolven	WV-DEQ-MW9-114	711.27
Wolven	WV-DEQ-MW9-131	711.27
Wolven	WV-DEQ-MW9-57	703.29
Wolven	WV-DEQ-MW9-73	711.32
Wolven	WV-DEQ-MW9-94	711.39
Wolven	WV-MW-1	751.30
Wolven	WV-MW-10D	749.49
Wolven	WV-MW-10M	747.82
Wolven	WV-MW-10S	742.24
Wolven	WV-MW-11D	*Artesian Conditions*
Wolven	WV-MW-11S	726.20
Wolven	WV-MW-12D	716.97
Wolven	WV-MW-12M	716.94
Wolven	WV-MW-12S	721.81
Wolven	WV-MW-13D	803.32
Wolven	WV-MW-13M	820.92
Wolven	WV-MW-13S	820.91
Wolven	WV-MW-14D	731.14
Wolven	WV-MW-14S	861.25
Wolven	WV-MW-15A	*ND*
Wolven	WV-MW-15B	*ND*
Wolven	WV-MW-15C	*ND*
Wolven	WV-MW-15D	*ND*
Wolven	WV-MW-16D	761.52
Wolven	WV-MW-16S	815.71
Wolven	WV-MW-2D	785.38
Wolven	WV-MW-2S	790.29
Wolven	WV-MW-3D	802.01
Wolven	WV-MW-3S	819.14
Wolven	WV-MW-4	753.96
Wolven	WV-MW-5D	802.39
Wolven	WV-MW-5S	802.11
Wolven	WV-MW-6D	765.11
Wolven	WV-MW-6S	781.51
Wolven	WV-MW-7D	715.73
Wolven	WV-MW-7M	715.73
Wolven	WV-MW-7S	715.71
Wolven	WV-MW-8D	754.38
Wolven	WV-MW-8M	823.77
Wolven	WV-MW-8S	823.75
Wolven	WV-MW-9	824.90
Rogue River	Dam Seawall	680.71
Rogue River	E Bridge Street Bridge	680.34
Rogue River	Rogue River Road Bridge	618.90
Rogue River	Jericho Ave Bridge	672.24
Rogue River	USGS04118500	630.419
Rogue River	Rogue River at Rum Creek	692.84

Abbreviations

ND = No data provided/available

ft = feet

Notes

1) Elevations are provided in North American Vertical Datum of 1988 (NAVD 88).

2) Water level static measurements were completed on November 4, 2019 by R&W/GZA, AECOM (for EGLE), and North Ke

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-1D	HS-MW-1D	HS-MW-1D	HS-MW-1D	HS-MW-1D	HS-MW-1D	HS-MW-1D	HS-MW-1S	HS-MW-1S	HS-MW-1S	HS-MW-1S	HS-MW-1S	HS-MW-1S	HS-MW-1S	HS-MW-2S	HS-MW-2S
Sample Name			MW-1D	MW-1D	HS-GW-MW-1D	HS-MW-1D	HS-GW-MW1D	HS-GW-MW1D	HS-GW-MW-1D	MW-1S	MW-1S	HS-GW-MW-1S	HS-MW-1S	HS-GW-MW1S	HS-GW-MW1S	HS-GW-MW-1S	MW-2	MW-2
Well Screen Interval (Feet below ground surface)			172.3-176.9	172.3 - 176.9	172.3 - 176.9	172.3-176.9	172.3-176.9	172.3-176.9	172.3-176.9	67.4-72.1	67.4 - 72.1	67.4 - 72.1	67.4-72.1	67.4-72.1	67.4-72.1	67.4-72.1	77.9-82.5	77.9 - 82.5
Laboratory Sample ID			K1711117-004	TG26033-001	TJ24030-014	UC16019-001	UE30036-007	UI28005-011	UL05555-005	K1711117-003	TG26033-002	TJ24030-013	UC16019-002	UE30036-008	UI28005-010	UL05555-003	K1711117-005	TG26033-003
Sample Date			10/12/2017	07/24/2018	10/24/2018	03/11/2019	05/29/2019	09/27/2019	12/02/2019	10/12/2017	07/23/2018	10/24/2018	03/11/2019	05/29/2019	09/27/2019	12/02/2019	10/12/2017	07/24/2018
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	<0.0042	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0042	<0.0035
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	<0.0042	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0042	<0.0035
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	<0.0042	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0042	<0.0035
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	<0.0042	-	-	-	-	-	-	<0.0042	-	-	-	-	-	-	<0.0042	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0042	<0.0069	<0.0073	<0.0071	<0.0072	<0.0068	<0.0069	<0.0042	<0.0074	<0.0074	<0.007	<0.0076	<0.007	<0.0071	<0.0042	<0.0069
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	<0.0042	-	-	-	-	-	-	<0.0042	-	-	-	-	-	-	<0.0042	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0042	0.0046	0.0056	0.0056	0.0057	0.005	0.0054	0.018	0.0057	0.0059	0.0057	0.0059	0.0051	0.0054	<0.0042	0.091
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	<0.0042	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0042	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	<0.0042	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0042	<0.0035
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	-	<0.0069	<0.0073	<0.0071	<0.0072	<0.0068	<0.0069	-	<0.0074	<0.0074	<0.007	<0.0076	<0.007	<0.0071	-	<0.0069
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	<0.0042	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0042	<0.0035
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	-	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	-	0.0045	0.0045	<0.0035	0.0038	<0.0035	<0.0035	-	0.1
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0042	0.0035	0.0038	<0.0035	<0.0036	<0.0034	0.0035	0.026	0.039	0.043	0.04	0.034	0.026	0.022	<0.0042	0.037
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0083	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	<0.0083	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0083	0.011
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	<0.0042	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0042	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	<0.0042	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0042	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	0.012	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0042	0.011
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	0.016	0.0064	0.0061	0.0053	0.0051	<0.0035	<0.0035	<0.0042	0.069
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	<0.0042	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0042	<0.0035
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0017	0.0081	0.0089	0.0091	0.0098	0.0087	0.01	0.0042	0.0079 [J]	0.009 [J]	0.0095	0.013	0.0064	0.0072	<0.0017	0.0048 [J]
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0042	<0.0034	<0.0036	0.0042	0.0044	0.0034	0.0038	<0.0042	<0.0037	0.005 [J]	0.0046	0.012	<0.0035	0.006	<0.0042	<0.0035
PFOA + PFOS (Calculated)	NCL	NCL	ND	0.0081	0.0089	0.013	0.014	0.012	0.014	0.0042	0.0079	0.014	0.014	0.025	0.0064	0.013	ND	0.0048
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	<0.0042	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0042	0.015
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	<0.0042	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0042	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	<0.0042	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0042	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0042	<0.0034	<0.0036	<0.0035	<0.0036	<0.0034	<0.0034	<0.0042	<0.0037	<0.0037	<0.0035	<0.0038	<0.0035	<0.0035	<0.0042	<0.0035
Total PFAS (Calculated)	NCL	NCL	ND	0.016	0.018	0.019	0.02	0.017	0.023	0.076	0.064	0.074	0.065	0.074	0.038	0.041	ND	0.34

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-2S	HS-MW-2S	HS-MW-2S	HS-MW-2S	HS-MW-2S	HS-MW-3S	HS-MW-3S	HS-MW-3S	HS-MW-3S	HS-MW-3S	HS-MW-3S	HS-MW-3S	HS-MW-3S	HS-MW-3S	HS-MW-3S	HS-MW-4S
Sample Name			HS-GW-MW-2S	HS-MW-2	HS-GW-MW2	HS-GW-MW2	HS-GW-MW-2S	MW-3S	MW-3D	MW-3D Dup	HS-GW-MW-3S	HS-GW-MW-3S DUP	HS-MW-3S	HS-MW-3S DUP	HS-GW-MW3S	HS-GW-MW3S	HS-GW-MW-3S	MW-4S
Well Screen Interval (Feet below ground surface)			77.9 - 82.5	77.9-82.5	77.9-82.5	77.9-82.5	77.9-82.5	70.1-75	70.1 - 75	70.1 - 75	70.1 - 75	70.1 - 75	70.1-75	70.1-75	70.1-75	70.1-75	70.1-75	70.2-74.8
Laboratory Sample ID			TJ24030-012	UC16019-003	UE30036-015	UI28005-012	UL05055-009	K1711250-001	TG26033-005	TG26033-006	TJ24030-008	TJ24030-009	UC16019-005	UC16019-006	UE30036-016	UI26001-008	UL05055-011	K1711250-002
Sample Date			10/24/2018	03/11/2019	05/30/2019	09/27/2019	12/03/2019	10/13/2017	07/24/2018	07/24/2018	10/23/2018	10/23/2018	03/13/2019	03/13/2019	05/30/2019	09/24/2019	12/03/2019	10/13/2017
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0036	<0.0037	<0.0043	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0043
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0036	<0.0037	<0.0043	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0043
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0036	<0.0037	<0.0043	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0043
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	<0.0043	-	-	-	-	-	-	-	-	-	<0.0043
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0073	<0.0071	<0.0072	<0.0071	<0.0075	<0.0043	<0.0069	<0.007	<0.007	<0.0069	<0.007	<0.007	<0.0071	<0.0069	<0.0071	<0.0043
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	<0.0043	-	-	-	-	-	-	-	-	-	<0.0043
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.14	0.079	0.099	0.089	0.04	0.37	0.28	0.29	0.32	0.33	0.38	0.39	0.5	0.4	0.57	0.093
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0036	<0.0037	<0.0043	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0043
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0036	<0.0037	0.032	0.019	0.019	0.03	0.029	0.034	0.04	0.065	0.056	0.05	0.55
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0073	<0.0071	<0.0072	<0.0071	<0.0075	-	<0.0069	<0.007	<0.007	<0.0069	<0.007	<0.007	<0.0071	<0.0069	<0.0071	-
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0036	<0.0037	<0.0043	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0043
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	0.18	0.097	0.11	0.094	0.028	-	0.47	0.48	0.52	0.52	0.68	0.6	0.92	0.71	0.75	-
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.054	0.046	0.055	0.03	0.022	0.93	1.1	1.1	1.3	1.3	1.5	1.3	2.1	1.7	1.6	1.6
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.019	0.0095	0.011	0.01	0.0063	0.091	0.061	0.061	0.076	0.074	0.093	0.09	0.13	0.1	0.14	0.16
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0036	<0.0037	<0.0043	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0043
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0036	<0.0037	<0.0043	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0043
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.037	0.023	0.022	0.018	0.0065	0.18	0.14	0.13	0.14	0.15	0.14	0.15	0.34	0.2	0.24	0.32
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.11	0.053	0.072	0.05	0.03	0.39	0.21	0.21	0.31	0.29	0.35	0.33	0.41	0.36	0.51	0.42
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0036	<0.0037	<0.0043	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0043
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.0098 [J]	0.0088	0.019	0.006	0.0044	0.38	0.52	0.52	0.59	0.61	0.69	0.63	0.89	0.83	0.73	0.83
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0037	<0.0035	<0.0036	<0.0036	<0.0037	***0.022***	***0.017 [J]***	***0.016 [J]***	***0.019 [J]***	***0.018 [J]***	***0.032***	***0.032***	***0.057***	***0.024***	***0.023***	***2***
PFOA + PFOS (Calculated)	NCL	NCL	0.0098	0.0088	0.019	0.006	0.0044	0.4	0.54	0.54	0.61	0.63	0.72	0.66	0.95	0.85	0.75	2.8
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.023	0.012	0.015	0.014	0.0076	0.13	0.084	0.083	0.1	0.1	0.11	0.11	0.14	0.13	0.16	0.17
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0036	<0.0037	<0.0043	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0043
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0036	<0.0037	<0.0043	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0043
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0036	<0.0037	<0.0043	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0043
Total PFAS (Calculated)	NCL	NCL	0.57	0.33	0.4	0.31	0.14	2.5	2.9	2.9	3.4	3.4	4	3.7	5.6	4.5	4.8	6.1

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-4S	HS-MW-4S	HS-MW-4S	HS-MW-4S	HS-MW-4S	HS-MW-4S	HS-MW-4S	HS-MW-5D	HS-MW-5D	HS-MW-5D	HS-MW-5D	HS-MW-5D	HS-MW-5D	HS-MW-5D	HS-MW-5D	HS-MW-5S
Sample Name			MW-4S	MW-4	HS-GW-MW-4S	HS-MW-4	HS-GW-MW4	HS-GW-MW4S	HS-GW-MW-4S	MW-5D	MW-5D	HS-GW-MW-5D	HS-MW-5D	HS-GW-MW5D	HS-GW-MW5D	HS-GW-MW-5D	HS-GW-MW-5D DUP	MW-5S
Well Screen Interval (Feet below ground surface)			70.2-74.8	70.2 - 74.8	70.2 - 74.8	70.2-74.8	70.2-74.8	70.2-74.8	70.2-74.8	190.5-200.5	190.5 - 200.5	190.5 - 200.5	190.5-200.5	190.5-200.5	190.5-200.5	190.5-200.5	190.5-200.5	60.3-65
Laboratory Sample ID			K1713964-002	TG26033-014	TJ24030-006	UC16019-015	UE30036-014	UI26001-009	UL05055-020	K1800647-004	TG26033-009	TJ24030-003	UC16019-013	UE30036-005	UI26001-007	UL05055-018	UL05055-019	K1711250-003
Sample Date			12/28/2017	07/26/2018	10/23/2018	03/15/2019	05/30/2019	09/24/2019	12/04/2019	01/22/2018	07/25/2018	10/22/2018	03/14/2019	05/28/2019	09/24/2019	12/04/2019	12/04/2019	10/13/2017
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0037	<0.0042	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	<0.0042
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0037	<0.0042	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	<0.0042
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0037	<0.0042	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	<0.0042
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	<0.0042	-	-	-	-	-	-	<0.0042	-	-	-	-	-	-	-	<0.0042
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0042	<0.007	<0.007	<0.007	<0.0069	<0.007	<0.0074	<0.0042	<0.0075	<0.0071	<0.0071	<0.0069	<0.0073	<0.007	<0.0072	<0.0042
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	<0.0042	-	-	-	-	-	-	<0.0042	-	-	-	-	-	-	-	<0.0042
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.17	0.16	0.097	0.058	0.055	0.033	0.1	0.0054	0.0063	<0.0035	<0.0035	<0.0034	<0.0036	0.005	0.0068	0.57
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0037	<0.0042	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	<0.0042
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	0.95	0.84	0.61	0.56	0.46	0.27	0.74	<0.0042	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	1.1
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	-	<0.007	<0.007	<0.007	<0.0069	<0.007	<0.0074	-	<0.0075	<0.0071	<0.0071	<0.0069	<0.0073	<0.007	<0.0072	-
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0037	<0.0042	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	<0.0042
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	-	0.56	0.31	0.18	0.19	0.14	0.38	-	0.0072	<0.0035	<0.0035	<0.0034	<0.0036	0.0053	0.0077	-
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	3.2	6	3.5	3	2.9	2.1	4.6	0.013	0.017	0.004	<0.0035	<0.0034	0.0058	0.013	0.02	1.9
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.29	0.29	0.16	0.095	0.071	0.047	0.23	<0.0083	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	0.14
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0037	<0.0042	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	<0.0042
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0037	<0.0042	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	<0.0042
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.56	0.4	0.3	0.19	0.19	0.15	0.45	<0.0042	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	0.71
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.73	0.55	0.42	0.22	0.2	0.12	0.48	0.0077	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	0.45
Perfluorononanoic acid (PFNA)	NCL	NCL	0.006	0.0051	0.0042	<0.0035	<0.0035	<0.0035	<0.0037	<0.0042	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	0.018
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	1.5	2.7	1.6	1.5	1.4	0.82	2.1	0.0089	0.0091	0.002	<0.0018	0.0028	0.0035	0.008	0.013	2.8
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	***3.6***	***5.9 [J]***	***4.8 [J]***	***4.5***	***3.2***	***1.1***	***2.3***	***0.026***	***0.021 [J]***	0.0056 [J]	0.0053	0.011	0.0083	0.01	***0.015***	***44***
PFOA + PFOS (Calculated)	NCL	NCL	5.1	8.6	6.4	6	4.6	1.9	4.4	0.035	0.03	0.0076	0.0053	0.014	0.012	0.018	0.028	47
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.33	0.27	0.16	0.094	0.075	0.048	0.21	<0.0042	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	0.19
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0037	<0.0042	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	<0.0042
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0037	<0.0042	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	<0.0042
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0037	<0.0042	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0035	<0.0036	<0.0042
Total PFAS (Calculated)	NCL	NCL	11	18	12	10	8.7	4.8	12	0.061	0.061	0.012	0.0053	0.014	0.018	0.041	0.063	52

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-5S	HS-MW-5S	HS-MW-5S	HS-MW-5S	HS-MW-5S	HS-MW-5S	HS-MW-5S	HS-MW-6D	HS-MW-6D	HS-MW-6D	HS-MW-6D	HS-MW-6D	HS-MW-6D	HS-MW-6D	HS-MW-6S	HS-MW-6S
Sample Name			MW-5S	MW-5M	HS-GW-MW-5M	HS-MW-5S	HS-GW-MW5S	HS-GW-MW5S	HS-GW-MW-5S	MW-6D	MW-6D	HS-GW-MW-6D	HS-MW-6D	HS-GW-MW6D	HS-GW-MW6D	HS-GW-MW-6D	MW-6S	MW-6S
Well Screen Interval (Feet below ground surface)			60.3-65	60.3 - 65	60.3 - 65	60.3-65	60.3-65	60.3-65	60.3-65	157.5-162.5	157.5 - 162.5	157.5 - 162.5	157.5-162.5	157.5-162.5	157.5-162.5	157.5-162.5	58.2-62.9	58.2 - 62.9
Laboratory Sample ID			K1713964-001	TG26033-008	TJ24030-004	UC16019-012	UE30036-004	UI26001-006	UL05055-021	K1713273-007	TG26033-015	TJ24030-002	UC21029-008	UE30036-009	UI28005-004	UL05055-028	K1711250-004	TG26033-016
Sample Date			12/28/2017	07/25/2018	10/23/2018	03/14/2019	05/28/2019	09/24/2019	12/04/2019	12/07/2017	07/26/2018	10/22/2018	03/20/2019	05/29/2019	09/26/2019	12/05/2019	10/16/2017	07/26/2018
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.03	<0.19	<0.07	<0.078	<0.07	<0.07	<0.071	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	<0.0035
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.03	<0.19	<0.07	<0.078	<0.07	<0.07	<0.071	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	<0.0035
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.03	<0.19	<0.07	<0.078	<0.07	<0.07	<0.071	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	<0.0035
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	<0.03	-	-	-	-	-	-	<0.0043	-	-	-	-	-	-	<0.0042	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.03	<0.37	<0.14	<0.16	<0.14	<0.14	<0.14	<0.0043	<0.007	<0.0069	<0.007	<0.0071	<0.0072	<0.0071	<0.0042	<0.0069
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	<0.03	-	-	-	-	-	-	<0.0043	-	-	-	-	-	-	<0.0042	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	1.6	1.2	1.1	1.9	1.6	1.4	1.4	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	0.0051
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.03	<0.19	<0.07	<0.078	<0.07	<0.07	<0.071	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	2.2	2.2	1.4	1.7	3.5	2.2	3.4	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	<0.0035
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	-	<0.37	<0.14	<0.16	<0.14	<0.14	<0.14	-	<0.007	<0.0069	<0.007	<0.0071	<0.0072	<0.0071	-	<0.0069
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.03	<0.19	<0.07	<0.078	<0.07	<0.07	<0.071	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	<0.0035 [UJ]
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	-	1.8	1.7	3.1	3.1	2.8	3.5	-	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	-	0.01
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	8.2	5.6	4.7	7.5	11	9.9	15	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	0.014	0.048
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.36	0.29	0.28	0.56	0.52	0.47	0.43	<0.0086	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0083	<0.0035
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.03	<0.19	<0.07	<0.078	<0.07	<0.07	<0.071	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.03	<0.19	<0.07	<0.078	<0.07	<0.07	<0.071	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	1.9	0.99	0.84	1.6	1.8	1.4	2.4	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	0.0061
Perfluorohexanoic acid (PFHxA)	NCL	NCL	1.3	0.81	0.74	1.5	1.6	1.3	1.3	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	0.0065
Perfluorononanoic acid (PFNA)	NCL	NCL	0.03	<0.19	<0.07	<0.078	<0.07	<0.07	<0.071	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	<0.0035
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	7.4	6.2	5.6	***8.5***	***11***	***8.2***	***11***	<0.0017	<0.0018	<0.0017	<0.0018	<0.0018	<0.0018	<0.0018	0.0098	0.028 [J]
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	***41***	***81 [J]***	***47 [J]***	***42***	***100***	***59***	***71***	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	<0.0035
PFOA + PFOS (Calculated)	NCL	NCL	48	87	53	51	110	67	82	ND	ND	ND	ND	ND	ND	ND	0.0098	0.028
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.51	0.36	0.37	0.65	0.61	0.54	0.51	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	<0.0035 [UJ]
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.03	<0.19	<0.07	<0.078	<0.07	<0.07	<0.071	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.03	<0.19	<0.07	<0.078	<0.07	<0.07	<0.071	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.03	<0.19	<0.07	<0.078	<0.07	<0.07	<0.071	<0.0043	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0042	<0.0035
Total PFAS (Calculated)	NCL	NCL	65	100	64	69	130	87	110	ND	ND	ND	ND	ND	ND	ND	0.024	0.1

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-6S	HS-MW-6S	HS-MW-6S	HS-MW-6S	HS-MW-6S	HS-MW-7S	HS-MW-7S	HS-MW-7S	HS-MW-7S	HS-MW-7S	HS-MW-7S	HS-MW-7S	HS-MW-7S	HS-MW-8	HS-MW-8	HS-MW-8
Sample Name			HS-GW-MW-6S	HS-MW-6S	HS-GW-MW6S	HS-GW-MW6S	HS-GW-MW-6S	MW-7S	MW-7	HS-GW-MW-7S	HS-MW-7S	HS-MW-7S DUP	HS-GW-MW7S	HS-GW-MW7S	HS-GW-MW-7S	MW-8	MW-8	HS-GW-MW-8
Well Screen Interval (Feet below ground surface)			58.2 - 62.9	58.2-62.9	58.2-62.9	58.2-62.9	58.2-62.9	69.9-74.5	69.9 - 74.5	69.9 - 74.5	69.9-74.5	69.9-74.5	69.9-74.5	69.9-74.5	69.9-74.5	30-35	30 - 35	30 - 35
Laboratory Sample ID			TJ24030-001	UC21029-007	UE30036-010	UI28005-005	UL05055-027	K1711250-005	TG28011-001	TJ24030-007	UC23028-001	UC23028-002	UE30036-017	UI26001-004	UL05055-022	K1713273-008	TG28011-002	TJ24030-015
Sample Date			10/22/2018	03/20/2019	05/29/2019	09/26/2019	12/05/2019	10/16/2017	07/27/2018	10/23/2018	03/21/2019	03/21/2019	05/30/2019	09/23/2019	12/04/2019	12/07/2017	07/27/2018	10/24/2018
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	<0.0044	<0.0035	<0.0037
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	<0.0044	<0.0035	<0.0037
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	<0.0044	<0.0035	<0.0037
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	<0.0042	-	-	-	-	-	-	-	<0.0044	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0069	<0.0073	<0.0069	<0.0072	<0.0072	<0.0042	<0.007	<0.007	<0.0071	<0.007	<0.0069	<0.0067	<0.007	<0.0044	<0.0071	<0.0074
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	<0.0042	-	-	-	-	-	-	-	<0.0044	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.039	0.047	0.0052	0.034	0.0046	<0.0042	0.0046	0.0058	0.0051	0.0053	0.006	0.0046	0.0055	0.11	0.1	0.041
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	<0.0044	<0.0035	<0.0037
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	0.12	0.032	0.16
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0069	<0.0073	<0.0069	<0.0072	<0.0072	-	<0.007	<0.007	<0.0071	<0.007	<0.0069	<0.0067	<0.007	-	<0.0071	<0.0074
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	<0.0044	<0.0035	<0.0037
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	0.058	0.061	0.011	0.036	<0.0036	-	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	-	0.12	0.053
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.08	0.085	0.039	0.074	0.013	0.0069	0.0064	0.0093	0.011	0.0099	0.0089	0.0089	0.01	0.25	0.28	0.22
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0035	0.0046	<0.0035	0.0036	<0.0036	<0.0083	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	0.018	0.017	0.011
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	<0.0044	<0.0035	<0.0037
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	<0.0044	<0.0035	<0.0037
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.013	0.015	0.0043	0.012	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	0.088	0.079	0.046
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.029	0.031	0.0053	0.021	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	0.033	0.049	0.023
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	<0.0044	<0.0035	<0.0037
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.045 [J]	0.044	0.028	0.043	0.012	0.0033	0.0023 [J]	0.0024 [J]	0.0029	0.003	0.0035	0.0029	0.003	0.6	0.62	0.59
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	0.0049 [J]	0.0087	0.0059	0.005	0.0046	0.0047	0.0035 [J]	0.004 [J]	<0.0035	<0.0035	0.0037	0.0047	0.0091	***0.15***	***0.045 [J]***	***0.18 [J]***
PFOA + PFOS (Calculated)	NCL	NCL	0.05	0.053	0.034	0.048	0.017	0.008	0.0058	0.0064	0.0029	0.003	0.0072	0.0076	0.012	0.75	0.67	0.77
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.0061	0.0078	<0.0035	0.006	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	0.017	0.016	0.0091
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	<0.0044	<0.0035	<0.0037
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	<0.0044	<0.0035	<0.0037
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0035	<0.0044	<0.0035	<0.0037
Total PFAS (Calculated)	NCL	NCL	0.28	0.3	0.099	0.23	0.034	0.015	0.017	0.022	0.019	0.018	0.022	0.021	0.028	1.4	1.4	1.3

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-8	HS-MW-8	HS-MW-8	HS-MW-8	HS-MW-9D	HS-MW-9D	HS-MW-9D	HS-MW-9D	HS-MW-9D	HS-MW-9D	HS-MW-9D	HS-MW-9D	HS-MW-9M	HS-MW-9M	HS-MW-9M	HS-MW-9M
Sample Name			HS-MW-8	HS-GW-MW8	HS-GW-MW8	HS-GW-MW-8	MW-9C	MW-9D	HS-GW-MW-9D	HS-MW-9D	HS-GW-MW9D	HS-GW-MW9D DUP	HS-GW-MW9D	HS-GW-MW-9D	MW-9B	MW-9M	HS-GW-MW-9M	HS-MW-9M
Well Screen Interval (Feet below ground surface)			30-35	30-35	30-35	30-35	204.3-209.3	204.3 - 209.3	204.3 - 209.3	204.3-209.3	204.3-209.3	204.3-209.3	204.3-209.3	204.3-209.3	126.8-131.8	126.8 - 131.8	126.8 - 131.8	126.8-131.8
Laboratory Sample ID			UC23028-003	UE30036-006	UI26001-010	UL05055-031	K1713273-004	TH01022-002	TJ24030-022	UC21029-006	UE24001-014	UE24001-015	UI26001-014	UL12091-004	K1713273-002	TH01022-005	TJ24030-017	UC21029-005
Sample Date			03/21/2019	05/29/2019	09/24/2019	12/06/2019	12/06/2017	07/31/2018	10/25/2018	03/19/2019	05/22/2019	05/22/2019	09/25/2019	12/09/2019	12/06/2017	07/30/2018	10/25/2018	03/19/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0036	<0.0035	<0.0039	<0.0038	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0036	<0.0035	<0.0039	<0.0038	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0036	<0.0035	<0.0039	<0.0038	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	<0.0041	-	-	-	-	-	-	-	<0.0043	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0072	<0.0071	<0.0078	<0.0075	<0.0041	<0.007	<0.0073	<0.007	<0.0072	<0.0071	<0.0068	<0.0076	<0.0043	<0.0069	<0.0069	<0.0071
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	<0.0041	-	-	-	-	-	-	-	<0.0043	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.026	0.028	0.075	0.086	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0036	<0.0035	<0.0039	<0.0038	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	0.078	0.033	0.09	0.12	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0072	<0.0071	<0.0078	<0.0075	-	<0.007	<0.0073	<0.007	<0.0072	<0.0071	<0.0068	<0.0076	-	<0.0069	<0.0069	<0.0071
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0036	<0.0035	<0.0039	<0.0038	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	0.0064	<0.0034	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	0.044	0.035	0.13	0.11	-	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	-	<0.0035	<0.0034	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.15	0.085	0.39	0.32	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.0066	0.0066	0.012	0.017	<0.0081	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0086	<0.0035	<0.0034	<0.0036
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0036	<0.0035	<0.0039	<0.0038	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0036	<0.0035	<0.0039	<0.0038	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.037	0.044	0.06	0.074	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.016	0.024	0.028	0.031	0.0064	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0036	<0.0035	<0.0039	<0.0038	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.38	0.35	1.3	0.7	<0.0016	<0.0017	<0.0018	<0.0017	<0.0018	<0.0018	<0.0017	<0.0019	<0.0017	<0.0017	<0.0017	<0.0018
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	***0.14***	***0.051***	***0.099***	***0.12***	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
PFOA + PFOS (Calculated)	NCL	NCL	0.52	0.4	1.4	0.82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.0055	0.0067	0.01	0.011	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0036	<0.0035	<0.0039	<0.0038	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0036	<0.0035	<0.0039	<0.0038	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0036	<0.0035	<0.0039	<0.0038	<0.0041	<0.0035	<0.0036	<0.0035	<0.0036	<0.0036	<0.0034	<0.0038	<0.0043	<0.0035	<0.0034	<0.0036
Total PFAS (Calculated)	NCL	NCL	0.88	0.66	2.2	1.6	0.0064	ND	ND	ND	ND	ND	ND	ND	ND	0.0064	ND	ND

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-9M	HS-MW-9M	HS-MW-9M	HS-MW-9S	HS-MW-9S	HS-MW-9S	HS-MW-9S	HS-MW-9S	HS-MW-9S	HS-MW-9S	HS-MW-9S	HS-MW-9S	HS-MW-10D	HS-MW-10D	HS-MW-10D	HS-MW-10D
Sample Name			HS-GW-MW9M	HS-GW-MW9M	HS-GW-MW-9M	MW-9A	MW-9S	HS-GW-MW-9S	HS-GW-MW-9S	HS-MW-9S	HS-GW-MW9S	HS-GW-MW9S	HS-GW-MW-9S	HS-GW-MW-9S DUP	MW-10C	MW-10D	HS-GW-MW-10D	HS-MW-10D
Well Screen Interval (Feet below ground surface)			126.8-131.8	126.8-131.8	126.8-131.8	26.2-31.2	26.2 - 31.2	26.2 - 31.2	26.2 - 31.2	26.2-31.2	26.2-31.2	26.2-31.2	26.2-31.2	26.2-31.2	188.2-193.2	188.2 - 193.2	188.2 - 193.2	188.2-193.2
Laboratory Sample ID			UE24001-013	UI26001-020	UL12091-003	K1713273-001	TH01022-004	TJ24030-016	TK12032-001	UC21029-004	UE24001-012	UI26001-016	UL12091-013	UL12091-014	K1800647-002	TH01022-007	TJ24030-021	UC21029-003
Sample Date			05/22/2019	09/25/2019	12/09/2019	12/06/2017	07/30/2018	10/24/2018	11/07/2018	03/19/2019	05/22/2019	09/25/2019	12/11/2019	12/11/2019	01/22/2018	08/01/2018	10/25/2018	03/18/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0064	<0.0035	<0.0034	<0.0037 [UJ]	<0.0036	<0.0035	0.0039	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	<0.0042	-	-	-	-	-	-	-	-	<0.0044	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0069	<0.0071	<0.0071	<0.0042	<0.007	<0.0069	<0.0073	<0.0073	<0.007	<0.0074	<0.0077	<0.0074	<0.0044	<0.0069	<0.0069	<0.0075
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	<0.0042	-	-	-	-	-	-	-	-	<0.0044	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0035	<0.0036	<0.0036	0.005	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0069	<0.0071	<0.0071	-	<0.007	<0.0069	<0.0073	<0.0073	<0.007	<0.0074	<0.0077	<0.0074	-	<0.0069	<0.0069	<0.0075
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0035	<0.0036	<0.0036	-	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	-	<0.0034	<0.0035	<0.0038
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0083	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	0.0049	0.0049	<0.0088	<0.0034	<0.0035	<0.0038
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0017	<0.0018	<0.0018	0.0024	<0.0017	<0.0017	<0.0018	<0.0018	<0.0017	<0.0018	0.0048	0.0049	<0.0018	<0.0017	<0.0017	<0.0019
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	0.0055 [J]	<0.0037	<0.0036	0.0049	<0.0037	0.0076	0.0081	<0.0044	<0.0034	<0.0035	<0.0038
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	ND	0.0024	ND	0.0055	ND	ND	0.0049	ND	0.012	0.013	ND	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0042	<0.0035	<0.0034	<0.0037	<0.0036	<0.0035	<0.0037	<0.0038	<0.0037	<0.0044	<0.0034	<0.0035	<0.0038
Total PFAS (Calculated)	NCL	NCL	ND	ND	ND	0.0074	ND	0.0055	ND	ND	0.0049	0.0039	0.017	0.018	ND	ND	ND	ND

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-10D	HS-MW-10D	HS-MW-10D	HS-MW-10M	HS-MW-10M	HS-MW-10M	HS-MW-10M	HS-MW-10M	HS-MW-10M	HS-MW-10M	HS-MW-10M	HS-MW-10S	HS-MW-10S	HS-MW-10S	HS-MW-10S	HS-MW-10S
Sample Name			HS-GW-MW10D	HS-GW-MW10D	HS-GW-MW10D	MW-10B	MW-10M	HS-GW-MW-10M	HS-GW-MW-10M	HS-GW-MW10M	HS-GW-MW10M	HS-GW-MW10M DUP	HS-GW-MW-10M	MW-10A	MW-10S	HS-GW-MW-10S	HS-MW-10S	HS-GW-MW10S
Well Screen Interval (Feet below ground surface)			188.2-193.2	188.2-193.2	188.2-193.2	126.4-131.4	126.4 - 131.4	126.4 - 131.4	126.4-131.4	126.4-131.4	126.4-131.4	126.4-131.4	126.4-131.4	48.3-58.3	48.3 - 58.3	48.3 - 58.3	48.3-58.3	48.3-58.3
Laboratory Sample ID			UE24001-003	UI26001-015	UL05055-006	K1800647-001	TH01022-008	TJ24030-018	UC21029-002	UE24001-002	UI26001-017	UI26001-018	UL05055-010	K1800647-003	TH01022-003	TJ27021-002	UC21029-001	UE24001-001
Sample Date			05/20/2019	09/25/2019	12/02/2019	01/22/2018	08/01/2018	10/25/2018	03/18/2019	05/20/2019	09/25/2019	09/25/2019	12/03/2019	01/22/2018	07/31/2018	10/26/2018	03/18/2019	05/20/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0039
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0039
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0039
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	<0.0042	-	-	-	-	-	-	-	<0.0042	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.007	<0.0072	<0.007	<0.0042	<0.0077	<0.007	<0.007	<0.007	<0.0072	<0.0071	<0.0071	<0.0042	<0.007	<0.007	<0.007	<0.0078
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	<0.0042	-	-	-	-	-	-	-	<0.0042	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0035	<0.0036	<0.0035	0.0084	0.0062	0.01	0.0085	0.0063	0.0075	0.0079	0.0089	<0.0042	0.004	0.0036	<0.0035	0.004
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0039
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	0.0085	0.0055	0.0051	0.0047	0.0049
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.007	<0.0072	<0.007	-	<0.0077	<0.007	<0.007	<0.007	<0.0072	<0.0071	<0.0071	-	<0.007	<0.007	<0.007	<0.0078
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0039
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0035	<0.0036	<0.0035	-	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	-	<0.0035	<0.0035	<0.0035	<0.0039
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0035	<0.0036	<0.0035	0.0045	0.0052	0.0054	0.0048	0.0036	0.0039	0.0039	0.0039	0.008	0.01	0.0075	0.006	0.0084
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0083	<0.0039	0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0083	<0.0035	<0.0035	<0.0035	<0.0039
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0039
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0039
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0039
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0039
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0039
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0017	<0.0018	<0.0018	0.0093	0.0073	0.0092	0.0084	0.0072	0.0096	0.0094	0.01	0.015	0.014	0.015	0.012	0.015
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0035	<0.0036	<0.0035	0.012	0.012	***0.014***	***0.013***	0.012	0.012	0.011	***0.013***	***0.037***	***0.041 [J]***	***0.041 [J]***	***0.04***	***0.036***
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	ND	0.021	0.019	0.023	0.021	0.019	0.022	0.02	0.023	0.052	0.055	0.056	0.052	0.051
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0039
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0039
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0039
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0042	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0042	<0.0035	<0.0035	<0.0035	<0.0039
Total PFAS (Calculated)	NCL	NCL	ND	ND	ND	0.034	0.031	0.042	0.035	0.029	0.033	0.032	0.036	0.069	0.075	0.072	0.063	0.068

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-10S	HS-MW-10S	HS-MW-11D	HS-MW-11D	HS-MW-11D	HS-MW-11D	HS-MW-11D	HS-MW-11D	HS-MW-11D	HS-MW-11M	HS-MW-11M	HS-MW-11M	HS-MW-11M	HS-MW-11M	HS-MW-11M	HS-MW-11M
Sample Name			HS-GW-MW10S	HS-GW-MW-10S	MW-11C	MW-11D	HS-GW-MW-11D	HS-MW-11D	HS-GW-MW11D	HS-GW-MW11D	HS-GW-MW-11D	MW-11B	MW-11M	HS-GW-MW-11M	HS-MW-11M	HS-GW-MW11M	HS-GW-MW11M	HS-GW-MW-11M
Well Screen Interval (Feet below ground surface)			48.3-58.3	48.3-58.3	153.6-158.6	153.6 - 158.6	153.6 - 158.6	153.6-158.6	153.6-158.6	153.6-158.6	153.6-158.6	96.4-101.4	96.4 - 101.4	96.4 - 101.4	96.4-101.4	96.4-101.4	96.4-101.4	96.4-101.4
Laboratory Sample ID			UI26001-019	UL05055-001	K1713273-012	TH01022-016	TJ27021-001	UC16019-011	UE24001-016	UI28005-003	UL05055-013	K1713273-015	TH01022-017	TJ27021-003	UC16019-010	UE24001-018	UI28005-002	UL05055-012
Sample Date			09/25/2019	12/02/2019	12/08/2017	08/02/2018	10/26/2018	03/14/2019	05/22/2019	09/26/2019	12/03/2019	12/08/2017	08/02/2018	10/26/2018	03/14/2019	05/22/2019	09/26/2019	12/03/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0036	<0.0035	<0.0077	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0036	<0.0035	<0.0081	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0036	<0.0035	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	<0.0041	-	-	-	-	-	-	<0.0041	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0072	<0.0071	<0.0041	<0.0071	<0.007	<0.0076	<0.0075	<0.0073	<0.0075	<0.0041	<0.0069	<0.0072	<0.0072	<0.0072	<0.0074	<0.0073
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	<0.0041	-	-	-	-	-	-	<0.0041	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0036	0.0037	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	0.0061	0.014	0.013	0.046	0.05
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0036	<0.0035	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0036	0.0037	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0072	<0.0071	-	<0.0071	<0.007	<0.0076	<0.0075	<0.0073	<0.0075	-	<0.0069	<0.0072	<0.0072	<0.0072	<0.0074	<0.0073
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0036	<0.0035	<0.0041	0.014	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0036	<0.0035	-	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	-	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	0.016
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.014	0.013	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	0.0045
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0036	<0.0035	<0.0081	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0081	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0036	<0.0035	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0036	<0.0035	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0036	<0.0035	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0036	<0.0035	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0036	<0.0035	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.018	0.021	<0.0016	<0.0018	<0.0018	<0.0019	<0.0019	<0.0018	<0.0019	<0.0016	<0.0017	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	***0.024***	***0.024***	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
PFOA + PFOS (Calculated)	NCL	NCL	0.042	0.045	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0036	<0.0035	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0036	<0.0035	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0036	<0.0035	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0036	<0.0035	<0.0041	<0.0036	<0.0035	<0.0038	<0.0037	<0.0036	<0.0038	<0.0041	<0.0034	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036
Total PFAS (Calculated)	NCL	NCL	0.056	0.065	ND	0.014	ND	ND	ND	ND	ND	ND	ND	0.0061	0.014	0.013	0.046	0.071

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-11S	HS-MW-11S	HS-MW-11S	HS-MW-11S	HS-MW-11S	HS-MW-11S	HS-MW-11S	HS-PMW-12	HS-PMW-12	HS-PMW-12	HS-PMW-12	HS-PMW-12	HS-PMW-12	HS-PMW-12	HS-PMW-12	HS-PMW-12
Sample Name			MW-11A	MW-11S	HS-GW-MW-11S	HS-MW-11S	HS-GW-MW11S	HS-GW-MW11S	HS-GW-MW-11S	HS-MW-12 (15-20)	HS-MW-12 (25-30)	HS-MW-12 (35-40)	HS-MW-12 (49-54)	HS-MW-12 (75-80)	HS-MW-12 (85-90)	HS-MW-12 (95-100)	HS-MW-12 (105-110)	HS-MW-12 (115-120)
Well Screen Interval (Feet below ground surface)			21.2-31.2	21.2 - 31.2	21.2 - 31.2	21.2-31.2	21.2-31.2	21.2-31.2	21.2-31.2	15-20	25-30	35-40	49-54	75-80	85-90	95-100	105-110	115-120
Laboratory Sample ID			K1713273-011	TH01022-018	TJ27021-005	UC16019-009	UE24001-017	UI28005-001	UL05055-014	UI05015-001	UI05015-002	UI05015-003	UI12066-001	UI12066-002	UI12066-003	UI12066-004	UI12066-005	UI12066-006
Sample Date			12/08/2017	08/02/2018	10/26/2018	03/14/2019	05/22/2019	09/26/2019	12/03/2019	09/04/2019	09/04/2019	09/04/2019	09/06/2019	09/10/2019	09/10/2019	09/11/2019	09/11/2019	09/11/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	<0.0036	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	<0.0037	<0.0036	<0.0039
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	<0.0036	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	<0.0037	<0.0036	<0.0039
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	<0.0036	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	<0.0037	<0.0036	<0.0039
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	<0.0043	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0043	<0.0074	<0.007	<0.0072	<0.0075	<0.0077	<0.0071	<0.0071	<0.0078	<0.0075	<0.0075	<0.0076	<0.007	<0.0074	<0.0072	<0.0078
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	<0.0043	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	0.034	<0.0039	<0.0037	<0.0038	<0.0038	0.0083	0.054	0.035	0.06
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	<0.0036	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	<0.0037	<0.0036	<0.0039
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	<0.0036	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	<0.0037	<0.0036	<0.0039
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	-	<0.0074	<0.007	<0.0072	<0.0075	<0.0077	<0.0071	<0.0071	<0.0078	<0.0075	<0.0075	<0.0076	<0.007	<0.0074	<0.0072	<0.0078
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	<0.0036	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	<0.0037	<0.0036	<0.0039
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	-	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	0.029	<0.0039	<0.0037	<0.0038	<0.0038	0.0065	0.052	0.022	0.055
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	0.038	0.0067	0.0052	0.0038	<0.0038	0.0062	0.069	0.015	0.064
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0086	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	0.0071	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	0.013	0.012	0.018
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	<0.0036	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	<0.0037	<0.0036	<0.0039
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	<0.0036	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	<0.0037	<0.0036	<0.0039
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	0.012	<0.0039	<0.0037	<0.0038	<0.0038	0.0035	0.027	0.018	0.035
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	0.013	<0.0039	<0.0037	<0.0038	<0.0038	0.0044	0.028	0.02	0.034
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	<0.0036	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	<0.0037	<0.0036	<0.0039
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0017	<0.0019	0.0018	0.0024	0.0028	<0.0019	0.0041	0.026	0.0065	<0.0019	<0.0019	<0.0019	0.0093	0.086	0.033	0.1
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	<0.0036	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	0.0046	<0.0036	<0.0039
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	0.0018	0.0024	0.0028	ND	0.0041	0.026	0.0065	ND	ND	ND	0.0093	0.091	0.033	0.1
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	0.0064	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	0.012	0.011	0.017
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	<0.0036	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	<0.0037	<0.0036	<0.0039
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	<0.0036	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	<0.0037	<0.0036	<0.0039
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0043	<0.0037	<0.0035	<0.0036	<0.0038	<0.0038	<0.0036	<0.0036	<0.0039	<0.0037	<0.0038	<0.0038	<0.0035	<0.0037	<0.0036	<0.0039
Total PFAS (Calculated)	NCL	NCL	ND	ND	0.0018	0.0024	0.0028	ND	0.0041	0.17	0.013	0.0052	0.0038	ND	0.038	0.35	0.17	0.38

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-PMW-12	HS-PMW-12	HS-PMW-12	HS-PMW-12	HS-PMW-12	HS-PMW-12	HS-PMW-12	HS-MW-12A	HS-MW-12B	HS-MW-12C	HS-MW-12D	HS-MW-12E	HS-PMW-13	HS-PMW-13	HS-PMW-13	HS-PMW-13
Sample Name			HS-MW-12 (125-130)	HS-MW-12 (135-140)	HS-MW-12 (145-150)	HS-MW-12 (155-160)	HS-MW-12 (165-170)	HS-MW-12 (175-180)	HS-MW-12 (185-190)	HS-GW-MW-12A	HS-GW-MW-12B	HS-GW-MW-12C	HS-GW-MW-12D	HS-GW-MW-12E	HS-13 59-64	HS-13 69-74	HS-13 79-84	HS-13 89-94
Well Screen Interval (Feet below ground surface)			125-130	135-140	145-150	155-160	165-170	175-180	185-190	15.4-20.4	51.5-56.5	127.7-132.7	158.7-163.7	187.5-192.5	59-64	69-74	79-84	89-94
Laboratory Sample ID			UI12066-007	UI18051-001	UI18051-002	UI18051-003	UI18051-004	UI18051-005	UI18051-006	UK29008-021	UK29008-012	UK29008-011	UK29008-010	UK29008-013	UL12092-001	UL12092-002	UL12092-003	UL12092-004
Sample Date			09/11/2019	09/12/2019	09/12/2019	09/12/2019	09/13/2019	09/13/2019	09/16/2019	11/27/2019	11/25/2019	11/25/2019	11/25/2019	11/25/2019	12/09/2019	12/10/2019	12/10/2019	12/10/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0034	<0.0039	<0.0036	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0037	<0.0038	<0.0034	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0034	<0.0039	<0.0036	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0037	<0.0038	<0.0034	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0034	<0.0039	<0.0036	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0037	<0.0038	<0.0034	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0068	<0.0079	<0.0072	<0.0074	<0.0074	<0.0074	<0.0069	<0.0072	<0.0073	<0.0076	<0.0068	<0.007	<0.0068	<0.0068	<0.0068	<0.0068
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.095	0.079	0.11	0.17	0.13	0.061	<0.0035	<0.0036	<0.0037	0.13	0.14	<0.0035	0.0044	0.0044	0.0054	0.0051
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0034	<0.0039	<0.0036	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0037	<0.0038	<0.0034	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0034	<0.0039	<0.0036	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0037	<0.0038	<0.0034	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0068	<0.0079	<0.0072	<0.0074	<0.0074	<0.0074	<0.0069	<0.0072	<0.0073	<0.0076	<0.0068	<0.007	<0.0068	<0.0068	<0.0068	<0.0068
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0034	<0.0039	<0.0036	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0037	<0.0038	<0.0034	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	0.09	0.085	0.11	0.13	0.11	0.037	<0.0035	<0.0036	<0.0037	0.13	0.12	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.09	0.082	0.1	0.06	0.06	0.013	<0.0035	<0.0036	0.0054	0.12	0.091	<0.0035	<0.0034	<0.0034	0.011	0.0079
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.029	0.021	0.026	0.054	0.037	0.023	<0.0035	<0.0036	<0.0037	0.036	0.037	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0034	<0.0039	<0.0036	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0037	<0.0038	<0.0034	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0034	<0.0039	<0.0036	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0037	<0.0038	<0.0034	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.056	0.045	0.057	0.078	0.065	0.025	<0.0035	<0.0036	<0.0037	0.07	0.072	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.056	0.045	0.061	0.1	0.074	0.037	<0.0035	<0.0036	<0.0037	0.076	0.09	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0034	<0.0039	<0.0036	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0037	<0.0038	<0.0034	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.15	0.13	0.15	0.14	0.13	0.037	<0.0017	0.0089	0.0023	0.19	0.17	<0.0017	<0.0017	<0.0017	0.0018	0.0035
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0034	<0.0039	<0.0036	<0.0037	<0.0037	<0.0037	<0.0035	0.0063	<0.0037	<0.0038	<0.0034	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
PFOA + PFOS (Calculated)	NCL	NCL	0.15	0.13	0.15	0.14	0.13	0.037	ND	0.015	0.0023	0.19	0.17	ND	ND	ND	0.0018	0.0035
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.028	0.023	0.029	0.059	0.036	0.023	<0.0035	0.0039	<0.0037	0.039	0.038	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0034	<0.0039	<0.0036	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0037	<0.0038	<0.0034	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0034	<0.0039	<0.0036	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0037	<0.0038	<0.0034	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0034	<0.0039	<0.0036	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0037	<0.0038	<0.0034	<0.0035	<0.0034	<0.0034	<0.0034	<0.0034
Total PFAS (Calculated)	NCL	NCL	0.59	0.51	0.64	0.79	0.64	0.26	ND	0.019	0.0077	0.79	0.76	ND	0.0044	0.0044	0.018	0.017

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-PMW-13	HS-PMW-13	HS-PMW-13	HS-PMW-13	HS-PMW-13	HS-PMW-13	HS-PMW-13	HS-PMW-13	HS-PMW-13	HS-PMW-13	HS-PMW-14	HS-PMW-14	HS-PMW-14	HS-PMW-14	HS-PMW-14	HS-PMW-14
Sample Name			HS-13 99-104	HS-13 109-114	HS-13 119-124	HS-13 129-134	HS-13-139-144	HS-13-149-154	HS-13-159-164	HS-13-169-174	HS-13-179-184	HS-13 189-194	PMW-14 18-23	PMW-14 38-43	PMW-14 48-53	PMW-14 63-68	PMW-14 73-78	PMW-14 83-88
Well Screen Interval (Feet below ground surface)			99-104	109-114	119-124	129-134	139-144	149-154	159-164	169-174	179-184	189-194	18-23	38-43	48-53	63-68	73-78	83-88
Laboratory Sample ID			UL12092-005	UL12092-006	UL12092-007	UL12092-008	UL17018-001	UL17018-002	UL17018-003	UL17018-004	UL17018-005	UL19173-001	K1802201-001	K1802201-002	K1802201-003	K1802247-001	K1802247-002	K1802247-005
Sample Date			12/10/2019	12/11/2019	12/11/2019	12/11/2019	12/12/2019	12/12/2019	12/12/2019	12/13/2019	12/13/2019	12/16/2019	03/08/2018	03/08/2018	03/08/2018	03/09/2018	03/09/2018	03/09/2018
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0068	<0.0072	<0.0072	<0.0074	<0.0071	<0.0069	<0.0074	<0.0074	<0.0073	<0.0076	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	0.0035	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0068	<0.0072	<0.0072	<0.0074	<0.0071	<0.0069	<0.0074	<0.0074	<0.0073	<0.0076	-	-	-	-	-	-
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	-	-	-	-	-	-
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0096	<0.01	<0.0096	<0.0096	<0.01	<0.0096
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0034	<0.0036	<0.0036	0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.0038	0.0029	0.003	0.0033	0.0031	0.0034	0.0035	0.0023	<0.0018	<0.0019	0.002	<0.002	<0.0019	<0.0019	<0.002	<0.0019
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
PFOA + PFOS (Calculated)	NCL	NCL	0.0038	0.0029	0.003	0.0033	0.0031	0.0034	0.0035	0.0023	ND	ND	0.002	ND	ND	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0034	<0.0036	<0.0036	<0.0037	<0.0035	<0.0034	<0.0037	<0.0037	<0.0036	<0.0038	<0.0048	<0.005	<0.0048	<0.0048	<0.005	<0.0048
Total PFAS (Calculated)	NCL	NCL	0.0038	0.0029	0.003	0.007	0.0031	0.0069	0.0035	0.0023	ND	ND	0.002	ND	ND	ND	ND	ND

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-PMW-14	HS-PMW-14	HS-MW-14D	HS-MW-14D	HS-MW-14D	HS-MW-14D	HS-MW-14D	HS-MW-14D	HS-MW-14M	HS-MW-14M	HS-MW-14M	HS-MW-14M	HS-MW-14M	HS-MW-14S	HS-MW-14S	HS-MW-14S
Sample Name			PMW-14 93-98	PMW-14 103-108	PMW-14D	HS-MW-14D	HS-MW-14D DUP	HS-GW-MW14D	HS-GW-MW14D	HS-GW-MW14D	PMW-14M	HS-MW-14M	HS-GW-MW14M	HS-GW-MW14M	HS-GW-MW-14M	PMW-14S	HS-MW-14S	HS-GW-MW14S
Well Screen Interval (Feet below ground surface)			93-98	103-108	109-114	109-114	109-114	109-114	109-114	109-114	68.1-73.1	68.1-73.1	68.1-73.1	68.1-73.1	68.1-73.1	13-23	13-23	13-23
Laboratory Sample ID			K1802247-006	K1802302-001	TD12015-001	UB27031-003	UB27031-004	UE18016-008	UI12010-007	UK29008-016	TD12015-003	UB27031-001	UE18016-009	UI12010-009	UK29008-015	TD12015-005	UB27031-002	UE18016-010
Sample Date			03/09/2018	03/12/2018	04/10/2018	02/26/2019	02/26/2019	05/17/2019	09/10/2019	11/25/2019	04/10/2018	02/26/2019	05/17/2019	09/10/2019	11/25/2019	04/10/2018	02/26/2019	05/17/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0052	<0.0046	<0.0072	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0073	<0.0036	<0.0036	<0.0038	<0.0034	<0.0073	<0.0036	<0.0036
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0052	<0.0046	<0.0072	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0073	<0.0036	<0.0036	<0.0038	<0.0034	<0.0073	<0.0036	<0.0036
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0052	<0.0046	<0.0072	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0073	<0.0036	<0.0036	<0.0038	<0.0034	<0.0073	<0.0036	<0.0036
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	<0.0052	<0.0046	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0052	<0.0046	<0.014	<0.0075	<0.0073	<0.0074	<0.0074	<0.007	<0.015	<0.0071	<0.0073	<0.0075	<0.0069	<0.015	<0.0071	<0.0072
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	<0.0052	<0.0046	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0052	<0.0046	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	<0.0036
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0052	<0.0046	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0052	<0.0046	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	-	-	<0.0072	<0.0075	<0.0073	<0.0074	<0.0074	<0.007	<0.0073	<0.0071	<0.0073	<0.0075	<0.0069	<0.0073	<0.0071	<0.0072
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0052	<0.0046	<0.0072	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0073	<0.0036	<0.0036	<0.0038	<0.0034	<0.0073	<0.0036	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	-	-	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0052	<0.0046	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	<0.0036
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.01	<0.0093	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	0.005
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0052	<0.0046	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0052	<0.0046	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0052	<0.0046	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	<0.0036
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0052	<0.0046	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	0.0065
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0052	<0.0046	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	<0.0036
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0021	<0.0019	<0.0036	<0.0019	<0.0018	<0.0019	<0.0019	<0.0017	<0.0036	<0.0018	<0.0018	<0.0019	<0.0017	<0.0037	<0.0018	0.0047
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0052	<0.0046	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	<0.0036
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0047
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0052	<0.0046	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	0.0054
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0052	<0.0046	<0.0072	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0073	<0.0036	<0.0036	<0.0038	<0.0034	<0.0073	<0.0036	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0052	<0.0046	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0052	<0.0046	<0.0036	<0.0037	<0.0036	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0038	<0.0034	<0.0037	<0.0036	<0.0036
Total PFAS (Calculated)	NCL	NCL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.022

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-14S	HS-MW-14S	HS-PMW-15	HS-PMW-15	HS-PMW-15	HS-PMW-15	HS-MW-15D	HS-MW-15D	HS-MW-15D	HS-MW-15D	HS-MW-15D	HS-MW-15M	HS-MW-15M	HS-MW-15M	HS-MW-15M	HS-MW-15M
Sample Name			HS-GW-MW14S	HS-GW-MW-14S	PMW152530	PMW154550	PMW15110115	PMW15D110115	PMW-15D	HS-MW-15D	HS-GW-MW15D	HS-GW-MW15D	HS-GW-MW-15D	PMW-15I	HS-MW-15M	HS-GW-MW15M	HS-GW-MW15M	HS-GW-MW-15M
Well Screen Interval (Feet below ground surface)			13-23	13-23	25-30	45-30	110-115	110-115	108.6-118.6	108.6-118.6	108.6-118.6	108.6-118.6	108.6-118.6	44.8-49.8	44.8-49.8	44.8-49.8	44.8-49.8	44.8-49.8
Laboratory Sample ID			UI12010-008	UK29008-014	K1713825-001	K1713825-003	K1713825-005	K1713825-006	K1802511-008	UB28086-006	UE18016-005	UI21016-005	UK19008-012	K1802511-007	UB28086-005	UE18016-006	UI21016-004	UK21036-009
Sample Date			09/10/2019	11/25/2019	12/19/2017	12/20/2017	12/21/2017	12/21/2017	03/15/2018	02/27/2019	05/16/2019	09/19/2019	11/20/2019	03/15/2018	02/27/2019	05/16/2019	09/19/2019	11/19/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	-	-	-	-	<0.0047	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0072	<0.0069	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0075	<0.0073	<0.0073	<0.0069	<0.0047	<0.0074	<0.0076	<0.0075	<0.0073
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	-	-	-	-	<0.0047	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0072	<0.0069	-	-	-	-	-	<0.0075	<0.0073	<0.0073	<0.0069	-	<0.0074	<0.0076	<0.0075	<0.0073
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0036	<0.0034	-	-	-	-	-	<0.0037	<0.0037	<0.0036	<0.0034	-	<0.0037	<0.0038	<0.0037	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0036	<0.0034	<0.0083	<0.0083	<0.0083	<0.01	<0.0094	<0.0037	<0.0037	<0.0036	<0.0034	<0.0094	<0.0037	<0.0038	<0.0037	<0.0036
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.0023	<0.0017	<0.0017	<0.0017	<0.0017	<0.002	<0.0019	<0.0019	<0.0018	<0.0018	<0.0017	<0.0019	<0.0018	<0.0019	<0.0019	<0.0018
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	0.0036	<0.0034	<0.0042	***0.066***	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
PFOA + PFOS (Calculated)	NCL	NCL	0.0059	ND	ND	0.066	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0036	<0.0034	<0.0042	<0.0042	<0.0042	<0.005	<0.0047	<0.0037	<0.0037	<0.0036	<0.0034	<0.0047	<0.0037	<0.0038	<0.0037	<0.0036
Total PFAS (Calculated)	NCL	NCL	0.0059	ND	ND	0.066	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-15S	HS-MW-15S	HS-MW-15S	HS-MW-15S	HS-MW-15S	HS-PMW-17	HS-PMW-17	HS-PMW-17	HS-PMW-17	HS-PMW-17	HS-PMW-17	HS-PMW-17	HS-PMW-17	HS-PMW-17	HS-PMW-17	HS-PMW-17
Sample Name			PMW-15S	HS-MW-15S	HS-GW-MW15S	HS-GW-MW15S	HS-GW-MW-15S	PMW-17 83-88	PMW-17 93-98	PMW-17 103-108	PMW-17 113-118	PMW-17 153-158	PMW-17 163-168	PMW-17 173-178	PMW-17-183'-188'-2/19	PMW-17-193'-198'-2/20	PMW-17-203'-208'-2/20	PMW-17-213'-218'-2/22
Well Screen Interval (Feet below ground surface)			6.9-16.9	6.9-16.9	6.9-16.9	6.9-16.9	6.9-16.9	83-88	93-98	103-108	113-118	153-158	163-168	173-178	183-188	193-198	203-208	213-218
Laboratory Sample ID			K1802511-006	UB28086-004	UE18016-007	UI21016-003	UK21036-010	K1801045-003	K1801045-004	K1801045-007	K1801045-008	K1801045-011	K1801593-002	K1801593-004	K1801660-001	K1801660-004	K1801660-007	K1801740-001
Sample Date			03/15/2018	02/27/2019	05/16/2019	09/19/2019	11/19/2019	01/30/2018	01/30/2018	01/31/2018	01/31/2018	02/02/2018	02/16/2018	02/16/2018	02/19/2018	02/20/2018	02/20/2018	02/22/2018
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	<0.0046
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	<0.0046
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	<0.0046
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	<0.0046	-	-	-	-	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	<0.0046
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0046	<0.0074	<0.0073	<0.0077	<0.0069	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	<0.0046
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	<0.0046	-	-	-	-	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	<0.0046
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.0086	0.0073	0.0058	0.0068	0.0073	<0.0042	<0.0042	0.0057	0.0069	<0.0042	<0.0047	<0.0047	<0.0046	0.026	0.14	0.4
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	<0.0046
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	0.067
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	-	<0.0074	<0.0073	<0.0077	<0.0069	-	-	-	-	-	-	-	-	-	-	-
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	<0.0046
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	-	<0.0037	<0.0036	<0.0038	<0.0034	-	-	-	-	-	-	-	-	-	-	-
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	0.004	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	0.0068	0.29	0.89
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0093	<0.0037	<0.0036	<0.0038	<0.0034	<0.0084	<0.0084	<0.0084	<0.0084	<0.0084	<0.0094	<0.0094	<0.0093	0.015	0.029	0.089
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	<0.0046
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	<0.0046
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	0.007	0.1	0.32
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	0.0055	<0.0042	<0.0047	<0.0047	<0.0046	0.023	0.11	0.27
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	<0.0046
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0019	<0.0018	<0.0018	<0.0019	0.0018	<0.0017	<0.0017	0.0044	0.0077	<0.0017	0.0038	0.0023	<0.0019	0.005	0.2	0.72
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	0.0063	0.0045	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	***0.039***
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	ND	ND	0.0018	ND	ND	0.011	0.012	ND	0.0038	0.0023	ND	0.005	0.2	0.76
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	0.017	0.038	0.13
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	<0.0046
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	<0.0046
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0046	<0.0037	<0.0036	<0.0038	<0.0034	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0047	<0.0047	<0.0046	<0.0046	<0.0048	<0.0046
Total PFAS (Calculated)	NCL	NCL	0.0086	0.0073	0.0058	0.0068	0.013	ND	ND	0.016	0.025	ND	0.0038	0.0023	ND	0.1	0.91	2.9

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-17D	HS-MW-17D	HS-MW-17D	HS-MW-17D	HS-MW-17D	HS-MW-17M	HS-MW-17M	HS-MW-17M	HS-MW-17M	HS-MW-17M	HS-MW-17S	HS-MW-17S	HS-MW-17S	HS-MW-17S	HS-MW-17S	HS-PMW-18
Sample Name			MW-17D	HS-MW-17D	HS-GW-MW17D	HS-GW-MW17D	HS-GW-MW-17D	MW-17M	HS-MW-17M	HS-GW-MW17M	HS-GW-MW17M	HS-GW-MW-17M	MW-17S	HS-MW-17S	HS-GW-MW17S	HS-GW-MW17S	HS-GW-MW-17S	PMW-18-14-19
Well Screen Interval (Feet below ground surface)			222.1-227.1	222.1-227.1	222.1-227.1	222.1-227.1	222.1-227.1	167.3-172.3	167.3-172.3	167.3-172.3	167.3-172.3	167.3-172.3	105.8-110.8	105.8-110.8	105.8-110.8	105.8-110.8	105.8-110.8	14-19
Laboratory Sample ID			K1803589-002	UC09042-006	UE25011-001	UI19006-002	UL12091-010	K1803589-003	UC09042-005	UE25011-003	UI12010-016	UL12091-012	K1803589-001	UC09042-003	UE25011-002	UI12010-014	UL12091-007	TE17021-002
Sample Date			04/17/2018	03/07/2019	05/23/2019	09/16/2019	12/10/2019	04/17/2018	03/07/2019	05/23/2019	09/11/2019	12/11/2019	04/17/2018	03/06/2019	05/23/2019	09/11/2019	12/10/2019	05/14/2018
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0046	<0.0035	<0.0035	<0.004	<0.0037	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0046	<0.0035	<0.0035	<0.004	<0.0037	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0046	<0.0035	<0.0035	<0.004	<0.0037	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	<0.0046	-	-	-	-	<0.0045	-	-	-	-	<0.0049	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0046	<0.007	<0.007	<0.007900001	<0.0074	<0.0045	<0.0074	<0.0071	<0.0066	<0.0068	<0.0049	<0.0071	<0.0069	<0.0067	<0.0075	<0.0069
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	<0.0046	-	-	-	-	<0.0045	-	-	-	-	<0.0049	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.44	0.43	0.41	0.47	0.42	<0.0045	0.004	0.0039	0.0036	0.0038	<0.0049	0.014	0.02	0.014	0.018	0.0051
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0046	<0.0035	<0.0035	<0.004	<0.0037	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	0.081	0.022	0.024	0.028	0.029	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	-	<0.007	<0.007	<0.007900001	<0.0074	-	<0.0074	<0.0071	<0.0066	<0.0068	-	<0.0071	<0.0069	<0.0067	<0.0075	<0.0069
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0046	<0.0035	<0.0035	<0.004	<0.0037	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	-	0.56	0.5	0.57	0.49	-	<0.0037	<0.0036	<0.0033	<0.0034	-	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	1.2	0.96	1	1.1	1	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.14	0.11	0.11	0.12	0.12	<0.0089	<0.0037	<0.0036	<0.0033	<0.0034	<0.0098	0.0041	0.0058	0.0034	0.0042	<0.0035
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0046	<0.0035	<0.0035	<0.004	<0.0037	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0046	<0.0035	<0.0035	<0.004	<0.0037	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.51	0.3	0.3	0.33	0.31	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.42	0.27	0.31	0.27	0.28	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	0.0054	<0.0035
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0046	<0.0035	<0.0035	<0.004	<0.0037	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	1.3	1	1.2	1.2	1.1	<0.0018	<0.0019	<0.0018	<0.0017	<0.0017	<0.002	<0.0018	<0.0017	<0.0017	<0.0019	<0.0017
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	***0.072***	***0.06***	***0.058***	***0.072***	***0.076***	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
PFOA + PFOS (Calculated)	NCL	NCL	1.4	1.1	1.3	1.3	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.16	0.12	0.13	0.13	0.14	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	0.0044	0.0048	0.0073	<0.0035
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0046	<0.0035	<0.0035	<0.004	<0.0037	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0046	<0.0035	<0.0035	<0.004	<0.0037	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0046	<0.0035	<0.0035	<0.004	<0.0037	<0.0045	<0.0037	<0.0036	<0.0033	<0.0034	<0.0049	<0.0035	<0.0035	<0.0033	<0.0038	<0.0035
Total PFAS (Calculated)	NCL	NCL	4.3	3.8	4	4.3	4	ND	0.004	0.0039	0.0036	0.0038	ND	0.018	0.03	0.022	0.035	0.0051

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-PMW-18	HS-PMW-18	HS-PMW-18	HS-PMW-18	HS-PMW-18	HS-PMW-18	HS-PMW-18	HS-PMW-18	HS-PMW-18	HS-PMW-18	HS-PMW-18	HS-PMW-18	HS-MW-18D	HS-MW-18D	HS-MW-18D	HS-MW-18D
Sample Name			PMW-18-24-29	PMW-18-34-39	PMW-18-44-49	PMW-18-54-59	PMW-18-64-69	PMW-18-74-79	PMW-18-84-89	PMW-18-94-99	PMW-18-104-109	PMW-18-114-119	PMW-18-124-129	PMW-18-134-139	MW-18D	HS-MW-18D	HS-GW-MW18D	HS-GW-MW18D
Well Screen Interval (Feet below ground surface)			24-29	34-39	44-49	54-59	64-69	74-79	84-89	94-89	104-109	114-119	124-129	134-139	140.6-145.6	140.6-145.6	140.6-145.6	140.6-145.6
Laboratory Sample ID			TE17021-004	TE17021-005	TE17021-006	TE17021-007	TE17021-008	TE17021-011	TE17021-012	TE17020-001	TE17020-004	TE17020-005	TE17020-006	TE17020-007	TG07027-006	UC02020-006	UE24001-004	UI12010-006
Sample Date			05/15/2018	05/15/2018	05/15/2018	05/15/2018	05/15/2018	05/15/2018	05/15/2018	05/16/2018	05/16/2018	05/16/2018	05/16/2018	05/16/2018	07/06/2018	03/01/2019	05/21/2019	09/10/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0034
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0034
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0034
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.007	<0.007	<0.0072	<0.007	<0.0072	<0.007	<0.007	<0.0074	<0.0071	<0.0072	<0.0071	<0.0071	<0.007	<0.0073	<0.0074	<0.0068
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.0062	<0.0035	<0.0036	<0.0035	0.0056	0.01	0.015	0.033	0.14	0.14	0.18	0.17	0.024	0.029	0.031	0.025
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0034
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	0.011	0.034	0.03	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0034
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.007	<0.007	<0.0072	<0.007	<0.0072	<0.007	<0.007	<0.0074	<0.0071	<0.0072	<0.0071	<0.0071	<0.007	<0.0073	<0.0074	<0.0068
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0034
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	0.0064	0.013	0.041	0.16	0.17	0.13	0.098	0.011	0.015	0.014	0.012
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.0043	<0.0035	<0.0036	<0.0035	<0.0036	0.011	0.026	0.09	0.35	0.32	0.13	0.06	0.0058	0.0074	0.0082	0.0062
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.0089	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	0.0074	0.028	0.03	0.059	0.06	0.016	0.018	0.02	0.018
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0034
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0034
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	0.0035	0.0071	0.019	0.082	0.087	0.084	0.07	0.0095	0.011	0.011	0.01
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	0.0052	0.0072	0.017	0.079	0.084	0.12	0.12	0.019	0.022	0.024	0.021
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0034
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0017	<0.0017	<0.0018	<0.0017	0.0022	0.011	0.026	0.083	0.33	0.33	0.18	0.1	0.0092	0.014	0.015	0.015
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	0.011	***0.043***	***0.098***	***0.084***	0.0045	<0.0036	<0.0035	<0.0037	<0.0037	<0.0034
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	ND	ND	0.0022	0.011	0.037	0.13	0.43	0.41	0.18	0.1	0.0092	0.014	0.015	0.015
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	0.0073	0.03	0.032	0.057	0.06	0.014	0.015	0.017	0.016
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0034
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0034
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0034
Total PFAS (Calculated)	NCL	NCL	0.019	ND	ND	ND	0.0078	0.047	0.11	0.35	1.3	1.3	0.94	0.74	0.11	0.13	0.14	0.12

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-18D	HS-MW-18S	HS-MW-18S	HS-MW-18S	HS-MW-18S	HS-MW-18S	HS-PMW-19	HS-PMW-19	HS-PMW-19	HS-PMW-19	HS-MW-19D	HS-MW-19D	HS-MW-19D	HS-MW-19D	HS-MW-19D	HS-MW-19S
Sample Name			HS-GW-MW-18D	MW-18S	HS-MW-18S	HS-GW-MW18S	HS-GW-MW18S	HS-GW-MW-18S	PMW-19 55-60	Dupe-1	PMW-19 80-85	PMW-19 90-95	PMW-19D	HS-MW-19D	HS-GW-MW19D	HS-GW-MW19D	HS-GW-MW-19D	PMW-19S
Well Screen Interval (Feet below ground surface)			140.6-145.6	12.8-22.8	12.8-22.8	12.8-22.8	12.8-22.8	12.8-22.8	55-60	55-60	80-85	90-95	85.9-95.9	85.9-95.9	85.9-95.9	85.9-95.9	85.9-95.9	58.4-61.4
Laboratory Sample ID			UK19008-015	TG07027-005	UC02020-007	UE24001-005	UI12010-010	UK21036-020	K1800413-001	K1800413-004	K1800413-006	K1800413-007	K1802511-009	UC02020-005	UE24001-007	UI26001-003	UL12091-019	K1802511-010
Sample Date			11/20/2019	07/06/2018	03/01/2019	05/21/2019	09/10/2019	11/21/2019	01/09/2018	01/09/2018	01/10/2018	01/10/2018	03/16/2018	02/28/2019	05/21/2019	09/23/2019	12/12/2019	03/16/2018
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0037	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0037	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0037	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	-	-	-	-	<0.0045
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0075	<0.007	<0.0074	<0.0073	<0.0068	<0.007	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.007	<0.007	<0.0069	<0.0072	<0.0045
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	-	-	-	-	<0.0045
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.029	<0.0035	0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0037	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0037	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0075	<0.007	<0.0074	<0.0073	<0.0068	<0.007	-	-	-	-	-	<0.007	<0.007	<0.0069	<0.0072	-
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0037	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	0.014	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	-	-	-	-	-	<0.0035	<0.0035	<0.0034	<0.0036	-
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.0072	<0.0035	<0.0037	<0.0036	<0.0034	0.0043	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.02	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0086	<0.0083	<0.0086	<0.0083	<0.0098	<0.0035	<0.0035	<0.0034	<0.0036	<0.0091
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0037	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0037	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.011	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.022	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0037	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.015	<0.0018	<0.0019	<0.0018	<0.0017	<0.0017	<0.0017	<0.0017	<0.0017	<0.0017	<0.002	<0.0018	<0.0018	<0.0017	<0.0018	<0.0018
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0037	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	0.0075
PFOA + PFOS (Calculated)	NCL	NCL	0.015	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0075
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.016	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0037	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0037	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0037	<0.0035	<0.0037	<0.0036	<0.0034	<0.0035	<0.0043	<0.0042	<0.0043	<0.0042	<0.0049	<0.0035	<0.0035	<0.0034	<0.0036	<0.0045
Total PFAS (Calculated)	NCL	NCL	0.13	ND	0.0037	ND	ND	0.0043	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0075

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-19S	HS-MW-19S	HS-MW-19S	HS-MW-19S	HS-PMW-20	HS-PMW-20	HS-PMW-20	HS-PMW-20	HS-PMW-20	HS-PMW-20	HS-PMW-20	HS-MW-20D	HS-MW-20D	HS-MW-20D	HS-MW-20D	HS-MW-20M
Sample Name			HS-MW-19S	HS-GW-MW19S	HS-GW-MW19S	HS-GW-MW19S	SB-20 60-65	SB-20 70-75	SB-20 80-85	SB-20 90-95	SB-20 100-105	SB-20 110-115	SB-20 120-125	HS-MW-20D	HS-GW-MW20D	HS-GW-MW20D	HS-GW-MW-20D	HS-MW-20M
Well Screen Interval (Feet below ground surface)			58.4-61.4	58.4-61.4	58.4-61.4	58.4-61.4	60-65	70-75	80-85	90-95	100-105	110-115	120-125	126.1-131.1	126.1-131.1	126.1-131.1	126.1-131.1	101.5-106.5
Laboratory Sample ID			UC02020-004	UE24001-006	UI26001-002	UL12091-016	TJ21003-001	TJ21003-002	TJ21003-005	TJ21003-006	TJ21003-007	TJ21003-008	TJ21003-011	UC09042-002	UE30036-003	UI19006-022	UK29008-019	UC09042-001
Sample Date			02/28/2019	05/21/2019	09/23/2019	12/11/2019	10/15/2018	10/15/2018	10/16/2018	10/16/2018	10/16/2018	10/16/2018	10/17/2018	03/06/2019	05/28/2019	09/18/2019	11/27/2019	03/06/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0081	<0.0069	<0.0077	<0.0072	<0.007	<0.007	<0.007	<0.007	<0.0071	<0.0071	<0.0071	<0.0071	<0.0073	<0.007	<0.0069	<0.0074
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	0.014	0.0035	0.018	0.05	0.068	0.11	0.15	0.16	0.17	0.17	0.15	0.071
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	<0.0035	<0.0035	<0.0035	0.0067	0.0066	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	0.0095
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0081	<0.0069	<0.0077	<0.0072	<0.007	<0.007	<0.007	<0.007	<0.0071	<0.0071	<0.0071	<0.0071	<0.0073	<0.007	<0.0069	<0.0074
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	0.0081	<0.0035	0.022	0.058	0.079	0.11	0.1	0.097	0.098	0.11	0.098	0.083
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	0.0051	<0.0035	0.044	0.11	0.13	0.11	0.053	0.042	0.042	0.046	0.043	0.16
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	0.0036	<0.0035	0.0045	0.012	0.015	0.027	0.043	0.047	0.052	0.05	0.049	0.015
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	0.0054	<0.0035	0.011	0.03	0.042	0.06	0.066	0.07	0.078	0.077	0.076	0.043
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	0.0074	<0.0035	0.012	0.028	0.041	0.069	0.11	0.088	0.1	0.1	0.1	0.038
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.002	<0.0017	<0.0019	<0.0018	0.0084	0.0053	0.041	0.1	0.13	0.13	0.096	0.09	0.12	0.12	0.11	0.16
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.004	<0.0034	<0.0038	<0.0036	<0.0035	<0.0035	0.011	***0.023***	***0.019***	0.0081	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	***0.04***
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	ND	ND	0.0084	0.0053	0.052	0.12	0.15	0.14	0.096	0.09	0.12	0.12	0.11	0.2
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	<0.0035	<0.0035	0.0051	0.013	0.016	0.032	0.046	0.045	0.054	0.052	0.049	0.017
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.004	<0.0034	<0.0038	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037
Total PFAS (Calculated)	NCL	NCL	ND	ND	ND	ND	0.052	0.0088	0.17	0.43	0.55	0.66	0.66	0.64	0.71	0.73	0.68	0.64

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-20M	HS-MW-20M	HS-MW-20M	HS-MW-20M	HS-MW-20S	HS-MW-20S	HS-MW-20S	HS-MW-20S	HS-PMW-21	HS-PMW-21	HS-PMW-21	HS-PMW-21	HS-PMW-21	HS-MW-21D	HS-MW-21D	HS-MW-21D
Sample Name			HS-GW-MW20M	HS-GW-MW20M	HS-GW-MW20M DUP	HS-GW-MW20M	MW-20S	HS-GW-MW20S	HS-GW-MW20S	HS-GW-MW-20S	PMW-21 15-20	PMW-21 25-30	PMW-21 35-40	PMW-21 55-60	PMW-21 80-85	PMW-21D	HS-MW-21D	HS-GW-MW21D
Well Screen Interval (Feet below ground surface)			101.5-106.5	101.5-106.5	101.5-106.5	101.5-106.5	61.1-66.1	61.1-66.1	61.1-66.1	61.1-66.1	15-20	25-30	35-40	55-60	80-65	76.2-86.2	76.2-86.2	76.2-86.2
Laboratory Sample ID			UE30036-002	UI19006-020	UI19006-021	UK29008-002	UC06036-001	UE30036-001	UI19006-019	UK29008-001	K1800184-001	K1800184-002	K1800184-003	K1800184-004	K1800184-005	K1802511-005	UB28086-003	UE18016-001
Sample Date			05/28/2019	09/18/2019	09/18/2019	11/26/2019	03/04/2019	05/28/2019	09/18/2019	11/26/2019	01/02/2018	01/03/2018	01/03/2018	01/03/2018	01/03/2018	03/15/2018	02/27/2019	05/16/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0069	<0.0069	<0.007	<0.0071	<0.0071	<0.0074	<0.0071	<0.007	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0072	<0.0073
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.068	0.069	0.07	0.06	0.015	0.016	0.018	0.018	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	0.0088	0.008	0.0084	0.0077	<0.0036	<0.0037	<0.0035	<0.0035	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0069	<0.0069	<0.007	<0.0071	<0.0071	<0.0074	<0.0071	<0.007	-	-	-	-	-	-	<0.0072	<0.0073
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	0.079	0.08	0.085	0.062	0.013	0.013	0.016	0.012	-	-	-	-	-	-	<0.0036	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.16	0.15	0.14	0.13	0.014	0.017	0.019	0.013	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.015	0.015	0.014	0.014	0.0042	0.0043	0.0047	0.0067	<0.0086	<0.0086	<0.0083	<0.0083	<0.0086	<0.0094	<0.0036	<0.0036
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.042	0.039	0.045	0.038	0.0056	0.0082	0.0094	0.0092	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.038	0.036	0.034	0.034	0.0068	0.0085	0.0093	0.013	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.17	0.17	0.17	0.15	0.016	0.022	0.022	0.023	0.0022	<0.0017	<0.0017	<0.0017	<0.0017	<0.0019	<0.0018	<0.0018
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	***0.034***	***0.033***	***0.032***	***0.029***	<0.0036	<0.0037	<0.0035	<0.0035	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	0.0061	<0.0036	<0.0036
PFOA + PFOS (Calculated)	NCL	NCL	0.2	0.2	0.2	0.18	0.016	0.022	0.022	0.023	0.0022	ND	ND	ND	ND	0.0061	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.017	0.015	0.016	0.014	<0.0036	0.0039	0.0045	0.0064	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0043	<0.0043	<0.0042	<0.0042	<0.0043	<0.0047	<0.0036	<0.0036
Total PFAS (Calculated)	NCL	NCL	0.63	0.62	0.61	0.54	0.075	0.093	0.1	0.1	0.0022	ND	ND	ND	ND	0.0061	ND	ND

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-21D	HS-MW-21D	HS-MW-21D	HS-MW-21D	HS-MW-21M	HS-MW-21M	HS-MW-21M	HS-MW-21M	HS-MW-21M	HS-MW-21S	HS-MW-21S	HS-MW-21S	HS-MW-21S	HS-MW-21S	HS-PMW-23	HS-PMW-23
Sample Name			HS-GW-MW21D DUP	HS-GW-MW21D	HS-GW-MW21D	HS-GW-MW-21D DUP	PMW-21I	HS-MW-21M	HS-GW-MW21M	HS-GW-MW21M	HS-GW-MW-21M	PMW-21S	HS-MW-21S	HS-GW-MW21S	HS-GW-MW21S	HS-GW-MW-21S	PMW-23(10-20)	PMW-23(70-80)
Well Screen Interval (Feet below ground surface)			76.2-86.2	76.2-86.2	76.2-86.2	76.2-86.2	59-64	59-64	59-64	59-64	59-64	9.8-19.8	9.8-19.8	9.8-19.8	9.8-19.8	9.8-19.8	10-20	70-80
Laboratory Sample ID			UE18016-002	UI19006-003	UL12091-001	UL12091-002	K1802511-002	UB28086-002	UE18016-003	UI19006-004	UK29008-020	K1802511-001	UB28086-001	UE18016-004	UI19006-006	UK29008-022	UF15016-001	UF15016-002
Sample Date			05/16/2019	09/16/2019	12/09/2019	12/09/2019	03/15/2018	02/27/2019	05/16/2019	09/16/2019	11/27/2019	03/15/2018	02/27/2019	05/16/2019	09/16/2019	11/27/2019	06/10/2019	06/11/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0035
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0036	0.0058	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0035
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0035
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	<0.0047	-	-	-	-	<0.0047	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0073	<0.0072	<0.0072	<0.0071	<0.0047	<0.0075	<0.0073	<0.0071	<0.0074	<0.0047	<0.0073	<0.0074	<0.0074	<0.007	<0.0072	<0.0069
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	<0.0047	-	-	-	-	<0.0047	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	0.0036	0.037	0.015
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0035
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0073	<0.0072	<0.0072	<0.0071	-	<0.0075	<0.0073	<0.0071	<0.0074	-	<0.0073	<0.0074	<0.0074	<0.007	<0.0072	<0.0069
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0035
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	-	<0.0037	<0.0036	<0.0036	<0.0037	-	<0.0037	<0.0037	<0.0037	<0.0035	0.034	0.011
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	0.072	0.032
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0094	<0.0037	<0.0036	<0.0036	<0.0037	<0.0094	<0.0037	<0.0037	<0.0037	<0.0035	0.0085	<0.0035
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0035
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	0.0078	<0.0035
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0035
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0018	<0.0018	<0.0018	<0.0018	<0.0019	<0.0019	<0.0018	<0.0018	<0.0019	0.0056	0.0028	0.0026	0.0034	0.0031	0.015	0.013
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0036	<0.0036	<0.0036	<0.0035	***0.017***	<0.0037	<0.0036	<0.0036	<0.0037	0.0092	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	0.0057
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	ND	ND	0.017	ND	ND	ND	ND	0.015	0.0028	0.0026	0.0034	0.0031	0.015	0.019
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0035
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0035	<0.0047	<0.0037	<0.0036	<0.0036	<0.0037	<0.0047	<0.0037	<0.0037	<0.0037	<0.0035	<0.0036	<0.0035
Total PFAS (Calculated)	NCL	NCL	ND	0.0058	ND	ND	0.017	ND	ND	ND	ND	0.015	0.0028	0.0026	0.0034	0.0067	0.17	0.077

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-PMW-23	HS-PMW-23	HS-PMW-23	HS-PMW-23	HS-PMW-23	HS-PMW-23	HS-PMW-23	HS-PMW-23	HS-PMW-23	HS-PMW-23	HS-PMW-23	HS-PMW-23	HS-PMW-23	HS-PMW-23	HS-PMW-23	HS-PMW-23
Sample Name			PMW-23(80-90)	PMW-23(90-100)	PMW-23(100-110)	PMW-23(110-120)	PMW-23(120-130)	PMW-23(130-140)	PMW-23(140-150)	PMW-23(150-160)	PMW-23(160-170)	PMW-23(170-180)	PMW-23(180-190)	PMW-23(190-200)	PMW-23(200-210)	PMW-23(210-220)	PMW-23(220-230)	PMW-23(230-240)
Well Screen Interval (Feet below ground surface)			80-90	90-100	100-110	110-120	120-130	130-140	140-150	150-160	160-170	170-180	180-190	190-200	200-210	210-220	220-230	230-240
Laboratory Sample ID			UF15016-003	UF15016-004	UF15016-005	UF15016-006	UF15016-007	UF15016-008	UF15016-009	UF15016-010	UF15016-011	UF15016-012	UF15016-013	UF15016-014	UF20036-001	UF20036-002	UF20036-003	UF20036-004
Sample Date			06/11/2019	06/11/2019	06/11/2019	06/12/2019	06/12/2019	06/12/2019	06/12/2019	06/13/2019	06/13/2019	06/13/2019	06/14/2019	06/14/2019	06/17/2019	06/17/2019	06/18/2019	06/18/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0069	<0.007	<0.0071	<0.0072	<0.0071	<0.007	<0.0071	<0.007	<0.0071	<0.0071	<0.0073	<0.007	<0.0069	<0.007	<0.007	<0.0069
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.0091	<0.0035	<0.0035	<0.0036	0.0042	0.069	0.086	0.057	0.16	0.15	0.23	0.22	0.38	0.28	0.25	0.25
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0069	<0.007	<0.0071	<0.0072	<0.0071	<0.007	<0.0071	<0.007	<0.0071	<0.0071	<0.0073	<0.007	<0.0069	<0.007	<0.007	<0.0069
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	0.0046	<0.0035	<0.0035	<0.0036	0.0054	0.056	0.069	0.052	0.13	0.092	0.16	0.19	0.3	0.19	0.14	0.15
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.0076	<0.0035	<0.0035	0.0041	0.012	0.06	0.086	0.062	0.11	0.031	0.052	0.071	0.11	0.064	0.021	0.017
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	0.012	0.014	0.0097	0.028	0.026	0.049	0.052	0.084	0.067	0.072	0.071
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	0.013	0.015	0.012	0.025	0.022	0.042	0.041	0.066	0.044	0.044	0.043
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	0.056	0.058	0.042	0.11	0.092	0.18	0.18	0.33	0.26	0.27	0.25
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.0049	<0.0017	<0.0018	0.003	0.0049	0.02	0.028	0.02	0.037	0.02	0.033	0.03	0.047	0.03	0.017	0.015
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	0.0054	<0.0035	<0.0035	<0.0036	<0.0035	0.0048	0.005	0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
PFOA + PFOS (Calculated)	NCL	NCL	0.01	ND	ND	0.003	0.0049	0.025	0.033	0.024	0.037	0.02	0.033	0.03	0.047	0.03	0.017	0.015
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	0.02	0.019	0.013	0.036	0.038	0.069	0.081	0.13	0.11	0.13	0.13
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035
Total PFAS (Calculated)	NCL	NCL	0.032	ND	ND	0.0071	0.027	0.31	0.38	0.27	0.64	0.47	0.82	0.87	1.4	1	0.94	0.93

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-23A	HS-MW-23A	HS-MW-23B	HS-MW-23B	HS-MW-23D	HS-MW-23C	HS-MW-23C	HS-MW-23D	HS-PMW-24	HS-PMW-24	HS-PMW-24	HS-PMW-24	HS-PMW-24	HS-PMW-24	HS-PMW-24	HS-PMW-24
Sample Name			HS-GW-MW23A	HS-GW-MW23A	HS-GW-MW23B	HS-GW-MW23B	HS-GW-MW23D	HS-GW-MW-23C	HS-GW-MW23C	HS-GW-MW-23D	MW-24A (55-60)	MW-24A (65-70)	MW-24A (75-80)	MW-24A (85-90)	MW-24A (95-100)	MW-24A (105-110)	MW-24A (115-120)	MW-24A (125-130)
Well Screen Interval (Feet below ground surface)			72.1-77.1	72.1-77.1	137.9-142.8	137.9-142.8	238.9-243.9	210.2-215	210.2-215	238.9-243.9	55-60	65-70	75-80	85-90	95-100	105-110	115-120	125-130
Laboratory Sample ID			UI21016-007	UL05055-032	UI21016-009	UL05055-033	UI21016-008	UL05055-034	UI26001-001	UL12091-008	UI26018-001	UI26018-002	UI26018-003	UI26018-004	UI26018-005	UI26018-006	UI26018-007	UI26018-008
Sample Date			09/20/2019	12/06/2019	09/20/2019	12/06/2019	09/20/2019	12/06/2019	09/23/2019	12/10/2019	09/23/2019	09/23/2019	09/23/2019	09/24/2019	09/24/2019	09/24/2019	09/24/2019	09/24/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0072	<0.0071	<0.0068	<0.007	<0.0069	<0.0071	<0.007	<0.0072	<0.0068	<0.0068	<0.007	<0.0072	<0.007	<0.007	<0.0068	<0.007
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.02	0.018	0.015	0.014	0.23	0.28	0.26	0.14	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0072	<0.0071	<0.0068	<0.007	<0.0069	<0.0071	<0.007	<0.0072	<0.0068	<0.0068	<0.007	<0.0072	<0.007	<0.007	<0.0068	<0.007
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	0.011	0.0094	0.0081	0.0071	0.15	0.23	0.22	0.076	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.02	0.019	0.019	0.015	0.016	0.09	0.091	0.011	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	0.067	0.067	0.064	0.043	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	0.037	0.057	0.05	0.02	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.0047	<0.0035	0.0061	0.0044	0.24	0.26	0.22	0.16	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.013	0.012	0.0075	0.0082	0.013	0.03	0.03	0.0056	<0.0017	<0.0017	<0.0017	<0.0018	<0.0017	<0.0018	<0.0017	<0.0017
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	0.0042	***0.015***	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
PFOA + PFOS (Calculated)	NCL	NCL	0.017	0.027	0.0075	0.0082	0.013	0.03	0.03	0.0056	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	0.13	0.11	0.1	0.08	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0034	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0034	<0.0035
Total PFAS (Calculated)	NCL	NCL	0.073	0.073	0.056	0.049	0.88	1.1	1	0.54	ND	ND	ND	ND	ND	ND	ND	ND

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-PMW-24	HS-PMW-24	HS-PMW-24	HS-PMW-24	HS-PMW-24	HS-PMW-24	HS-PMW-24	HS-PMW-24	HS-PMW-24	HS-PMW-24	HS-MW-24A	HS-MW-24B	HS-PMW-25	HS-PMW-25	HS-PMW-25	HS-MW-25D
Sample Name			MW-24A(135-140)	MW-24A(145-150)	MW-24A(155-160)	MW-24A(165-170)	MW-24A(175-180)	MW-24A(185-190)	MW-24A(195-200)	MW-24 205-210	MW-24 215-220	MW-24 225-230	HS-GW-MW-24A	HS-GW-MW-24B	SB-25 41-46	SB-25 55-60	SB-25 65-70	HS-MW-25D
Well Screen Interval (Feet below ground surface)			135-140	145-150	155-160	165-170	175-180	185-190	195-200	205-210	215-220	225-230	55.6-60.4	225.2-230	41-46	55-60	65-70	65.7-70.7
Laboratory Sample ID			UI28012-001	UI28012-002	UI28012-003	UI28012-004	UI28012-005	UI28012-006	UI28012-007	UJ02010-001	UJ02010-002	UJ02010-003	UL12091-009	UL12091-015	TJ05091-003	TJ05091-004	TJ05091-005	UC02020-009
Sample Date			09/25/2019	09/25/2019	09/25/2019	09/26/2019	09/26/2019	09/26/2019	09/27/2019	09/30/2019	09/30/2019	09/30/2019	12/10/2019	12/11/2019	10/03/2018	10/03/2018	10/03/2018	03/01/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0036
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0036
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0036
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0073	<0.007	<0.0071	<0.0071	<0.0068	<0.007	<0.0069	<0.0076	<0.0072	<0.0072	<0.007	<0.0074	<0.0074	<0.0074	<0.0073	<0.0072
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	0.0039	0.012	0.0099	0.016
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0073	<0.007	<0.0071	<0.0071	<0.0068	<0.007	<0.0069	<0.0076	<0.0072	<0.0072	<0.007	<0.0074	<0.0074	<0.0074	<0.0073	<0.0072
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	0.0065	0.005	0.008
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	0.01	0.005	0.0038	0.0054
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	0.0055	<0.0037	0.0056
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	0.0049	0.011	0.0075	0.011
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0036
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0018	<0.0018	<0.0018	<0.0018	<0.0017	<0.0017	<0.0017	<0.0019	<0.0018	<0.0018	<0.0017	<0.0018	0.0062	0.018	0.012	0.016
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	0.011	***0.08***	***0.05***	***0.072***
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.017	0.098	0.062	0.088
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	0.0089	0.006	0.0091
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0036	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0035	<0.0038	<0.0036	<0.0036	<0.0035	<0.0037	<0.0037	<0.0037	<0.0037	<0.0036
Total PFAS (Calculated)	NCL	NCL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.036	0.15	0.094	0.14

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-25D	HS-MW-25D	HS-MW-25D	HS-MW-25S	HS-MW-25S	HS-MW-25S	HS-MW-25S	HS-PMW-26	HS-PMW-26	HS-PMW-26	HS-PMW-26	HS-PMW-26	HS-MW-26D	HS-MW-26D	HS-MW-26D	HS-MW-26D
Sample Name			HS-GW-MW25D	HS-GW-MW25D	HS-GW-MW25D	HS-MW-25S	HS-GW-MW25S	HS-GW-MW25S	HS-GW-MW-25S	SB-26 25-30	SB-26 50-55	SB-26 60-65	SB-26 70-75	SB-26 79-84	HS-MW-26D	HS-GW-MW26D	HS-GW-MW26D	HS-GW-MW-26D
Well Screen Interval (Feet below ground surface)			65.7-70.7	65.7-70.7	65.7-70.7	51.1-56.1	51.1-56.1	51.1-56.1	51.1-56.1	25-30	50-55	60-65	70-75	79-84	79.6-84.6	79.6-84.6	79.6-84.6	79.6-84.6
Laboratory Sample ID			UE15023-008	UI19006-009	UL05055-004	UC02020-008	UE15023-007	UI19006-012	UL05055-002	TK16018-001	TK16018-003	TK16018-004	TK16018-005	TK16018-006	UC02020-003	UE15023-009	UI12010-013	UK21036-008
Sample Date			05/14/2019	09/17/2019	12/02/2019	03/01/2019	05/14/2019	09/17/2019	12/02/2019	11/12/2018	11/14/2018	11/14/2018	11/14/2018	11/14/2018	02/28/2019	05/15/2019	09/11/2019	11/19/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0036	<0.0038	<0.0037	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0036	<0.0038	<0.0037	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0036	<0.0038	<0.0037	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0074	<0.0073	<0.0077	<0.0073	<0.0072	<0.0076	<0.0074	<0.0072	<0.0071	<0.007	<0.0071	<0.0072	<0.0074	<0.0071	<0.0077	<0.007
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.012	0.011	0.018	0.017	0.01	0.0082	0.012	<0.0036	0.0059	0.0072	0.0094	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0036	<0.0038	<0.0037	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0036	<0.0038	<0.0037	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0074	<0.0073	<0.0077	<0.0073	<0.0072	<0.0076	<0.0074	<0.0072	<0.0071	<0.007	<0.0071	<0.0072	<0.0074	<0.0071	<0.0077	<0.007
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0036	<0.0038	<0.0037	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0036	<0.0038	<0.0037	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.0069	0.007	0.0082	0.0083	0.0045	0.0045	0.0057	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.0047	0.0045	0.0054	0.0046	<0.0036	<0.0038	0.0039	<0.0036	<0.0035	<0.0035	0.0036	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0036	<0.0038	<0.0037	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0036	<0.0038	<0.0037	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.0045	<0.0037	0.005	0.004	<0.0036	<0.0038	0.0049	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.01	0.0076	0.012	0.0089	0.0056	0.0068	0.0092	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0036	<0.0038	<0.0037	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.014	0.01	0.015	0.012	0.0091	0.011	0.014	<0.0018	<0.0018	0.0071	0.0051	<0.0018	0.0022	<0.0018	<0.0019	<0.0017
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	***0.051***	***0.039***	***0.042***	***0.11***	***0.071***	***0.057***	***0.061***	<0.0036	<0.0035	***0.028***	***0.014***	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
PFOA + PFOS (Calculated)	NCL	NCL	0.065	0.049	0.057	0.12	0.08	0.068	0.075	ND	ND	0.035	0.019	ND	0.0022	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.0086	0.0061	0.0087	0.007	0.0043	0.0047	0.0067	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0036	<0.0038	<0.0037	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0036	<0.0038	<0.0037	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0037	<0.0037	<0.0038	<0.0037	<0.0036	<0.0038	<0.0037	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0036	<0.0038	<0.0035
Total PFAS (Calculated)	NCL	NCL	0.11	0.085	0.11	0.17	0.1	0.092	0.12	ND	0.0059	0.042	0.032	ND	0.0022	ND	ND	ND

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-26M	HS-MW-26M	HS-MW-26M	HS-MW-26M	HS-MW-26S	HS-MW-26S	HS-MW-26S	HS-MW-26S	HS-MW-26S	HS-PMW-27	HS-PMW-27	HS-PMW-27	HS-PMW-27	HS-PMW-27	HS-MW-27A	HS-MW-27B
Sample Name			HS-MW-26M	HS-GW-MW26M	HS-GW-MW26M	HS-GW-MW26M	HS-MW-26S	HS-GW-MW26S	HS-GW-MW26S	HS-GW-MW26S DUP	HS-GW-MW-26S	HS-MW27 21-25	HS-MW27 33-37	HS-MW27 41-45	HS-MW27-52-56	HS-MW27-60-64	HS-GW-MW-27A	HS-GW-MW27B
Well Screen Interval (Feet below ground surface)			61.7-66.7	61.7-66.7	61.7-66.7	61.7-66.7	25.8-30.8	25.8-30.8	25.8-30.8	25.8-30.8	25.8-30.8	21-25	33-37	41-45	52-56	60-64	21.6-26.2	35.4-38
Laboratory Sample ID			UC02020-002	UE15023-011	UI12010-017	UK21036-005	UC02020-001	UE15023-010	UI12010-015	UI12010-018	UK21036-001	UF19002-001	UF19002-002	UF19002-003	UF19026-001	UF19026-002	UK19008-001	UI12010-002
Sample Date			02/28/2019	05/15/2019	09/11/2019	11/19/2019	02/28/2019	05/15/2019	09/11/2019	09/11/2019	11/19/2019	06/17/2019	06/17/2019	06/17/2019	06/18/2019	06/18/2019	11/18/2019	09/09/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0076	<0.0074	<0.0071	<0.0073	<0.0073	<0.0073	<0.0076	<0.0073	<0.0073	<0.0075	<0.0069	<0.0075	<0.0071	<0.0082	<0.0077	<0.0068
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.0044	0.0046	0.0049	0.0053	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	0.004	<0.0034
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0076	<0.0074	<0.0071	<0.0073	<0.0073	<0.0073	<0.0076	<0.0073	<0.0073	<0.0075	<0.0069	<0.0075	<0.0071	<0.0082	<0.0077	<0.0068
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	0.0056	<0.0034
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	0.0079	<0.0035	<0.0037	<0.0036	0.012	0.0067	<0.0034
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	0.0038	<0.0035	<0.0037	<0.0036	<0.0041	0.0069	<0.0034
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.006	0.0055	0.0054	0.0052	<0.0018	<0.0018	<0.0019	<0.0018	<0.0018	0.0067	0.0032	<0.0019	<0.0018	0.0025	0.0051	<0.0017
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	***0.014***	0.011	***0.016***	***0.017***	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
PFOA + PFOS (Calculated)	NCL	NCL	0.02	0.017	0.021	0.022	ND	ND	ND	ND	ND	0.01	0.0032	ND	ND	0.0025	0.0051	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	0.0037	<0.0035	<0.0037	<0.0036	0.006	<0.0038	<0.0034
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0038	<0.0037	<0.0035	<0.0037	<0.0036	<0.0036	<0.0038	<0.0037	<0.0037	<0.0037	<0.0035	<0.0037	<0.0036	<0.0041	<0.0038	<0.0034
Total PFAS (Calculated)	NCL	NCL	0.024	0.021	0.026	0.028	ND	ND	ND	ND	ND	0.026	0.0032	ND	ND	0.021	0.028	ND

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-27B	HS-MW-27C	HS-MW-27C	HS-MW-27D	HS-MW-27D	HS-MW-27E	HS-MW-27E	HS-PMW-28	HS-PMW-28	HS-PMW-28	HS-PMW-28	HS-MW-28A	HS-MW-28A	HS-MW-28B	HS-MW-28B	HS-MW-28C
Sample Name			HS-GW-MW-27B	HS-GW-MW27C	HS-GW-MW-27C	HS-GW-MW27D	HS-GW-MW-27D	HS-GW-MW27E	HS-GW-MW-27E	HS-MW28 (42-44)	HS-MW28 (51-53)	HS-MW28 (70.5-72.5)	HS-MW28 81-85	HS-GW-MW28A	HS-GW-MW-28A	HS-GW-MW28B	HS-GW-MW-28B	HS-GW-MW28C
Well Screen Interval (Feet below ground surface)			35.4-38	41.3-45.9	41.3-45.9	52.4-56.4	52.4-56.4	58.5-62.5	58.5-62.5	42-44	51-53	70.5-72.5	81-85	39.1-43.7	39.1-43.7	43.3-47.9	43.3-47.9	49.2-53.8
Laboratory Sample ID			UK19008-003	UI12010-001	UK19008-002	UI12010-003	UK21036-002	UI12010-004	UK19008-004	UF07034-001	UF07034-002	UF07034-003	UF12004-001	UI19006-013	UK21036-018	UI19006-005	UK21036-019	UI19006-001
Sample Date			11/18/2019	09/09/2019	11/18/2019	09/09/2019	11/19/2019	09/09/2019	11/18/2019	06/05/2019	06/05/2019	06/06/2019	06/10/2019	09/17/2019	11/21/2019	09/16/2019	11/21/2019	09/16/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	<0.0036	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	<0.0036	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	0.011
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	<0.0036	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0075	<0.0072	<0.0075	<0.0068	<0.0076	<0.0073	<0.0074	<0.007	<0.0072	<0.0069	<0.007900001	<0.0072	<0.0072	<0.0074	<0.0075	<0.0076
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	0.005	0.0065	<0.0035	<0.004	0.0063	0.0047	0.0083	0.0092	<0.0038
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	<0.0036	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	<0.0036	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0075	<0.0072	<0.0075	<0.0068	<0.0076	<0.0073	<0.0074	<0.007	<0.0072	<0.0069	<0.007900001	<0.0072	<0.0072	<0.0074	<0.0075	<0.0076
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	<0.0036	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	<0.0036	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	0.0039	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	0.01	0.0074	<0.0035	0.0049	<0.0035	0.006	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	<0.0036	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	<0.0036	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	<0.0036	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	0.0037	<0.0037	<0.0035	0.0041	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	<0.0036	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0019	<0.0018	<0.0019	<0.0017	<0.0019	0.0031	0.0025	<0.0017	0.0059	<0.0017	0.002	<0.0018	<0.0018	0.0023	<0.0019	<0.0019
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	0.0057	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	ND	ND	ND	0.0031	0.0025	ND	0.012	ND	0.002	ND	ND	0.0023	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	0.0038	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	<0.0036	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	<0.0036	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0037	<0.0036	<0.0038	<0.0034	<0.0038	<0.0036	<0.0037	<0.0035	<0.0036	<0.0035	<0.004	<0.0036	<0.0036	<0.0037	<0.0038	<0.0038
Total PFAS (Calculated)	NCL	NCL	ND	ND	ND	ND	ND	0.017	0.0099	0.005	0.035	ND	0.008	0.0063	0.0047	0.011	0.0092	0.011

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-28C	HS-MW-28D	HS-MW-28D	HS-MW-28D	HS-MW-28E	HS-MW-28E	HS-PMW-29	HS-PMW-29	HS-PMW-29	HS-PMW-29	HS-PMW-29	HS-MW-29A	HS-MW-29B	HS-MW-29C	HS-MW-29D	HS-PMW-30
Sample Name			HS-GW-MW-28C	HS-GW-MW28D	HS-GW-MW-28D	HS-GW-MW-28D DUP	HS-GW-MW28E	HS-GW-MW-28E	HS-GW-MW29 (11-15)	HS-GW-MW29 (21-25)	HS-GW-MW29 (31-35)	HS-GW-MW29 (41-45)	HS-GW-MW29 (46-50)	HS-GW-MW-29A	HS-GW-MW-29B	HS-GW-MW-29C	HS-GW-MW-29D	HS-MW30 (52-54)
Well Screen Interval (Feet below ground surface)			49.2-53.8	62.2-66.8	62.2-66.8	62.2-66.8	82.7-87.3	82.7-87.3	11-15	21-25	31-35	41-45	46-50	3.5-13.5	16.8-21.8	27.2-32.2	37.1-42.1	52-54
Laboratory Sample ID			UK21036-016	UI19006-010	UK21036-014	UK21036-015	UI19006-011	UK21036-017	UJ08016-001	UJ08016-002	UJ08016-003	UJ08016-004	UJ08016-005	UK19008-006	UK21036-003	UK21036-004	UK19008-005	UE17049-001
Sample Date			11/21/2019	09/17/2019	11/21/2019	11/21/2019	09/17/2019	11/21/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/02/2019	11/18/2019	11/19/2019	11/19/2019	11/18/2019	05/13/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0036
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0036
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0036
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0071	<0.007	<0.0072	<0.0074	<0.007	<0.0072	<0.0071	<0.007	<0.007	<0.0071	<0.0073	<0.007	<0.0069	<0.007	<0.007	<0.0072
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	0.015	<0.0035	<0.0035	<0.0036	<0.0036	0.018	0.024	0.011	0.0035	0.0067
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	0.01	<0.0034	<0.0035	<0.0035	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0071	<0.007	<0.0072	<0.0074	<0.007	<0.0072	<0.0071	<0.007	<0.007	<0.0071	<0.0073	<0.007	<0.0069	<0.007	<0.007	<0.0072
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	0.0056	<0.0034	<0.0035	<0.0035	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	0.017	<0.0035	<0.0035	<0.0036	<0.0036	0.025	<0.0034	<0.0035	<0.0035	0.0044
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	0.01	<0.0034	<0.0035	<0.0035	<0.0036
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	0.0064	<0.0034	<0.0035	<0.0035	<0.0036
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	0.017	<0.0034	<0.0035	<0.0035	0.0041
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0036
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0018	<0.0017	<0.0018	<0.0018	<0.0018	<0.0018	0.0091	<0.0017	<0.0018	<0.0018	<0.0018	0.036	<0.0017	<0.0018	<0.0018	0.0088
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	***0.053***	<0.0035	<0.0035	<0.0036	<0.0036	***0.32***	0.004	<0.0035	<0.0035	<0.0036
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	ND	ND	ND	ND	0.062	ND	ND	ND	ND	0.36	0.004	ND	ND	0.0088
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	0.01	<0.0034	<0.0035	<0.0035	<0.0036
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	<0.0036	<0.0036	<0.0035	<0.0035	<0.0036	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0036
Total PFAS (Calculated)	NCL	NCL	ND	ND	ND	ND	ND	ND	0.094	ND	ND	ND	ND	0.46	0.028	0.011	0.0035	0.024

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-PMW-30	HS-PMW-30	HS-PMW-30	HS-PMW-30	HS-PMW-30	HS-PMW-30	HS-PMW-30	HS-MW-30A	HS-MW-30A	HS-MW-30A	HS-MW-30A	HS-MW-30B	HS-MW-30B	HS-MW-30B	HS-MW-30C	HS-MW-30C
Sample Name			HS-MW30 (61-63)	HS-MW30 (75-77)	HS-MW30 (100-102)	HS-MW30 (111-113)	HS-MW30 (121-123)	HS-MW30 (128-130)	HS-MW30 (138-140)	HS-GW-MW30A	HS-GW-MW30A	HS-GW-MW30A	HS-GW-MW30A DUP	HS-GW-MW30B	HS-GW-MW30B	HS-GW-MW30B	HS-GW-MW30C	HS-GW-MW30C
Well Screen Interval (Feet below ground surface)			61-63	75-77	100-102	111-113	121-123	128-130	138-140	46.9-51.5	46.9-51.5	46.9-51.5	46.9-51.5	51.5-56.1	51.5-56.1	51.5-56.1	77.4-82	77.4-82
Laboratory Sample ID			UE17049-003	UE17049-004	UE17049-005	UE17049-006	UE17005-001	UE17005-002	UE17005-003	UG03026-005	UI19006-014	UK19008-010	UK19008-011	UG03026-007	UI21016-001	UK19008-014	UG06001-001	UI19006-015
Sample Date			05/14/2019	05/14/2019	05/14/2019	05/14/2019	05/15/2019	05/15/2019	05/15/2019	07/02/2019	09/17/2019	11/20/2019	11/20/2019	07/02/2019	09/19/2019	11/20/2019	07/03/2019	09/17/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.007	<0.0073	<0.0071	<0.0075	<0.0073	<0.0071	<0.0071	<0.0071	<0.0069	<0.0071	<0.0084	<0.0072	<0.0075	<0.007	<0.0074	<0.0069
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0035	0.0042	<0.0035	0.004	<0.0036	<0.0036	<0.0036	0.0061	0.0068	0.0072	0.0069	0.0071	0.0074	0.0073	0.0057	0.0055
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.007	<0.0073	<0.0071	<0.0075	<0.0073	<0.0071	<0.0071	<0.0071	<0.0069	<0.0071	<0.0084	<0.0072	<0.0075	<0.007	<0.0074	<0.0069
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	0.0038	<0.0035	<0.0035	<0.0042	0.0038	<0.0038	0.0038	<0.0037	<0.0035
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0035	<0.0036	<0.0035	0.0043	0.01	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	0.0056	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0017	<0.0018	<0.0018	0.0026	0.0041	<0.0018	<0.0018	0.0033	0.0025	0.003	0.0027	0.0064	0.0035	0.0041	<0.0018	<0.0017
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	ND	0.0026	0.0041	ND	ND	0.0033	0.0025	0.003	0.0027	0.0064	0.0035	0.0041	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0035	<0.0036	<0.0035	0.0041	0.0066	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0036	<0.0035	<0.0035	<0.0035	<0.0042	<0.0036	<0.0038	<0.0035	<0.0037	<0.0035
Total PFAS (Calculated)	NCL	NCL	ND	0.0042	ND	0.015	0.026	ND	ND	0.013	0.0093	0.01	0.0096	0.017	0.011	0.015	0.0057	0.0055

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-30C	HS-MW-30D	HS-MW-30D	HS-MW-30D	HS-MW-30E	HS-MW-30E	HS-MW-30E	HS-PMW-31	HS-PMW-31	HS-PMW-31	HS-PMW-31	HS-MW-31A	HS-MW-31A	HS-MW-31A	HS-MW-31B	HS-MW-31B
Sample Name			HS-GW-MW-30C	HS-GW-MW30D	HS-GW-MW30D	HS-GW-MW-30D	HS-GW-MW30E	HS-GW-MW30E	HS-GW-MW-30E	HS-MW31 (21.22.5)	HS-MW31 (31.0-32.5)	HS-MW31 (41.0-42.5)	HS-MW31 (51.0-52.5)	HS-GW-MW31A	HS-GW-MW31A	HS-GW-MW-31A	HS-GW-MW31B	HS-GW-MW31B
Well Screen Interval (Feet below ground surface)			77.4-82	112.7-117.3	112.7-117.3	112.7-117.3	123.2-127.7	123.2-127.7	123.2-127.7	21-22.5	31-32.5	41-42.5	51-52.5	17.1-21.6	17.1-21.6	17.1-21.6	26-30.5	26-30.5
Laboratory Sample ID			UK21036-026	UG03026-008	UI21016-002	UK21036-024	UG03026-006	UI19006-016	UK21036-025	UE17005-006	UE17005-007	UE17005-008	UE17005-009	UG03026-003	UI13033-001	UK21036-006	UG03026-001	UI13033-004
Sample Date			11/22/2019	07/02/2019	09/19/2019	11/22/2019	07/02/2019	09/17/2019	11/22/2019	05/15/2019	05/15/2019	05/17/2019	05/17/2019	07/01/2019	09/12/2019	11/19/2019	07/01/2019	09/12/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0037
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	0.0047	<0.0038	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0037
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0037
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0069	<0.0071	<0.007	<0.0071	<0.0074	<0.0069	<0.0077	<0.0068	<0.007	<0.0072	<0.0071	<0.007	<0.007	<0.0073	<0.0073	<0.0075
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.0055	0.0048	0.0053	0.0056	0.0055	0.0063	0.0059	<0.0034	0.0099	0.015	0.011	0.011	0.0055	0.0068	0.014	0.012
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0037
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0037
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0069	<0.0071	<0.007	<0.0071	<0.0074	<0.0069	<0.0077	<0.0068	<0.007	<0.0072	<0.0071	<0.007	<0.007	<0.0073	<0.0073	<0.0075
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0037
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	<0.0035	0.0055	<0.0035	<0.0035	<0.0035	<0.0036	0.0041	0.0049
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	0.0091	0.012	0.008	0.0071	0.0075	0.0053	0.011	0.011
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	0.0042	0.005	<0.0035	<0.0035	<0.0035	<0.0036	0.006	0.0042
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0037
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0037
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	0.0034	0.0039	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	0.0038	<0.0037
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	0.0054	0.0059	0.007	0.0075	<0.0035	<0.0035	<0.0036	0.0043	0.0056	0.0082
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0037
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0017	<0.0018	<0.0018	<0.0018	<0.0018	<0.0017	<0.0019	0.0069	0.011	0.011	0.008	0.0035	0.0038	0.0032	0.022	0.012
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	<0.0035	0.0055	0.0055	<0.0035	<0.0035	<0.0036	0.0059	0.005
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	ND	ND	ND	ND	ND	0.0069	0.011	0.017	0.014	0.0035	0.0038	0.0032	0.028	0.017
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	0.0067	0.0048	0.005	0.0053	<0.0035	<0.0035	<0.0036	0.0051	0.0059
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0037
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0037
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0034	<0.0036	<0.0035	<0.0036	<0.0037	<0.0034	<0.0038	<0.0034	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0036	<0.0036	<0.0037
Total PFAS (Calculated)	NCL	NCL	0.0055	0.0048	0.0053	0.0056	0.0055	0.011	0.0059	0.022	0.049	0.066	0.045	0.022	0.017	0.02	0.078	0.063

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-31B	HS-MW-31C	HS-MW-31C	HS-MW-31C	HS-MW-31D	HS-MW-31D	HS-MW-31D	HS-MW-31E	HS-MW-31E	HS-MW-31E	HS-MW-31E	HS-PMW-32	HS-PMW-32	HS-PMW-32	HS-PMW-32	HS-PMW-32
Sample Name			HS-GW-MW-31B	HS-GW-MW31C	HS-GW-MW31C	HS-GW-MW-31C	HS-GW-MW31D	HS-GW-MW31D	HS-GW-MW-31D	HS-GW-MW31E	HS-GW-MW31E DUP	HS-GW-MW31E	HS-GW-MW-31E	WV-MW-32 (54-64)	WV-MW-32 (64-74)	WV-MW-32 (102-112)	WV-MW-32 (112-122)	WV-MW-32 (130-140)
Well Screen Interval (Feet below ground surface)			26-30.5	41.3-45.8	41.3-45.8	41.3-45.8	48.8-53.4	48.8-53.4	48.8-53.4	64.1-68.7	64.1-68.7	64.1-68.7	64.1-68.7	54-64	64-74	102-112	112-122	130-140
Laboratory Sample ID			UK19008-013	UG03026-004	UI13033-003	UK21036-007	UG03026-002	UI13033-002	UK21036-027	UG06001-002	UG06001-003	UI13033-005	UK19008-009	UD19022-001	UD19022-002	UD19022-003	UD19022-004	UD19022-005
Sample Date			11/20/2019	07/01/2019	09/12/2019	11/19/2019	07/01/2019	09/12/2019	11/22/2019	07/03/2019	07/03/2019	09/12/2019	11/20/2019	04/15/2019	04/16/2019	04/16/2019	04/17/2019	04/17/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0034	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0034	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0034	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0073	<0.0075	<0.007	<0.0073	<0.0072	<0.0069	<0.0075	<0.0075	<0.0072	<0.0068	<0.007	<0.01	<0.0084	<0.0088	<0.0078	<0.0078
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.012	0.018	0.016	0.015	0.012	0.011	0.0076	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0034	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0034	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0073	<0.0075	<0.007	<0.0073	<0.0072	<0.0069	<0.0075	<0.0075	<0.0072	<0.0068	<0.007	<0.01	<0.0084	<0.0088	<0.0078	<0.0078
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0034	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	0.0043	0.005	0.0052	0.0048	<0.0036	0.0035	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.013	0.011	0.0095	0.01	0.0082	0.0069	0.0053	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.0072	0.0051	0.0048	0.0047	0.0042	0.0035	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	0.0046	<0.0039	<0.0039
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0034	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0034	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.018	<0.0037	<0.0035	<0.0036	0.0037	0.0038	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.017	0.006	0.0063	0.0073	0.0074	0.0064	0.0041	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0034	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.052	0.01	0.0086	0.0079	0.0073	0.0075	0.0074	<0.0019	<0.0018	<0.0017	<0.0018	<0.0026	<0.0021	0.0026	<0.002	<0.0019
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	***0.014***	0.0077	0.0059	0.0052	0.0044	0.0053	0.007	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
PFOA + PFOS (Calculated)	NCL	NCL	0.066	0.018	0.015	0.013	0.012	0.013	0.014	ND	ND	ND	ND	ND	ND	0.0026	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.014	0.004	0.0045	0.0057	0.006	0.0048	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0034	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0034	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0037	<0.0037	<0.0035	<0.0036	<0.0036	<0.0034	<0.0037	<0.0037	<0.0036	<0.0034	<0.0035	<0.0051	<0.0042	<0.0044	<0.0039	<0.0039
Total PFAS (Calculated)	NCL	NCL	0.15	0.067	0.061	0.061	0.053	0.053	0.031	ND	ND	ND	ND	ND	ND	0.0072	ND	ND

TABLE 3
GROUNDWATER ANALYTICAL DATA - PFAS
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	HS-MW-32A	HS-MW-32A	HS-MW-32A	HS-MW-32B	HS-MW-32B	HS-MW-32B	HS-MW-32C	HS-MW-32C	HS-MW-32C	HS-MW-32D	HS-MW-32D	HS-MW-32D
Sample Name			HS-GW-MW32A	HS-GW-MW32A	HS-GW-MW32A	HS-GW-MW32B	HS-GW-MW32B	HS-GW-MW32B	HS-GW-MW32C	HS-GW-MW32C	HS-GW-MW32C	HS-GW-MW32D	HS-GW-MW32D	HS-GW-MW32D
Well Screen Interval (Feet below ground surface)			60.9-65.5	60.9-65.5	60.9-65.5	79.1-83.7	79.1-83.7	79.1-83.7	108.8-113.4	108.8-113.4	108.8-113.4	142.3-146.9	142.3-146.9	142.3-146.9
Laboratory Sample ID			UE25011-005	UI07020-001	UK29008-003	UE25011-006	UI07020-003	UK29008-004	UE25011-007	UI07020-002	UK29008-005	UE25011-008	UI07020-004	UK29008-006
Sample Date			05/24/2019	09/06/2019	11/26/2019	05/24/2019	09/06/2019	11/26/2019	05/24/2019	09/06/2019	11/26/2019	05/24/2019	09/06/2019	11/26/2019
Parameter (µg/L)														
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0073	<0.0074	<0.0068	<0.0074	<0.0069	<0.0069	<0.0076	<0.0071	<0.0074	<0.0074	<0.0069	<0.0071
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0073	<0.0074	<0.0068	<0.0074	<0.0069	<0.0069	<0.0076	<0.0071	<0.0074	<0.0074	<0.0069	<0.0071
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	0.0044	<0.0035
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0018	<0.0019	<0.0017	<0.0018	<0.0017	<0.0017	<0.0019	<0.0018	<0.0019	<0.0018	<0.0017	<0.0018
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0036	<0.0037	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Total PFAS (Calculated)	NCL	NCL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0044	ND

TABLE 3 NOTES
House Street Disposal Site Study Area
Plainfield Township, Kent County, MI

NOTES:

1. Concentration and criteria units are micrograms per Liter (µg/L) or parts per billion (ppb). Calculated criteria and concentrations are rounded to two significant digits. "ND" indicates the parameters used in the calculation were not detected.
2. Michigan Part 201 Groundwater Cleanup Criteria are based on "Table 1, Groundwater: Residential and Nonresidential Part 201 Generic Cleanup Criteria and Screening Levels/Part 213 Tier I Risk Based Screening Levels," Michigan Administrative Code, Cleanup Criteria Requirements for Response Activity, Rules 299.44 and 299.49, effective December 30, 2013; updated August 3, 2020.
   Abbreviations Include:
   "NCL" indicates no criterion listed in EGLE Table 1.
   Footnotes Include:
   (A) - The criterion is the State of Michigan drinking water standard.
3. Bold, italic number with thick line border or italic parameter name indicates that parameter was detected above the Michigan Part 201 Groundwater Cleanup Criteria listed.
4. Abbreviations include:
   "< RL" indicates the parameter was analyzed for but not detected above the method detection limit; RL = Reporting Limit.
   "DUP" indicates a duplicate sample.
   "-" indicates the paramater was not analyzed.
   "J" indicates the result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
   "UJ" indicates the analyte was analyzed for but was not detected. The reported quantitation limit is approximate.
5. Well screen interval presented is the top of the well screen to the bottom of the well screen in feet below ground surface.

TABLE 4
GROUNDWATER ANALYTICAL DATA - PFAS
Wolven/Jewell Study Areas
Algoma Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	WV-MW-1	WV-MW-1	WV-MW-1	WV-MW-1	WV-MW-1	WV-PMW-2	WV-PMW-2	WV-MW-2D	WV-MW-2D	WV-MW-2D	WV-MW-2D	WV-MW-2D	WV-MW-2S	WV-MW-2S	WV-MW-2S	WV-MW-2S
Sample Name			PMW-WV-1	MW-WV-1	WV-GW-MW1	WV-GW-MW1	WV-GW-MW-1	PMW-WV-2 (13-18)	PMV-WV 2 31 - 36	PMW-WV-2D	MW-WV-2D	WV-GW-MW2D	WV-GW-MW2D	WV-GW-MW-2D	PMW-WV-2S	MW-WV-2S	WV-GW-MW2S	WV-GW-MW2S
Well Screen Interval (Feet below ground surface)			137.8-142.8	137.8-142.8	137.8-142.8	137.8-142.8	137.8-142.8	13-18	31-36	30.2-35.2	30.2-35.2	30.2-35.2	30.2-35.2	30.2-35.2	20.2-25.2	20.2-25.2	20.2-25.2	20.2-25.2
Laboratory Sample ID			TC30012-002	UB20051-010	UE09028-012	UI05007-008	UK13023-002	K1801515-002	K1801591-001	TC30012-006	UB20051-002	UE09028-013	UI05007-005	UK07051-005	TC30012-010	UB20051-001	UE09028-014	UI05007-004
Sample Date			03/28/2018	02/20/2019	05/10/2019	09/04/2019	11/12/2019	02/14/2018	02/16/2018	03/29/2018	02/18/2019	05/10/2019	09/03/2019	11/05/2019	03/29/2018	02/18/2019	05/10/2019	09/03/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.007	<0.0035	<0.0036	<0.0034	<0.0035	<0.0047	<0.0051	<0.0072	<0.0036	<0.0036	<0.0036	<0.0038	<0.0074	<0.0036	<0.0037	<0.0036
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.007	<0.0035	<0.0036	<0.0034	<0.0035	<0.0047	<0.0051	<0.0072	<0.0036	<0.0036	<0.0036	<0.0038	<0.0074	<0.0036	<0.0037	<0.0036
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.007	<0.0035	<0.0036	<0.0034	<0.0035	<0.0047	<0.0051	<0.0072	<0.0036	<0.0036	<0.0036	<0.0038	<0.0074	<0.0036	<0.0037	<0.0036
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	<0.0047	<0.0051	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.014	<0.007	<0.0071	<0.0067	<0.007	<0.0047	<0.0051	<0.014	<0.0071	<0.0072	<0.0072	<0.0077	<0.015	<0.0071	<0.0073	<0.0071
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	<0.0047	<0.0051	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.046	0.032	0.0072	0.048	0.041	0.02	0.05	0.056	0.051	0.046	0.045	0.042	0.017	0.014	0.013	0.016
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0047	<0.0051	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0037	<0.0036	<0.0037	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	0.23	0.17	0.071	0.25	0.22	0.13	0.024	0.015	0.016	0.016	0.022	0.016	0.074	0.062	0.047	0.054
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.007	<0.007	<0.0071	<0.0067	<0.007	-	-	<0.0072	<0.0071	<0.0072	<0.0072	<0.0077	<0.0074	<0.0071	<0.0073	<0.0071
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.007	<0.0035	0.0099	<0.0034	<0.0035	<0.0047	<0.0051	<0.0072	<0.0036	<0.0036	<0.0036	<0.0038	<0.0074	<0.0036	<0.0037	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	0.14	0.1	0.022	0.14	0.12	-	-	0.14	0.14	0.12	0.13	0.13	0.018	0.015	0.016	0.02
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	1.1	0.81	0.18	1.1	0.77	0.086	0.24	0.35	0.32	0.28	0.26	0.28	0.08	0.065	0.052	0.065
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.031	0.022	0.0059	0.037	0.029	<0.0094	0.02	0.026	0.022	0.02	0.017	0.019	0.011	0.0081	0.0074	0.0096
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0047	<0.0051	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0037	<0.0036	<0.0037	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0047	<0.0051	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0037	<0.0036	<0.0037	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.25	0.17	0.035	0.26	0.22	0.035	0.15	0.15	0.14	0.13	0.12	0.12	0.033	0.024	0.022	0.032
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.1	0.065	0.014	0.11	0.095	0.023	0.061	0.081	0.068	0.061	0.055	0.057	0.023	0.016	0.015	0.017
Perfluorononanoic acid (PFNA)	NCL	NCL	0.015	0.01	0.0049	0.017	0.013	0.0057	<0.0051	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	0.0058	0.0059	0.006	0.0071
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	3.3	2.8	0.57	4.3	2.9	0.28	0.72	0.97	1.1	1	0.89	0.92	0.32	0.29	0.27	0.32
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	***7.3***	***6.1***	***3.7***	***10***	***6.7***	***2.7***	***0.096***	***0.064***	***0.064***	***0.077***	***0.15***	***0.11***	***3.2***	***3.8***	***3.4***	***3.8***
PFOA + PFOS (Calculated)	NCL	NCL	11	8.9	4.3	14	9.6	3	0.82	1	1.2	1.1	1	1	3.5	4.1	3.7	4.1
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.039	0.025	0.0057	0.037	0.036	0.014	0.025	0.033	0.027	0.026	0.025	0.026	0.014	0.0093	0.0083	0.0089
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.007	<0.0035	<0.0036	<0.0034	<0.0035	<0.0047	<0.0051	<0.0072	<0.0036	<0.0036	<0.0036	<0.0038	<0.0074	<0.0036	<0.0037	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0047	<0.0051	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0037	<0.0036	<0.0037	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0035	<0.0035	<0.0036	<0.0034	<0.0035	<0.0047	<0.0051	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0037	<0.0036	<0.0037	<0.0036
Total PFAS (Calculated)	NCL	NCL	13	10.3	4.6	16	11	3.3	1.4	1.9	1.9	1.8	1.7	1.7	3.8	4.3	3.9	4.3

TABLE 4
GROUNDWATER ANALYTICAL DATA - PFAS
Wolven/Jewell Study Areas
Algoma Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	WV-MW-2S	WV-PMW-3	WV-PMW-3	WV-PMW-3	WV-PMW-3	WV-PMW-3	WV-MW-3D	WV-MW-3D	WV-MW-3D	WV-MW-3D	WV-MW-3D	WV-MW-3D	WV-MW-3S	WV-MW-3S	WV-MW-3S	WV-MW-3S
Sample Name			WV-GW-MW-2S	PMW-WV-3 5-10	PMW-WV-3 13-18	PMW_WV3-3439	PMW_WV3-4449	PMW_WV3-5459	DUP-1	PMW-WV-3D	MW-WV-3D	WV-GW-MW3D	WV-GW-MW3D	WV-GW-MW-3D	PMW-WV-3S	MW-WV-3S	WV-GW-MW3S	WV-GW-MW3S
Well Screen Interval (Feet below ground surface)			20.2-25.2	5-10	13-18	34-39	44-49	54-59	57.5-62.5	57.5-62.5	57.5-62.5	57.5-62.5	57.5-62.5	57.5-62.5	5.1-10.1	5.1-10.1	5.1-10.1	5.1-10.1
Laboratory Sample ID			UK07051-004	K1801320-001	K1801320-002	K1801365-002	K1801365-004	K1801365-005	TC30012-011	TC30012-008	UB16022-008	UE09028-018	UI05007-010	UK07025-005	TC30012-009	UB16022-007	UE09028-022	UI05007-011
Sample Date			11/05/2019	02/08/2018	02/08/2018	02/12/2018	02/12/2018	02/12/2018	03/29/2018	03/29/2018	02/15/2019	05/09/2019	09/04/2019	11/06/2019	03/29/2018	02/15/2019	05/09/2019	09/04/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0036	<0.0042	<0.0042	<0.0044	<0.0044	<0.0044	<0.0075	<0.0075	<0.0038	<0.0037	<0.0037	<0.0039	<0.007	<0.0037	<0.0037	<0.0035
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0036	<0.0042	<0.0042	<0.0044	<0.0044	<0.0044	<0.0075	<0.0075	<0.0038	<0.0037	<0.0037	0.0049	<0.007	<0.0037	<0.0037	<0.0035
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0036	<0.0042	<0.0042	<0.0044	<0.0044	<0.0044	<0.0075	<0.0075	<0.0038	<0.0037	<0.0037	<0.0039	<0.007	<0.0037	<0.0037	<0.0035
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	<0.0042	<0.0042	<0.0044	<0.0044	<0.0044	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0073	<0.0042	<0.0042	<0.0044	<0.0044	<0.0044	<0.015	<0.015	<0.0076	<0.0074	<0.0073	<0.0078	<0.014	<0.0075	<0.0074	<0.0071
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	<0.0042	<0.0042	<0.0044	<0.0044	<0.0044	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.013	0.0049	0.012	<0.0044	0.0052	0.0053	0.0066	0.0064	0.006	0.0051	0.006	0.0054	0.0049	0.006	0.0068	0.0082
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0036	<0.0042	<0.0042	<0.0044	<0.0044	<0.0044	<0.0038	<0.0037	<0.0038	<0.0037	<0.0037	<0.0039	<0.0035	<0.0037	<0.0037	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	0.049	0.021	<0.0042	<0.0044	<0.0044	<0.0044	<0.0038	<0.0037	<0.0038	<0.0037	<0.0037	<0.0039	0.0092	0.0044	<0.0037	0.0041
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0073	-	-	-	-	-	<0.0075	<0.0075	<0.0076	<0.0074	<0.0073	<0.0078	<0.007	<0.0075	<0.0074	<0.0071
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0036	<0.0042	<0.0042	<0.0044	<0.0044	<0.0044	<0.0075	<0.0075	<0.0038	<0.0037	<0.0037	<0.0039	<0.007	<0.0037	<0.0037	<0.0035
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	0.017	-	-	-	-	-	<0.0038	<0.0037	<0.0038	<0.0037	<0.0037	<0.0039	0.005	0.0052	0.0053	0.0074
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.061	0.045	0.11	0.024	<0.0044	0.0061	0.0047	0.0042	0.004	<0.0037	0.004	0.0039	0.023	0.018	0.014	0.024
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.0081	0.009	<0.0085	<0.0089	<0.0089	<0.0087	<0.0038	<0.0037	<0.0038	<0.0037	<0.0037	<0.0039	0.0053	0.008	0.0081	0.0097
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0036	<0.0042	<0.0042	<0.0044	<0.0044	<0.0044	<0.0038	<0.0037	<0.0038	<0.0037	<0.0037	<0.0039	<0.0035	<0.0037	<0.0037	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0036	<0.0042	<0.0042	<0.0044	<0.0044	<0.0044	<0.0038	<0.0037	<0.0038	<0.0037	<0.0037	<0.0039	<0.0035	<0.0037	<0.0037	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.023	0.029	0.06	<0.0044	<0.0044	<0.0044	<0.0038	<0.0037	<0.0038	<0.0037	<0.0037	<0.0039	0.011	0.0097	0.009	0.014
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.013	0.013	0.024	<0.0044	<0.0044	<0.0044	<0.0038	<0.0037	<0.0038	<0.0037	<0.0037	<0.0039	0.0061	0.007	0.008	0.0083
Perfluorononanoic acid (PFNA)	NCL	NCL	0.0059	<0.0042	<0.0042	<0.0044	<0.0044	<0.0044	<0.0038	<0.0037	<0.0038	<0.0037	<0.0037	<0.0039	<0.0035	<0.0037	<0.0037	<0.0035
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.27	0.19	0.13	0.028	<0.0018	<0.0017	<0.0038	<0.0037	<0.0019	<0.0018	0.0019	<0.0019	0.093	0.082	0.063	0.099
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	***3.1***	***0.34***	<0.0042	***0.028***	<0.0044	<0.0044	<0.0038	<0.0037	<0.0038	<0.0037	<0.0037	<0.0039	***0.23***	***0.15***	***0.11***	***0.15***
PFOA + PFOS (Calculated)	NCL	NCL	3.4	0.53	0.13	0.056	ND	ND	ND	ND	ND	ND	0.0019	ND	0.32	0.23	0.17	0.25
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.0079	0.0059	0.0051	<0.0044	<0.0044	<0.0044	<0.0038	<0.0037	<0.0038	<0.0037	<0.0037	<0.0039	<0.0035	<0.0037	<0.0037	0.0049
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0036	<0.0042	<0.0042	<0.0044	<0.0044	<0.0044	<0.0075	<0.0075	<0.0038	<0.0037	<0.0037	<0.0039	<0.007	<0.0037	<0.0037	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0036	<0.0042	<0.0042	<0.0044	<0.0044	<0.0044	<0.0038	<0.0037	<0.0038	<0.0037	<0.0037	<0.0039	<0.0035	<0.0037	<0.0037	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0036	<0.0042	<0.0042	<0.0044	<0.0044	<0.0044	<0.0038	<0.0037	<0.0038	<0.0037	<0.0037	<0.0039	<0.0035	<0.0037	<0.0037	<0.0035
Total PFAS (Calculated)	NCL	NCL	3.6	0.7	0.34	0.08	0.0052	0.011	0.011	0.011	0.01	0.0051	0.012	0.014	0.39	0.29	0.22	0.33

TABLE 4
GROUNDWATER ANALYTICAL DATA - PFAS
Wolven/Jewell Study Areas
Algoma Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	WV-MW-3S	WV-PMW-4	WV-PMW-4	WV-MW-4	WV-MW-4	WV-MW-4	WV-MW-4	WV-MW-4	WV-PMW-5	WV-MW-5D	WV-MW-5D	WV-MW-5D	WV-MW-5D	WV-MW-5D	WV-MW-5D	WV-MW-5S
Sample Name			WV-GW-MW-3S	PMW-WV-4-123	PMW-WV-4-125-130	PMW-WV-4	MW-WV-4	WV-GW-MW4	WV-GW-MW4	WV-GW-MW-4	PMW-WV5	PMW-WV-5D	MW-WV-5D	MW-WV-5D DUP	WV-GW-MW5D	WV-GW-MW5D	WV-GW-MW-5D	PMW-WV-5S
Well Screen Interval (Feet below ground surface)			5.1-10.1	118-123	125-130	130.2-135.2	130.2-135.2	130.2-135.2	130.2-135.2	130.2-135.2	-	68.7-73.7	68.7-73.7	68.7-73.7	68.7-73.7	68.7-73.7	68.7-73.7	61.5-66.5
Laboratory Sample ID			UK07025-004	K1802438-001	K1802438-002	TE25018-002	UB20051-013	UE16022-001	UI05007-002	UK19013-002	K1802089-001	TC30012-004	UB16022-003	UB16022-005	UE09028-017	UI05007-001	UK19013-003	TC30012-003
Sample Date			11/06/2019	03/14/2018	03/14/2018	05/23/2018	02/21/2019	05/13/2019	09/03/2019	11/13/2019	03/06/2018	03/28/2018	02/14/2019	02/14/2019	05/09/2019	09/03/2019	11/13/2019	03/28/2018
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0037	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0072	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0071
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0037	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0072	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0071
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0037	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0072	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0071
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	<0.0051	<0.0046	-	-	-	-	-	<0.0048	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0075	<0.0051	<0.0046	<0.007	<0.007	<0.0071	<0.0069	<0.0074	<0.0048	<0.014	<0.0073	<0.0076	<0.007	<0.0069	<0.0072	<0.014
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	<0.0051	<0.0046	-	-	-	-	-	<0.0048	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.0074	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	0.008	0.0083	0.0077	0.0074	0.0074	0.0086	0.009	0.006
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0037	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0036	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0037	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0036	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0075	-	-	<0.007	<0.007	<0.0071	<0.0069	<0.0074	-	<0.0072	<0.0073	<0.0076	<0.007	<0.0069	<0.0072	<0.0071
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0037	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0072	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0071
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	0.0054	-	-	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	-	<0.0036	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.015	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	0.0069	<0.0036	<0.0037	0.0038	0.0039	0.0037	0.0036	<0.0036
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.0085	0.016	<0.0093	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0096	<0.0036	<0.0037	<0.0038	0.005	0.0041	<0.0036	<0.0036
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0037	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0036	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0037	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0036	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.0089	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0036	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0036
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.0063	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0036	<0.0037	<0.0038	<0.0035	0.0051	0.0046	<0.0036
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0037	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0036	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0036
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.06	0.0044	<0.0019	<0.0017	<0.0017	<0.0018	<0.0017	<0.0019	0.0043	<0.0036	0.0027	0.0027	0.0055	0.0082	0.0061	<0.0036
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	***0.095***	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0036	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0036
PFOA + PFOS (Calculated)	NCL	NCL	0.16	0.0044	ND	ND	ND	ND	ND	ND	0.0043	ND	0.0027	0.0027	0.0055	0.0082	0.0061	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0037	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0036	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0036
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0037	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0072	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0071
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0037	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0036	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0037	<0.0051	<0.0046	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0048	<0.0036	<0.0037	<0.0038	<0.0035	<0.0034	<0.0036	<0.0036
Total PFAS (Calculated)	NCL	NCL	0.21	0.0	ND	ND	ND	ND	ND	ND	0.019	0.0083	0.01	0.014	0.022	0.03	0.023	0.006

TABLE 4
GROUNDWATER ANALYTICAL DATA - PFAS
Wolven/Jewell Study Areas
Algoma Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	WV-MW-5S	WV-MW-5S	WV-MW-5S	WV-MW-5S	WV-PMW-6	WV-PMW-6	WV-MW-6D	WV-MW-6D	WV-MW-6D	WV-MW-6D	WV-MW-6D	WV-MW-6S	WV-MW-6S	WV-MW-6S	WV-MW-6S	WV-MW-6S
Sample Name			MW-WV-5S	WV-GW-MW5S	WV-GW-MW5S	WV-GW-MW-5S	PMW-WV-6 13-18	PMWWV6-03-21-18 (98-103)	MW-6D	MW-WV-6D	WV-GW-MW6D	WV-GW-MW6D	VW-GW-MW-6D	MW-6S	MW-WV-6S	WV-GW-MW6S	WV-GW-MW6S	VW-GW-MW-6S
Well Screen Interval (Feet below ground surface)			61.5-66.5	61.5-66.5	61.5-66.5	61.5-66.5	13-18	98-103	99.1-104.1	99.1-104.1	99.1-104.1	99.1-104.1	99.1-104.1	13.3-18.3	13.3-18.3	13.3-18.3	13.3-18.3	13.3-18.3
Laboratory Sample ID			UB16022-004	UE09028-016	UI05007-003	UK19013-004	K1802550-001	K1802656-003	TD12014-001	UB20051-005	UE02030-010	UH29005-021	UK09009-004	TD12014-003	UB20051-004	UE02030-011	UH29005-020	UK09009-003
Sample Date			02/14/2019	05/09/2019	09/03/2019	11/13/2019	03/19/2018	03/21/2018	04/11/2018	02/19/2019	05/02/2019	08/28/2019	11/08/2019	04/11/2018	02/19/2019	05/02/2019	08/28/2019	11/08/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0075	<0.0036	<0.0036	<0.0033	<0.0036	<0.0073	<0.0036	<0.0036	<0.0034	<0.0036
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0075	<0.0036	<0.0036	<0.0033	<0.0036	<0.0073	<0.0036	<0.0036	<0.0034	<0.0036
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0075	<0.0036	<0.0036	<0.0033	<0.0036	<0.0073	<0.0036	<0.0036	<0.0034	<0.0036
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	<0.0049	<0.0048	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0073	<0.0072	<0.007	<0.0077	<0.0049	<0.0048	<0.015	<0.0072	<0.0072	<0.0067	<0.0072	<0.015	<0.0071	<0.0071	<0.0069	<0.0072
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	<0.0049	<0.0048	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.0088	0.0075	0.0087	0.0074	0.0083	0.017	0.018	0.016	0.016	0.017	0.017	0.0078	0.0076	0.0082	0.0086	0.0093
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0038	<0.0036	<0.0036	<0.0033	<0.0036	<0.0036	<0.0036	<0.0036	<0.0034	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0038	<0.0036	<0.0036	<0.0033	<0.0036	<0.0036	<0.0036	<0.0036	<0.0034	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0073	<0.0072	<0.007	<0.0077	-	-	<0.0075	<0.0072	<0.0072	<0.0067	<0.0072	<0.0073	<0.0071	<0.0071	<0.0069	<0.0072
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0075	<0.0036	<0.0036	<0.0033	<0.0036	<0.0073	<0.0036	<0.0036	<0.0034	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	-	-	<0.0038	<0.0036	<0.0036	<0.0033	<0.0036	<0.0036	<0.0036	<0.0036	<0.0034	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0037	<0.0036	0.004	<0.0038	<0.0049	<0.0048	<0.0038	<0.0036	<0.0036	<0.0033	<0.0036	<0.0036	<0.0036	<0.0036	<0.0034	0.0039
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0098	<0.0096	0.005	0.0047	0.0049	0.0055	0.0053	<0.0036	0.0072	0.0056	0.0036	0.0098
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0038	<0.0036	<0.0036	<0.0033	<0.0036	<0.0036	<0.0036	<0.0036	<0.0034	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0038	<0.0036	<0.0036	<0.0033	<0.0036	<0.0036	<0.0036	<0.0036	<0.0034	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0038	<0.0036	<0.0036	<0.0033	<0.0036	<0.0036	0.0039	<0.0036	<0.0034	0.0036
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.004	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0038	<0.0036	<0.0036	<0.0033	<0.0036	<0.0036	0.0063	<0.0036	<0.0034	0.0066
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0038	<0.0036	<0.0036	<0.0033	<0.0036	<0.0036	<0.0036	<0.0036	<0.0034	<0.0036
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.005	0.0047	0.0061	0.0026	0.009	0.0029	<0.0038	0.0027	0.0027	0.0034	0.0035	0.0069	0.019	0.013	0.0066	0.024
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0037	<0.0036	<0.0035	<0.0038	0.0058	<0.0048	<0.0038	<0.0036	<0.0036	<0.0033	<0.0036	0.0048	0.0044	0.0046	0.0066	0.0089
PFOA + PFOS (Calculated)	NCL	NCL	0.005	0.0047	0.0061	0.0026	0.015	0.0029	ND	0.0027	0.0027	0.0034	0.0035	0.012	0.023	0.018	0.013	0.033
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0038	<0.0036	<0.0036	<0.0033	<0.0036	<0.0036	<0.0036	<0.0036	<0.0034	<0.0036
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0075	<0.0036	<0.0036	<0.0033	<0.0036	<0.0073	<0.0036	<0.0036	<0.0034	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0038	<0.0036	<0.0036	<0.0033	<0.0036	<0.0036	<0.0036	<0.0036	<0.0034	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0037	<0.0036	<0.0035	<0.0038	<0.0049	<0.0048	<0.0038	<0.0036	<0.0036	<0.0033	<0.0036	<0.0036	<0.0036	<0.0036	<0.0034	<0.0036
Total PFAS (Calculated)	NCL	NCL	0.018	0.012	0.019	0.01	0.023	0.02	0.023	0.023	0.024	0.026	0.026	0.02	0.048	0.031	0.025	0.066

TABLE 4
GROUNDWATER ANALYTICAL DATA - PFAS
Wolven/Jewell Study Areas
Algoma Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	WV-PMW-7	WV-PMW-7	WV-PMW-7	WV-PMW-7	WV-PMW-7	WV-PMW-7	WV-PMW-7	WV-PMW-7	WV-MW-7D	WV-MW-7D	WV-MW-7D	WV-MW-7D	WV-MW-7M	WV-MW-7M	WV-MW-7M	WV-MW-7S
Sample Name			PMW-WV-7 20-25	PMW-WV-7 29.5-34.5	PMW-WV-7 40-45	PMW-WV-7 50-55	PMW-WV-7-7 60-65	PMW-WV-7-7 70-75	PMW-WV-7-7 80-85	PMW-WV-7-7 88.5-93.5	MW-WV-7D	WV-GW-MW7D	WV-GW-MW 7D	WV-GW-MW-7D	WV-GW-MW7M	WV-GW-MW 7M	WV-GW-MW-7M	MW-WV-7S
Well Screen Interval (Feet below ground surface)			20-25	29.5-34.5	40-45	50-55	60-65	70-75	80-85	88.5-93.5	89.5-94.5	89.5-94.5	89.5-94.5	89.5-94.5	49.9-54.9	49.9-54.9	49.9-54.9	16.1-21.1
Laboratory Sample ID			TJ26001-001	TJ26001-002	TJ26001-003	TJ26001-004	TJ26001-007	TJ26001-008	TJ26001-009	TJ26001-010	UB14084-007	UE02030-009	UH29005-001	UK07051-003	UE02030-008	UH29005-003	UK07051-002	UB14084-005
Sample Date			10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/24/2018	10/24/2018	10/24/2018	10/24/2018	02/13/2019	05/03/2019	08/26/2019	11/05/2019	05/03/2019	08/26/2019	11/05/2019	02/13/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0038	<0.0036	<0.0036	<0.0039	<0.0036	<0.0035	<0.0038	<0.0039
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0038	<0.0036	<0.0036	<0.0039	<0.0036	<0.0035	<0.0038	<0.0039
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0038	<0.0036	<0.0036	<0.0039	<0.0036	<0.0035	<0.0038	<0.0039
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0072	<0.0072	<0.0071	<0.0071	<0.0071	<0.0073	<0.0071	<0.0071	<0.0077	<0.0072	<0.0071	<0.0078	<0.0072	<0.007	<0.0076	<0.0078
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.0051	0.0064	0.0073	0.011	0.0066	0.0073	0.0095	0.0076	0.012	0.01	0.011	0.0097	0.0083	0.01	0.0091	0.0039
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0038	<0.0036	<0.0036	<0.0039	<0.0036	<0.0035	<0.0038	<0.0039
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0036	0.011	0.0092	0.012	0.009	0.0081	0.013	0.0053	0.013	0.013	0.013	0.012	0.01	0.011	0.0097	<0.0039
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0072	<0.0072	<0.0071	<0.0071	<0.0071	<0.0073	<0.0071	<0.0071	<0.0077	<0.0072	<0.0071	<0.0078	<0.0072	<0.007	<0.0076	<0.0078
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0038	<0.0036	<0.0036	<0.0039	<0.0036	<0.0035	<0.0038	<0.0039
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0036	0.0042	0.0042	0.006	0.0037	0.0039	0.0054	0.0068	0.0092	0.0078	0.0069	0.0077	0.0046	0.0053	0.0053	<0.0039
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.0058	0.025	0.02	0.028	0.018	0.018	0.028	0.023	0.041	0.035	0.034	0.033	0.024	0.022	0.024	0.0044
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0036	0.0036	<0.0035	0.0044	0.0039	0.0039	0.0047	0.0042	0.0056	0.0054	0.0055	0.0052	0.004	0.0043	0.0042	0.0047
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0038	<0.0036	<0.0036	<0.0039	<0.0036	<0.0035	<0.0038	<0.0039
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0038	<0.0036	<0.0036	<0.0039	<0.0036	<0.0035	<0.0038	<0.0039
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0036	0.0075	0.006	0.009	0.0064	0.0065	0.0092	0.0087	0.012	0.012	0.011	0.01	0.0073	0.0078	0.0074	<0.0039
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0036	0.0073	0.0064	0.0088	0.0062	0.0075	0.0099	0.0074	0.011	0.0097	0.0095	0.0081	0.0066	0.0061	0.0059	0.011
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0038	<0.0036	<0.0036	<0.0039	<0.0036	<0.0035	<0.0038	<0.0039
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.015	0.063	0.052	0.075	0.051	0.055	0.077	0.063	0.11	0.1	0.12	0.095	0.067	0.077	0.076	0.011
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	***0.018***	***0.23***	***0.23***	***0.32***	***0.27***	***0.26***	***0.31***	***0.06***	***0.14***	***0.16***	***0.2***	***0.17***	***0.27***	***0.28***	***0.3***	<0.0039
PFOA + PFOS (Calculated)	NCL	NCL	0.033	0.29	0.28	0.4	0.32	0.32	0.39	0.12	0.25	0.26	0.32	0.27	0.34	0.36	0.38	0.011
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0036	<0.0036	<0.0035	0.0039	0.0043	0.0045	0.0056	0.0035	0.0049	0.0052	0.005	0.0046	0.0038	0.0039	<0.0038	0.0091
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0038	<0.0036	<0.0036	<0.0039	<0.0036	<0.0035	<0.0038	<0.0039
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0038	<0.0036	<0.0036	<0.0039	<0.0036	<0.0035	<0.0038	<0.0039
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0036	<0.0036	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0038	<0.0036	<0.0036	<0.0039	<0.0036	<0.0035	<0.0038	<0.0039
Total PFAS (Calculated)	NCL	NCL	0.044	0.4	0.34	0.48	0.38	0.37	0.47	0.19	0.36	0.36	0.42	0.36	0.41	0.43	0.44	0.044

TABLE 4
GROUNDWATER ANALYTICAL DATA - PFAS
Wolven/Jewell Study Areas
Algoma Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	WV-MW-7S	WV-MW-7S	WV-MW-7S	WV-PMW-8	WV-PMW-8	WV-PMW-8	WV-PMW-8	WV-PMW-8	WV-PMW-8	WV-MW-8D	WV-MW-8D	WV-MW-8D	WV-MW-8D	WV-MW-8M	WV-MW-8M	WV-MW-8M
Sample Name			WV-GW-MW7S	WV-GW-MW 7S	WV-GW-MW-7S	WV-8 30-35	WV-8 40-45	WV-8 50-55	WV-8 60-65	PMW-WV-8-109-114	PMW-WV-8-119-124	MW-WW-8D	MW-WV-8D	WV-GW-MW 8D	VW-GW-MW-8D	MW-WW-8M	MW-WV-8M	WV-GW-MW8M
Well Screen Interval (Feet below ground surface)			16.1-21.1	16.1-21.1	16.1-21.1	30-35	40-45	50-55	60-65	109-114	119-124	117.2-122.2	117.2-122.2	117.2-122.2	117.2-122.2	60-65	60-65	60-65
Laboratory Sample ID			UE02030-007	UH29005-002	UK07051-001	TE03004-001	TE03004-002	TE03004-003	TE03004-004	TE09005-001	TE09005-002	TG07028-003	UB16022-009	UH29005-004	UK09009-001	TG07028-002	UB14084-002	UE02030-003
Sample Date			05/03/2019	08/26/2019	11/05/2019	05/01/2018	05/01/2018	05/01/2018	05/01/2018	05/08/2018	05/08/2018	07/05/2018	02/15/2019	08/26/2019	11/08/2019	07/05/2018	02/12/2019	05/01/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0035	<0.0034	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	<0.0035	<0.0038	<0.0036
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0035	<0.0034	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	<0.0035	<0.0038	<0.0036
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0035	<0.0034	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	<0.0035	<0.0038	<0.0036
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0071	<0.0068	<0.0078	<0.0071	<0.0069	<0.0069	<0.0072	<0.007	<0.007	<0.0069	<0.007	<0.0069	<0.0075	<0.007	<0.0075	<0.0072
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0035	<0.0034	<0.0039	0.016	0.023	0.054	0.025	<0.0035	0.0038	<0.0035	<0.0035	0.0034	<0.0037	0.073	0.083	0.081
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0035	<0.0034	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	<0.0035	<0.0038	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0035	<0.0034	<0.0039	0.0039	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	<0.0035	<0.0038	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0071	<0.0068	<0.0078	<0.0071	<0.0069	<0.0069	<0.0072	<0.007	<0.007	<0.0069	<0.007	<0.0069	<0.0075	<0.007	<0.0075	<0.0072
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0035	<0.0034	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	<0.0035	<0.0038	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0035	<0.0034	<0.0039	0.0043	0.0051	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	<0.0035	<0.0038	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0035	0.0065	<0.0039	0.021	0.02	0.011	0.012	0.0047	0.0041	<0.0035	<0.0035	<0.0034	<0.0037	0.01	0.012	0.01
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0035	0.028	0.0053	0.0065	0.0058	0.0077	0.0056	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	0.0085	0.0097	0.01
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0035	<0.0034	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	<0.0035	<0.0038	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0035	<0.0034	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	<0.0035	<0.0038	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0035	0.016	0.0054	0.0092	0.0069	0.0049	0.0043	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	0.0042	0.0052	0.0046
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0035	0.028	0.0079	0.012	0.011	0.0096	0.0067	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	0.0087	0.011	0.011
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0035	<0.0034	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	<0.0035	<0.0038	<0.0036
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.011	0.026	0.011	0.085	0.06	0.031	0.037	0.011	0.0059	0.0048	0.0048	0.0052	0.0057	0.028	0.03	0.03
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	0.0036	<0.0034	<0.0039	***0.039***	0.0065	0.0061	0.0039	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	0.0045	0.0065	0.005
PFOA + PFOS (Calculated)	NCL	NCL	0.015	0.026	0.011	0.12	0.067	0.037	0.041	0.011	0.0059	0.0048	0.0048	0.0052	0.0057	0.033	0.037	0.035
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0035	0.031	0.0069	0.0068	0.0074	0.0074	0.0047	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	0.0081	0.0093	0.0086
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0035	<0.0034	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	<0.0035	<0.0038	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0035	<0.0034	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	<0.0035	<0.0038	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0035	<0.0034	<0.0039	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0035	<0.0035	<0.0035	<0.0034	<0.0037	<0.0035	<0.0038	<0.0036
Total PFAS (Calculated)	NCL	NCL	0.015	0.1	0.037	0.2	0.15	0.13	0.099	0.016	0.014	0.0048	0.0048	0.0086	0.0057	0.15	0.17	0.16

TABLE 4
GROUNDWATER ANALYTICAL DATA - PFAS
Wolven/Jewell Study Areas
Algoma Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	WV-MW-8M	WV-MW-8M	WV-MW-8S	WV-MW-8S	WV-MW-8S	WV-MW-8S	WV-MW-8S	WV-MW-8S	WV-PMW-9	WV-PMW-9	WV-MW-9	WV-MW-9	WV-MW-9	WV-MW-9	WV-MW-9	WV-PMW-10
Sample Name			WV-GW-MW 8M	WV-GW-MW-8M	MW-WW-8S	MW-WV-8S	WV-GW-MW8S	WV-GW-MW8SDUP	WV-GW-MW 8S	WV-GW-MW-8S	PMW-WV-9 79-84	PMW-WV-9 89-94	MW-WW-9	MW-WV-9	WV-GW-MW9	WV-GW-MW9	WV-GW-MW9	WV-MW-10 (8-18)
Well Screen Interval (Feet below ground surface)			60-65	60-65	30-35	30-35	30-35	30-35	30-35	30-35	79-84	89-94	92.3-97.3	92.3-97.3	92.3-97.3	92.3-97.3	92.3-97.3	8-18
Laboratory Sample ID			UH29005-005	UK07025-007	TG07028-001	UB14084-001	UE02030-004	UE02030-005	UH29005-006	UK07025-006	TE12011-001	TE12011-002	TG07028-004	UB20051-012	UE09028-015	UI05007-009	UK13023-011	UB28083-001
Sample Date			08/26/2019	11/06/2019	07/05/2018	02/12/2019	05/01/2019	05/01/2019	08/26/2019	11/06/2019	05/10/2018	05/10/2018	07/05/2018	02/21/2019	05/10/2019	09/04/2019	11/11/2019	02/25/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0036	<0.0039	<0.0035	<0.0037	<0.0036	<0.0036	<0.0034	<0.0037	<0.0038	<0.0036	<0.0035	<0.0034	<0.0035	<0.0037	<0.0038	<0.0036
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0036	<0.0039	<0.0035	<0.0037	<0.0036	<0.0036	<0.0034	<0.0037	<0.0038	<0.0036	<0.0035	<0.0034	<0.0035	<0.0037	<0.0038	<0.0036
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0036	<0.0039	<0.0035	<0.0037	<0.0036	<0.0036	<0.0034	<0.0037	<0.0038	<0.0036	<0.0035	<0.0034	<0.0035	<0.0037	<0.0038	<0.0036
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0071	<0.0078	<0.0069	<0.0074	<0.0073	<0.0072	<0.0068	<0.0074	<0.0076	<0.0073	<0.007	<0.0069	<0.0071	<0.0075	<0.0077	<0.0072
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.092	0.08	0.018	0.021	0.012	0.014	0.015	0.013	<0.0038	0.011	0.011	0.014	0.012	0.014	0.015	0.0077
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0036	<0.0039	<0.0035	<0.0037	<0.0036	<0.0036	<0.0034	<0.0037	<0.0038	<0.0036	<0.0035	<0.0034	<0.0035	<0.0037	<0.0038	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0036	<0.0039	<0.0035	<0.0037	<0.0036	<0.0036	<0.0034	<0.0037	0.022	0.025	0.026	0.023	0.026	0.047	0.038	0.0046
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0071	<0.0078	<0.0069	<0.0074	<0.0073	<0.0072	<0.0068	<0.0074	<0.0076	<0.0073	<0.007	<0.0069	<0.0071	<0.0075	<0.0077	<0.0072
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0036	<0.0039	<0.0035	<0.0037	<0.0036	<0.0036	<0.0034	<0.0037	0.2	0.026	0.031	0.032	0.027	0.025	0.021	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0036	<0.0039	0.004	0.0042	0.0042	0.0043	0.0037	0.0037	0.0074	0.031	0.033	0.036	0.035	0.039	0.043	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.011	0.01	0.016	0.019	0.016	0.016	0.017	0.02	0.042	0.13	0.11	0.13	0.13	0.18	0.21	0.0098
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.011	0.0099	0.006	0.0069	0.0062	0.0063	0.0061	0.0056	0.0069	0.0073	0.0063	0.0075	0.0081	0.0099	0.011	<0.0036
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0036	<0.0039	<0.0035	<0.0037	<0.0036	<0.0036	<0.0034	<0.0037	<0.0038	<0.0036	<0.0035	<0.0034	<0.0035	<0.0037	<0.0038	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0036	<0.0039	<0.0035	<0.0037	<0.0036	<0.0036	<0.0034	<0.0037	<0.0038	<0.0036	<0.0035	<0.0034	<0.0035	<0.0037	<0.0038	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.0055	0.0049	0.0051	0.0048	0.0047	0.005	0.0054	0.007	0.017	0.045	0.04	0.047	0.049	0.062	0.067	<0.0036
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.012	0.011	0.0045	0.0038	0.0042	<0.0036	0.004	0.0057	0.0083	0.021	0.019	0.022	0.025	0.03	0.029	0.0042
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0036	<0.0039	<0.0035	<0.0037	<0.0036	<0.0036	<0.0034	<0.0037	<0.0038	<0.0036	<0.0035	<0.0034	<0.0035	<0.0037	<0.0038	<0.0036
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.033	0.031	0.05	0.055	0.052	0.051	0.066	0.092	0.21	0.47	0.47	0.53	0.54	0.73	0.77	0.023
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	0.0052	0.0055	***0.042***	***0.058***	***0.046***	***0.048***	***0.042***	***0.034***	***1.6***	***0.36***	***0.59***	***0.54***	***0.47***	***0.47***	***0.48***	***0.31***
PFOA + PFOS (Calculated)	NCL	NCL	0.038	0.037	0.092	0.11	0.098	0.099	0.11	0.13	1.8	0.83	1.1	1.1	1	1.2	1.3	0.33
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.0096	0.009	<0.0035	<0.0037	<0.0036	<0.0036	<0.0034	<0.0037	<0.0038	0.0076	0.0071	0.0083	0.0086	0.01	0.011	<0.0036
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0036	<0.0039	<0.0035	<0.0037	<0.0036	<0.0036	<0.0034	<0.0037	<0.0038	<0.0036	<0.0035	<0.0034	<0.0035	<0.0037	<0.0038	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0036	<0.0039	<0.0035	<0.0037	<0.0036	<0.0036	<0.0034	<0.0037	<0.0038	<0.0036	<0.0035	<0.0034	<0.0035	<0.0037	<0.0038	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0036	<0.0039	<0.0035	<0.0037	<0.0036	<0.0036	<0.0034	<0.0037	<0.0038	<0.0036	<0.0035	<0.0034	<0.0035	<0.0037	<0.0038	<0.0036
Total PFAS (Calculated)	NCL	NCL	0.18	0.2	0.15	0.17	0.15	0.14	0.16	0.18	2.1	1.1	1.3	1.4	1.3	1.6	1.7	0.36

TABLE 4
GROUNDWATER ANALYTICAL DATA - PFAS
Wolven/Jewell Study Areas
Algoma Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	WV-PMW-10	WV-PMW-10	WV-PMW-10	WV-PMW-10	WV-MW-10D	WV-MW-10D	WV-MW-10D	WV-MW-10M	WV-MW-10M	WV-MW-10M	WV-MW-10S	WV-MW-10S	WV-MW-10S	WV-PMW-11	WV-PMW-11	WV-PMW-11
Sample Name			WV-MW-10 (18-28)	WV-MW-10 (26-36)	WV-MW-10 (66-76)	WV-MW-10 (163-168)	WV-GW-MW10D	WV-GW-MW10D	WV-GW-MW-10D	WV-GW-MW10M	WV-GW-MW10M	WV-GW-MW-10M	WV-GW-MW10S	WV-GW-MW10S	WV-GW-MW-10S	SB-11 20-25	SB-11 29-34	SB-11-107.5-112.5
Well Screen Interval (Feet below ground surface)			18-28	26-36	66-76	163-168	165-170	165-170	165-170	69.9-74.9	69.9-74.9	69.9-74.9	7-12	7-12	7-12	20-25	29-34	107.5-112.5
Laboratory Sample ID			UB28083-002	UB28083-003	UB28083-004	UC21100-001	UE09028-004	UH29005-011	UK07025-003	UE02030-002	UH29005-009	UK07025-002	UE02030-001	UH29005-010	UK07025-001	UA05034-001	UA05034-002	UA11012-001
Sample Date			02/25/2019	02/26/2019	02/27/2019	03/13/2019	05/08/2019	08/27/2019	11/06/2019	04/30/2019	08/27/2019	11/06/2019	04/30/2019	08/27/2019	11/06/2019	01/03/2019	01/03/2019	01/08/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0083	<0.0075	<0.0073	<0.0073	<0.0072	<0.0071	<0.0078	<0.0071	<0.0072	<0.0074	<0.0073	<0.0071	<0.007	<0.0072	<0.0071	<0.0071
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0041	<0.0038	<0.0036	0.0059	0.0039	0.0042	0.0039	<0.0036	<0.0036	<0.0037	0.011	0.013	0.009	0.0051	<0.0036	<0.0036
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	0.014	0.014	0.016	<0.0036	<0.0036	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0083	<0.0075	<0.0073	<0.0073	<0.0072	<0.0071	<0.0078	<0.0071	<0.0072	<0.0074	<0.0073	<0.0071	<0.007	<0.0072	<0.0071	<0.0071
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0041	<0.0038	<0.0036	0.006	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	0.0057	0.006	0.0044	<0.0036	<0.0036	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	0.023	0.029	0.021	<0.0036	<0.0036	<0.0036
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	0.0037	0.01	0.0051	<0.0036	<0.0036	<0.0036
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	0.0053	0.012	0.0081	<0.0036	<0.0036	<0.0036
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	<0.0037	0.013	0.0048	<0.0036	<0.0036	<0.0036
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0021	<0.0019	<0.0018	0.0045	0.0027	0.0029	0.0026	<0.0018	<0.0018	<0.0018	0.061	0.11	0.092	0.0029	<0.0018	<0.0018
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	0.0082	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	***0.49***	***1***	***0.69***	<0.0036	<0.0036	<0.0036
PFOA + PFOS (Calculated)	NCL	NCL	0.0082	ND	ND	0.0045	0.0027	0.0029	0.0026	ND	ND	ND	0.55	1.1	0.78	0.0029	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	<0.0037	0.0092	<0.0035	<0.0036	<0.0036	<0.0036
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0041	<0.0038	<0.0036	<0.0036	<0.0036	<0.0036	<0.0039	<0.0036	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035	<0.0036	<0.0036	<0.0036
Total PFAS (Calculated)	NCL	NCL	0.0082	ND	ND	0.016	0.0066	0.0071	0.0065	ND	ND	ND	0.61	1.2	0.85	0.008	ND	ND

TABLE 4
GROUNDWATER ANALYTICAL DATA - PFAS
Wolven/Jewell Study Areas
Algoma Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	WV-PMW-11	WV-PMW-11	WV-PMW-11	WV-PMW-11	WV-PMW-11	WV-MW-11D	WV-MW-11D	WV-MW-11D	WV-MW-11D	WV-MW-11D	WV-MW-11S	WV-MW-11S	WV-MW-11S	WV-MW-11S	WV-PMW-12	WV-PMW-12
Sample Name			SB-11-118-123	SB-11-128-133	SB-11-138-143	SB-11-148-153	SB-11-158.5-163.5	MW-WV-11D	WV-GW-MW11D	WV-GW-MW11D	WV-GW-MW-11D	WV-GW-MW-11D DUP	MW-WV-11S	WV-GW-MW11S	WV-GW-MW11S	WV-GW-MW-11S	SB-12 75-80	SB-12 85-90
Well Screen Interval (Feet below ground surface)			118-123	128-133	138-143	148-153	158.5-163.5	158.9-163.9	158.9-163.9	158.9-163.9	158.9-163.9	158.9-163.9	29.4-34.4	29.4-34.4	29.4-34.4	29.4-34.4	75-80	85-90
Laboratory Sample ID			UA11012-002	UA11012-003	UA11012-004	UA11012-005	UA11012-006	UB16022-001	UE02030-012	UH29005-012	UK07051-006	UK07051-007	UB16022-002	UE02030-013	UH29005-013	UK07051-008	TJ31080-001	TJ31080-002
Sample Date			01/08/2019	01/08/2019	01/09/2019	01/09/2019	01/09/2019	02/14/2019	05/02/2019	08/27/2019	11/05/2019	11/05/2019	02/14/2019	05/02/2019	08/27/2019	11/05/2019	10/29/2018	10/29/2018
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0072	<0.0071	<0.0072	<0.0072	<0.0071	<0.0073	<0.0072	<0.0081	<0.0074	<0.0074	<0.0072	<0.0072	<0.0071	<0.0072	<0.0072	<0.0086
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0072	<0.0071	<0.0072	<0.0072	<0.0071	<0.0073	<0.0072	<0.0081	<0.0074	<0.0074	<0.0072	<0.0072	<0.0071	<0.0072	<0.0072	<0.0086
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.002	<0.0019	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0021
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.004	<0.0037	<0.0037	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0043
Total PFAS (Calculated)	NCL	NCL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

TABLE 4
GROUNDWATER ANALYTICAL DATA - PFAS
Wolven/Jewell Study Areas
Algoma Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	WV-PMW-12	WV-PMW-12	WV-PMW-12	WV-PMW-12	WV-MW-12D	WV-MW-12D	WV-MW-12D	WV-MW-12D	WV-MW-12M	WV-MW-12M	WV-MW-12M	WV-MW-12M	WV-MW-12S	WV-PMW-13	WV-MW-12S	WV-MW-12S
Sample Name			SB-12 145-150	SB-12 155-160	SB-12 165-170	SB-12 175-180	MW-WV-12D	WV-GW-MW12D	WV-GW-MW12D	WV-GW-MW-12D	MW-WV-12M	WV-GW-MW12M	WV-GW-MW12M	WV-GW-MW-12M	MW-WV-12S	WV-MW-13(0-10)	WV-GW-MW12S	WV-GW-MW12S
Well Screen Interval (Feet below ground surface)			145-150	155-160	165-170	175-180	179.2-184.2	179.2-184.2	179.2-184.2	179.2-184.2	146.6-151.6	146.6-151.6	146.6-151.6	146.6-151.6	75.8-80.8	0-10	75.8-80.8	75.8-80.8
Laboratory Sample ID			TL01010-001	TL01010-002	TL01010-003	TL01010-004	UB14084-006	UE09028-006	UH31001-004	UK09008-003	UB14084-004	UE09028-007	UH31001-007	UK09008-002	UB14084-003	UB16023-001	UE09028-008	UH31001-003
Sample Date			11/26/2018	11/27/2018	11/27/2018	11/29/2018	02/13/2019	05/07/2019	08/29/2019	11/07/2019	02/13/2019	05/07/2019	08/30/2019	11/07/2019	02/12/2019	02/14/2019	05/07/2019	08/29/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.026	<0.023	<0.011	<0.0078	<0.0074	<0.0071	<0.007	<0.0071	<0.0074	<0.0074	<0.0068	<0.0068	<0.0072	<0.0077	<0.0071	<0.0072
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	0.0045	<0.0035	<0.0036
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.026	<0.023	<0.011	<0.0078	<0.0074	<0.0071	<0.007	<0.0071	<0.0074	<0.0074	<0.0068	<0.0068	<0.0072	<0.0077	<0.0071	<0.0072
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	0.0059	<0.0035	<0.0036
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	0.0066	<0.0035	<0.0036
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.008	<0.0057	0.0034	<0.002	<0.0018	<0.0018	<0.0017	<0.0018	<0.0018	<0.0018	<0.0017	<0.0017	<0.0018	0.029	<0.0018	<0.0018
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	***0.13***	<0.0035	<0.0036
PFOA + PFOS (Calculated)	NCL	NCL	0.008	ND	0.0034	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.16	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.013	<0.011	<0.0056	<0.0039	<0.0037	<0.0035	<0.0035	<0.0035	<0.0037	<0.0037	<0.0034	<0.0034	<0.0036	<0.0038	<0.0035	<0.0036
Total PFAS (Calculated)	NCL	NCL	0.008	ND	0.0034	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.18	ND	ND

TABLE 4
GROUNDWATER ANALYTICAL DATA - PFAS
Wolven/Jewell Study Areas
Algoma Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	WV-MW-12S	WV-PMW-13	WV-PMW-13	WV-PMW-13	WV-PMW-13	WV-MW-13D	WV-MW-13D	WV-MW-13D	WV-MW-13M	WV-MW-13M	WV-MW-13M	WV-MW-13S	WV-MW-13S	WV-MW-13S	WV-PMW-14	WV-PMW-14
Sample Name			WV-GW-MW-12S	WV-MW-13(10-20)	WV-MW-13 (35-45)	WV-MW-13 (45-55)	WV-MW-13 (53-63)	WV-GW-MW13D	WV-GW-MW13D	WV-GW-MW-13D	WV-GW-MW13M	WV-GW-MW13M	WV-GW-MW-13M	WV-GW-MW13S	WV-GW-MW13S	WV-GW-MW-13S	WV-MW-14 (139-144)	WV-MW-14 (9-14)
Well Screen Interval (Feet below ground surface)			75.8-80.8	10-20	35-45	45-55	53-63	58.8-63.8	58.8-63.8	58.8-63.8	18.1-23.1	18.1-23.1	18.1-23.1	1.7-6.7	1.7-6.7	1.7-6.7	139-144	9-14
Laboratory Sample ID			UK09008-001	UB16023-002	UB20051-007	UB20051-008	UB20051-009	UE09028-002	UH29005-017	UK09008-006	UE09028-001	UH29005-019	UK09008-005	UE09028-003	UH29005-016	UK09008-004	UD30028-001	UD20015-001
Sample Date			11/07/2019	02/14/2019	02/18/2019	02/18/2019	02/18/2019	05/08/2019	08/28/2019	11/07/2019	05/08/2019	08/28/2019	11/07/2019	05/08/2019	08/28/2019	11/07/2019	04/24/2019	04/15/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0079	<0.0084	<0.007	<0.0073	<0.007	<0.0072	<0.0073	<0.0076	<0.007	<0.0072	<0.0072	<0.0072	<0.0072	<0.0076	<0.0072	<0.0073
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.004	<0.0042	0.0053	0.011	0.01	0.01	0.01	0.0098	0.0052	0.0047	0.005	<0.0036	<0.0036	<0.0038	<0.0036	0.015
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0079	<0.0084	<0.007	<0.0073	<0.007	<0.0072	<0.0073	<0.0076	<0.007	<0.0072	<0.0072	<0.0072	<0.0072	<0.0076	<0.0072	<0.0073
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	0.0038	0.005	0.0048	0.0056	<0.0036	<0.0036	0.004	<0.0036	0.0062
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	0.0052	0.0066	0.0062	0.0045	0.0076	0.0078	<0.0036	<0.0037
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.002	0.0091	0.0032	0.0023	0.0025	0.0027	0.0031	0.003	0.012	0.016	0.015	0.011	0.014	0.018	<0.0018	0.011
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.004	***0.014***	0.0062	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	***0.016***	***0.017***	***0.017***	***0.022***	***0.041***	***0.085***	<0.0036	0.0059
PFOA + PFOS (Calculated)	NCL	NCL	ND	0.023	0.0094	0.0023	0.0025	0.0027	0.0031	0.003	0.028	0.033	0.032	0.033	0.055	0.1	ND	0.017
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.004	<0.0042	<0.0035	<0.0037	<0.0035	<0.0036	<0.0036	<0.0038	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0038	<0.0036	<0.0037
Total PFAS (Calculated)	NCL	NCL	ND	0.0	0.015	0.013	0.013	0.013	0.013	0.017	0.043	0.049	0.049	0.038	0.063	0.11	ND	0.038

TABLE 4
GROUNDWATER ANALYTICAL DATA - PFAS
Wolven/Jewell Study Areas
Algoma Township, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	WV-MW-14D	WV-MW-14D	WV-MW-14S	WV-MW-14S	WV-PMW-15	WV-PMW-15	WV-PMW-15	WV-MW-15A	WV-MW-15B	WV-MW-15C	WV-PMW-16	WV-MW-15D	WV-MW-15D	WV-PMW-16	WV-PMW-16	WV-MW-16D
Sample Name			WV-GW-MW14D	VW-GW-MW-14D	WV-GW-MW14S	WV-GW-MW-14S	WV-MW-15 (9-14)	WV-MW-15 33-38	WV-MW-15 43-48	WV-GW-MW-15A	WV-GW-MW-15B	WV-GW-MW-15C	WV-MW-16 (4-14)	WV-GW-MW-15D	WV-GW-MW-15D DUP	WV-MW-16 (12-22)	WV-MW-16 (86-96)	WV-GW-MW16D
Well Screen Interval (Feet below ground surface)			142.3-147.3	142.3-147.3	8.9-13.9	8.9-13.9	9-14	33-38	43-48	9-14	33.1-38.1	43.7-48.5	4-14	135.1-137.8	135.1-137.8	12-22	86-96	91.7-96.7
Laboratory Sample ID			UH29005-018	UK09009-002	UH29005-015	UK09008-007	UH22047-001	UH23038-001	UH23038-002	UK13023-008	UK13023-009	UK13023-010	UC23027-001	UK13023-013	UK13023-014	UC23027-002	UC23027-003	UE09028-005
Sample Date			08/28/2019	11/08/2019	08/28/2019	11/07/2019	08/19/2019	08/21/2019	08/21/2019	11/11/2019	11/11/2019	11/11/2019	03/19/2019	11/11/2019	11/11/2019	03/20/2019	03/22/2019	05/08/2019
Parameter (µg/L)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0034	<0.0035	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	<0.0037	<0.0042	<0.0037
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0034	<0.0035	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	<0.0037	0.006	<0.0037
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0034	<0.0035	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	<0.0037	<0.0042	<0.0037
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0068	<0.007	<0.0068	<0.0076	<0.0069	<0.0076	<0.0072	<0.0077	<0.0076	<0.0074	<0.0071	<0.0074	<0.0075	<0.0073	<0.0083	<0.0074
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	0.029	0.03	0.015	0.008	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	0.0083	<0.0037	<0.0038	0.025	<0.0042	<0.0037
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0034	<0.0035	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	<0.0037	<0.0042	<0.0037
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	0.0035	0.0036	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	<0.0037	<0.0042	<0.0037
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0068	<0.007	<0.0068	<0.0076	<0.0069	<0.0076	<0.0072	<0.0077	<0.0076	<0.0074	<0.0071	<0.0074	<0.0075	<0.0073	<0.0083	<0.0074
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0034	<0.0035	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	<0.0037	<0.0042	<0.0037
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	0.064	0.07	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	0.006	<0.0042	<0.0037
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	0.17	0.16	0.0085	0.01	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	0.011	<0.0042	<0.0037
Perfluorobutanoic acid (PFBA)	NCL	NCL	0.011	0.0099	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	0.01	<0.0037	<0.0038	0.059	<0.0042	<0.0037
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0034	<0.0035	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	<0.0037	<0.0042	<0.0037
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0034	<0.0035	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	<0.0037	<0.0042	<0.0037
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	0.083	0.076	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	0.019	<0.0042	<0.0037
Perfluorohexanoic acid (PFHxA)	NCL	NCL	0.033	0.033	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	0.0083	<0.0037	<0.0038	0.055	<0.0042	<0.0037
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0034	<0.0035	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	<0.0037	<0.0042	<0.0037
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	0.54	0.52	0.0065	0.013	<0.0017	<0.0019	<0.0018	<0.0019	<0.0019	<0.0019	0.01	<0.0018	<0.0019	0.054	0.0024	<0.0019
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	0.007	0.0074	<0.0034	0.009	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	***0.021***	<0.0037	<0.0038	***0.066***	<0.0042	<0.0037
PFOA + PFOS (Calculated)	NCL	NCL	0.55	0.53	0.0065	0.022	ND	ND	ND	ND	ND	ND	0.031	ND	ND	0.12	0.0024	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	0.012	0.012	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	0.0043	<0.0037	<0.0038	0.026	<0.0042	<0.0037
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0034	<0.0035	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	<0.0037	<0.0042	<0.0037
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0034	<0.0035	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	<0.0037	<0.0042	<0.0037
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0034	<0.0035	<0.0034	<0.0038	<0.0034	<0.0038	<0.0036	<0.0038	<0.0038	<0.0037	<0.0036	<0.0037	<0.0038	<0.0037	<0.0042	<0.0037
Total PFAS (Calculated)	NCL	NCL	0.95	0.9	0.03	0.04	ND	ND	ND	ND	ND	ND	0.062	ND	ND	0.32	0.0084	ND

TABLE 4
GROUNDWATER ANALYTICAL DATA - PFAS
Wolven/Jewell Study Areas
Algoma Township, Kent County, MI

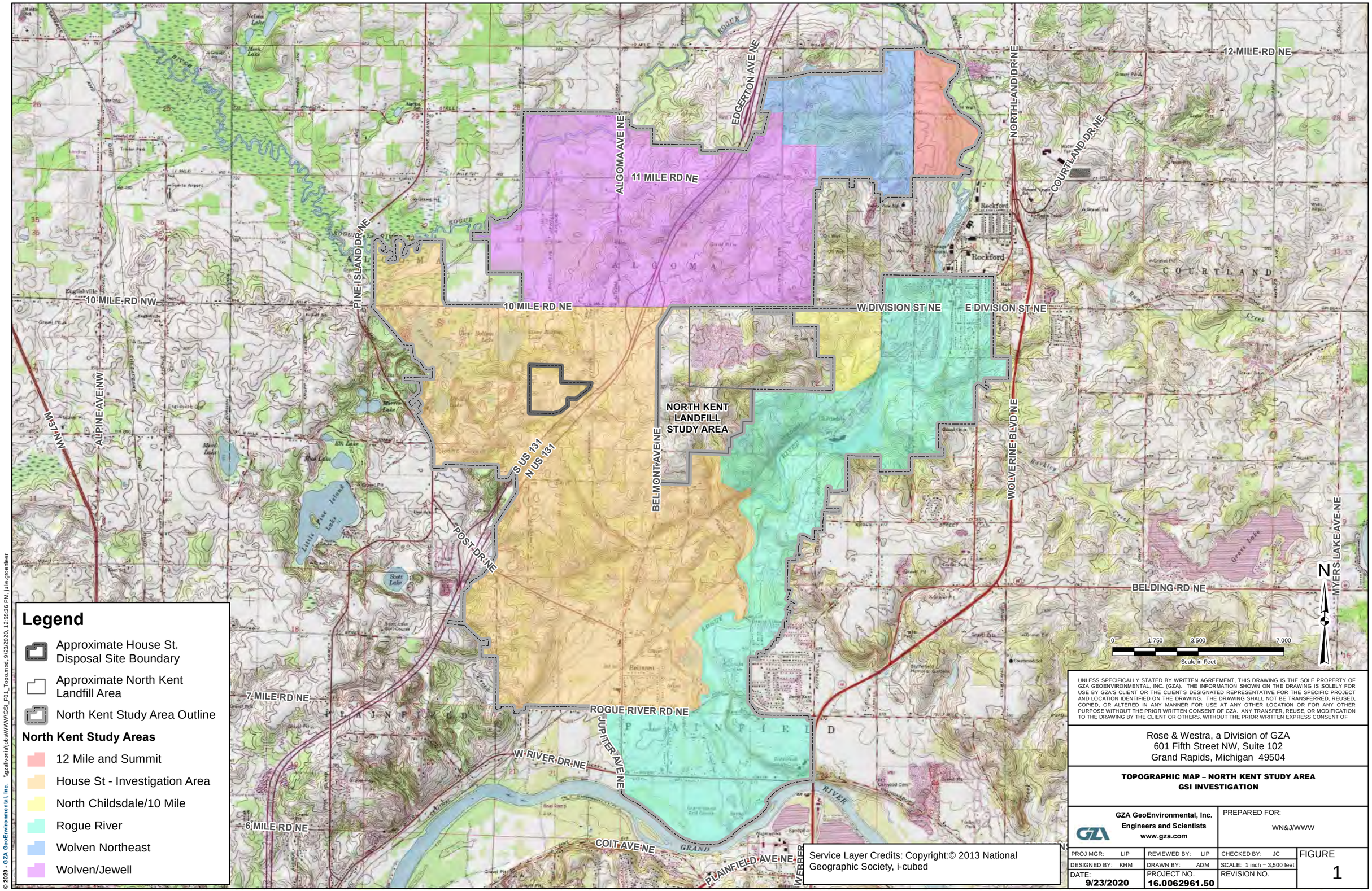
Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water[2]	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	WV-MW-16D	WV-MW-16D	WV-MW-16S	WV-MW-16S	WV-MW-16S	WV-MW-16S
Sample Name			WV-GW-MW16D	WV-GW-MW-16D	WV-GW-MW16S	WV-GW-MW16S	WV-GW-MW16S DUP	WV-GW-MW-16S
Well Screen Interval (Feet below ground surface)			91.7-96.7	91.7-96.7	17.5-22.5	17.5-22.5	17.5-22.5	17.5-22.5
Laboratory Sample ID			UH31001-005	UK13023-001	UE02030-006	UH31001-001	UH31001-002	UK19013-001
Sample Date			08/29/2019	11/12/2019	05/03/2019	08/29/2019	08/29/2019	11/13/2019
Parameter (µg/L)								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0037
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0037
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0037
N-Ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NCL	NCL	-	-	-	-	-	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	<0.0072	<0.007	<0.0071	<0.007	<0.0074	<0.0074
N-Methyl perfluorooctane sulfonamidoethanol (N-MeFOSE)	NCL	NCL	-	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	<0.0036	<0.0035	0.0073	0.016	0.018	0.016
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0037
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0037
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	<0.0072	<0.007	<0.0071	<0.007	<0.0074	<0.0074
Perfluorooctane sulfonamide (FOSA)	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0037
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	0.004	<0.0037
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	<0.0036	<0.0035	<0.0036	0.0068	0.007	0.0072
Perfluorobutanoic acid (PFBA)	NCL	NCL	<0.0036	<0.0035	0.0074	0.028	0.029	0.02
Perfluorodecanoic acid (PFDA)	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0037
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0037
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	<0.0036	<0.0035	<0.0036	0.0076	0.0085	0.0054
Perfluorohexanoic acid (PFHxA)	NCL	NCL	<0.0036	<0.0035	0.0061	0.023	0.023	0.013
Perfluorononanoic acid (PFNA)	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0037
Perfluorooctanoic acid (PFOA)	8.0 (A)	12	<0.0018	<0.0018	0.0094	0.026	0.029	0.021
Perfluorooctane sulfonic acid (PFOS)	16 (A)	0.012	<0.0036	<0.0035	***0.026***	***0.023***	***0.025***	***0.027***
PFOA + PFOS (Calculated)	NCL	NCL	ND	ND	0.035	0.049	0.054	0.048
Perfluoropentanoic acid (PFPeA)	NCL	NCL	<0.0036	<0.0035	<0.0036	0.0097	0.011	0.007
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0037
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0037
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0037
Total PFAS (Calculated)	NCL	NCL	ND	ND	0.056	0.14	0.15	0.12

TABLE 4 NOTES
Wolven/Jewell Study Areas
Algoma Township, Kent County, MI

NOTES:

1. Concentration and criteria units are micrograms per Liter (µg/L) or parts per billion (ppb). Calculated criteria and concentrations are rounded to two significant digits. "ND" indicates the parameters used in the calculation were not detected.
2. Michigan Part 201 Groundwater Cleanup Criteria are based on "Table 1, Groundwater: Residential and Nonresidential Part 201 Generic Cleanup Criteria and Screening Levels/Part 213 Tier I Risk Based Screening Levels," Michigan Administrative Code, Cleanup Criteria Requirements for Response Activity, Rules 299.44 and 299.49, effective December 30, 2013; updated August 3, 2020.
   Abbreviations Include:
   "NCL" indicates no criterion listed in EGLE Table 1.
   Footnotes Include:
   (A) - The criterion is the State of Michigan drinking water standard.
3. Bold, italic number with thick line border or italic parameter name indicates that parameter was detected above the Michigan Part 201 Groundwater Cleanup Criteria listed.
4. Abbreviations include:
   "< RL" indicates the parameter was analyzed for but not detected above the method detection limit; RL = Reporting Limit.
   "DUP" indicates a duplicate sample.
   "-" indicates the parameter was not analyzed.
5. Well screen interval presented is the top of the well screen to the bottom of the well screen in feet below ground surface.

FIGURES



Legend

- Approximate House St. Disposal Site Boundary
- Approximate North Kent Landfill Area
- North Kent Study Area Outline

North Kent Study Areas

- 12 Mile and Summit
- House St - Investigation Area
- North Childsdale/10 Mile
- Rogue River
- Wolven Northeast
- Wolven/Jewell

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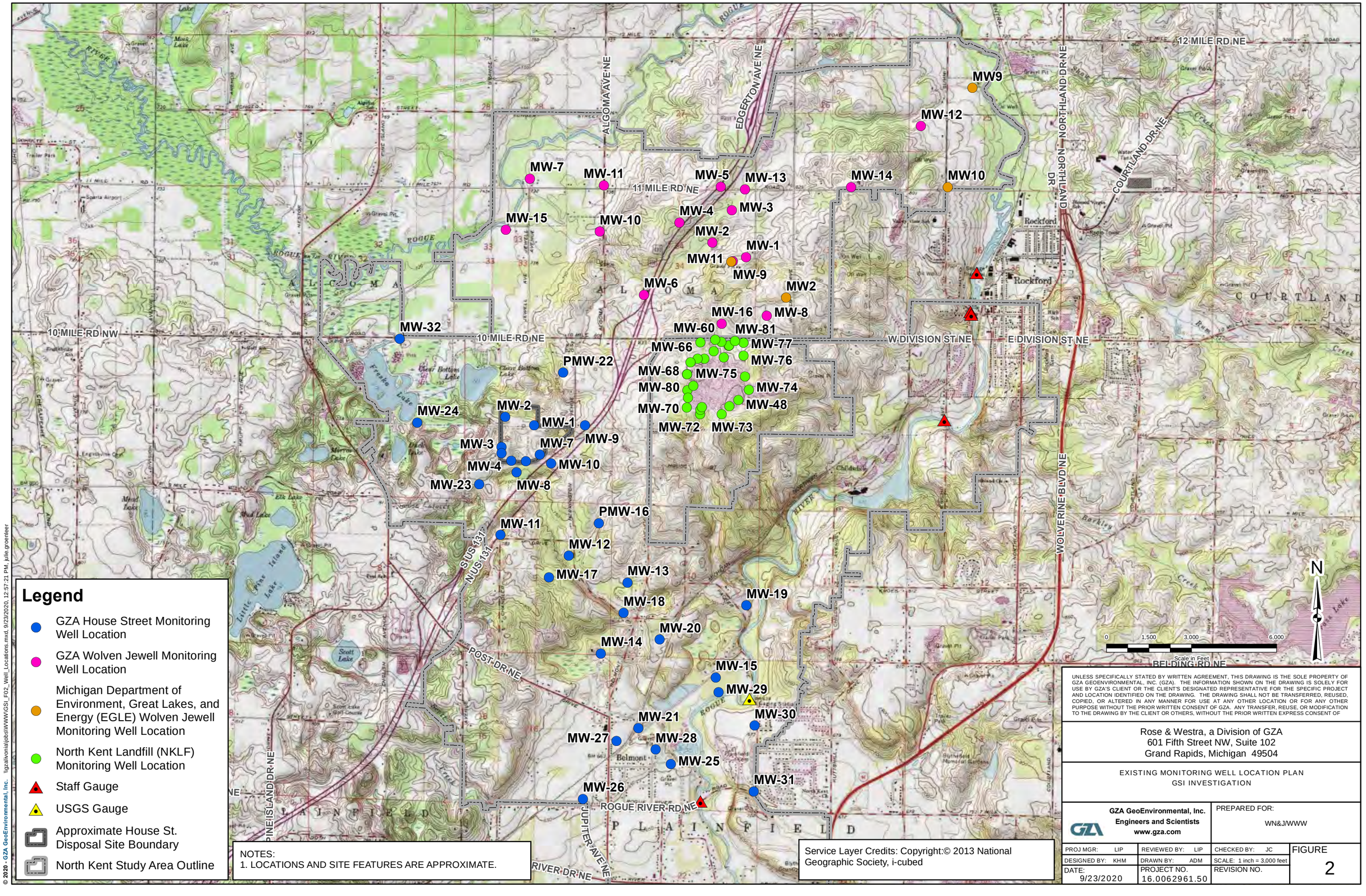
TOPOGRAPHIC MAP – NORTH KENT STUDY AREA
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR: WN&J/WWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 1
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 3,500 feet	
DATE: 9/23/2020	PROJECT NO. 16.0062961.50	REVISION NO.	



Legend

- GZA House Street Monitoring Well Location
- GZA Wolven Jewell Monitoring Well Location
- Michigan Department of Environment, Great Lakes, and Energy (EGLE) Wolven Jewell Monitoring Well Location
- North Kent Landfill (NKLF) Monitoring Well Location
- Staff Gauge
- USGS Gauge
- Approximate House St. Disposal Site Boundary
- North Kent Study Area Outline

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

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EXISTING MONITORING WELL LOCATION PLAN
GSI INVESTIGATION

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PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 2
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 3,000 feet	
DATE: 9/23/2020	PROJECT NO. 16.0062961.50	REVISION NO.	

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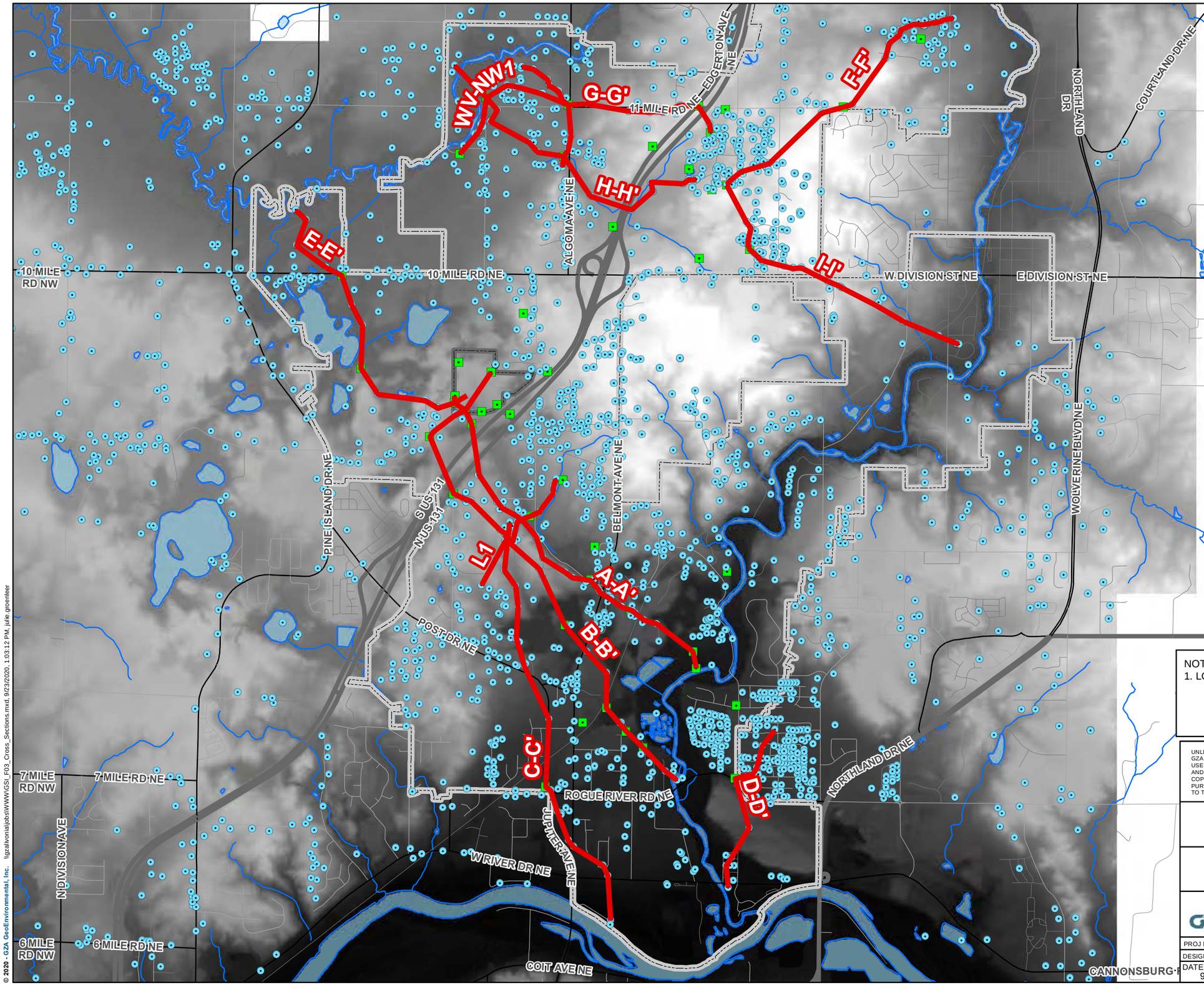

Legend

- Residential Drinking Water Well
- Groundwater Monitoring Well
- Geologic Cross Section
- River or Stream
- Surface Water
- Approximate House St. Disposal Site Boundary
- North Kent Study Area

Roadway

- Highways
- Primary County Roads
- Local County Roads
- Major City Roads
- Minor City Roads
- Minor Roads and Two tracks

Bare Earth Surface

Elevation in Feet

High : 947.589

Low : 588.329

N

NOTE:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

0 1,500 3,000 6,000
Scale in Feet

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RESIDENTIAL DRINKING WATER WELLS
GEOLGOICAL CROSS SECTIONS
GSI INVESTIGATION

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PREPARED FOR:
WN&J/WWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 3
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 3,000 feet	
DATE: 9/23/2020	PROJECT NO. 16.0062961.50	REVISION NO.	

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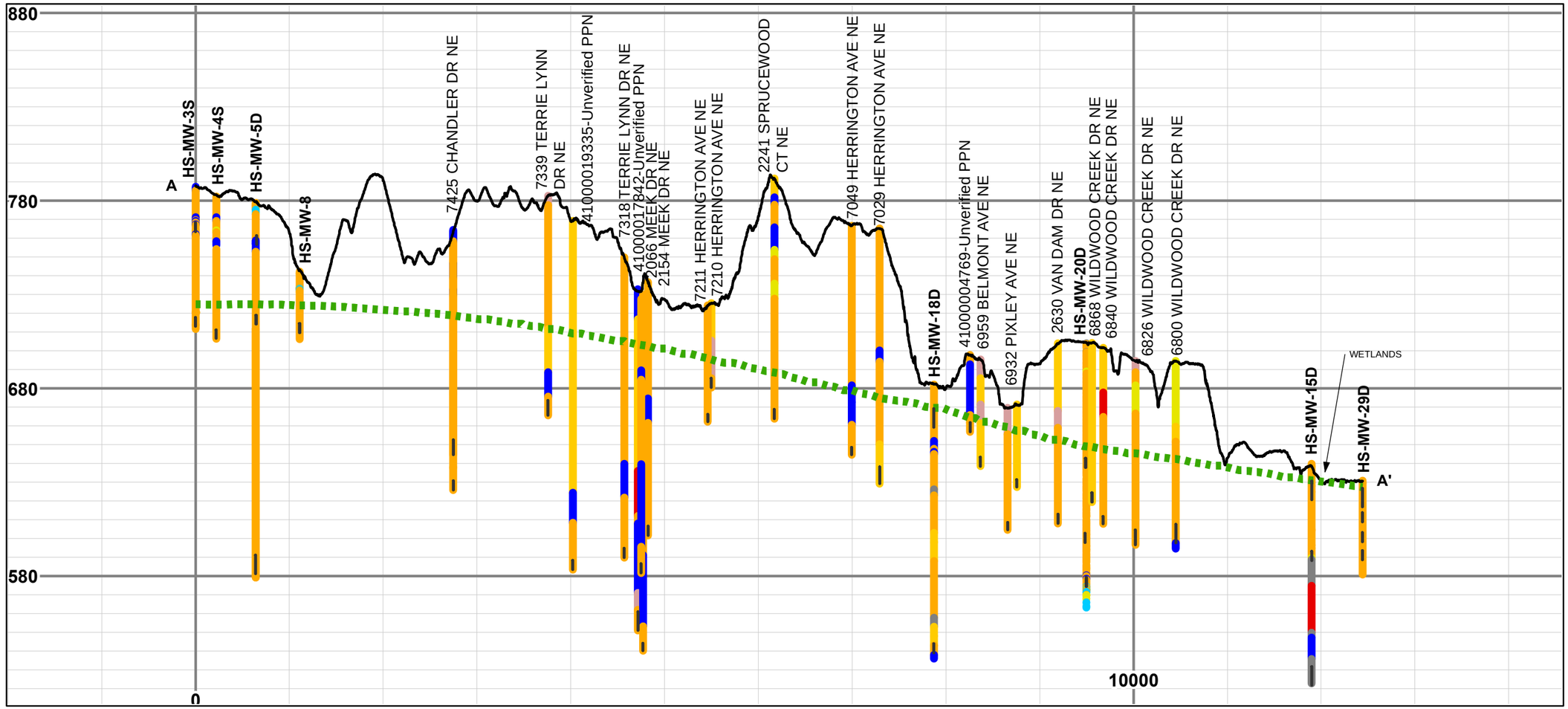


CROSS SECTION LEGEND

- WELL SCREEN
- ESTIMATED GROUNDWATER TABLE (11/2019)
- GROUND SURFACE

BOREHOLE LITHOLOGY

- GRAVEL
- SAND AND
- SAND
- SAND/GRAVEL WITH CLAY/SILT
- CLAY/SILT WITH SAND/GRAVEL
- SILT
- CLAY AND SILT
- CLAY

OVERVIEW MAP LEGEND

- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
- SURFACE WATER
- APPROXIMATE HOUSE ST. DISPOSAL SITE BOUNDARY
- NORTH KENT LANDFILL

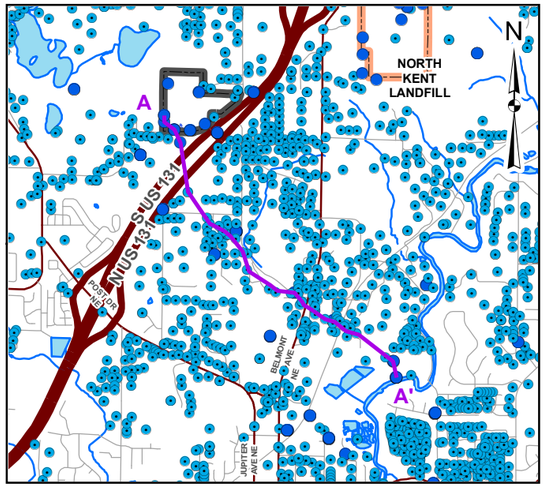
NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

2. GROUND SURFACE ELEVATIONS ARE BASED ON DIGITAL RASTER FILES OF BARE EARTH DIGITAL ELEVATION MODELS (DEMS), GENERATED FROM LIDAR DATA WITH 1-METER HORIZONTAL ACCURACY AND 18.5-CENTIMETER VERTICAL ACCURACY. DIGITAL FILES OF DEMS AND LIDAR DATA WERE PROVIDED BY KENT COUNTY.

3. ESTIMATED GROUNDWATER TABLE WAS DEVELOPED BASED ON MEASUREMENTS MADE IN GROUNDWATER MONITORING WELLS IN NOVEMBER 2019. GROUNDWATER ELEVATIONS WERE NOT MEASURED FROM RESIDENTIAL WATER SUPPLY WELLS.

4. WELL SCREEN ELEVATIONS PROVIDED IN FEET ABOVE MEAN SEA LEVEL, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). RESIDENTIAL WELL SCREEN ELEVATIONS AND BOREHOLE LITHOLOGY ELEVATIONS WERE CALCULATED USING WELL INFORMATION PROVIDED BY THE STATE OF MICHIGAN'S WELLOGIC DATABASE AND GROUND SURFACE ELEVATIONS OF THE CENTER OF THE PPN GENERATED FROM LIDAR DATA PROVIDED BY KENT COUNTY. ELEVATIONS ARE ROUNDED TO THE NEAREST FOOT.

OVERVIEW MAP



0 2,500 5,000 10,000
SCALE IN FEET

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NORTH KENT STUDY AREA
CROSS SECTION A-A'
GSI INVESTIGATION

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com

PREPARED FOR: WN&J/WWW

PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN	FIGURE
DESIGNED BY: JC	DRAWN BY: JMG	SCALE: 1 in = 5,000 ft	4
DATE: 09/17/2020	PROJECT NO: 16.0062961.50	REVISION NO:	

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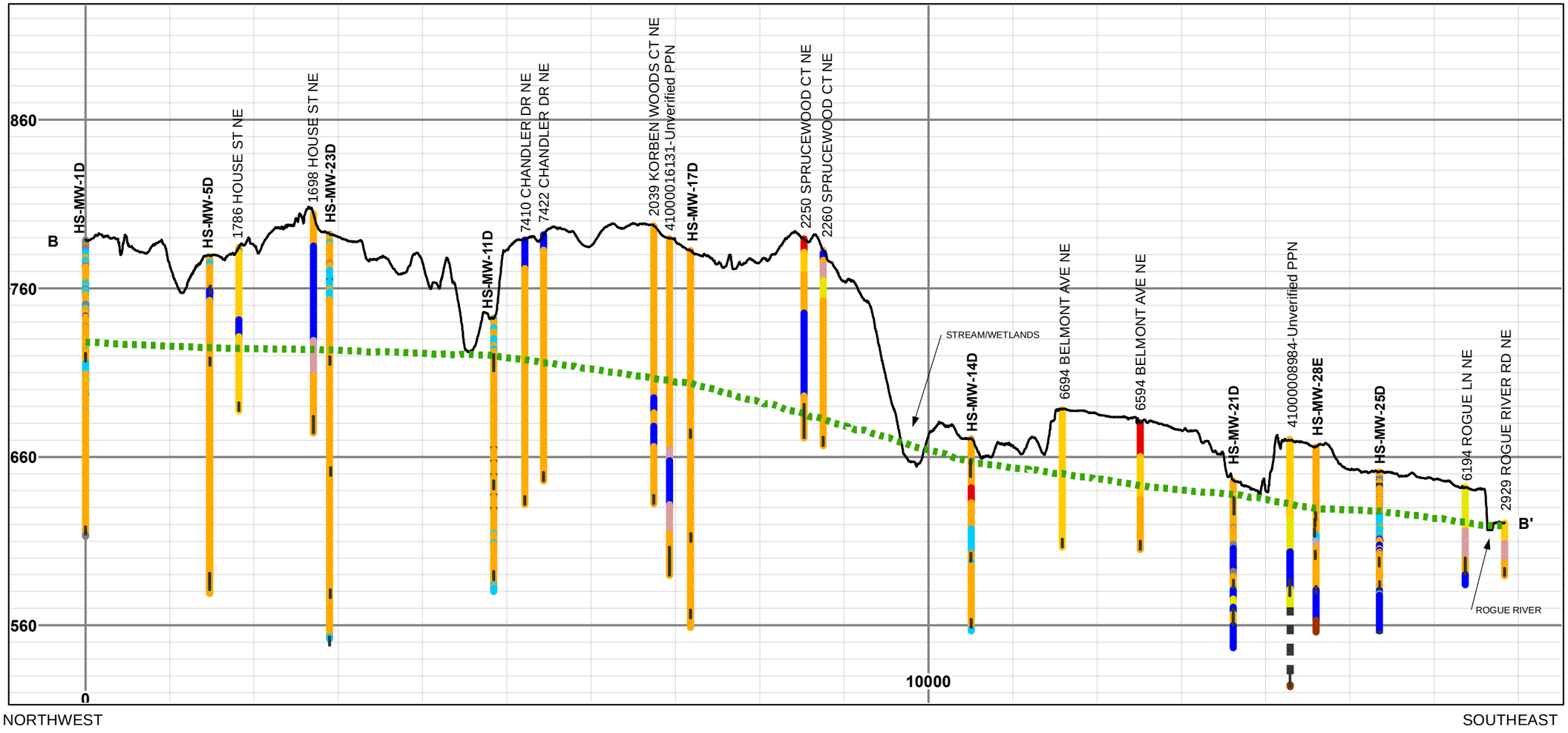

CROSS SECTION LEGEND

- WELL SCREEN
- ESTIMATED GROUNDWATER TABLE (11/2019)
- GROUND SURFACE
- GRAVEL
- SAND AND
- SAND
- SAND/GRAVEL WITH CLAY/SILT
- CLAY/SILT WITH SAND/GRAVEL
- SILT
- CLAY AND SILT
- CLAY
- TOP SOIL
- BEDROCK
- NOT AVAILABLE

OVERVIEW MAP LEGEND

- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
- SURFACE WATER
- APPROXIMATE HOUSE ST. DISPOSAL SITE BOUNDARY
- NORTH KENT LANDFILL

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

2. GROUND SURFACE ELEVATIONS ARE BASED ON DIGITAL RASTER FILES OF BARE EARTH DIGITAL ELEVATION MODELS (DEMS), GENERATED FROM LIDAR DATA WITH 1-METER HORIZONTAL ACCURACY AND 18.5-CENTIMETER VERTICAL ACCURACY. DIGITAL FILES OF DEMS AND LIDAR DATA WERE PROVIDED BY KENT COUNTY.

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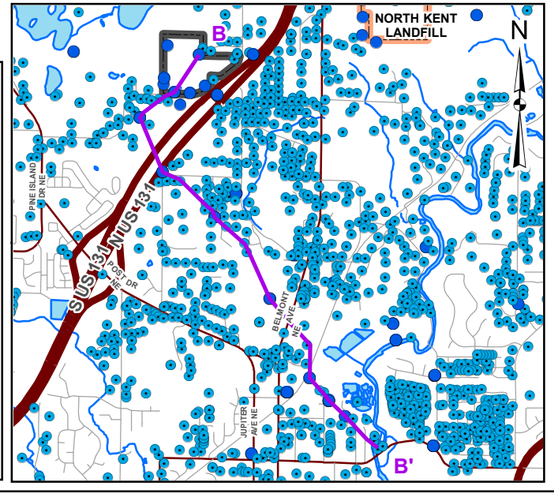
OVERVIEW MAP



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SCALE IN FEET

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Rose & Westra, a Division of GZA
601 Fifth Street NW, Suite 102
Grand Rapids, Michigan 49504

NORTH KENT STUDY AREA
CROSS SECTION B-B'
GSI INVESTIGATION

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
WN&J/WWW

PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN	FIGURE
DESIGNED BY: JC	DRAWN BY: JMG	SCALE: 1 in = 5,000 ft	5
DATE: 09/17/2020	PROJECT NO: 16.0062961.50	REVISION NO:	

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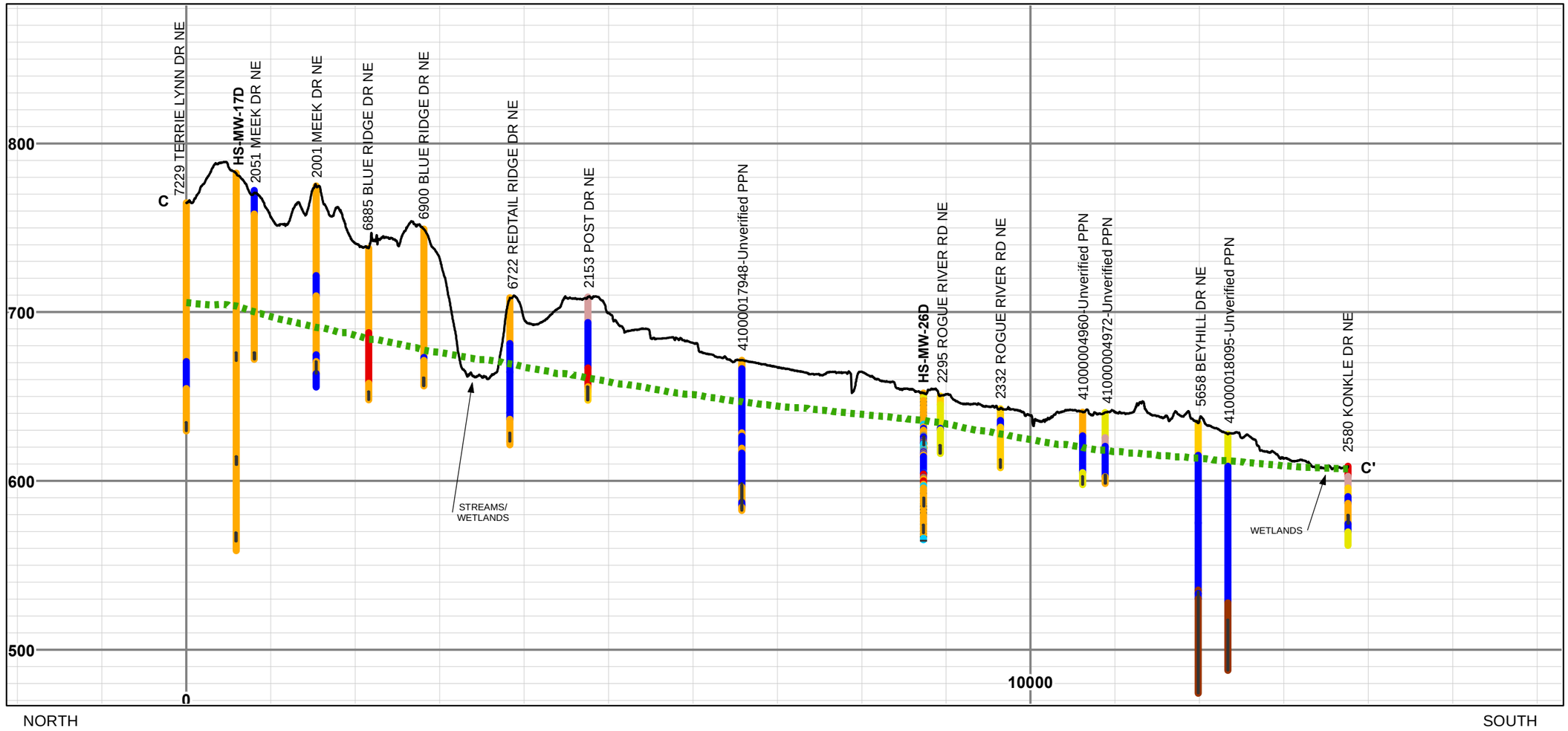

CROSS SECTION LEGEND

- WELL SCREEN
- ESTIMATED GROUNDWATER TABLE (11/2019)
- GROUND SURFACE
- GRAVEL
- SAND AND GRAVEL
- SAND
- SAND/GRAVEL WITH CLAY/SILT
- CLAY/SILT WITH SAND/GRAVEL
- SILT
- CLAY AND SILT
- CLAY
- BEDROCK
- NOT AVAILABLE

OVERVIEW MAP LEGEND

- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
- SURFACE WATER

NOTES:
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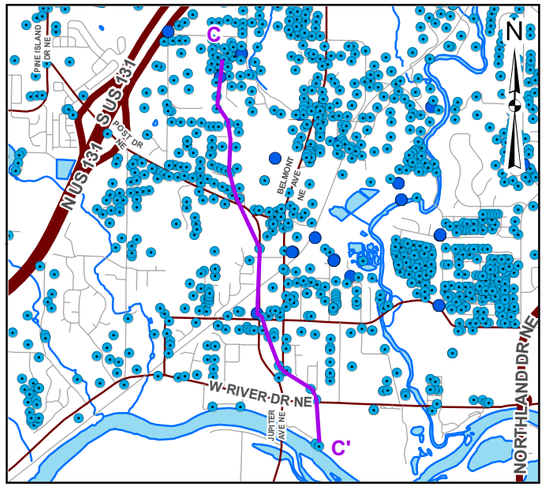
OVERVIEW MAP



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Grand Rapids, Michigan 49504

NORTH KENT STUDY AREA
CROSS SECTION C-C'
GSI INVESTIGATION

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
WN&J/WWW

PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN	FIGURE
DESIGNED BY: JC	DRAWN BY: JMG	SCALE: 1 in = 5,000 ft	6
DATE: 09/17/2020	PROJECT NO: 16.0062961.50	REVISION NO:	

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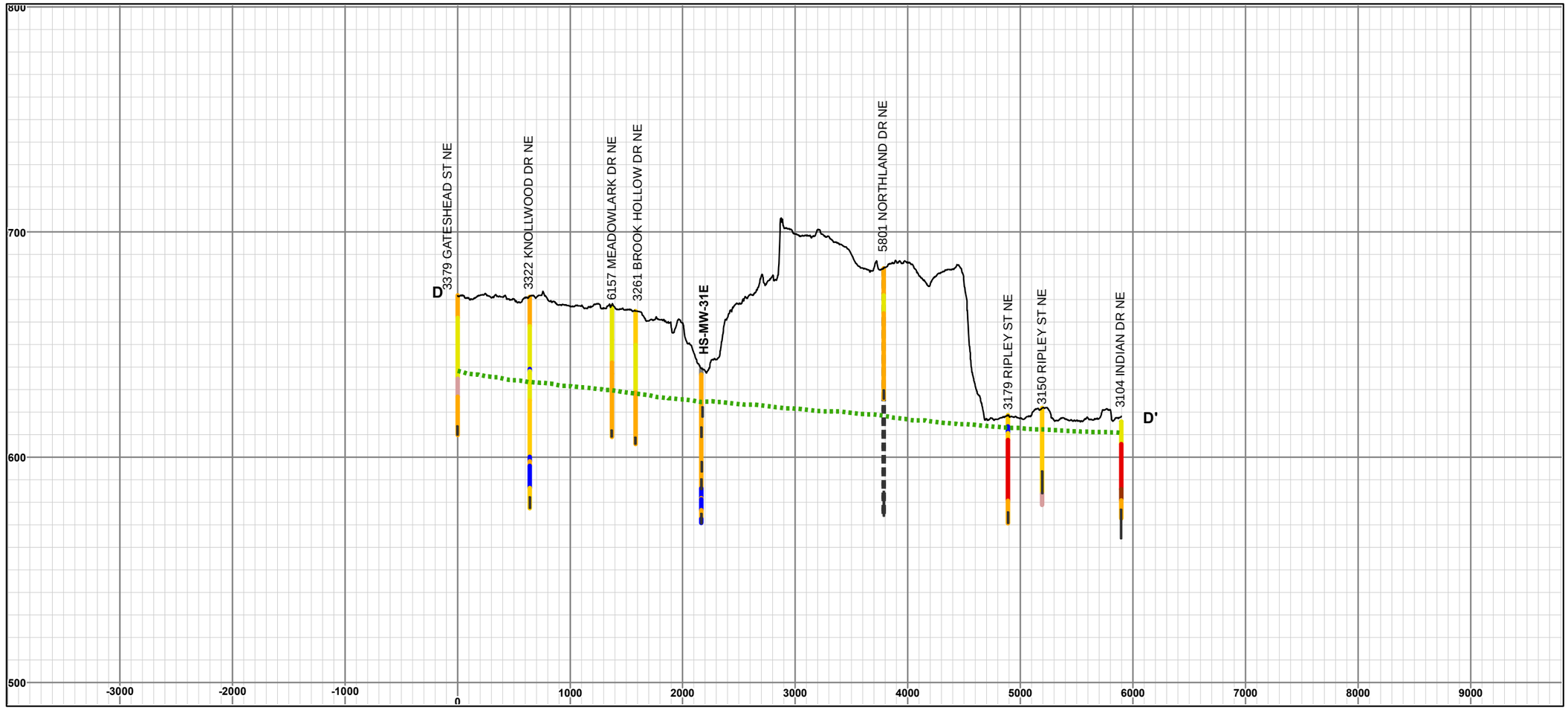

NORTHEAST SOUTHWEST

CROSS SECTION LEGEND

- WELL SCREEN
- ESTIMATED GROUNDWATER TABLE (11/2019)
- GROUND SURFACE
- GRAVEL
- SAND AND GRAVEL
- SAND
- SAND/GRAVEL WITH CLAY/SILT
- CLAY/SILT WITH SAND/GRAVEL
- SILT
- CLAY
- BEDROCK
- NOT AVAILABLE

OVERVIEW MAP LEGEND

- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
- SURFACE WATER

NOTES:
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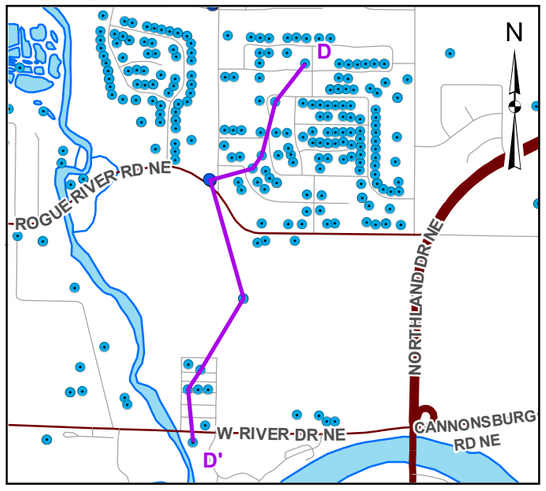
OVERVIEW MAP



0 1,000 2,000 4,000
SCALE IN FEET

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Grand Rapids, Michigan 49504

NORTH KENT STUDY AREA
CROSS SECTION D-D'
GSI INVESTIGATION

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
WN&J/WWW

PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN		FIGURE
DESIGNED BY: JC	DRAWN BY: JMG	SCALE: 1 in = 2,000 ft		7
DATE: 09/17/2020	PROJECT NO: 16.0062961.50	REVISION NO:		

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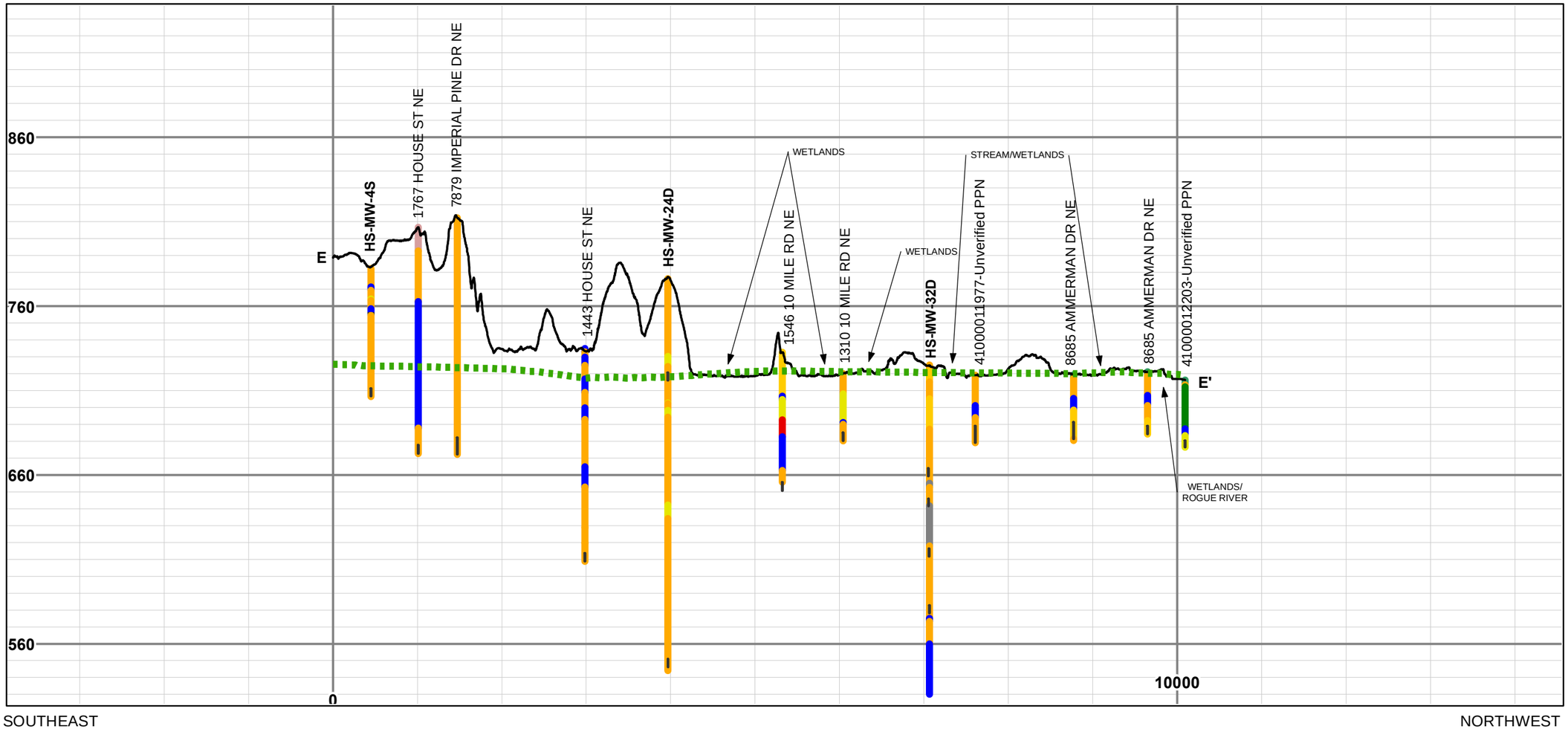

CROSS SECTION LEGEND

- WELL SCREEN
- ESTIMATED GROUNDWATER TABLE (11/2019)
- GROUND SURFACE
- GRAVEL
- SAND AND
- SAND
- SAND/GRAVEL WITH CLAY/SILT
- CLAY/SILT WITH SAND/GRAVEL
- SILT
- CLAY
- TOP SOIL
- ORGANIC SOIL
- NOT AVAILABLE

OVERVIEW MAP LEGEND

- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
- SURFACE WATER
- APPROXIMATE HOUSE ST. DISPOSAL SITE BOUNDARY
- NORTH KENT LANDFILL

NOTES:
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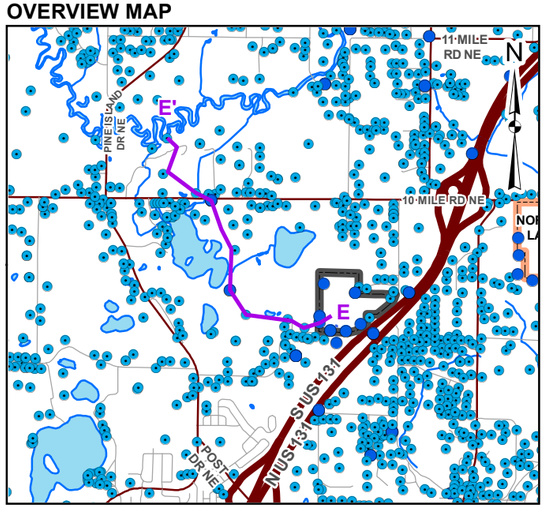
OVERVIEW MAP



0 2,500 5,000 10,000
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Grand Rapids, Michigan 49504

NORTH KENT STUDY AREA
CROSS SECTION E-E'
GSI INVESTIGATION

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		WN&J/WWW	
PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN	FIGURE
DESIGNED BY: JC	DRAWN BY: JMG	SCALE: 1 in = 5,000 ft	8
DATE: 09/17/2020	PROJECT NO: 16.0062961.50	REVISION NO:	

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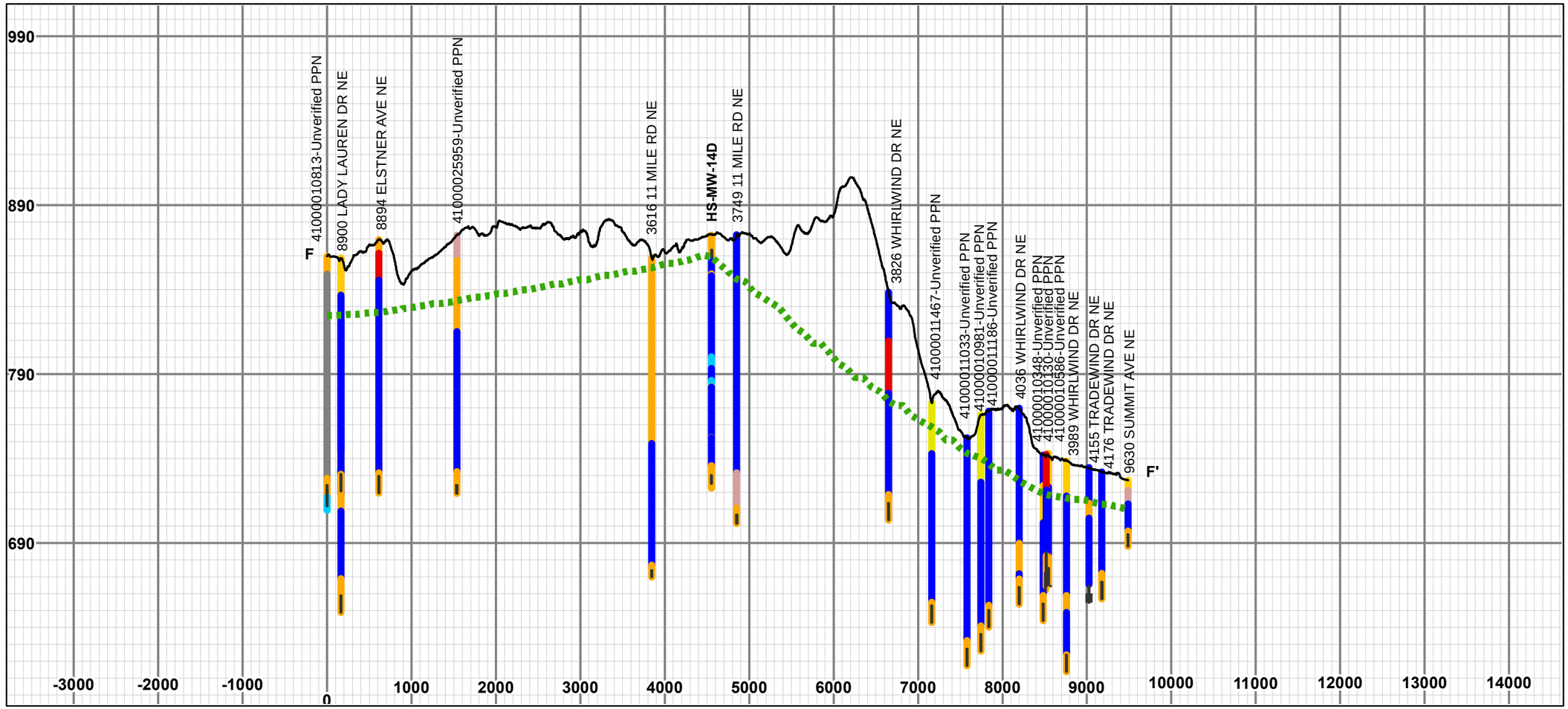

SOUTHWEST NORTHEAST

CROSS SECTION LEGEND

- WELL SCREEN
- ESTIMATED GROUNDWATER TABLE (11/2019)
- GROUND SURFACE
- GRAVEL
- SAND AND GRAVEL
- SAND
- SAND/GRAVEL WITH CLAY/SILT
- CLAY/SILT WITH SAND/GRAVEL
- SILT
- CLAY AND SILT
- CLAY
- NOT AVAILABLE

OVERVIEW MAP LEGEND

- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
- SURFACE WATER
- NORTH KENT LANDFILL

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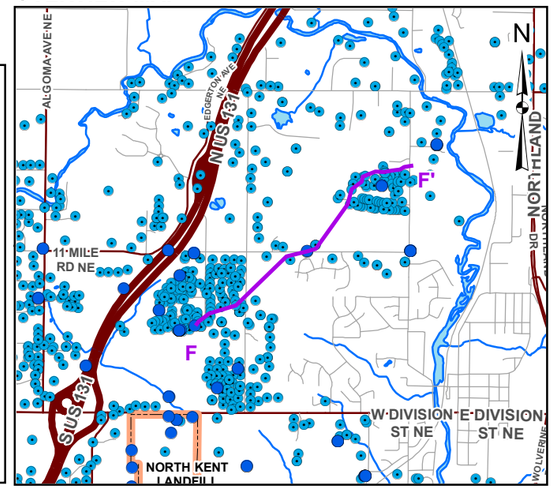
OVERVIEW MAP



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SCALE IN FEET

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NORTH KENT STUDY AREA
CROSS SECTION F-F'
GSI INVESTIGATION

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com

PREPARED FOR: WN&J/WWW

PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN	FIGURE 9
DESIGNED BY: JC	DRAWN BY: JMG	SCALE: 1 in = 5,000 ft	
DATE: 09/17/2020	PROJECT NO: 16.0062961.50	REVISION NO:	

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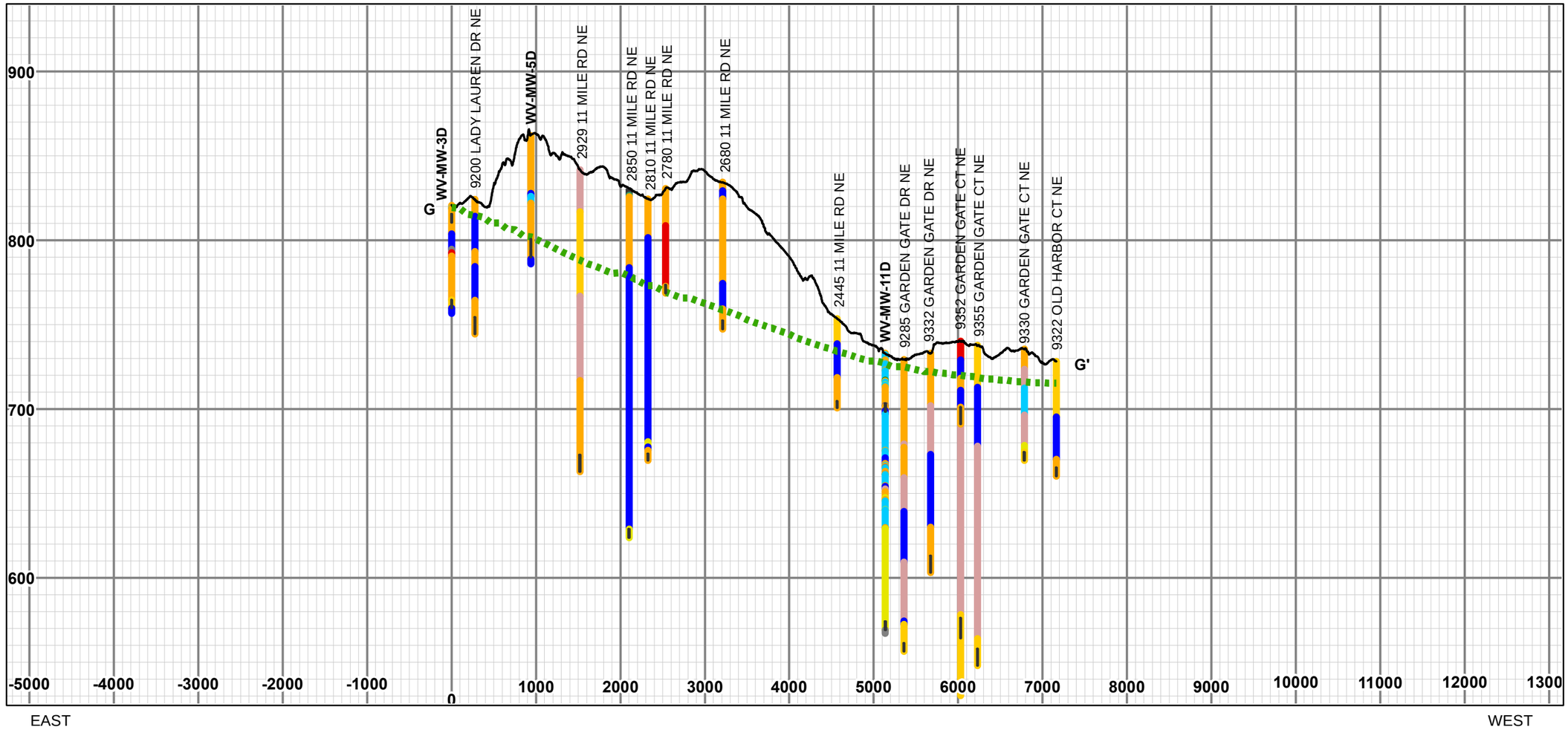

CROSS SECTION LEGEND

- WELL SCREEN
- ESTIMATED GROUNDWATER TABLE (11/2019)
- GROUND SURFACE
- GRAVEL
- SAND AND
- SAND
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- SILT
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- TOP SOIL
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- NOT AVAILABLE

OVERVIEW MAP LEGEND

- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
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- SURFACE WATER
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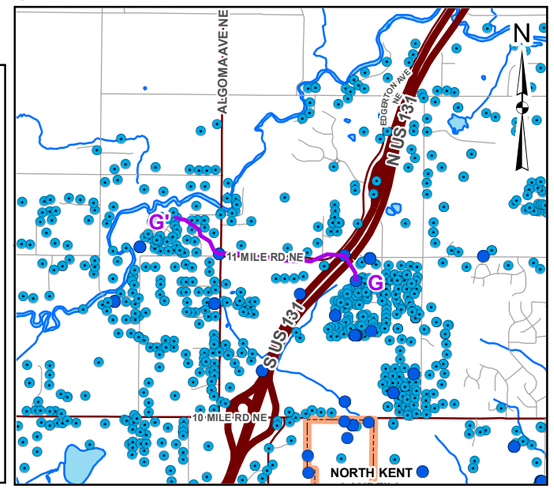
OVERVIEW MAP



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Grand Rapids, Michigan 49504

NORTH KENT STUDY AREA
CROSS SECTION G-G'
GSI INVESTIGATION

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
WN&J/WWW

PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN	FIGURE
DESIGNED BY: JC	DRAWN BY: JMG	SCALE: 1 in = 5,000 ft	10
DATE: 09/17/2020	PROJECT NO: 16.0062961.50	REVISION NO:	

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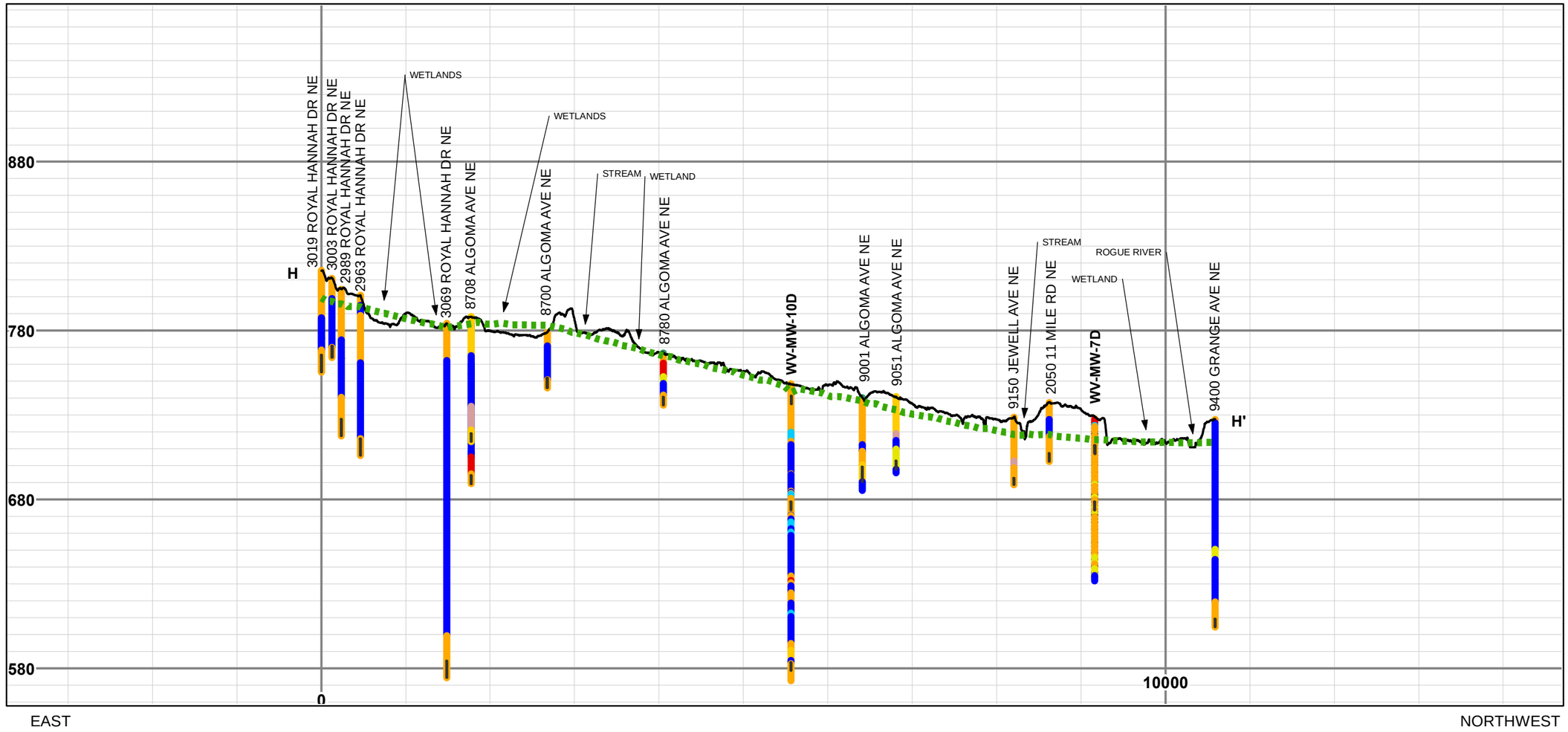

CROSS SECTION LEGEND

- WELL SCREEN
- ESTIMATED GROUNDWATER TABLE (11/2019)
- GROUND SURFACE
- GRAVEL
- SAND AND
- SAND
- SAND/GRAVEL WITH CLAY/SILT
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- CLAY AND SILT
- CLAY
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- NOT AVAILABLE

OVERVIEW MAP LEGEND

- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
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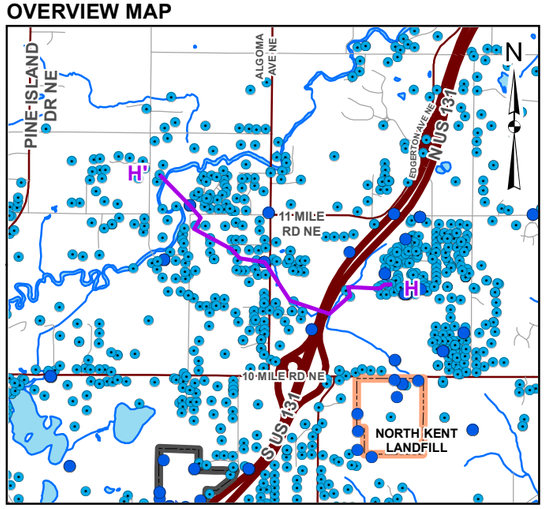
2. GROUND SURFACE ELEVATIONS ARE BASED ON DIGITAL RASTER FILES OF BARE EARTH DIGITAL ELEVATION MODELS (DEMS), GENERATED FROM LIDAR DATA WITH 1-METER HORIZONTAL ACCURACY AND 18.5-CENTIMETER VERTICAL ACCURACY. DIGITAL FILES OF DEMS AND LIDAR DATA WERE PROVIDED BY KENT COUNTY.

3. ESTIMATED GROUNDWATER TABLE WAS DEVELOPED BASED ON MEASUREMENTS MADE IN GROUNDWATER MONITORING WELLS IN NOVEMBER 2019. GROUNDWATER ELEVATIONS WERE NOT MEASURED FROM RESIDENTIAL WATER SUPPLY WELLS.

4. WELL SCREEN ELEVATIONS PROVIDED IN FEET ABOVE MEAN SEA LEVEL, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). RESIDENTIAL WELL SCREEN ELEVATIONS AND BOREHOLE LITHOLOGY ELEVATIONS WERE CALCULATED USING WELL INFORMATION PROVIDED BY THE STATE OF MICHIGAN'S WELLOGIC DATABASE AND GROUND SURFACE ELEVATIONS OF THE CENTER OF THE PPN GENERATED FROM LIDAR DATA PROVIDED BY KENT COUNTY. ELEVATIONS ARE ROUNDED TO THE NEAREST FOOT.

OVERVIEW MAP



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0 2,500 5,000 10,000
SCALE IN FEET

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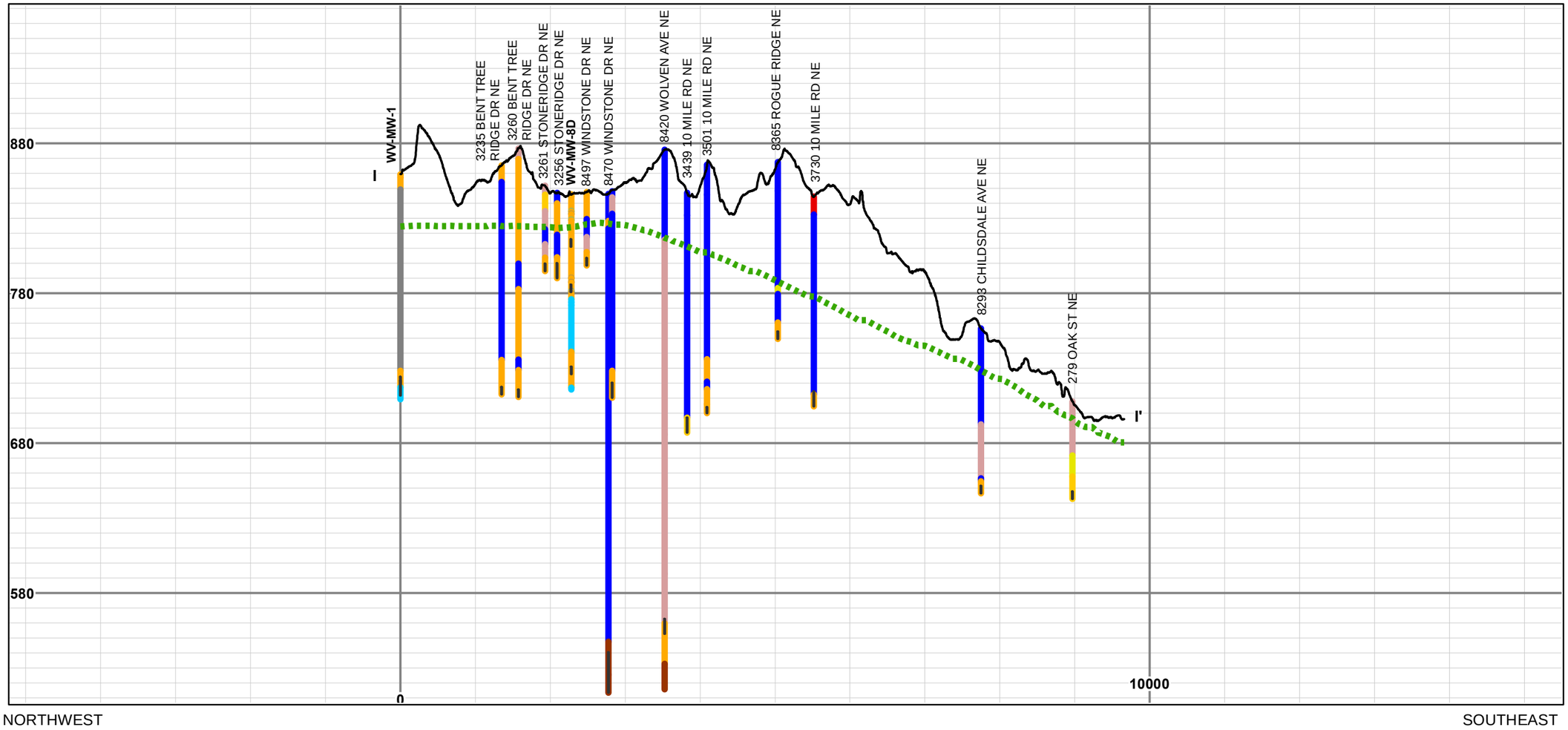
NORTH KENT STUDY AREA
CROSS SECTION H-H'
GSI INVESTIGATION

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com

PREPARED FOR: WN&J/WWW

PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN	FIGURE
DESIGNED BY: JC	DRAWN BY: JMG	SCALE: 1 in = 5,000 ft	11
DATE: 09/17/2020	PROJECT NO: 16.0062961.50	REVISION NO:	



CROSS SECTION LEGEND

- WELL SCREEN
- ESTIMATED GROUNDWATER TABLE (11/2019)
- GROUND SURFACE
- GRAVEL
- SAND AND GRAVEL
- SAND
- SAND/GRAVEL WITH CLAY/SILT
- CLAY/SILT WITH SAND/GRAVEL
- SILT
- CLAY AND SILT
- CLAY
- BEDROCK

OVERVIEW MAP LEGEND

- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
- SURFACE WATER
- APPROXIMATE HOUSE ST. DISPOSAL SITE BOUNDARY
- NORTH KENT LANDFILL

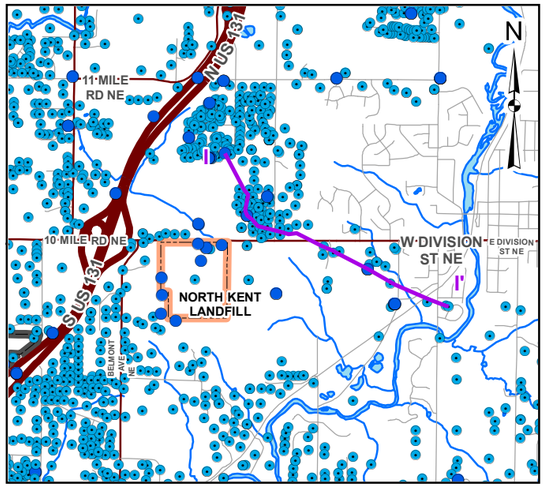
NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

2. GROUND SURFACE ELEVATIONS ARE BASED ON DIGITAL RASTER FILES OF BARE EARTH DIGITAL ELEVATION MODELS (DEMS), GENERATED FROM LIDAR DATA WITH 1-METER HORIZONTAL ACCURACY AND 18.5-CENTIMETER VERTICAL ACCURACY. DIGITAL FILES OF DEMS AND LIDAR DATA WERE PROVIDED BY KENT COUNTY.

3. ESTIMATED GROUNDWATER TABLE WAS DEVELOPED BASED ON MEASUREMENTS MADE IN GROUNDWATER MONITORING WELLS IN NOVEMBER 2019. GROUNDWATER ELEVATIONS WERE NOT MEASURED FROM RESIDENTIAL WATER SUPPLY WELLS.

4. WELL SCREEN ELEVATIONS PROVIDED IN FEET ABOVE MEAN SEA LEVEL, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). RESIDENTIAL WELL SCREEN ELEVATIONS AND BOREHOLE LITHOLOGY ELEVATIONS WERE CALCULATED USING WELL INFORMATION PROVIDED BY THE STATE OF MICHIGAN'S WELLOGIC DATABASE AND GROUND SURFACE ELEVATIONS OF THE CENTER OF THE PPN GENERATED FROM LIDAR DATA PROVIDED BY KENT COUNTY. ELEVATIONS ARE ROUNDED TO THE NEAREST FOOT.

OVERVIEW MAP



0 2,500 5,000 10,000
SCALE IN FEET

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NORTH KENT STUDY AREA
CROSS SECTION I-I'
GSI INVESTIGATION

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: WN&J/WWW	
PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN	FIGURE 12
DESIGNED BY: JC	DRAWN BY: JMG	SCALE: 1 in = 5,000 ft	
DATE: 09/17/2020	PROJECT NO: 16.0062961.50	REVISION NO:	

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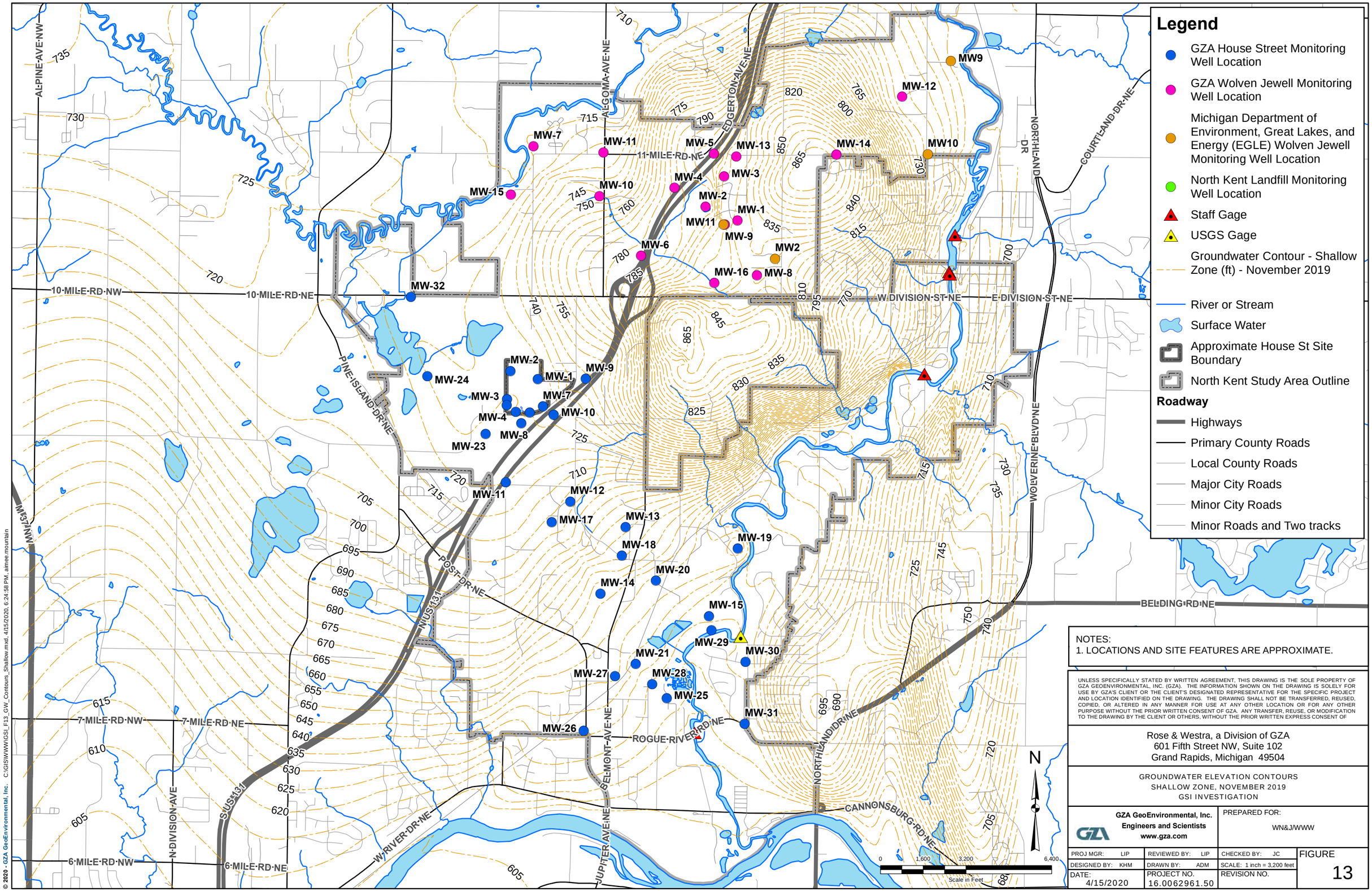

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

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GROUNDWATER ELEVATION CONTOURS
SHALLOW ZONE, NOVEMBER 2019
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR: WN&J/WWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 13
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 3,200 feet	
DATE: 4/15/2020	PROJECT NO. 16.0062961.50	REVISION NO.	

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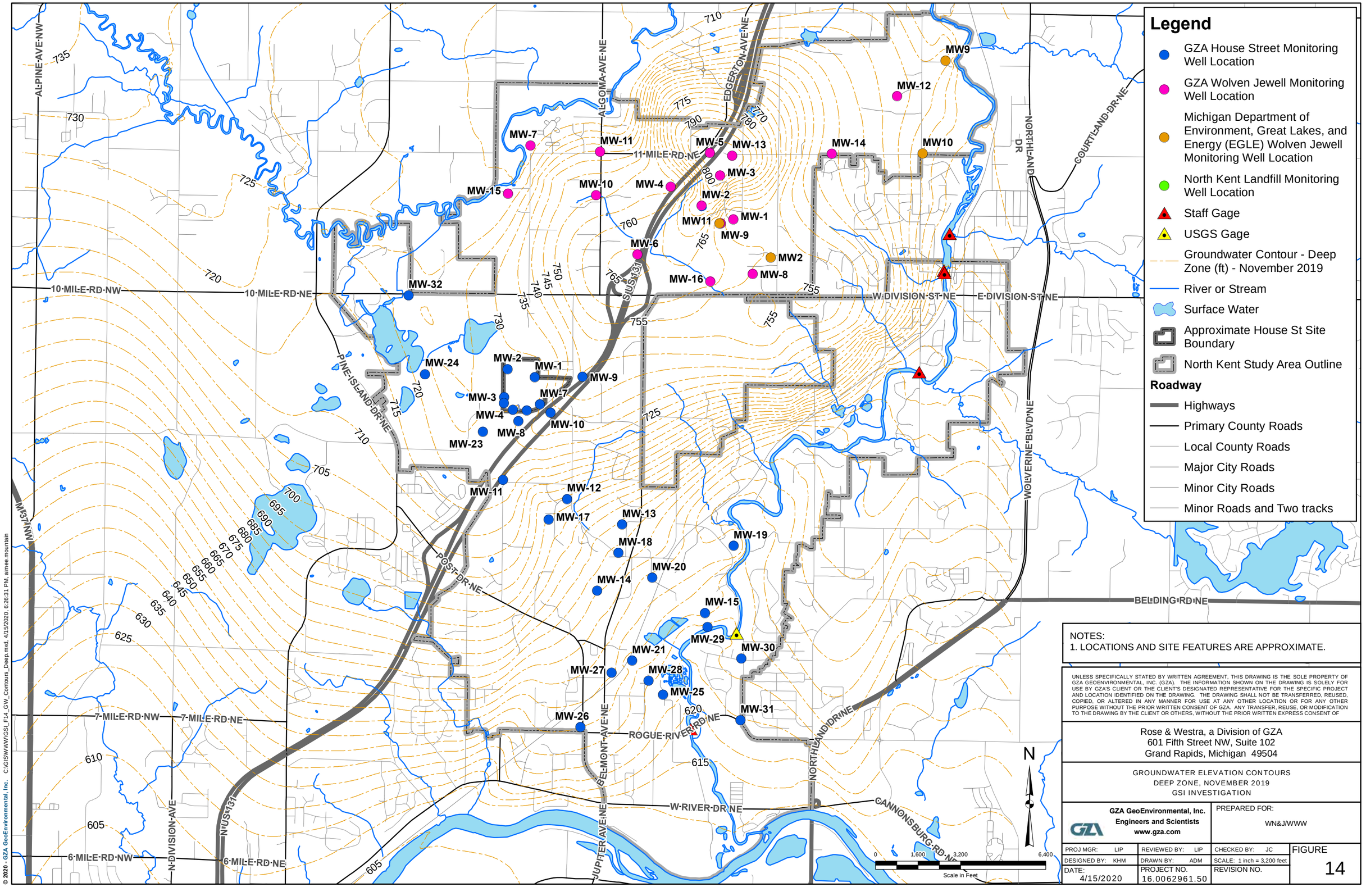

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

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GROUNDWATER ELEVATION CONTOURS
DEEP ZONE, NOVEMBER 2019
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR: WN&JWWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 14
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 3,200 feet	
DATE: 4/15/2020	PROJECT NO. 16.0062961.50	REVISION NO.	

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Legend

- GZA House Street Monitoring Well Location
- GZA Wolven Jewell Monitoring Well Location
- Michigan Department of Environment, Great Lakes, and Energy (EGLE) Wolven Jewell Monitoring Well Location
- North Kent Landfill (NKLF) Monitoring Well Location
- Staff Gage
- USGS Gage
- River or Stream
- Surface Water
- Approximate House St. Disposal Site Boundary
- North Kent Study Area Outline

Roadway

- Highways
- Primary County Roads
- Local County Roads
- Major City Roads
- Minor City Roads
- Minor Roads and Two tracks

Approximate PFOS Extent

- ≤ 0.012 µg/L (GSI)
- >0.012 - 0.07 µg/L
- >0.07 - 5.0 µg/L
- >5.0 - 20.0 µg/L
- >20.0 - 100 µg/L (MAX)

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

2. PFOS = PERFLUOROOCTANE SULFONATE

3. µg/L = MICROGRAM PER LITER

4. MAXIMUM CONCENTRATION FROM MONITORING AND RESIDENTIAL WELL SAMPLE RESULTS WERE USED TO DEVELOP CONCENTRATION ISOPLETHS.

5. CONCENTRATION ISOPLETHS WERE DEVELOPED USING NATURAL NEIGHBOR INTERPOLATION IN ARCGIS. CONCENTRATIONS WERE NOT EXTRAPOLATED OUTSIDE OF THE AREA OF KNOWN CONCENTRATIONS.

6. ABBREVIATIONS FOR MICHIGAN PART 201 GENERIC CLEANUP CRITERIA FOR RESIDENTIAL USES:

GSI = GROUNDWATER - SURFACE WATER INTERFACE CRITERIA.

7. MAX = MAXIMUM DETECTED CONCENTRATION IN THE SAMPLES.

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PFOS ISOCONCENTRATION MAP
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR: WN&J/WWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 15
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 3,200 feet	
DATE: 9/23/2020	PROJECT NO. 16.0062961.50	REVISION NO.	

Legend

- GZA House Street Monitoring Well Location
- GZA Wolven Jewell Monitoring Well Location
- Michigan Department of Environment, Great Lakes, and Energy (EGLE) Wolven Jewell Monitoring Well Location
- North Kent Landfill (NKLF) Monitoring Well Location
- Staff Gage
- USGS Gage
- River or Stream
- Surface Water
- Approximate House St. Disposal Site Boundary
- North Kent Study Area Outline

Roadway

- Highways
- Primary County Roads
- Local County Roads
- Major City Roads
- Minor City Roads
- Minor Roads and Two tracks

Approximate PFOA Extent

- ≤ 0.07 µg/L
- >0.07 – 1.0 µg/L
- >1.0 – 5.0 µg/L
- >5.0 – 12.0 µg/L (GSI)
- >12.0 – 16 µg/L (MAX)

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

2. PFOA = PERFLUORO-N-OCTANOIC ACID

3. µg/L = MICROGRAM PER LITER

4. MAXIMUM CONCENTRATION FROM MONITORING AND RESIDENTIAL WELL SAMPLE RESULTS WERE USED TO DEVELOP CONCENTRATION ISOPLETHS.

5. CONCENTRATION ISOPLETHS WERE DEVELOPED USING NATURAL NEIGHBOR INTERPOLATION IN ARCGIS. CONCENTRATIONS WERE NOT EXTRAPOLATED OUTSIDE OF THE AREA OF KNOWN CONCENTRATIONS.

6. ABBREVIATIONS FOR MICHIAN PART 201 GENERIC CLEANUP CRITERIA FOR RESIDENTIAL USES:

GSI = GROUNDWATER - SURFACE WATER INTERFACE CRITERIA.

7. MAX = MAXIMUM DETECTED CONCENTRATION IN THE SAMPLES.

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0 1,600 3,200 6,400
Scale in Feet

N

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PFOA ISOCONCENTRATION MAP
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR: WN&J/WWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 16
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 3,200 feet	
DATE: 9/23/2020	PROJECT NO. 16.0062961.50	REVISION NO.	

Legend

- GZA House Street Monitoring Well Location
- GZA Wolven Jewell Monitoring Well Location
- Michigan Department of Environment, Great Lakes, and Energy (EGLE) Wolven Jewell Monitoring Well Location
- North Kent Landfill (NKLF) Monitoring Well Location
- Staff Gage
- USGS Gage
- River or Stream
- Surface Water
- Approximate House St. Disposal Site Boundary
- North Kent Study Area Outline

Roadway

- Highways
- Primary County Roads
- Local County Roads
- Major City Roads
- Minor City Roads
- Minor Roads and Two tracks

Approximate Total PFAS Extent

- ≤ 0.012 µg/L
- >0.012 - 0.07 µg/L
- >0.07 - 5.0 µg/L
- >5.0 - 20.0 µg/L
- >20.0 - 134.73 µg/L (MAX)

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

2. PFAS = PERFLUOROALKYL SUBSTANCES (NO TOTAL PFAS CRITERIA/SCREENING LEVELS)

3. µg/L = MICROGRAM PER LITER

4. MAXIMUM CONCENTRATION FROM MONITORING AND RESIDENTIAL WELL SAMPLE RESULTS WERE USED TO DEVELOP CONCENTRATION ISOPLETHS.

5. CONCENTRATION ISOPLETHS WERE DEVELOPED USING NATURAL NEIGHBOR INTERPOLATION IN ARCGIS. CONCENTRATIONS WERE NOT EXTRAPOLATED OUTSIDE OF THE AREA OF KNOWN CONCENTRATIONS.

6. MAX = MAXIMUM DETECTED CONCENTRATION IN THE SAMPLES.

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TOTAL PFAS ISOCONCENTRATION MAP
GSI INVESTIGATION

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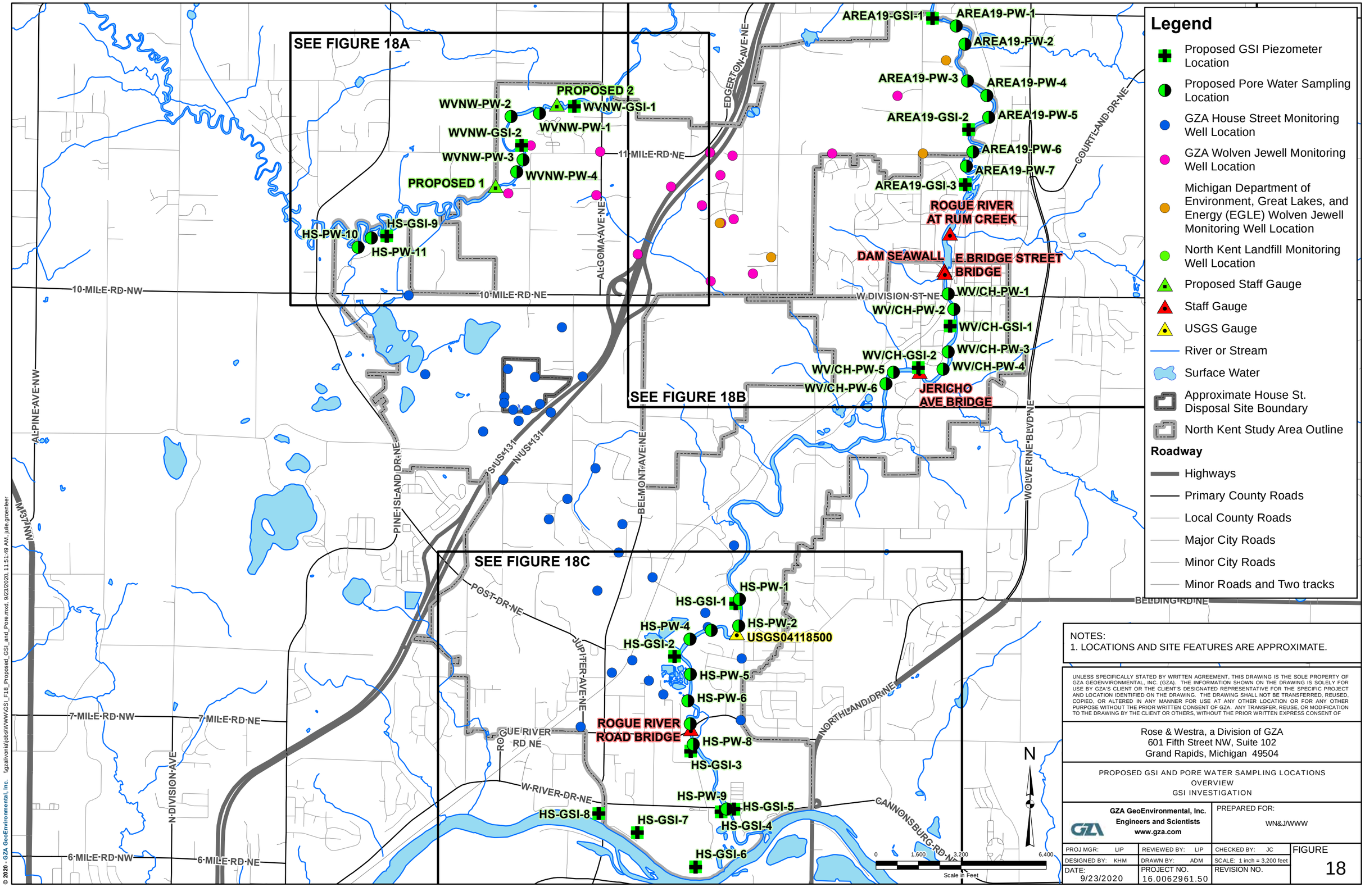
Engineers and Scientists
www.gza.com

PREPARED FOR: WN&J/WWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 17
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 3,200 feet	
DATE: 9/23/2020	PROJECT NO. 16.0062961.50	REVISION NO.	

0 1,600 3,200 6,400
Scale in Feet

N



Legend

- Proposed GSI Piezometer Location
- Proposed Pore Water Sampling Location
- GZA House Street Monitoring Well Location
- GZA Wolven Jewell Monitoring Well Location
- Michigan Department of Environment, Great Lakes, and Energy (EGLE) Wolven Jewell Monitoring Well Location
- North Kent Landfill Monitoring Well Location
- Proposed Staff Gauge
- Staff Gauge
- USGS Gauge
- River or Stream
- Surface Water
- Approximate House St. Disposal Site Boundary
- North Kent Study Area Outline

Roadway

- Highways
- Primary County Roads
- Local County Roads
- Major City Roads
- Minor City Roads
- Minor Roads and Two tracks

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

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PROPOSED GSI AND PORE WATER SAMPLING LOCATIONS
OVERVIEW
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
Engineers and Scientists
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PREPARED FOR:
WN&J/WWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 18
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 3,200 feet	
DATE: 9/23/2020	PROJECT NO. 16.0062961.50	REVISION NO.	

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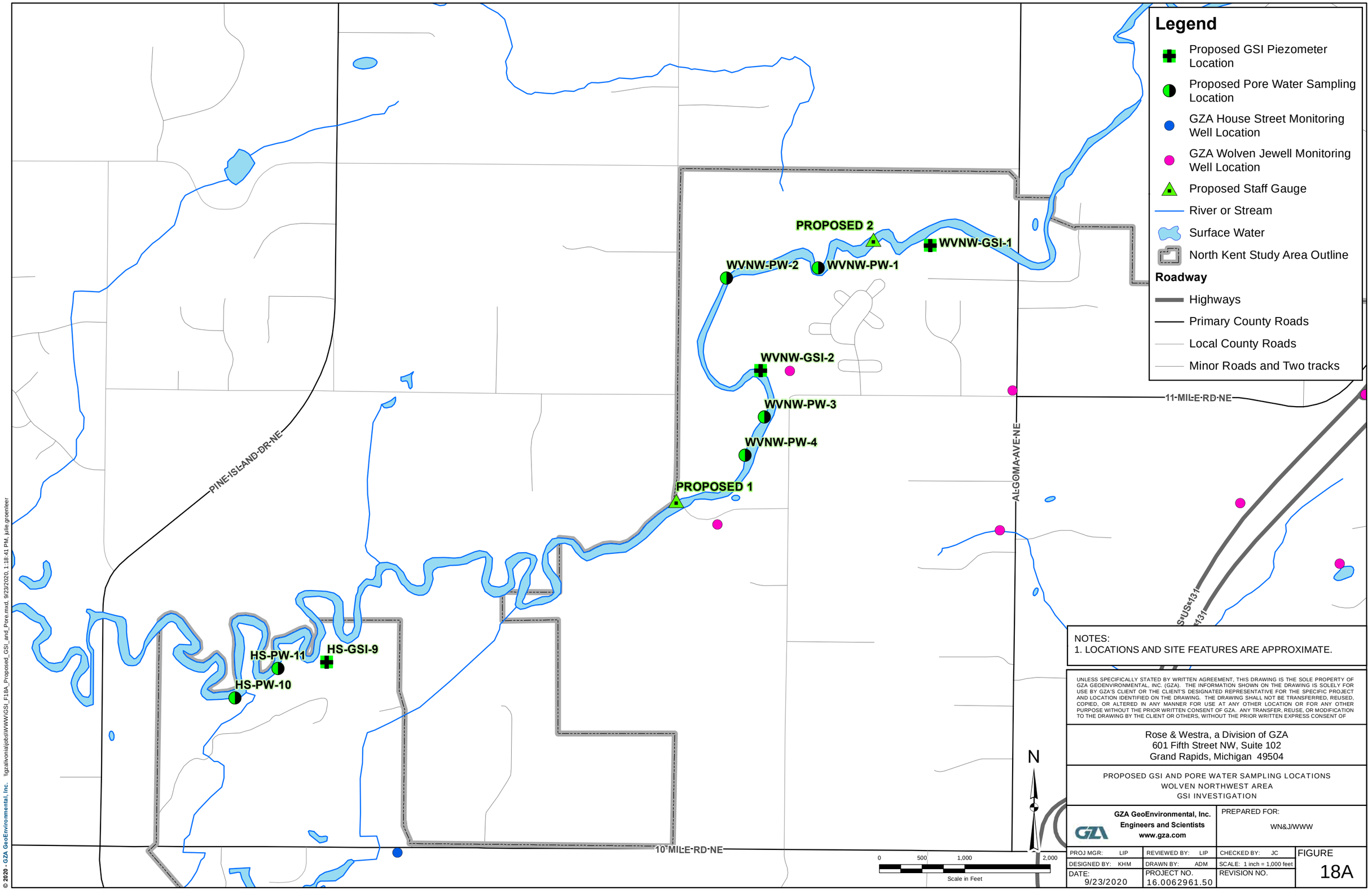

Legend

- Proposed GSI Piezometer Location
- Proposed Pore Water Sampling Location
- GZA House Street Monitoring Well Location
- GZA Wolven Jewell Monitoring Well Location
- Proposed Staff Gauge
- River or Stream
- Surface Water
- North Kent Study Area Outline

Roadway

- Highways
- Primary County Roads
- Local County Roads
- Minor Roads and Two tracks

NOTES:
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PROPOSED GSI AND PORE WATER SAMPLING LOCATIONS
WOLVEN NORTHWEST AREA
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
WN&J/WWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 18A
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 1,000 feet	
DATE: 9/23/2020	PROJECT NO. 16.0062961.50	REVISION NO.	

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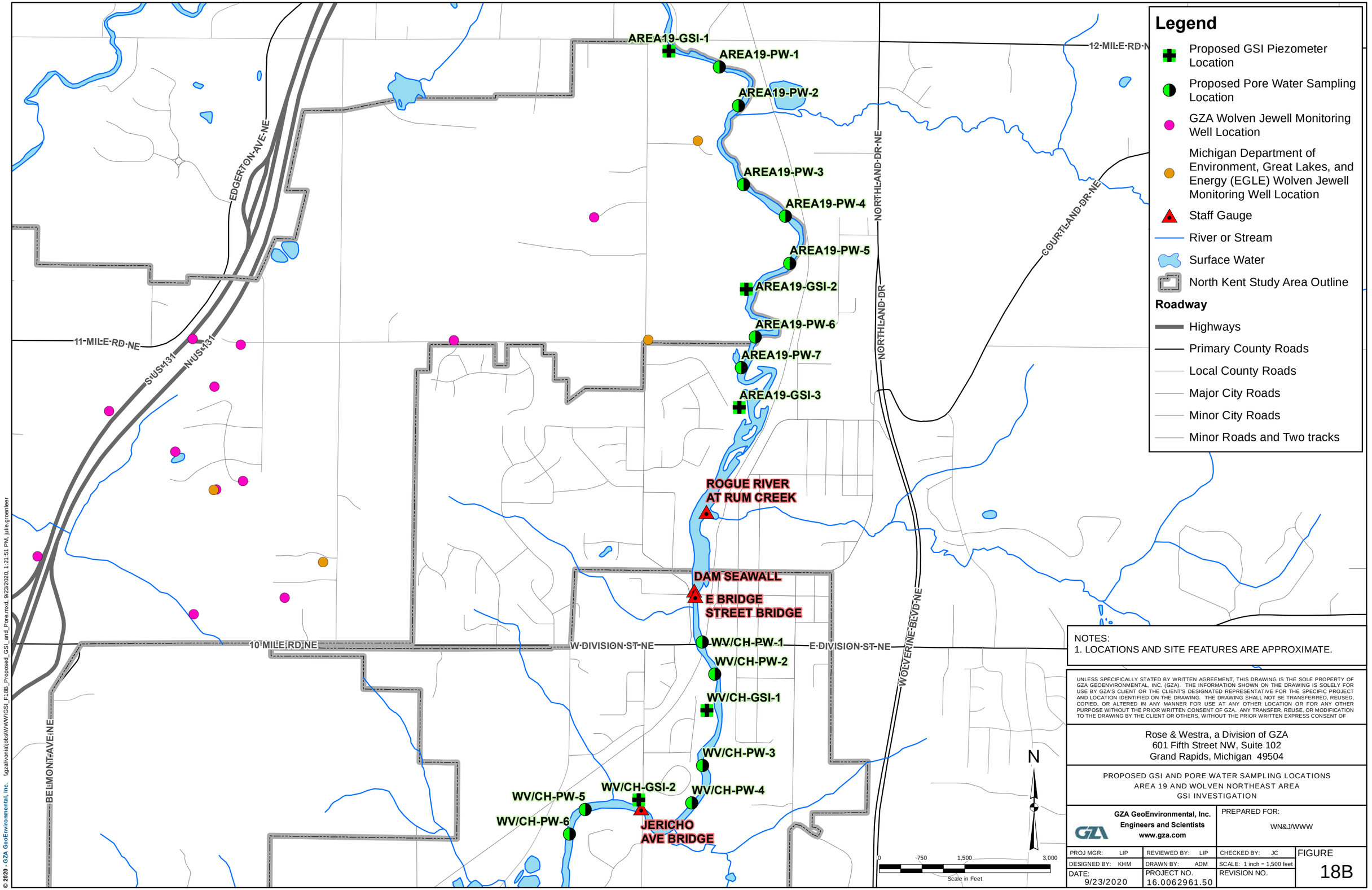

Legend

- Proposed GSI Piezometer Location
- Proposed Pore Water Sampling Location
- GZA Wolven Jewell Monitoring Well Location
- Michigan Department of Environment, Great Lakes, and Energy (EGLE) Wolven Jewell Monitoring Well Location
- Staff Gauge
- River or Stream
- Surface Water
- North Kent Study Area Outline

Roadway

- Highways
- Primary County Roads
- Local County Roads
- Major City Roads
- Minor City Roads
- Minor Roads and Two tracks

NOTES:
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PROPOSED GSI AND PORE WATER SAMPLING LOCATIONS
AREA 19 AND WOLVEN NORTHEAST AREA
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
Engineers and Scientists
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PREPARED FOR: WN&JWWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 18B
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 1,500 feet	
DATE: 9/23/2020	PROJECT NO. 16.0062961.50	REVISION NO.	

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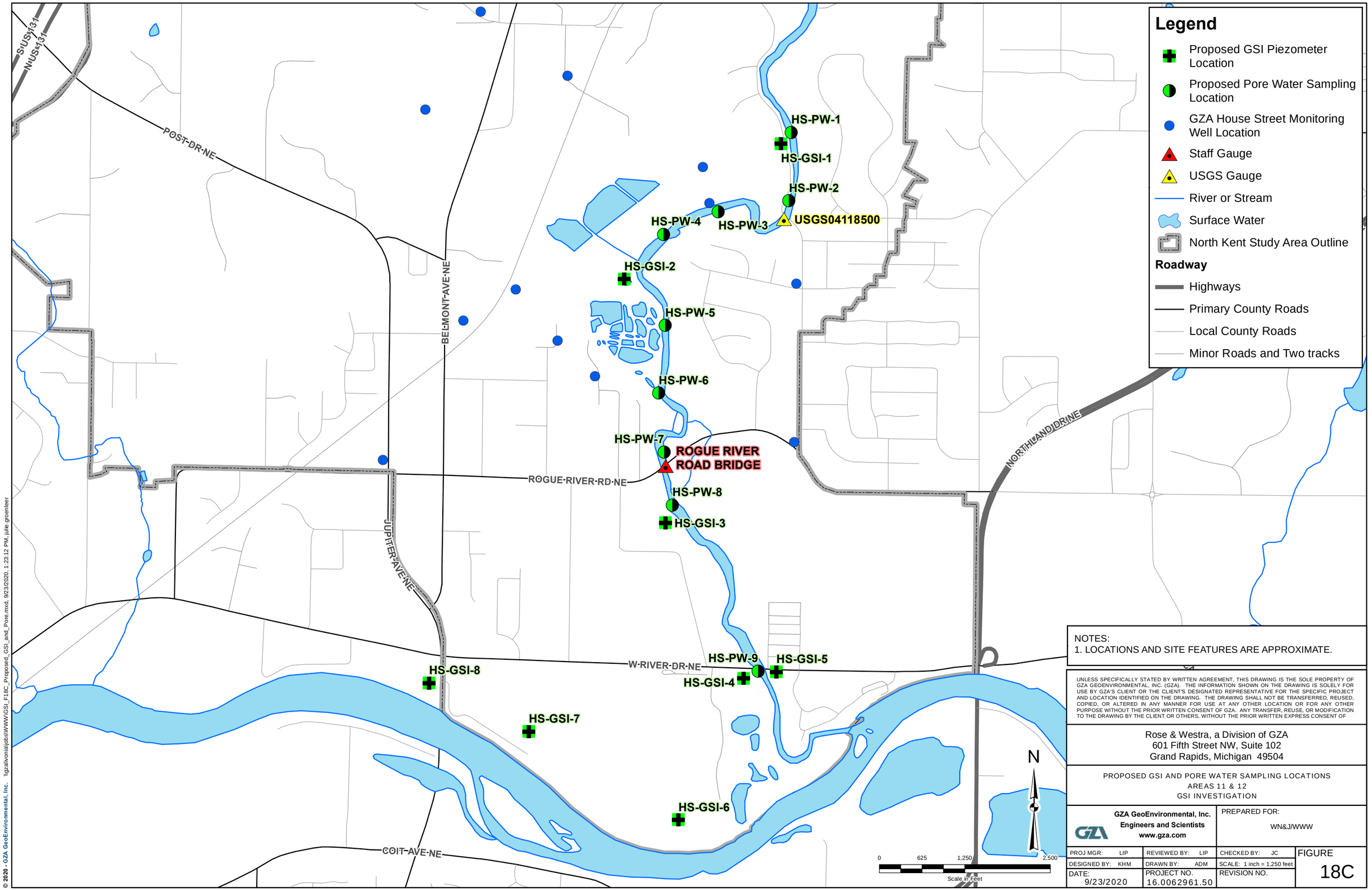

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

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PROPOSED GSI AND PORE WATER SAMPLING LOCATIONS
AREAS 11 & 12
GSI INVESTIGATION

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PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 18C
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 1,250 feet	
DATE: 9/23/2020	PROJECT NO. 16.0062961.50	REVISION NO.	

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APPENDIX A – GROUNDWATER MONITORING WELL INSTALLATION LOGS, SOIL BORING LOGS

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Wolverine World Wide, Inc.
1855 House Street NE
Belmont, Michigan

Boring No.: SB-1/MW-1D
Page: 1 **of** 13
File No.: 16.0062335.52
Check: J Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 9-5-17 / 9-5-17
Boring Location:
GS Elev.: 788.80' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/20	0-2	3-4 4-7		Yellowish-brown to brown, SILT, some fine grained Sand, trace Gravel, poorly sorted, dry (ML).	SILT (ML)		PROTECTIVE CASING Backfill/Cement Pad
2	2	24/22	2-4	4-5 8-9		Yellowish-brown to brown, SILT, some fine grained Sand, trace Gravel, poorly sorted, dry (ML). Changing at 2.6 feet to: Yellowish-brown, fine to medium SAND, little Silt, moderately sorted, dry (SM). Changing at 2.7 feet to: Mottled dark yellowish-brown to light grayish-brown, SILT, little Clay, little Sand, trace Gravel, poorly sorted, dry (ML).	2.6' 2.7' SAND (SM) SILT (ML)		
4	3	24/24	4-6	8-6 7-7		Yellowish-red to dark brown, medium to fine grained SAND, some Silt, trace Gravel, moderate sorting, dry (SM). Changing at 4.5 feet to: Mottled dark yellowish-brown to light gray, SILT, little Clay, little fine to medium grained Sand, slightly plastic, cohesive, poorly sorted, dry (ML).	4' SAND (SM) 4.5' SILT (ML)		
6	4	24/24	6-8	3-4 5-5		Mottled dark yellowish-brown to light gray, SILT, little Clay, little fine to medium grained Sand, slightly plastic, cohesive, poorly sorted, dry (ML). Changing at 7.1 feet to: Mottled grayish-brown to dark yellowish-brown, CLAY & SILT, plastic, cohesive, moist (CL).	7.1' CLAY & SILT (CL)		
8	5	24	8-10	4-4 3-5		Mottled grayish-brown to dark yellowish-brown, CLAY & SILT, plastic, cohesive, moist (CL).			
10	6	24/20	10-12	2-4 2-2		Mottled grayish-brown to dark yellowish-brown, CLAY & SILT, plastic, cohesive, moist (CL). Changing at 10.4 feet to: Dark gray to dark grayish-brown, fine to medium grained SAND, trace Silt, moderately sorted, moist (SP). Changing at 11.4 feet to: Dark gray to dark grayish-brown, fine to coarse SAND, trace	10.4' SAND (SP) 11.4' SAND (SW) 12'		

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-1/MW-1D

BORING_WELL 6233550 WWW HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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File No.: 16.0062335.52
Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	7	24/24	12-14	5-6 14-16		Gravel, trace Silt, trace Clay, slightly cohesive, poorly sorted, moist to wet (SW). Dark grayish-brown to very dark grayish-brown, CLAY & SILT, trace Gravel, plastic, cohesive, poorly sorted, moist (CL). Changing at 13.6 feet to: Grayish-brown, coarse to medium SAND, trace Gravel, trace Silt, poorly sorted, moist (SP). Changing at 13.7 feet to: Mottled yellowish-brown to light yellowish-brown to dark gray to black, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, poorly sorted, moist (CL). Mottled yellowish-brown to light yellowish-brown to dark gray to black, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, poorly sorted, moist (CL). Changing at 15.0 feet to: Black, fine to coarse grained SAND, trace Gravel, trace Silt, poorly sorted, moist (SW). Changing at 15.1 feet to: Brownish-yellow, SILT, very well sorted, moist to wet (ML). Light yellowish-brown to pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP). Changing at 17.3 feet to: Dark yellowish-brown, fine grained SAND, little Clay, little Silt, slightly to moderately plastic, cohesive, moderately sorted, moist (SC). Light yellowish-brown to pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP). Changing at 19.0 feet to: Yellowish-brown, fine grained SAND, little Clay, little Silt, moderately plastic, cohesive, moderately sorted, moist (SC). Changing at 19.3 feet to: Light yellowish-brown to pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP). Light yellowish-brown to pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP).	CLAY & SILT (CL)		
13							13.6'		
	8	24/24	14-16	4-12 7-7			13.7' SAND (SP) CLAY & SILT (CL)		
14									
15							15' 15.1' SAND (SW) SILT (ML)		
	9	24/18	16-18	3-3 5-6			16' SAND (SP)		
16									
17							17.3' SAND (SM)		
	10	24/20	18-20	2-4 7-9			18' SAND (SP)		
18									
19							19' 19.3' SAND (SM) SAND (SP)		
	11	24/17	20-22	3-6 7-10					
20									
21									
	12	24/18	22-24	3-5 6-9		Light yellowish-brown to pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP).			
22									
23									
24	13	24/23	24-26	5-9 10-14		Light yellowish-brown to pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP). Changing at 25.5 feet to: Yellowish-brown, SILT & CLAY, little Silt, slightly plastic, cohesive, well sorted, moist (CL).			
25							25.5' CLAY & SILT (CL) 26'		

REMARKS

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File No.: 16.0062335.52
Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
27	14	24/24	26-28	6-8 13-13		Light yellowish-brown to pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP). Changing at 26.3 feet to: Yellowish-brown, SILT & CLAY, little Silt, slightly plastic, cohesive, well sorted, moist (CL). Changing at 27.7 feet to: Light yellowish-brown to pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP). Yellowish-brown, CLAY & SILT, little Sand, slightly plastic, cohesive, well sorted, moist (CL). Changing at 28.9 feet to: Light yellowish-brown to pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP). Changing at 29.1 feet: Yellowish-brown, CLAY & SILT, little Sand, slightly plastic, cohesive, well sorted, moist (CL). Changing at 29.3 feet to: Yellowish-brown, SILT, cohesive, well sorted, moist (ML). Changing at 29.9 feet to: Yellowish-brown, CLAY & SILT, little Sand, slightly plastic, cohesive, well sorted, moist (CL). Yellowish-brown, CLAY & SILT, little Sand, slightly plastic, cohesive, well sorted, moist (CL). Changing at 30.6 feet to: Light yellowish-brown to pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP). Changing at 31.0 feet to: Yellowish-brown, CLAY & SILT, little Silt, slightly plastic, cohesive, well sorted, moist (CL). Yellowish-brown, CLAY & SILT, little Silt, slightly plastic, cohesive, well sorted, moist (CL). Changing at 32.5 feet to: Light gray to light brownish-gray, fine grained SAND, trace Silt, very well sorted, moist (SP). Light gray to light brownish-gray, fine grained SAND, trace Silt, very well sorted, moist (SP).	26.3' SAND (SP) CLAY & SILT (CL) 27.7'		
28	15	24/23	28-30	4-10 8-13			28' SAND (SP) CLAY & SILT (CL) 28.9' 29.1' SAND (SP) 29.3' CLAY & SILT (CL) SILT (ML) 29.9' CLAY & SILT (CL) 30.6' SAND (SP)		
30	16	24/22	30-32	9-12 16-15					
32	17	24/22	32-34	4-10 8-13			32.5' SAND (SP)		
34	18	24/23	34-36	7-13 20-25					
36	19	24/20	36-38	4-11 18-26		Light gray to light brownish-gray, fine grained SAND, trace Silt, very well sorted, moist (SP). Changing 37.1 feet to: Light gray, fine to medium SAND, trace Silt, well sorted, moist (SP).			
38	20	24/23	38-40	4-7 12-15		Very pale brown to light yellowish-brown, SILT, little Clay, slightly plastic, coheisve, well sorted, moist (ML). Changingn at 38.2 feet to: Yellowish-brown, CLAY & SILT, plastic, cohesive, moderately well sorted, moist (CL). Changing at 38.4 feet to: Very pale, brown to light yellowish-brown, SILT, little Clay, slightly plastic, cohesive,	38' 38.2' SILT (ML) 38.4' CLAY & SILT (CL) 38.7' SILT (ML) 38.9' CLAY & SILT (CL) SILT (ML) 40'		

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	21	24/20	40-42	5-10 14-14		moderately well sorted, moist (ML). Changing at 38.7 feet to: Yellowish-brown, CLAY & SILT, plastic, cohesive, moderately well sorted, moist (CL). Changing at 38.9 feet to: Very pale brown to light yellowish-brown, SILT, little Clay, slightly plastic, cohesive, well sorted, moist (ML).	40.2' CLAY & SILT (CL) 40.5' SILT (ML) CLAY & SILT (CL) 41' SAND (SP)		
41									
42	22	24/18	42-44	5-5 11-13		Light yellowish-brown, CLAY & SILT, slight plastic, cohesive, very well sorted, moist (CL). Changing at 40.2 feet to: Very pale brown to yellowish-brown, SILT, little Clay, slightly plastic, coheisive, well sorted, moist (ML). Changing at 40.5 feet to: Light yellowish-brown, CLAY & SILT, slight plastic, cohesive, very well sorted, moist (CL). Changing at 41.0 feet to: Very pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP).	42.2' 42.4' SILT (ML) SAND (SP)		
43									
44	23	24/20	44-46	10-10 15-22		Very pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP). Changing at 42.2 feet to: Light yellowish-brown, SILT, trace Clay, slightly plastic, cohesive, well sorted, moist (ML).Changing at 42.4 feet to: Very pale, brown, fine grained SAND, trace Silt, very well sorted, moist (SP).			
45							45.3'		
46	24	24/20	46-48	4-13 16-21		Very pale, brown, fine grained SAND, trace Silt, very well sorted, moist (SP). Changing at 45.3 feet to: Brown to yellowish-brown, CLAY & SILT, plastic, cohesive, very well sorted, moist (CL). Changing at 45.6 feet to: Very pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP).	45.6' CLAY (CL) SAND (SP)		
47									
48	25	24/17	48-50	5-12 23-28		Very pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP). Very pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP).			
49									
50	26	24/20	50-52	4-6 15-17		Very pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP). Changing at 51.2 feet to: Yellowish-brown, SILT, trace Clay, cohesive, non to slightly plastic, very well sorted (bedded), moist (ML).Changing at 51.7 feet to: Very pale brown, fine grained SAND, trace Silt, very well sorted, moist, with occasional very thin Silt seams (SP).			
51							51.2' SILT (ML) 51.7' SAND (SP)		
52	27	24/16	52-54	7-12 16-21		Very pale brown, fine grained SAND, trace Silt, very well sorted, moist, with occasional very thin Silt seams (SP).			
53									

REMARKS

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Boring No.: SB-1/MW-1D

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
55	28	24/20	54-56	5-11 17-26		Very pale brown, fine grained SAND, trace Silt, very well sorted, moist, with occasional very thin Silt seams (SP). Changing at 54.2 feet to: Very pale brown, fine grained SAND, little Silt, very well sorted, moist (SP).	54.2' SAND (SM)		
56	29	24/23	56-58	4-9 16-20		Light yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, moist (SP). Changing at 56.3 feet to: Very pale brown, fine grained SAND, little Silt, very well sorted, moist (SM).	56' 56.3' SAND (SP) SAND (SM)		
57									
58	30	24/24	58-60	9-13 18-24		Very pale brown, fine grained SAND, little Silt, very well sorted, moist (SM). Changing at 59.0 feet to: Brown, fine grained SAND, some Silt, very well sorted, moist to wet (SM).			
59									
60	31	24/22	60-62	11-13 22-28		Brown, fine grained SAND, little Silt, non plastic, moderately cohesive, very well sorted, moist (SP).			
61									
62	32	24/22	62-64	6-6 11-14		Brown, fine grained SAND, little Silt, non plastic, moderately cohesive, very well sorted, moist (SM). Changing at 62.7 feet to: Brown, fine to medium grained SAND, trace Silt, grading fine with depth, well sorted, damp (SP). Changing at 63.0 feet to: Brown, fine grained SAND, trace Silt, very well sorted, damp (SP).	62.7' 63' SAND (SP) SAND (SM)		
63									
64	33	24/20	64-66	11-3 6-11		Brown, fine to medium grained SAND, trace Silt, grading fine with depth, well sorted, damp (SP). Changing at 65.0 feet to: Brown, fine grained SAND, some Silt, very well sorted, damp (SM). Changing at 65.1 feet to: Brown, fine to medium grained SAND, trace Silt, grading fine with depth, well sorted, wet (SP). Changing at 65.6 feet to: Brown, CLAY & SILT, plastic, cohesive, well sorted, moist (CL).	64' SAND (SP) 65' 65.1' SAND (SM) SAND (SP) 65.6' CLAY & SILT (CL)		
65									
66	34	24/24	66-68	5-11 12-14		Brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP). Changing at 67.0 feet to: Yellowish-brown, fine to medium grained SAND, little Silt, very well sorted wet (SP).	66' SAND (SP) 67' SAND (SM)		
67									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	35	24/13	68-70	2-4 7-13		Yellowish-brown, fine to medium grained SAND, little Silt, very well sorted wet (SP).	SAND (SM)		
69									
70	36	24/18	70-72	2-6 12-16		Yellowish-brown, fine to medium grained SAND, little Silt, very well sorted wet (SP).			
71									
72	37	24/23	72-74	3-3 5-9		Brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP). Changing at 73.1 feet to: Brown, CLAY & SILT, slightly plastic, moderately cohesive, well sorted, moist to wet (CL).	72' SAND (SP) 73.1' CLAY & SILT (CL)		
73									
74	38	24/20	74-76	2-1 2-2		Brown, CLAY & SILT, slightly plastic, moderately cohesive, well sorted, moist to wet (CL).			
75									
76	39	24/19	76-78	2-5 8-11		Brown, CLAY & SILT, slightly plastic, moderately cohesive, well sorted, moist to wet (CL).			
77									
78	40	24/23	78-80	2-4 5-10		Brown, CLAY & SILT, slightly plastic, moderately cohesive, well sorted, moist to wet (CL). Changing at 79.3 feet to: Yellowish-brown, CLAY & SILT, plastic, cohesive, well sorted, moist (CL). Changing at 79.4 feet to: Yellowish-brown, medium to coarse grained SAND, trace Silt, moderately well sorted, wet (SW).			
79							79.4' SAND (SW)		
80	41	24/22	80-82	2-4 6-7		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).	80' SAND (SP)		
81									
							82'		

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	42	24/24	82-84	2-5 11-12		Yellowish-brown, medium to coarse grained SAND, trace Silt, well sorted, wet (SW). Changing at 82.4 feet to: Yellowish-brown, medium to coarse grained SAND, trace Silt, poorly sorted, wet (SW). Changing at 83.2 feet to: Yellowish-brown to gray, GRAVEL, some coarse grained Sand, trace Silt, poorly sorted, wet (GW). Changing at 83.4 feet to: Yellowish-brown, CLAY & SILT, plastic, coheisve, well sorted, moist (CL). Changing at 83.5 feet to: Yellowish-brown to gray, GRAVEL, some coarse grained Sand, trace Silt, poorly sorted, wet (GW). Changing at 83.7 feet to: Yellowish-brown, fine to medium SAND, trace Silt, trace Gravel, well sorted, wet (SP).	SAND (SW) 82.4' SAND (SW) 83.4' 83.5' CLAY & SILT (CL) 83.7' GRAVEL (GW) SAND (SP)		
83									
84	43	24/23	84-86	3-6 11-14			84.7' GRAVEL (GW)		Grout
85							85.2' SAND (SP)		
86	44	24/24	86-88	3-4 9-15		Yellowish-brown, fine to medium SAND, trace Silt, trace Gravel, well sorted, wet (SP). Changing at 84.7 feet to: Yellowish-brown to gray, GRAVEL, some coarse to medium grained Sand, trace Silt, poorly sorted, wet (GW). Changing at 85.2 feet to: Yellowish-brown, fine grained SAND, trace Silt, very well sorted, wet (SP).			
87							87.2' SAND (SW)		
88	45	24/16	88-90	3-5 8-12		Yellowish-brown, fine grained SAND, trace Silt, very well sorted, wet (SP). Changing at 87.2 feet to: Yellowish-brown, coarse grained SAND, some Gravel, trace Silt, very well sorted, wet (SW).			
89						Yellowish-brown, medium to coarse grained SAND, some Gravel, trace Silt, poorly sorted wet (SW).			
90	46	24/22	90-92	3-4 7-11		Yellowish-brown, fine to medium SAND, trace Silt, moderately sorted, wet (SP). Changing at 91.6 feet to: Dark grayish-brown, CLAY & SILT, plastic, cohesive, well sorted, moist (CL). Changing at 91.7 feet to: Yellowish-brown, medium to coarse grained SAND, trace Silt, trace Gravel, grading finer with depth, well sorted, wet (SW).	90' SAND (SP)		
91							91.6' 91.7' CLAY & SILT (CL)		
92	47	24/1	92-94	5-7 12-13		Yellowish-brown, medium to coarse grained SAND, trace Silt, trace Gravel, grading finer with depth, well sorted, wet (SW).	SAND (SW)	1	
93									
94	48	24/4	94-96	5-7 9-10		Yellowish-brown, medium to coarse grained SAND, trace Silt, trace Gravel, grading finer with depth, well sorted, wet (SW).			
95									

REMARKS

1. Groundwater was encountered at approximately 91.7 feet below ground surface.

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1855 House Street NE
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Boring No.: SB-1/MW-1D
Page: 8 **of** 13
File No.: 16.0062335.52
Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	49	24/8	96-98	2-3 6-12		Yellowish-brown, medium to coarse grained SAND, trace Silt, trace Gravel, grading finer with depth, well sorted, wet (SW).	SAND (SW)		
97									
98	50	24/11	98-100	2-3 10-12		Yellowish-brown, medium to coarse grained SAND, trace Silt, trace Gravel, grading finer with depth, well sorted, wet (SW).			
99									
100	51	24/23	100-102	3-4 9-13		Yellowish-brown, medium to coarse grained SAND, trace Silt, trace Gravel, grading finer with depth, well sorted, wet (SW). Changing at 101.8 feet to: Dark yellowish-brown to yellowish-brown, CLAY & SILT, moderately plastic, cohesive, well sorted, moist (CL).			
101							101.8'		
102	52	24/11	102-104	1-1 3-9		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).	102 CLAY & SILT (CL) SAND (SP)		
103									
104	53	24/11	104-106	4-4 15-26		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
105									
106	54	24/11	106-108	1-5 15-30		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
107									
108	55	24/10	108-110	4-9 25-32		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
109									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-1/MW-1D

BORING_WELL 6233550 WWW HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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File No.: 16.0062335.52
Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	56	24/10	110-112	4-9 20-31		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).	SAND (SP)		
111									
112	57	24/8	112-114	2-5 14-27		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
113									
114	58	24/11	114-116	2-4 10-28		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
115									
116	59	24/14	116-118	4-10 25-40		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
117									
118	60	24/10	118-120	3-7 21-25		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
119									
120	61	24/16	120-122	4-7 14-31		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
121									
122	62	24/14	122-124	3-6 22-32		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
123									

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
	63	24/19	124-126	5-13 29-45		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).	SAND (SP)		
125									
126	64	24/1	126-128	1-5 18-34		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
127									
128	65	24/24	128-130	6-18 34-48		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
129									
130	66	24/23	130-132	5-10 28-46		Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP). Changing at 131.5 feet to: Yellowish-brown, medium to coarse grained SAND, trace Silt, moderately sorted, wet (SW). Changing at 131.7 feet to: Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
131									
132	67	24/23	132-134	5-15 30-45		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
133									
134	68	24/24	134-136	3-5 21-31		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
135									
136	69	24/11	136-138	6-16 29-43		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
137									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
	70	24/6	138-140	2-3 13-33		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).	SAND (SP)		
139									
140	71	24/11	140-142	2-4 9-27		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
141									
142	72	24/14	142-144	3-10 25-42		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
143									
144	73	24/20	144-146	9-25-50/5"		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
145									
146	74	24/18	146-148	6-27 52-53		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
147									
148	75	24/12	148-150	9-34 48-50/3"		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
149									
150	76	24/0	150-152	6-11 26-29		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
151									

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
	77	24/24	152-154	2-8 26-31		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).	SAND (SP)		
153									
154	78	24/20	154-156	5-12 28-43		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
155									
156	79	24/1	156-158	3-6 18-21		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
157									
158	80	24/24	158-160	7-8 19-25		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
159									
160	81	24/7	160-162	3-10 21-29		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
161									
162	82	24/0	162-164	4-11 25-32		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
163									
164	83	24/6	164-166	1-14 34-45		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
165									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
167	84	24/24	166-168	9-29 51-50/3"		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).	SAND (SP)		
168	85	24/13	168-170	3-6 18-34		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			
169									
170	86	24/1	170-172	5-6 19-44		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).			Top of Well Screen
171									Silica Sand Filter Pack
172	87	24/16	172-174	2-4 7-14		Yellowish-brown, fine to medium grained SAND, little Silt, trace Gravel, well sorted, wet (SP).	172' SAND (SM)		
173									2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
174	88	24/24	174-176	8-13 21-23		Yellowish-brown, fine to medium grained SAND, little Silt, very well sorted, wet (SP). Changing at 174.7 feet to: Yellowish-brown, SILT, trace Clay, non plastic, cohesive, very well sorted (bedded), moist (ML). Changing at 175.5 feet to: Yellowish-brown, SILT, trace Clay, moderately plastic, cohesive, very well sorted (bedded), wet (ML).	174.7' SILT (ML) 176'		
175									Bottom of Well Screen
176						Bottom of Borehole at 176.0 Feet		2	
177									
178									
179									

REMARKS

2. Monitoring well was installed in borehole upon completion. Well screen set from 170.1 to 174.7 feet below ground surface.

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Boring No.: SB-1/MW-1D

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Boring No.: MW-1S
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File No.: 16.0062335.52
Check: J Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 9-5-17 / 9-5-17
Boring Location:
GS Elev.: 788.70' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1						See SB-1/MW-1D boring log for detailed soil descriptions.			PROTECTIVE CASING; Backfill/Cement Pad
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									

REMARKS

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Boring No.: MW-1S

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Check: J Cai

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-1S

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
27									
28									
29									
30									
31									
32									Bentonite/Grout
33									
34									
35									
36									
37									
38									
39									

REMARKS

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BORING_WELL 6233550 WWW HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
41									
42									
43									
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
55									
56									
57									
58									
59									
60									
61									
62									
63									
64									Bentonite Seal
65									
66									
67									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
69									Top of Well Screen
70									Silica Sand Filter Pack
71									2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
72									
73									
74									Bottom of Well Screen
75						Bottom of Borehole at 75.0 Feet		1	
76									
77									
78									
79									
80									
81									

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 68.4 to 73.1 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: SB-2/MW-2S
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File No.: 16.0062335.52
Check: J Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 9-11-17 / 9-11-17
Boring Location:
GS Elev.: 797.60' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/18	0-2	7-8 8-10		Dark brown to yellowish-brown, SILT & CLAY, some Sand, plastic, cohesive, poorly sorted, moist (CL).	CLAY & SILT (CL)		PROTECTIVE CASING; Backfill/Cement Pad
2	2	24/23	2-4	8-8 9-9		Dark brown to yellowish-brown, SILT & CLAY, some Sand, plastic, cohesive, poorly sorted, moist (CL).			
4	3	24/22	4-6	5-6 7-7		Dark brown to yellowish-brown, CLAY & SILT, some Sand, plastic, cohesive, poorly sorted, moist (CL). Changing at 4.6 feet to: Brown to grayish-brown, SILT, some fine grained Sand, trace Clay, non to slightly plastic, slightly cohesive, moderately sorted moist (ML). Changing at 5.1 feet to: Yellowish-brown to brown, CLAY & SILT, some Sand, moderately plstic, cohesive, moderately sorted, moist (CL).	4.6' SILT (ML) 5.1' CLAY & SILT (CL)		
6	4	24/22	6-8	4-5 5-6		Yellowish-brown to brown, CLAY & SILT, some Sand, moderately plstic, cohesive, moderately sorted, moist (CL).			
8	5	24/17	8-10	2-4 6-6		Yellowish-brown to brown, CLAY & SILT, some Sand, moderately plastic, cohesive, moderately sorted, moist (CL). Changing at 9.0 feet to: Dark yellowish-brown, fine to medium SAND, trace Silt, moderately sorted moist (SP).	9' SAND (SP)		
10	6	24/17	10-12	3-4 4-4		Mottled dark yellowish-red to dark reddish-brown to dark brown to dark grayish-brown, SILT, some fine grained SAND, moderately sorted, moist (ML). Changing at 10.5 feet to: Yellowish-brown to pale brown, fine to medium SAND, trace Silt, well sorted, moist (SP).	10' SILT (ML) 10.5' SAND (SP)		

REMARKS

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Boring No.: SB-2/MW-2S

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
13	7	24/17	12-14	2-2 3-4		Yellowish-brown to pale brown, fine to medium SAND, trace Silt, well sorted, moist (SP).	SAND (SP)		
14	8	24/22	14-16	2-2 3-5		Yellowish-brown to pale brown, fine to medium SAND, trace Silt, well sorted, moist (SP). Changing at 15.2 feet to: Soft, Dark brown, CLAY & SILT, plastic, cohesive, moderately sorted, moist (CL). Changing at 15.3 feet to: Yellowish-brown to pale brown, fine to medium grained SAND, trace Silt, well sorted, moist (SP).	15.2' 15.3' CLAY & SILT (CL) SAND (SP)		
16	9	24/24	16-18	4-5 6-6		Yellowish-brown to pale brown, fine to medium grained SAND, trace Silt, well sorted, moist (SP). Changing at 16.6 feet to: Yellowish-brown, CLAY & SILT, plastic, cohesive, moderately sorted, moist (CL).	16.6' CLAY & SILT (CL)		
18	10	24/14	18-20	4-5 8-10		Yellowish-brown, CLAY & SILT, plastic, cohesive, moderately sorted, moist (CL). Changing at 18.6 feet to: Yellowish-brown, fie to coarse grained SAND, some Gravel, trace Silt, poorly sorted, moist SW). Changing at 19.0 feet to: Yellowish-brown, CLAY & SILT, plastic, cohesive, moderately sorted, moist (CL). Changing at 19.3 feet to: Yellowish-brown, fine grained SAND, some Silt, non plastic, moderately cohesive, well sorted, moist (SM).	18.6' SAND (SW) 19' 19.3' CLAY & SILT (CL) SAND (SM)		
20	11	24/24	20-22	4-5 8-10			20' CLAY & SILT (CL)		
22	12	24/16	22-24	2-3 5-6		Dark yellowish-brown to yellowish-brown, SILT & CLAY, moderately plastic, cohesive, well sorted, moist (CL). Changing at 21.7 feet to: Light gray to light brownish-gray, fine grained SAND, trace Silt, very well sorted, moist (SP). Dark yellowish-brown to yellowish-brown, SILT & CLAY, moderately plastic, cohesive, well sorted, moist (CL). Changing at 22.4 feet to: Light yellowish-brown to pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).	21.7' 22' SAND (SP) CLAY & SILT 22.4' (CL) SAND (SP)		
24	13	24/16	24-26	4-6 6-6		Light yellowish-brown to pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
25									

REMARKS

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Boring No.: SB-2/MW-2S

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Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
27	14	24/20	26-28	4-5 6-6		Light yellowish-brown to pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).	SAND (SP)		
28	15	24/18	28-30	6-7 12-12		Light yellowish-brown to pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
29									
30	16	24/22	30-32	7-9 11-13		Light yellowish-brown to pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP). Changing at 31.7 feet to: Light yellowish-brown, fine to medium grained SAND, trace Gravel, trace Silt, moderately well sorted, moist (SP).			
31									
32	17	24/18	32-34	7-7 7-8		Light yellowish-brown to yellowish-brown, fine grained SAND, trace Silt, very well sorted, moist (SP). Changing at 32.2 feet to: Pale brown to very pale brown, fine to coarse grained SAND, some Gravel, trace Silt, poorly sorted, moist (SW).	32.2' SAND (SW)		
33									
34	18	24/20	34-36	13-38 31-18		Pale brown, fine to coarse grained SAND, some Gravel, trace Silt, poorly sorted, moist (SW).			
35									
36	19	24/20	36-38	2-4 7-8		Very pale brown, fine grained SAND, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).	36' SAND (SP)		
37									Grout
38	20	24/19	38-40	2-3 6-7		Very pale brown, fine grained SAND, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).			
39									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-2/MW-2S

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	21	24/20	40-42	5-7 9-13		Very pale brown, fine grained SAND, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).	SAND (SP)		
41									
42	22	24/19	42-44	4-6 9-11		Very pale brown, fine grained SAND, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).			
43									
44	23	24/22	44-46	5-8 10-13		Very pale brown, fine grained SAND, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).			
45									
46	24	24/22	46-48	3-5 8-13		Very pale brown, fine grained SAND, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).			
47									
48	25	24/23	48-50	5-7 9-10		Very pale brown, fine grained SAND, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).			
49									
50	26	24/22	50-52	6-7 12-13		Very pale brown, fine grained SAND, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).			
51									
52	27	24/20	52-54	5-9 11-13		Very pale brown, fine grained SAND, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP). Changing at 52.8 feet to: Yellowish-brown, CLAY & SILT, well sorted, moist (CL). Changing at 52.9 feet to: Very pale brown, fine grained SAND, trace Silt, very well sorted, moist (SP).	52.8' 52.9' CLAY & SILT (CL) SAND (SP) 54'		
53									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
55	28	24/22	54-56	5-9 13-13		Yellowish-brown, fine to coarse grained SAND, trace Gravel, trace Silt, poorly sorted, moist (SW). Changing at 55.0 feet to: Very pale brown grading to yellowish-brown, fine grained SAND, little Silt, grading to fine to medium grained Sand, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).	SAND (SW) 55' SAND (SM)		
56	29	24/22	56-58	3-5 11-14		Very pale brown grading to yellowish-brown, fine grained SAND, little Silt, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).			
58	30	24/20	58-60	8-12 15-20		Very pale brown grading to yellowish-brown, fine grained SAND, little Silt, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).			
60	31	24/20	60-62	5-9 10-11		Very pale brown grading to yellowish-brown, fine grained SAND, little Silt, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).			
62	32	24/22	62-64	8-11 14-15		Very pale brown grading to yellowish-brown, fine grained SAND, little Silt, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).			
64	33	24/18	64-66	2-4 8-14		Very pale brown grading to yellowish-brown, fine grained SAND, little Silt, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).			
66	34	24/18	66-68	6-14 17-18		Very pale brown grading to yellowish-brown, fine grained SAND, little Silt, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).			

REMARKS

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Boring No.: SB-2/MW-2S

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	35	24/18	68-70	5-14 19-24		Very pale brown grading to yellowish-brown, fine grained SAND, little Silt, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP). Changing at 69.3 feet to: Light yellowish-brown, fine to coarse grained SAND, trace Silt, moderately sorted, moist (SW). Changing at 69.4 feet to: Very pale brown grading to yellowish-brown, fine grained SAND, little Silt, grading to fine to medium grained Sand, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).	SAND (SM)		
69							69.3'		
							69.4 SAND (SW)		
70	36	24/16	70-72	4-10 17-19			SAND (SP)		
71						Very pale brown grading to yellowish-brown, fine grained SAND, little Silt, grading to fine to medium grained Sand, trace Silt, very well sorted, moist with occasional trace Gravel, moist (SP).			
72	37	24/18	72-74	6-14 24-23		Brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
73									
74	38	24/23	74-76	2-3 5-10		Brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP). Changing at 75.5 feet to: Brown, fine to coarse grained SAND, trace Silt, trace Gravel, poorly sorted, wet (SW).			
75							75.5'		
							SAND (SW)		
76	39	24/18	76-78	2-8 14-20		Brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
77									
78	40	24/18	78-80	3-7 10-18		Brown, fine to coarse grained SAND, trace Silt, trace Gravel, poorly sorted, wet (SW).			Top of Well Screen Silica Sand Filter Pack
79									
80	41	24/18	80-82	3-9 9-19		Brown, fine to coarse grained SAND, trace Silt, trace Gravel, poorly sorted, wet (SW). Changing at 80.7 feet to: Brown, fine to medium SAND, trace Silt, trace Gravel, moderately well sorted, wet (SW).			
							80.7'		
81							SAND (SP)		2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
							82'		

REMARKS

1. Groundwater was not encountered during drilling or upon completion.
2. Monitoring well was installed in borehole upon completion. Well screen set from 78.5 to 83.1 feet below ground surface.

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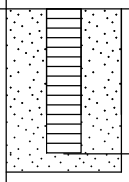
Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
						Bottom of Borehole at 82.0 Feet		1 2	 Bottom of Well Screen
83									
84									
85									
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									

REMARKS

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Check: J Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 9-12-17 / 9-12-17
Boring Location:
GS Elev.: 787.50' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
0						See SB-3/MW-3S boring log for detailed soil descriptions.			PROTECTIVE CASING
1									Backfill/Cement Pad
2									
3									
4									
5									
6									
7									
8									Bentonite/Grout
9									
10									
11									

REMARKS

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Boring No.: SB-3P/MW-3P

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
13									
14									
15									
16									Bentonite Seal
17									
18									
19									Top of Well Screen
20									
21									Silica Sand Filter Pack
22									2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
23	1	24/24	23-25	3-4 7-9		Medium dense, brown, well sorted, fine SAND, trace Silt, wet (SP). Changing at 24.3 feet to: Hard, gray and brown mottled, CLAY, trace Silt, damp (CL).	SAND (SP)		
24					>4.0 tsf		24.3' CLAY (CL)	1	Bottom of Well Screen
25						Bottom of Borehole at 25.0 Feet	25'	2	

REMARKS

1. Pocket penetrometer readings were measured in tons per square foot (tsf) and are used to evaluate consistency of cohesive soil.
2. Monitoring well was installed in borehole upon completion. Well screen set from 19.0 to 24.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check: J Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 9-12-17 / 9-12-17
Boring Location:
GS Elev.: 788.10' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

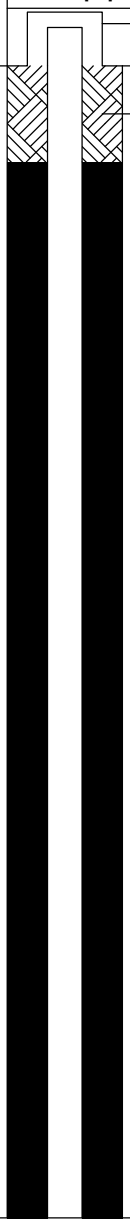
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/21	0-2	5-6 6-7	0.0 ppm >4.0 tsf	Hard, brown, CLAY, trace Silt, trace fine Sand, dry (CL).	CLAY (CL)	1 2
2	2	24/21	2-4	7-5 5-4	0.0 ppm	Loose, dark brown, yellowish brown, fine SAND, trace Silt, damp (SP).	2' SAND (SP)	
4	3	24/14	4-6	3-2 2-3	0.0 ppm	Loose, dark yellowish brown, fine SAND, trace Silt, damp (SP) Changing at 5.2 feet to: Loose, dark yellowish-brown, fine SAND, little Gravel, trace Silt, damp (SP).		
6	4	24/21	6-8	2-5 5-5		Loose, yellowish-brown, well sorted, fine SAND, damp (SP). Changing at 7.8 feet to: Loose, pale brown, fine SAND, damp (SP).		
8	5	24/21	8-10	1-4 5-7		Loose, pale brown, well sorted, fine SAND, trace Silt, damp (SP).		
10	6	24/20	10-12	4-5 6-7		Loose, pale brown, well sorted, fine SAND, trace Silt, damp (SP).		

Equipment Installed



REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million (ppm) of isobutylene. Background was measured at 0.0 ppm.
2. Pocket penetrometer readings were measured in tons per square foot (tsf) and are used to evaluate consistency of cohesive soil.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	7	24/20	12-14	3-5 5-5		Loose, pale brown, well sorted, fine SAND, trace Silt, damp (SP).	SAND (SP)		
13									
14	8	24/20	14-16	4-5 5-5		Loose, pale brown, well sorted, fine SAND, trace Silt, damp (SP).			
15									
16	9	24/24	16-18	2-5 9-10	>4.0 tsf	Loose, pale brown, well sorted, fine SAND, trace Silt, damp (SP). Changing at 16.2 feet to: Hard, brown, CLAY, trace Silt, damp (CL). Changing at 17.8 feet to: Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).	16.2' CLAY (CL)		
17							17.8' SAND (SP)		
18	10	24/24	18-20	2-6 7-9		Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP). Changing at 18.2 feet to: Brown, CLAY, trace Silt, damp (CL). Changing at 19.0 feet to: Medium dense, brown, well sorted, fine to medium SAND, trace Silt, moist (SP).	18.2' CLAY (CL)		
19							19' SAND (SP)		
20	11	24/24	20-22	5-6 7-10	>4.0 tsf	Hard, brown, CLAY, trace Silt, damp (CL). Changing at 20.5 feet to: Medium dense, brown, well sorted, fine to medium SAND, trace Silt, moist (SP). Changing at 21.5 feet to: Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).	20' CLAY (CL)		
21							20.5' SAND (SP)		
22	12	24/22	22-24	4-4 5-6		Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP). Changing at 23.5 feet to: Medium dense, pale brown, well sorted, fine SAND, some Silt, wet (SM).			
23							23.5' SAND (SM)		
24	13	24/22	24-26	4-4 5-6		Medium dense, pale brown, well sorted, fine SAND, some Silt, wet (SM). Changing at 25.3 feet to: Hard, light gray and brown mottled, CLAY, trace Silt, moist (CL). Changing at 25.9 feet to: Loose, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
25							25.3' CLAY (CL)		
							25.9'		

REMARKS

3. Double cased from 0.0 to 25.0 feet during drilling.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
27	14	24/20	26-28	2-2 6-8	>4.0 tsf	Loose, pale brown, well sorted, fine SAND, trace Silt, moist (SP).	SAND (SP)	3	
28	15	24/20	28-30	6-10 10-11		Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
30	16	24/20	30-32	2-4 9-10		Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
32	17	24/21	32-34	5-12 13-20		Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
34	18	24/19	34-36	8-16 28-40		Dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			Grout
36	19	24/21	36-38	18-18 19-31		Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
38	20	24	38-40			Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	21	24	40-42			Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).	SAND (SP)		
41									
42	22	24	42-44			Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
43									
44	24	24	44-46			Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
45									
46	26	24	46-48			Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
47									
48	27	24	48-50			Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
49									
50	28	24	50-52			Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
51									
52	30	24	52-54			Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
53									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	31	24	54-56			Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).	SAND (SP)		
55									
56	32	24	56-58			Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
57									
58	33	24	58-60			Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
59									
60	34	24	60-62			Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
61									
62	35	24	62-64			Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP). Changing at 63.0 feet to: Light yellowish-brown to yellowish-brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
63									
64	36	24	64-66			Yellowish-brown, fine to medium SAND, trace Silt, very well sorted, wet (SP).		4	
65									
66	37	24	66-68			Yellowish-brown, fine to medium SAND, trace Silt, very well sorted, wet (SP). Changing at 67.0 feet to: Yellowish-brown, fine to medium SAND, some Silt, very well sorted, wet (SM). Changing at 67.2 feet to: Yellowish-brown, fine to medium SAND, trace Silt, very well sorted, wet (SP).	67' 67.2'SAND (SM) SAND (SP)		
67									

REMARKS

4. Groundwater was encountered at approximately 64.0 feet below ground surface.

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BORING_WELL 6233550 WWW HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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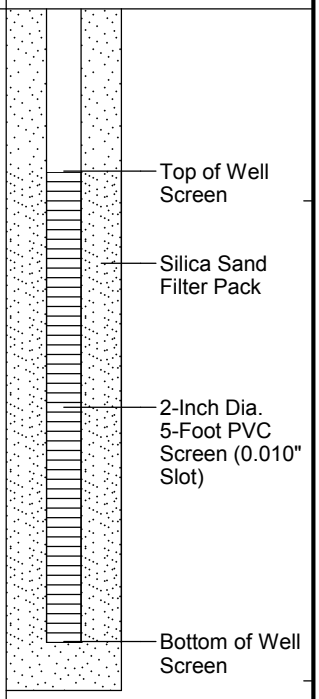
GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide, Inc.
1855 House Street NE
Belmont, Michigan

Boring No.: SB-3/MW-3S
Page: 6 **of** 6
File No.: 16.0062335.52
Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
69	38	24	68-70			Yellowish-brown, fine to medium SAND, trace Silt, very well sorted, wet (SP).	SAND (SP)		
70	39	24	70-72			Yellowish-brown, fine to medium SAND, trace Silt, very well sorted, wet (SP).			
72	40	24	72-74			Yellowish-brown, fine to medium SAND, trace Silt, very well sorted, wet (SP). Changing at 73.8 feet to: Yellowish-brown, fine to medium SAND, some Silt, well sorted, wet (SM).			
74	41	24	74-76			Yellowish-brown, fine to medium SAND, some Silt, well sorted, wet (SM).	73.8' SAND (SM)		
76						Bottom of Borehole at 76.0 Feet	76'	5	
77									
78									
79									
80									
81									



REMARKS

5. Monitoring well was installed in borehole upon completion. Well screen set from 69.7 to 74.6 feet below ground surface.

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1855 House Street NE
Belmont, Michigan

Boring No.: SB-4/MW-4S
Page: 1 **of** 6
File No.: 16.0062335.52
Check: J Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 9-12-17 / 9-12-17
Boring Location:
GS Elev.: 782.30' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

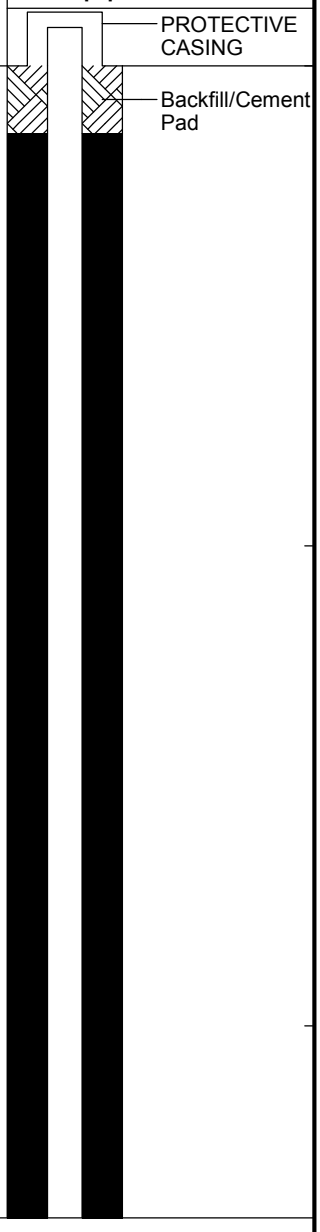
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
0	1	24/14	0-2	1-1 1-1	0.0 ppm	Very loose, yellowish- brown, well sorted, fine SAND, some Organic Matter (roots), trace Silt, dry (SP).	SAND	1
2	2	24/14	2-4	1-2 2-2	0.0 ppm	Loose, pale brown, well sorted, fine SAND, damp (SP).		
4	3	24/13	4-6	2-2 4-5	0.1 ppm	Loose, pale brown, well sorted, fine SAND, damp (SP).		
6	4	24/14	6-8	2-3 5-7	0.0 ppm	Loose, pale brown, well sorted, fine SAND, damp (SP).		
8	5	24/14	8-10	3-3 5-7	0.0 ppm	Loose, pale brown, well sorted, fine SAND, damp (SP).		
10	6	24/21	10-12	5-5 7-8	0.0 ppm >4.0 tsf	Loose, pale brown, well sorted, fine SAND, damp (SP). Changing at 11.0 feet to: Hard, gray and brown mottled, CLAY, trace Silt, damp (CL).	11' CLAY (CL)	2

Equipment Installed



REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million (ppm) of isobutylene. Background was measured at 0.0 ppm.
2. Pocket penetrometer readings were measured in tons per square foot (tsf) and are used to evaluate consistency of cohesive soil.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-4/MW-4S

BORING_WELL 6233550 WWW HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	7	24	12-14	5-6 7-7	0.0 ppm >4.0 tsf	Hard, gray and brown mottled, CLAY, trace Silt, damp (CL). Changing at 13.0 feet to: Medium dense, pale brown and brown mottled, well sorted, fine SAND, trace Silt, damp (SP).	CLAY (CL) 13' SAND (SP)		
14	8	24/24	14-16	2-2 3-2	0.0 ppm	Loose, yellowish-brown, well sorted, fine SAND, trace Silt, damp (SP).			
16	9	24/18	16-18	1-1 1-3	0.0 ppm	Loose, yellowish-brown, well sorted, fine SAND, trace Silt, damp (SP). Changing at 17.8 feet to: Loose, yellowish-brown, well sorted, fine GRAVEL, trace Silt, damp (GW).			
18	10	24/16	18-20	2-3 6-7	0.0 ppm	Loose, yellowish-brown, well sorted, fine GRAVEL, trace Silt, damp (GW). Changing at 19.0 feet to: Medium dense, yellowish-brown, well sorted, fine SAND, trace Silt, damp (SP).	18' GRAVEL (GW) 19' SAND (SP)		
20	11	24/15	20-22	6-7 9-9	0.0 ppm	Medium dense, yellowish-brown, well sorted, fine SAND, trace Silt, damp (SP).			
22	12	24/24	22-24	4-8 8-10	0.0 ppm	Medium dense, yellowish-brown, well sorted, fine SAND, trace Silt, moist (SP). Changing at 23.9 feet to: Hard, brown, CLAY, damp (CL).			
24	13	24/24	24-26	6-7 9-10	0.0 ppm >4.0 tsf	Hard, brown, CLAY, damp (CL).	23.9' CLAY (CL) 26'		

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
27	14	24/0	26-28			NO RECOVERY.	NO RECOVERY		
28	15	24/16	28-30	5-9 11-15	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, damp (SP).	28' SAND (SP)		
29									
30	16	24/15	30-32	6-12 13-21	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, damp (SP).			
31									
32	17	24/17	32-34	4-18 31-39	0.0 ppm	Dense, pale brown, well sorted, fine SAND, trace Silt, damp (SP).			
33									Bentonite/Grout
34	18	24/17	34-36	7-10 15-19	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, damp (SP).			
35									
36	19	24/17	36-38	4-10 15-22	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, trace Gravel, damp (SP).			
37									
38	20	24/20	38-40	10-12 21-24	0.0 ppm	Dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
39									

REMARKS

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Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
41	21	24/17	40-42	10-11 16-19	0.0 ppm	Dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP). Encountered Rock at 40.2 feet.	SAND (SP)		
42	22	24/19	42-44	7-11 17-25	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
44	23	24/19	44-46	7-12 23-26	0.0 ppm	Dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
46	24	24/19	46-48	10-14 15-15	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
48	25	24/20	48-50	8-14 36-49	0.0 ppm	Dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
50	26	24/24	50-52	18-37 47-47	0.0 ppm	Very dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
52	27	24/21	52-54	33-29 52-50/3"	0.0 ppm	Very dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
55	28	24/16	54-56	19-58-50/4"	0.0 ppm	Very dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).	SAND (SP)		
56	29	24	56-58			Light yellowish-brown to pale brown, very well sorted, fine to medium SAND, trace Silt, moist (SP).			
58	30	24	58-60			Light yellowish-brown to pale brown, very well sorted, fine to medium SAND, trace Silt, moist (SP). Changing at 59.6 feet to: Brown, very well sorted, fine to medium SAND, trace Silt, wet (SP).		3	
60	31	24	60-62			Brown, very well sorted, fine to medium SAND, trace Silt, wet (SP).			
62	32	24	62-64			Brown, very well sorted, fine to medium SAND, trace Silt, wet (SP).			
64	33	24	64-66			Brown, very well sorted, fine to medium SAND, trace Silt, wet (SP).			
66	34	24	66-68			Brown, very well sorted, fine to medium SAND, trace Silt, wet (SP).			Bentonite Seal
67									

REMARKS

3. Groundwater was encountered at approximately 59.6 feet below ground surface.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	35	24	68-70			Brown, very well sorted, fine to medium SAND, trace Silt, wet (SP).	SAND (SP)		
69									
70	36	24	70-72			Brown, very well sorted, fine to medium SAND, trace Silt, wet (SP).			
71									Top of Well Screen Silica Sand Filter Pack
72	37	24	72-74			Brown, very well sorted, fine to medium SAND, trace Silt, wet (SP).			
73									
74	38	24	74-76			Brown, very well sorted, fine to medium SAND, trace Silt, wet (SP).			2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
75									
76						Bottom of Borehole at 76.0 Feet	76'	4	Bottom of Well Screen
77									
78									
79									
80									
81									

REMARKS

4. Monitoring well was installed in borehole upon completion. Well screen set from 71.1 to 75.7 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Wolverine World Wide, Inc.
1855 House Street NE
Belmont, Michigan

Boring No.: SB-5/MW-5D
Page: 1 **of** 6
File No.: 16.0062335.52
Check: J Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Joe Workman/Adam Kittler
Date Start/Finish: 12-1-17 / 12-5-17
Boring Location:
GS Elev.: 779.10' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	17.5" / 12.0"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–19						Blind drill from 0.0 to 20.0 feet. Cuttings observed to consist of brown, fine to medium SAND, trace Silt, damp (SP). See SB-5/MW-5S boring log detailed soil descriptions from 0.0 to 66.0 feet.	SAND (SP) (BLIND DRILL)		PROTECTIVE CASING
20	1	24/24	20-22	16/24"	2.5 tsf	Very stiff, gray, Silty CLAY, trace fine Sand, damp (CL).	20' Silty CLAY (CL)	1	
21–22						Blind drill from 22.0 to 69.0 feet.	22'	2 3	
23–29									

REMARKS

1. Pocket penetrometer readings were measured in tons per square foot (tsf) and are used to evaluate the consistency of cohesive soil.
2. Spoon driven to confirm depth of confining layer.
3. Double cased from 0.0 to 22.0 feet during drilling.

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Boring No.: SB-5/MW-5D

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									
42									
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63									
64									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
66									
67									
68									
69	34	24/20	69-71	5-7 9-10	0.0 ppm	Loose, brown, well sorted, fine SAND, trace wet (SP).	SAND (SP)	4	
70									
71									
72									
73									
74	35	24/13	74-76	7-9 12-17	0.0 ppm	Medium dense, brown, well sorted, fine SAND, trace Silt, moist (SP).			
75									
76									
77									
78									
79	36	24/18	79-81	1-3 4-9	0.0 ppm	Loose, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
80									
81									
82									
83									
84	37	24/6	84-86	2-5 11-11	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Gravel, trace Silt, moist (SP).			
85									
86									
87									
88									
89	38	24/12	89-91	2-5 10-14	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Gravel, trace Silt, moist (SP).			
90									
91									
92									
93									Bentonite/Grout
94	39	24/18	94-96	3-10 11-24	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
95									
96									
97									
98									
99	40	24/24	99-101	3-4 10-14	0.0 ppm	Medim dense, pale brown, well sorted, fine			

REMARKS

4. Field screening of samples for orgainc vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million (ppm) of isobutylene. Background was measured at 0.0 ppm.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
101						SAND, trace Silt, trace Gravel, moist (SP).	SAND (SP)		
102									
103									
104	41	24/9	104-106	2-6 10-19	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
105									
106									
107									
108									
109	42	24/14	109-111	4-8 18-26	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, grace Gravel, moist (SP).			
110									
111									
112									
113									
114	43	24/8	114-116	5-9 16-22	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, trace Gravel, moist (SP).			
115									
116									
117									
118									
119	44	24/8	119-121	2-4 10-11	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
120									
121									
122									
123									
124	45	24/8	124-126	3-11 22-27	0.0 ppm	Dense, pale brown, well sorted, fine SAND, trace Silt, trace Gravel, moist (SP).			
125									
126									
127									
128									
129	46	24/24	129-131	3-8 17-31	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, trace Gravel, moist (SP).			
130									
131									
132									
133									
134	47	24/13	134-136	10-22-50/6"	0.0 ppm	Very dense, pale brown, well sorted, fine			

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
136						SAND, little Gravel, trace Silt, moist (SP).	SAND (SP)		
137									
138									
139	48	24/14	139-141	10-23 34-35	0.0 ppm	Very dense, pale brown, well sorted, fine SAND, little Gravel, trace Silt, moist (SP).			
140									
141									
142									
143									
144	49	24/6	144-146	4-7 14-21	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
145									
146									
147									
148									
149	50	24/5	149-151	1-3 8-17	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
150									
151									
152									
153									
154	51	24/3	154-156	4-22-50/6"	0.0 ppm	Very dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
155									
156									
157									
158									
159	52	24/18	159-161	10-21 29-34	0.0 ppm	Dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
160									
161									
162									
163									
164	53	24/12	164-166	8-11 11-11	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Gravel, trace Silt, moist (SP).			
165									
166									
167									
168									
169	54	24/12	169-171	3-3 3-5	0.0 ppm	Loose, pale brown, well sorted, fine SAND,			

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
171						trace Silt, trace Gravel, moist (SP).	SAND (SP)		
172									
173									
174	55	24/10	174-176	1-1 1-2	0.0 ppm	Very loose, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
175									
176									
177									
178									
179	56	24/12	179-181	1-3 1-3	0.0 ppm	Very loose, pale brown, well sorted, fine SAND, trace Silt, trace Gravel, moist (SP).			
180									
181									
182									
183									
184	57	24/18	184-186	1-1 1-1	0.0 ppm	Very loose, pale brown, well sorted, fine SAND, little Gravel, trace Silt, moist (SP).			
185									
186									
187									
188									Top of Well Screen
189	58	24/12	189-191	1-3 10-21	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, little Gravel, trace Silt, moist (SP).			
190									
191									
192									Silica Sand Filter Pack
193									2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
194	59	24/8	194-196	32-38-50/4"	0.0 ppm	Very dense, pale brown, well sorted, fine SAND, little Gravel, trace Silt, trace Cobbles, moist (SP).			
195									
196									
197									
198	60	24/0	198-200	50/0"		NO RECOVERY.	198' NO RECOVERY		Bottom of Well Screen
199									
200						Bottom of Borehole at 200.0	200'	5	
201									
202									
203									
204									

REMARKS

5. Monitoring well was installed in borehole upon completion. Well screen set from 188.0 to 198.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6233550 WWW HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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1855 House Street NE
Belmont, Michigan

Boring No.: MW-5P
Page: 1 **of** 2
File No.: 16.0062335.52
Check: J Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 9-19-17 / 9-19-17
Boring Location:
GS Elev.: 778.90' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
0						See SB-5/MW-5S boring log for detailed soil descriptions.			PROTECTIVE CASING
1									Backfill/Cement Pad
2									
3									
4									
5									
6									
7									Bentonite/Grout
8									
9									
10									
11									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-5P

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Boring No.: MW-5P
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File No.: 16.0062335.52
Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
13									
14									Bentonite Seal
15									
16									
17									Top of Well Screen
18									
19									Silica Sand Filter Pack
20									2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
21									
22									Bottom of Well Screen
						Bottom of borehole at 22.3 Feet		1	
23									
24									
25									

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 17.1 to 21.8 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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File No.: 16.0062335.52
Check: J Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 9-19-17 / 9-19-17
Boring Location:
GS Elev.: 778.80' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/19	0-2	6-5 8-9		Dark yellowish-brown, fine to coarse grained SAND, little Gravel, trace Silt, poorly sorted, dry to moist (FILL). Changing at 0.4 feet to: Light yellowish-brown, fine to coarse grained SAND, trace Silt, trace Gravel, moderately sorted, moist (FILL). Changing at 0.7 feet to: Very dark grayish-brown to dark yellowish-brown, fine grained SAND, some Silt, slightly cohesive, moderately sorted, moist (FILL). Changing at 1.2 feet to: Brownish-yellow grading to pale brown to very pale brown, fine grained SAND, trace Silt, well sorted, moist (SP).	SAND (FILL)		PROTECTIVE CASING
2	2	24/20	2-4	4-5 5-5			1.2' SAND (SP)		Backfill/Cement Pad
3									
4	3	24/18	4-6	2-3 3-4		Brownish-yellow grading to pale brown to very pale brown, fine grained SAND, trace Silt, well sorted, moist (SP). Changing at 3.2 feet to: Dark yellowish-brown to brown, fine to medium grained SAND, little Clay, little Silt, trace Gravel, slightly plastic, moderately cohesive, poorly sorted, moist (SC). Changing at 3.5 feet to: Dark yellowish-brown, CLAY & SILT, plastic, cohesive, modereately well sorted, moist (CL).	3.5' CLAY & SILT (CL)		
5									
6	4	24/19	6-8	2-2 2-3		Dark yellowish-brown, CLAY & SILT, plastic, cohesive, modereately well sorted, moist (CL). Light yellowish-brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).	6' SAND (SP)		
7									
8	5	24/17	8-10	2-2 3-4		Light yellowish-brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
9									
10	6	24/18	10-12	3-4 4-6		Light yellowish-brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
11						Light yellowish-brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-5/MW-5S

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Boring No.: SB-5/MW-5S
Page: 2 **of** 15
File No.: 16.0062335.52
Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	7	24/23	12-14	2-3 5-9		Light yellowish-brown, fine to medium SAND, trace Silt, very well sorted, moist (SP). Light yellowish-brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).	SAND (SP)		
13									
14	8	24/20	14-16	3-9 10-10		Light yellowish-brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
15									
16	9	24/20	16-18	2-4 4-4		Light yellowish-brown, fine to medium SAND, trace Silt, very well sorted, moist (SP). Light yellowish-brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
17									
18	10	24/19	18-20	3-5 5-4		Light yellowish-brown, fine to medium SAND, trace Silt, very well sorted, moist (SP). Changing at 19.5 feet to: Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, moist (SP). Changing at 19.3 feet to: Dark brown to dark yellowish-brown grading to black, fine to medium grained SAND, trace Silt, well sorted, moist to wet (SP).			
19									
20	11	24/18	20-22	3-3 4-3		Dark yellowish-brown, fine to medium grained SAND, trace Silt, wet sorted, moist to wet (SP). Changing at 20.2 feet to: Dark gray, fine to medium grained SAND, trace Silt, well sorted, wet (SP). Changing at 20.3 feet to: Reddish-gray, fine to medium grained SAND, trace Silt, well sorted, wet (SP). Changing at 20.7 feet to: Yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
21									
22	12	24/23	22-24	2-5 8-8		Brown, Silty CLAY, plastic, cohesive, very well sorted, moist (CL).	22' Silty CLAY (CL)		
23									
24	13	24/20	24-26	4-6 6-7		Brown, Silty CLAY, plastic, cohesive, very well sorted, moist (CL).			
25							26'		

REMARKS

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Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
27	14	24/17	26-28	3-5 8-9		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).	SAND (SP)		
28	15	24/18	28-30	4-6 8-9		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			Bentonite/Grout
29									
30	16	24/24	30-32	5-6 9-10		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
31									
32	17	24/18	32-34	3-5 9-13		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
33									
34	18	24/18	34-36	3-7 13-16		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
35									
36	19	24/19	36-38	3-7 10-10		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
37									
38	20	24/24	38-40	3-5 8-12		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
39									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
41	21	24/22	40-42	3-5 11-16		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).	SAND (SP)		
42	22	24/24	42-44	3-11 18-21		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
44	23	24/20	44-46	5-10 14-17		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
46	24	24/24	46-48	4-7 9-9		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
48	25	24/20	48-50	3-8 11-15		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
50	26	24/24	50-52	3-10 17-18		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
52	27	24/22	52-54	9-13 21-25		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			

REMARKS

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Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
55	28	24/24	54-56	4-5 8-10		Pale brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP). Changing at 54.5 feet to: Brown to yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).	SAND (SP)	1	
56	29	24/24	56-58	3-4 5-6		Brown to yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			Bentonite Seal
58	30	24/16	58-60	2-3 5-5		Brown to yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
60	31	24/16	60-62	1-1 2-2		Brown to yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP). Brown to yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			
62	32	24/5	62-64	1-4 7-11		Brown to yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			Top of Well Screen Silica Sand Filter Pack
64	33	24/11	64-66	2-6 10-10		Brown to yellowish-brown, fine to medium grained SAND, trace Silt, well sorted, wet (SP).			2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
66							66'		Bottom of Well Screen
67									

REMARKS

1. Groundwater was encountered at approximately 54.5 feet below ground surface.

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Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
69	34	24/20	69-71	5-7 9-10	0.0 ppm	Loose, brwn, well sorted, fine SAND, trace Silt, moist (SP).			
70									
71									
72									
73									
74	35	24/13	74-76	7-9 12-17	0.0 ppm	Medium dense, brown, well sorted, fine SAND, trace Silt, moist (SP).			
75									
76									
77									
78									
79	36	24/18	79-81	1-3 4-9	0.0 ppm	Loose, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
80									
81									

REMARKS

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Boring No.: SB-5/MW-5S

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
83									
84	37	24/6	84-86	2-5 11-11	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Gravel, trace Silt, moist (SP).			
85									
86									
87									
88									
89	38	24/12	89-91	2-5 10-14	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Gravel, trace Silt, moist (SP).			
90									
91									
92									
93									
94	39	24/18	94-96	3-10 11-24	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
95									

REMARKS

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Boring No.: SB-5/MW-5S

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
97									
98									
99	40	24/24	99-101	3-4 10-14	0.0 ppm	Medim dense, pale brown, well sorted, fine SAND, trace Silt, trace Gravel, moist (SP).			
100									
101									
102									
103									
104	41	24/9	104-106	2-6 10-19	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
105									
106									
107									
108									
109	42	24/14	109-111	4-8 18-26	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, grace Gravel, moist (SP).			

REMARKS

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Check: J Cai

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
111									
112									
113									
114	43	24/8	114-116	5-9 16-22	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, trace Gravel, moist (SP).			
115									
116									
117									
118									
119	44	24/8	119-121	2-4 10-11	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
120									
121									
122									
123									

REMARKS

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BORING_WELL 6233550 WWW HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
	45	24/8	124-126	3-11 22-27	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, trace Gravel, moist (SP).			
125									
126									
127									
128									
129	46	24/24	129-131	3-8 17-31	0.0 ppm	Dense, pale brown, well sorted, fine SAND, trace Silt, trace Gravel, moist (SP).			
130									
131									
132									
133									
134	47	24/13	134-136	10-22-50/6"	0.0 ppm	Very dense, pale brown, well sorted, fine SAND, little Gravel, trace Silt, moist (SW).			
135									
136									
137									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
139	48	24/14	139-141	10-23 34-35	0.0 ppm	Dense, pale brown, well sorted, fine SAND, little Gravel, trace Silt, moist (SW).			
140									
141									
142									
143									
144	49	24/6	144-146	4-7 14-21	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
145									
146									
147									
148									
149	50	24/5	149-151	1-3 8-17	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
150									
151									

REMARKS

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Boring No.: SB-5/MW-5S

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
153									
154	51	24/3	154-156	4-22-50/6"	0.0 ppm	Very dense, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
155									
156									
157									
158									
159	52	24/18	159-161	10-21 29-34	0.0 ppm	Dense, plae brown, well sorted, fine SAND, trace Silt, moist (SP).			
160									
161									
162									
163									
164	53	24/12	164-166	8-11 11-11	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, trace Gravel, trace Silt, moist (SP).			
165									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6233550 WWW HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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1855 House Street NE
Belmont, Michigan

Boring No.: SB-5/MW-5S
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File No.: 16.0062335.52
Check: J Cai

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
167									
168									
169	54	24/12	169-171	3-3 3-5	0.0 ppm	Loose, pale brown, well sorted, fine SAND, trace Silt, trace Gravel, moist (SP).			
170									
171									
172									
173									
174	55	24/10	174-176	1-1 1-2	0..0 ppm	Very loose, pale brown, well sorted, fine SAND, trace Silt, moist (SP).			
175									
176									
177									
178									
179	56	24/12	179-181	3-3 3-3	0.0 ppm	Very loose, pale brown, well sorted, fine SAND, trace Silt, trace Gravel, moist (SP).			

REMARKS

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Boring No.: SB-5/MW-5S

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Boring No.: SB-5/MW-5S
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Check: J Cai

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
181									
182									
183									
184	57	24/18	184-186	1-1 1-1	0.0 ppm	Very loose, pale brown, well sorted, fine SAND, little Gravel, trace Silt, moist (SW).			
185									
186									
187									
188									
189	58	24/12	189-191	1-3 10-21	0.0 ppm	Medium dense, pale brown, well sorted, fine SAND, little Gravel, trace Silt, moist (SW).			
190									
191									
192									
193									

REMARKS

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File No.: 16.0062335.52
Check: J Cai

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
	59	24/8	194-196	32-38-50/4"	0.0 ppm	Very dense, pale brown, well sorted, fine SAND, little Gravel, trace Silt, trace Cobbles, moist (SP).			
195									
196									
197									
198	60	24/0	198-200	50/0"		NO RECOVERY.			
199									
200						Bottom of Borehole at 200.0		2	
201									
202									
203									
204									
205									
206									
207									

REMARKS

2. Monitoring well was installed in borehole upon completion. Well screen set from 61.9 to 66.6 feet below ground surface.

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Boring No.: SB-6D/MW-6D
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File No.: 16.0062335.52
Check: J Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Julie Groenleer
Date Start/Finish: 10-31-17 / 11-2-17
Boring Location:
GS Elev.: 770.60' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1						See SB-6/MW-6S for soil description from 0.0 to 70.0 feet.			PROTECTIVE CASING
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-6D/MW-6D

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									
42									
43									
44									
45									
46									
47									
48									
49									
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51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									
63									
64									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
66									
67									
68									
69									
70	1	24/18	70-72	1-2 4-12		Loose, brown, fine to medium SAND, trace Silt, wet (SP).	SAND (SP)		
71									
72	2	24/13	72-74	2-3 11-17		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
73									
74	3	24/1	74-76	7-11 19-18		Medium dense, light brown, fine Silty SAND, wet (SM).	74' Silty SAND (SM)		
75									
76	4	24/4	76-78	2-3 3-8		Loose, brown, fine to medium SAND, trace Silt, wet (SP).	76' SAND (SP)		Bentonite/Grout
77									
78	5	24/12	78-80	4-7 15-18		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
79									
80	6	24/20	80-82	2-6 17-25		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
81									
82	7	24/16	82-84	2-2 4-8		Loose, brown, fine to medium SAND, trace Silt, wet (SP).			
83									
84	8	24/12	84-86	2-2 2-7		Very loose, brown, fine to medium SAND, trace Silt, wet (SP).			
85									
86	9	24/20	86-88	5-16 37-35		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
87									
88	10	24/13	88-90	5-6 56-50		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
89									
90	11	24/24	90-92	6-17 60-30		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
91									
92	12	24/0	92-94	4-7 10-11		NO RECOVERY.	92' NO RECOVERY		
93									
94	13	24/0	94-96	2-3 4-11		NO RECOVERY.			
95									
96	14	24/24	96-98	2-7 9-24		Medium dense, brown, fine SAND, trace medium Sand, trace Silt, wet (SP).	96' SAND (SP)		
97									
98	15	24/24	98-100	3-6 13-22		Medium dense, brown, fine SAND, trace medium Sand, trace Silt, wet (SP). Changing at 99.6 feet to: Medium dense,	99.6'		
99							100'		

REMARKS

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Boring No.: SB-6D/MW-6D
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File No.: 16.0062335.52
Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
101	16	24/11	100-102	3-8 20-31		brown, fine Silty SAND, wet (SM). Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).	Silty SAND (SM)/ SAND (SP)		
102 103	17	24/18	102-104	2-3 10-15		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
104 105	18	24/6	104-106	5-10 23-22		Dense, brown, fine Silty SAND, wet (SM).	104' Silty SAND (SM)		
106 107	19	24/17	106-108	9-19 29-29		Dense, brown, fine Silty SAND, wet (SM).			
108 109	20	24/12	108-110	5-12 18-18		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).	108' SAND (SP)		
110 111	21	24/13	110-112	2-3 5-17		Loose, brown, fine to medium SAND, trace Silt, wet (SP).			
112 113	22	24/0	112-114	3-4 7-12		NO RECOVERY.	112' NO RECOVERY		
114 115	23	24/0	114-116	3-5 15-17		NO RECOVERY.			
116 117	24	24/0	116-118	4-13 30-45		NO RECOVERY (bailed for sample description: Brown, fine to medium SAND, trace Silt, moist (SP)).	116' NO RECOVERY (bailed for sample description: SAND (SP))		
118 119	25	24/10	118-120	9-29 46-54		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).	118' SAND (SP) with Silty SAND in spoon at 120.0 feet		
120 121	26	24/8	120-122	6-7 9-19		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
122 123	27	24/24	122-124	10-22 37-39		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
124 125	28	24/24	124-126	6-21 28-28		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			
126 127	29	24/24	126-128	11-19 33-24		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
128 129	30	24/12	128-130	3-3 3-10		Loose, brown, fine to medium SAND, trace Silt, wet (SP).			
130 131	31	24/24	130-132	8-25 35-17		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
132 133	32	24/14	132-134	12-29 44-50		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
134	33	24/20	134-136	2-7 30-50		Dense, brown, fine to medium SAND, trace			

REMARKS

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BORING_WELL 6233550 WWW HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: SB-6D/MW-6D
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Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
136						Silt, wet (SP).	SAND (SP) with Silty SAND in spoon at 120.0 feet		
137	34	24/19	136-138	2-4 12-21		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
138	35	24/14	138-140	8-11 11-14		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
140	36	24/12	140-142	5-11 23-24		Dense, brown, fine to medium SAND, trace Silt, trace fine Gravel, wet (SP).			
142	37	24/12	142-144	4-8 12-18		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
144	38	24/10	144-146	1-3 12-17		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
146	39	24/8	146-148	1-2 4-8		Loose, brown, fine to medium SAND, trace Silt, wet (SP).			
148	40	24/9	148-150	1-3 7-14		Loose, brown, fine to medium SAND, trace Silt, wet (SP).			
150	41	24/7	150-152	1-2 5-7		Loose, brown, fine to medium SAND, trace Silt, wet (SP).			
152	42	24/0	152-154	3-7 20-32		NO RECOVERY.	152' NO RECOVERY		
154	43	24/24	154-156	3-8 18-32		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).	154' SAND (SP)		Top of Well Screen
156	44	24/14	156-158	5-12 47-24		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			Silica Sand Filter Pack
158	45	24/24	158-160	3-12 29-36		Dense, brown, fine to medium SAND, trace Silt, wet (SP). Changing at 160.0 feet (in shoe) to: Very stiff, gray, CLAY & SILT, some fine Sand, moist (CL).			2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
160	46	24/24	160-162	1-9 23-36	3.75 tsf >4.0 tsf	Hard, gray, CLAY & SILT, some fine to coarse Sand, moist (CL).	160' CLAY & SILT (CL)		Bottom of Well Screen
162						Bottom of Borehole at 162.0 Feet	162'		
163									
164									
165									
166									
167									
168									
169									

REMARKS

Pocket penetrometer readings were measured in tons per square foot (tsf) and are used to evaluate consistency of cohesive soil.
Monitoring well was installed in borehole upon completion. Well screen set from 155.0 to 160.0 feet below ground surface.

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Boring No.: SB-6D/MW-6D

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Boring No.: SB-6/MW-6S
Page: 1 **of** 5
File No.: 16.0062335.52
Check: J Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 9-13-17 / 9-14-17
Boring Location:
GS Elev.: 770.30' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/18	0-2	4-3 3-5		Very dark grayish-brown to dark brown, fine to medium grained SAND, some Silt, poorly sorted, dry (SM). Changing at 0.2 feet to: Dark brown, fine to medium grained SAND, some Silt, moderately sorted, dry (SM). Changing at 0.4 feet to: Dark yellowish-brown,fine to medium grained SAND, some Silt, trace Gravel, moderately sorted, dry (SM).	SAND (SM)		PROTECTIVE CASING
2	2	24/16	2-4	8-8 11-12		Dark yellowish-brown,fine to medium grained SAND, some Silt, trace Gravel, moderately sorted, dry (SM). Changing at 2.8 feet to: Dark yellowish-brown, fine to medium SAND, little Clay, little Silt, non to slightly plastic, moderately cohesive, poorly sorted, dry (SC). Changing at 3.0 feet to: Mottled dark yellowish-brown to pale brown, CLAY & SILT, some Sand, trace Gravel, plastic, cohesive, poorly sorted, dry to moist (CL).	2.8'		Backfill/Cement Pad
3							3' SAND (SC)		
4	3	24/19	4-6	8-9 13-15			CLAY & SILT (CL)		
5						Mottled dark yellowish-brown to pale brown, CLAY & SILT, some Sand, trace Gravel, plastic, cohesive, poorly sorted, dry to moist (CL). Changing at 5.2 feet to: Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).	5.2'		
6	4	24/14	6-8	2-2 2-2		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).	SAND (SP)		
7									
8	5	24/20	8-10	1-3 3-4		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
9									
10	6	24/24	10-12	2-3 3-5		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
11									

REMARKS

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Boring No.: SB-6/MW-6S

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
	7	24/22	12-14	3-4 5-5		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).	SAND (SP)		
13									
14	8	24/20	14-16	2-5 6-11		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist with some alternating beds of dark yellowish-brown, fine to medium grained SAND, trace Gravel at 14.6 feet.			
15									
16	9	24/22	16-18	4-8 9-10		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
17									
18	10	24/22	18-20	4-5 7-8		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
19									
20	11	24/19	20-22	6-9 14-15		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
21									
22	12	24/24	22-24	6-10 11-13		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
23									
24	13	24/20	24-26	5-8 13-18		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
25									

REMARKS

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Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	14	24/22	26-28	7-10 15-18		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).	SAND (SP)		Bentonite/Grout
27									
28	15	24/22	28-30	7-11 12-14		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
29									
30	16	24/20	30-32	7-14 15-17		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
31									
32	17	24/16	32-34	7-10 15-21		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
33									
34	18	24/22	34-36	6-10 18-20		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).			
35									
36	19	24/19	36-38	10-16 23-34		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP). Changing at 36.8 feet to: Light yellowish-brown, fine grained SAND, little Silt, very well sorted, moist (SM). Changing at 37.8 feet to: Light yellowish-brown to pale brown, fine to medium grained SAND, trace Silt, well sorted, moist (SP).	36.8' SAND (SM) 37.8' SAND (SP)		
37									
38	20	24/19	38-40	9-22 22-20		Light yellowish-brown to pale brown, fine to medium grained SAND, trace Silt, well sorted, moist (SP). Changing at 38.5 feet to: Light yellowish-brown, fine grained SAND, little Silt, very well sorted, moist (SM).	38.5' SAND (SM)		
39									

REMARKS

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Boring No.: SB-6/MW-6S

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
41	21	24/24	40-42	4-6 7-3		Light yellowish-brown, fine grained SAND, little Silt, very well sorted, moist (SM). Changing at 40.9 feet to: Yellowish-brown, fine grained SAND, little Silt, well sorted, moist (SM).	SAND (SM)		
42	22	24/19	42-44	11-22 37-38		Yellowish-brown, fine grained SAND, little Silt, well sorted, moist (SM). Changing at 43.1 feet to: Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP).	43.1' SAND (SP)		
44	23	24/22	44-46	16-22 28-30		Very pale brown, fine to medium SAND, trace Silt, very well sorted, moist (SP). Changing at 44.8 feet to: Brown, fine to medium grained SAND, trace Silt, well sorted, moist (SP).			
46	24	24/22	46-48	6-8 10-11		Brown, fine to medium grained SAND, trace Silt, trace Gravel, well sorted, wet (SP).		1	
48	25	24/18	48-50	4-11 18-21		Brown, fine to medium grained SAND, trace Silt, trace Gravel, well sorted, wet (SP).			
50	26	24/18	50-52	5-11 14-17		Brown, fine to medium grained SAND, trace Silt, trace Gravel, well sorted, wet (SP).			
52	27	24/11	52-54	3-9 18-21		Brown, fine to medium grained SAND, trace Silt, trace Gravel, well sorted, wet (SP).			Bentonite Seal

REMARKS

1. Groundwater was encountered at approximately 46.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-6/MW-6S

BORING_WELL 6233550 WWW HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: SB-6/MW-6S
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File No.: 16.0062335.52
Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
55	28	24/20	54-56	3-8 14-15		Brown, fine to medium grained SAND, trace Silt, trace Gravel, well sorted, wet (SP).	SAND (SP)		
56	29	24/8	56-58	2-4 12-12		Brown, fine to medium grained SAND, trace Silt, trace Gravel, well sorted, wet (SP).			
57									Top of Well Screen Silica Sand Filter Pack
58	30	24/12	58-60	3-7 12-11		Brown, fine to medium grained SAND, trace Silt, trace Gravel, well sorted, wet (SP).			
59									
60	31	24/7	60-62	1-1 3-7		Brown, fine to medium grained SAND, trace Silt, trace Gravel, well sorted, wet (SP).			2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
61									
62						Bottom of Borehole at 62.0 Feet	62'	2	Bottom of Well Screen
63									
64									
65									
66									
67									

REMARKS

2. Monitoring well was installed in borehole upon completion. Well screen set from 57.1 to 61.8 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: SB-7/MW-7S
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File No.: 16.0062335.52
Check: J Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 9-19-17 / 9-20-17
Boring Location:
GS Elev.: 788.90' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/18	0-2	2-1 2-1		Very loose, dark brown to yellowish-brown, fine grained SAND, some Silt, moderately sorted, dry (TOPSOIL). Changing at 0.5 feet to: Brownish-yellow, fine grained SAND, little Silt, well sorted, dry (SM).	SAND (TOPSOIL) 0.5' SAND (SM)		PROTECTIVE CASING Backfill/Cement Pad
2	2	24/12	2-4	2-3 3-4		Loose, yellowish-brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).	2' SAND (SP)		
4	3	24/18	4-6	2-2 3-2		Loose, yellowish-brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
6	4	24/5	6-8	2-2 2-2		Loose, yellowish-brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP) with fractured rock at 6.1 feet. Changing at 6.3 feet to: Dark brown, CLAY & SILT, some Sand, trace Gravel, plastic, cohesive, mmoist (CL).	6.3' CLAY & SILT (CL)		
8	5	24/12	8-10	2-2 3-4		Loose dark grayish-brown to dark brown, coarse grained SAND, little Gravel, trace Silt, poorly sorted, moist (SP).	8' SAND (SP)		
10	6	24/11	10-12	4-6 4-4		Loose dark grayish-brown to dark brown, coarse grained SAND, little Gravel, trace Silt, poorly sorted, moist (SP).			

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-7/MW-7S

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Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	7	24/19	12-14	4-7 5-5		Loose dark grayish-brown to dark brown, coarse grained SAND, little Gravel, trace Silt, poorly sorted, moist (SP). Changing at 12.6 feet to: Stiff, brown, CLAY & SILT, some Sand, trace Gravel, plastic, cohesive, poorly sorted, moist (CL). Changing at 13.2 feet to: Stiff, dark brown, CLAY & SILT, some Sand, trace Gravel, plastic, cohesive, poorly sorted, moist (CL).	SAND (SP) 12.6' CLAY & SILT (CL) 13' 13.2' SAND (SM) CLAY & SILT (CL)		
13									
14	8	24/0	14-16	8-8 9-10		NO RECOVERY.			
15									
16	9	24/17	16-18	3-4 3-5		Loose, brown, fine grained SAND, trace Silt, very well sorted, moist (SP). Changing at 16.4 feet to: Medium brown, CLAY & SILT, some Sand, trace Gravel, moderately plastic, cohesive, poorly sorted, moist (CL). Changing at 16.7 feet to: Loose, dark yellowish-brown, fine grained SAND, trace Silt, well sorted, moist (SP). Changing at 17.0 feet to: Medium mottled yellowish-brown, CLAY & SILT, plastic, cohesive, well sorted, moist (CL).	16' SAND (SP) 16.4' 16.7' CLAY & SILT (CL) 17' SAND (SP) CLAY & SILT (CL)		
17									
18	10	24/22	18-20	4-4 5-6					
19						Medium mottled yellowish-brown, CLAY & SILT, plastic, cohesive, well sorted, moist (CL). Changing at 18.6 feet to: Stiff mottled yellowish-brown, CLAY & SILT, plastic, cohesive, well sorted, moist (CL). Changing at 18.9 feet to: Loose, light yellowish-brown to brownish-yellow, fine grained SAND, very well sorted, moist (SP). Changing at 19.0 feet to: Stiff, mottled yellowish-brown, CLAY & SILT, plastic, cohesive, well sorted, moist (CL).	18.9' 19' SAND (SP) CLAY & SILT (CL)		
20	11	24/14	20-22	3-3 4-5					
21						Stiff, mottled yellowish-brown, CLAY & SILT, plastic, cohesive, well sorted, moist (CL).	20.6' SAND (SP)		
22	12	24/16	22-24	1-1 2-3		Loose to medium dense, very pale brown, fine grained SAND, trace Silt, very well sorted (bedded), moist (SP).			
23									
24	13	24/22	24-26	2-3 3-2		Loose to medium dense, very pale brown, fine grained SAND, trace Silt, very well sorted (bedded), moist (SP).			
25									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-7/MW-7S

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File No.: 16.0062335.52
Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
27	14	24/22	26-28	2-3 3-3		Loose to medium dense, very pale brown, fine grained SAND, trace Silt, very well sorted (bedded), moist (SP).	SAND (SP)		
28	15	24/22	28-30	2-3 4-3		Loose to medium dense, very pale brown, fine grained SAND, trace Silt, very well sorted (bedded), moist (SP).			
29									
30	16	24/20	30-32	1-3 6-8		Loose to medium dense, very pale brown, fine grained SAND, trace Silt, very well sorted (bedded), moist (SP). Changing at 30.3 feet to: Stiff, yellowish-brown, SILT, little Clay, plastic, cohesive, well sorted, moist to wet (ML). Changing at 30.7 feet to: Medium dense, very pale brown, fine to medium grained SAND, trace Silt, very well sorted (bedded), moist (SP).	30.3' SILT (ML) 30.7' SAND (SP)		
31									
32	17	24/23	32-34	5-5 7-8		Medium dense, very pale brown, fine to medium grained SAND, trace Silt, very well sorted (bedded), moist (SP). Changing at 32.7 feet to: Soft, dark yellowish-brown, CLAY & SILT, plastic, cohesive, moist (CL). Changing at 32.8 feet to: Medium dense, very pale brown, fine to coarse grained SAND, some Gravel, trace Silt, poorly sorted, moist (SP).	32.7' 32.8' CLAY & SILT (CL) SAND (SP)		Bentonite/Grout
33									
34	18	24/20	34-36	4-8 9-8		Medium dense, very pale brown, fine to coarse grained SAND, some Gravel, trace Silt, moderately sorted, moist (SP).			
35									
36	19	24/18	36-38	5-6 7-8		Medium dense, very pale brown, fine to coarse grained SAND, some Gravel, trace Silt, moderately sorted, moist (SP). Changing at 36.1 feet to: Brown to yellowish-brown, CLAY & SILT, plastic, cohesive, well sorted (bedded), moist (CL). Changing at 36.2 feet to: Medium dense, very pale brown, fine to coarse grained SAND, some Gravel, trace Silt, moderately sorted, moist (SP).	36.1' 36.2' CLAY & SILT (CL) SAND (SP)		
37									
38	20	24/18	38-40	3-5 5-7		Medium dense, very pale brown, fine to coarse grained SAND, some Gravel, trace Silt, moderately sorted, moist (SP). Changing at 38.5 feet to: Medium dense, light yellowish-brown to very pale brown, fine to medium grained SAND, trace Silt,			
39									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6233550 WWW HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: SB-7/MW-7S
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File No.: 16.0062335.52
Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	21	24/20	40-42	2-4 7-8		very well sorted, moist (SP). Medium dense, light yellowish-brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).	SAND (SP)		
41									
42	22	24/16	42-44	4-4 6-10		Medium dense, light yellowish-brown to very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP). Changing at 42.9 feet to: Medium dense, light yellowish-brown, fine to coarse grained SAND, some Gravel, trace Silt, poorly sorted, moist (SP).			
43									
44	23	24/20	44-46	3-5 6-9		Medium dense, light yellowish-brown, fine to coarse grained SAND, trace Silt, poorly sorted, moist (SP). Changing at 45.3 feet to: Stiff to very stiff yellowish-brown grading to dark gray, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, poorly sorted, moist (CL).			
45							45.3' CLAY & SILT (CL)		
46	24	24/12	46-48	3-6 7-10		Stiff to very stiff yellowish-brown grading to dark gray, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, poorly sorted, moist (CL).			
47									
48	25	24/18	48-50	10-11 29-17		Stiff to very stiff yellowish-brown grading to dark gray, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, poorly sorted, moist (CL). Changing 48.6 feet to: Dense to very dense, very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).	48.6' SAND (SP)		
49									
50	26	24/6	50-52	21-39 48-25		Dense to very dense, very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
51									
52	27	24/23	52-54	6-12 16-20		Dense to very dense, very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
53									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-7/MW-7S

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Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
55	28	24/20	54-56	6-16 17-23		Dense to very dense, very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).	SAND (SP)		
56	29	24/23	56-58	6-13 17-21		Dense to very dense, very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
58	30	24/20	58-60	8-16 20-31		Dense to very dense, very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
60	31	24/24	60-62	9-17 18-24		Dense to very dense, very pale brown, fine to medium grained SAND, trace Silt, very well sorted, moist (SP).			
62	32	24/18	62-64	4-8 10-11		Medium dense, yellowish-brown, fine to medim grained SAND, trace Silt, well sorted, wet (SP).		1	
64	33	24/23	64-66	2-3 7-10		Medium dense, yellowish-brown, fine to medim grained SAND, trace Silt, well sorted, wet (SP).			
66	34	24/1	66-68	1-3 5-9		Medium dense, yellowish-brown, fine to medim grained SAND, trace Silt, well sorted, wet (SP).			Bentonite Seal

REMARKS

1. Groundwater was encountered at approximately 62.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-7/MW-7S

BORING_WELL 6233550 WWW HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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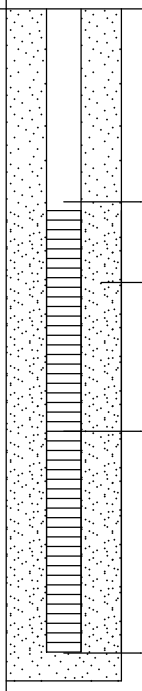
File No.: 16.0062335.52
Check: J Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
69	35	24/23	68-70	1-4 7-7		Medium dense, yellowish-brown, fine to medim grained SAND, trace Silt, well sorted, wet (SP).	SAND (SP)		
70	36	24/8	70-72	2-7 11-11		Medium dense, yellowish-brown, fine to medim grained SAND, trace Silt, well sorted, wet (SP).			
72	37	24/5	72-74	1-2 5-9		Medium dense, yellowish-brown, fine to medim grained SAND, trace Silt, well sorted, wet (SP).			
74						Bottom of Borehole at 74.0 Feet	74'	2	



REMARKS

2. Monitoring well was installed in borehole upon completion. Well screen set from 70.1 to 74.7 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-7/MW-7S

BORING_WELL 6233550 WWW HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: SB-8/MW-8
Page: 1 **of** 3
File No.: 16.0062335.52
Check: Jim Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehosue
Date Start/Finish: 10-30-17 / 10-30-17
Boring Location:
GS Elev.: 742.20' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/20	0-2	1-1 1-3		Very loose, very dark grayish-brown, well sorted, fine grained SAND, little silt, slightly cohesive, moist (SM). Changing at 0.9 feet to: Very loose, yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP).	SAND (SM) 0.9' SAND (SP)		PROTECTIVE CASING
2	2	24/6	2-4	2-2 2-1		Very loose, yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP).			
4	3	24/15	4-6	2-2 2-1		Very loose, yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP).			
6	4	24/17	6-8	2-3 4-6		Loose, yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP).			
8	5	24/19	8-10	3-5 5-7		Loose, yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP). Changing at 8.5 feet to: Loose, dark yellowish-brown, well sorted, fine grained SAND, little Silt, slightly cohesive, moist (SM). Changing at 8.8 feet to: Loose, light yellowish-brown to brownish-yellow, well sorted, fine to medium grained SAND, trace Silt, moist (SP). Changing at 8.9 feet to: Dark yellowish-brown, moderately well sorted, CLAY & SILT, little Sand, moderately plastic, cohesive, moist (CL). Changing at 9.1 feet to: Loose, light yellowish-brown to brownish-yellow, well sorted, fine to medium grained SAND, trace Silt, moist (SP). Changing at 9.3 feet to: Dark yellowish-brown, moderately well sorted, CLAY & SILT, little Sand, moderately plastic, cohesive, moist (CL). Medium dense, brown, well sorted, fine to medium grained SAND, little Silt, slightly cohesive, moist (SM). Changing at 10.8 feet to: Medium dense, dark yellowish-brown,	8.5' 8.8' SAND (SM) 8.9' SAND (SP) 9.1' CLAY & SILT (CL) 9.3' SAND (SP) 10' CLAY & SILT (CL) SAND (SM) 10.8' SAND (SP)		
10	6	24/18	10-12	6-6 5-5					
12	7	24/17	12-14	3-3 4-4					
14	8	24/17	14-16	3-3 4-5					Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-8/MW-8

BORING_WELL 6233552 WWW 1758 HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: SB-8/MW-8
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File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						very well sorted, fine to medium grained SAND, trace Silt, moist (SP).	SAND (SP)		
16	9	24/18	16-18	3-4 5-5		Loose, dark yellowish-brown, very well sorted, fine to medium grained SAND, trace Silt, moist (SP).			
17						Loose, yellowish-brown, very well sorted, fine to medium grained SAND, trace Silt, moist (SP).			
18	10	24/19	18-20	4-4 4-4		Loose, dark yellowish-brown, very well sorted, fine to medium grained SAND, trace Silt, moist (SP).			
19						Dark yellowish-brown, very well sorted, fine to medium grained SAND, trace Silt, moist (SP).			
20	11	24/16	20-22	2-2 2-3		Very loose, brown to yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).		1	
21									
22	12	24/18	22-24	1-3 2-2		Very loose, brown to yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
23									
24	13	24/19	24-26	1-0 0-0		Very loose, brown to yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
25									
26	14	24/18	26-28	0-0 0-1		Very loose, brown to yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
27									
28	15	24/6	28-30	0-0 0-3		Very loose, brown to yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			Top of Well Screen
29									
30	16	24/18	30-32	0-1 0-1		Very loose, brown to yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			Silica Sand Filter Pack 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
31									
32	18	24/15	32-34	1-1 2-3		Very loose, brown to yellowish-brown, well			

REMARKS

1. Groundwater was encountered at approximately 20.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-8/MW-8

BORING_WELL 6233552 WWW 1758 HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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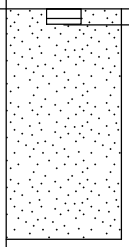
Check: Jim Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
33						sorted, fine to medium grained SAND, trace Silt, wet (SP).	SAND (SP)		 Bottom of Well Screen
34	19	24/17	34-36	0-1 2-3		Very loose, brown to yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
35									
36						Bottom of Borehole at 36.0 Feet	36'	2	
37									
38									
39									
40									
41									
42									
43									
44									
45									
46									
47									
48									
49									

REMARKS

2. Monitoring well was installed in borehole upon completion. Well screen set from 27.7 to 32.7 feet below ground surface.

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BORING_WELL 6233552 WWW 1758 HOUSE STREET NE.GPJ GZA_CORP.GDT 1/25/18

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Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Joe Workman/John Morehouse
Date Start/Finish: 11-10-17 / 11-17-17
Boring Location:
GS Elev.: 818.20' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/13	0-2	2-2 1-2	1.0 tsf	Stiff, brown, CLAY & SILT, trace fine to medium Sand, trace Organic Matter, damp (CL).	CLAY & SILT (CL)	1	PROTECTIVE CASING
2	2	24/6	2-4	1-2 3-5	1.5 tsf	Stiff, brown, CLAY & SILT, trace fine to coarse Sand, trace fine Gravel, damp (CL).			
4	3	24/24	4-6	2-4 7-8	3.5 tsf	Very stiff, brown, CLAY & SILT, trace fine Sand, damp (CL).			
6	4	24/24	6-8	4-5 9-11	3.0 tsf	Very stiff, brown, CLAY & SILT, trace fine Sand, damp (CL).			
8	5	24/24	8-10	2-4 7-9	2.5 tsf 3.5 tsf	Very stiff, brown, CLAY & SILT, trace fine Sand, damp (CL). Changing at 9.0 feet to: Very stiff, brown, CLAY & SILT, little fine to coarse Sand, trace fine Gravel, damp (CL).			
10	6	24/24	10-12	4-5 13-12	1.0 tsf 3.5 tsf	Stiff, brown, CLAY & SILT, little fine to coarse Sand, trace fine Gravel, damp (CL). Changing at 11.0 feet to: Very stiff, brown and gray, CLAY & SILT with intermittent 1/8 inch seams of fine to medium Sand, damp (CL).			

REMARKS

1. Pocket penetrometer readings were measured in tons per square foot (tsf) and are used to evaluate consistency of coheisve soil.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
13	7	24/24	12-14	4-8 12-10	3.5 tsf 3.0 tsf	Very stiff, brown and gray, CLAY & SILT with intermittent 1/8 inch seams of fine to medium Sand, damp (CL). Changing at 13.2 feet to: Very stiff, gray, CLAY & SILT, little fine to coarse Sand, trace fine Gravel, damp (CL).	CLAY & SILT (CL)		
14	8	24/24	14-16	3-4 7-11	3.0 tsf	Very stiff, gray, CLAY & SILT, little fine to coarse Sand with intermittent 1/16" seams of fine to medium Sand, damp (CL).			
16	9	24/24	16-18	3-5 9-12	3.0 tsf	Very stiff, brown and gray CLAY & SILT, trace fine to medium Sand, damp (CL). Changing at 17.7 feet to: Medium dense, brown, fine to medium SAND, trace Silt, damp (SP).			
18	10	24/13	18-20	2-6 7-8		Medium dense, brown, fine to medium SAND, trace coarse Sand, trace Silt, damp (SP).	17.7' SAND (SP)		
20	11	24/8	20-22	6-13 12-11	3.0 tsf	Very stiff, brown, CLAY & SILT, little fine to coarse Sand, damp (CL). Changing at 21.0 feet to: Medium dense, brown, fine to coarse SAND, little fine to coarse Gravel, trace Silt, damp (SW).	20' CLAY & SILT (CL) 21' SAND (SP)		
22	12	24/20	22-24	5-5 7-8		Medium dense, brown, fine to medium SAND, trace coarse Sand, trace fine to coarse Gravel, trace Silt, damp (SP).			
24	13	24/20	24-26	2-2 2-3		Medium dense, brown, fine to medium SAND, trace coarse Sand, trace fine to coarse Gravel, trace Silt, wet (SP).		2	
25									

REMARKS

2. Groundwater was encountered at approximately 24.0 feet below ground surface.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	14	24/13	26-28	1-1 3-2		Loose, brown, fine to medium SAND, trace coarse Sand, trace Silt, wet (SP).	SAND (SP)		
27									
28	15	24/14	28-30	1-1 2-3		Loose, brown, fine to medium SAND, trace coarse Sand, trace Silt, wet (SP).			
29									
30	16	24/24	30-32	3-1 3-4		Loose, brown, fine to medium SAND, trace coarse Sand, trace Silt, wet (SP). Changing at 31.0 feet to: Stiff, brown, CLAY & SILT, little fine to coarse Sand, moist (CL).	31'		
31					1.0 tsf		CLAY & SILT (CL)		
32	17	24/8	32-34	2-5 4-4	0.25 tsf	Very soft, brown, CLAY & SILT, some fine to coarse Sand, little fine Gravel, moist (CL).			
33									
34	18	24/14	34-36	6-3 6-7	1.5 tsf	Stiff, brown, CLAY & SILT, some fine to coarse Sand, little fine Gravel, damp (CL).			
35									
36	19	24/15	36-38	6-8 12-14	2.5 tsf	Very stiff, brown, CLAY & SILT, little fine to coarse Sand, trace fine Gravel, damp (CL).			
37									
38	20	24/14	38-40	8-16 12-12	3.5 tsf	Very stiff, gray, CLAY & SILT, some fine to coarse Sand, trace Cobbles (based on fragments), damp (CL).			
39									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
41	21	24/16	40-42	2-9 31-17	>4.0 tsf	Hard, gray, CLAY & SILT, some fine to coarse Sand, trace fine to coarse Gravel, damp (CL).	CLAY & SILT (CL)		
42	22	24/22	42-44	3-4 10-14	2.5 tsf	Very stiff, gray, CLAY & SILT, little fine to coarse Sand, trace fine Gravel, damp (CL).			
44	23	24/19	44-46	4-6 15-18	3.0 tsf	Very stiff, gray, CLAY & SILT, little fine to coarse Sand, trace fine to coarse Gravel, damp (CL).			
46	24	24/20	46-48	3-15 32-28	>4.0 tsf	Hard, gray, CLAY & SILT, little fine to coarse Sand, trace fine to coarse Gravel, damp (CL).			
48	25	24/20	48-50	4-18 22-30	>4.0 tsf	Hard, gray, CLAY & SILT, little fine to coarse Sand, damp (CL).			
50	26	24/0	50-52	25-29 35-45		NO RECOVERY.	50' NO RECOVERY		
52	27	24/20	52-54	26-24 30-31	>4.0 tsf	Hard, gray, CLAY & SILT, some fine to coarse Sand, little fine to coarse Gravel, trace Cobbles (based on fragments), damp (CL).	52' CLAY & SILT (CL)		

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
55	28	24/24	54-56	10-17 20-30	4.0 tsf	Hard, gray, CLAY & SILT, little fine to coarse Sand, trace fine Gravel, damp (CL).	CLAY & SILT (CL)		
56	29	24/0	56-58	24-40 49-54		NO RECOVERY.	56' NO RECOVERY		
58	30	24/24	58-60	8-18 20-31	>4.0 tsf	Hard, gray, CLAY & SILT, little fine to coarse Sand, trace fine Gravel, damp (CL).	58' CLAY & SILT (CL)		
60	31	24/24	60-62	5-4 18-24	4.0 tsf	Hard, gray, CLAY & SILT, little fine to coarse Sand, trace fine Gravel, damp (CL).			
62	32	24/24	62-64	6-14 14-15		Brown, poorly sorted, SILT & CLAY, little Sand, trace gravel, plastic, cohesive, moist (ML).	62' SILT & CLAY (ML)		
64	33	24/24	64-66	6-12 15-17		Brown, poorly sorted, SILT & CLAY, little Sand, trace gravel, plastic, cohesive, moist (ML).			
66	34	24/24	66-68	5-9 14-25		Brown, poorly sorted, SILT & CLAY, little Sand, trace gravel, plastic, cohesive, moist (ML).			

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
69	35	24/24	68-70	9-14 19-26		Brown, poorly sorted, SILT & CLAY, little Sand, trace gravel, plastic, cohesive, moist (ML).	SILT & CLAY (ML)		
70	36	24/23	70-72	5-15 20-26		Brown grading to dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL).	70' CLAY & SILT (CL)		
71									
72	37	24/24	72-74	7-14 23-28		Brown grading to dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL).			
73									
74	38	24/24	74-76	9-11 15-20		Brown grading to dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL).			
75									
76	39	24/14	76-78	10-13 33-39		Brown grading to dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL).			
77									
78	40	24/24	78-80	5-25 19-23		Brown grading to dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL).			
79									
80	41	24/24	80-82	6-11 15-21		Brown grading to dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL).			
81									

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
	42	24/24	82-84	10-15 23-25		Brown grading to dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL).	CLAY & SILT (CL)		
83									
84	43	24/12	84-86	7-14 21-20		Brown grading to dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL).			
85									
86	44	24/24	86-88	8-18 23-25		Brown grading to dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL).			
87									
88	45	24/15	88-90	5-38 33-33		Brown grading to dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL).			
89									
90	46	24/24	90-92	8-14 15-28		Brown grading to dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL).			
91									
92	47	24/24	92-94	15-16 25-33		Brown grading to dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL). Changing at 92.1 feet to: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist (CL).	92.1' Silty CLAY (CL)		
93									
94	48	24/24	94-96	13-22 37-43		Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist (CL). Changing at 94.4 feet to: Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL).	94.4' CLAY & SILT (CL)		
95									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
97	49	24/24	96-98	8-18 30-23		Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL).	CLAY & SILT (CL)		
98	50	24/24	98-100	14-24 33-45		Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL).			Grout
99									
100	51	24/21	100-102	19-29 47-50/3.5"		Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist (CL). Changing at 101.5 feet to: Dark grayish-brown, very well sorted, SILT, trace Clay, cohesive, non to slighty plastic, moist with occasional very thin lenses of Clayey Silt, moist (ML).	101.5' SILT (ML)		
101									
102	52	24/24	102-104	13-26 38-44		Dark grayish-brown, very well sorted, SILT, trace Clay, cohesive, non to slighty plastic, moist with occasional very thin lenses of Clayey Silt, moist (ML).			
103									
104	53	24/24	104-106	20-30 41-39		Dark grayish-brown, very well sorted, SILT, trace Clay, cohesive, non to slighty plastic, moist with occasional very thin lenses of Clayey Silt, moist (ML).			
105									
106	54	24/24	106-108	22-33 37-50		Dark grayish-brown, very well sorted, SILT, trace Clay, cohesive, non to slighty plastic, moist with occasional very thin lenses of Clayey Silt, moist (ML).			
107									
108	55	24/14	108-110	7-9 27-28		Dark grayish-brown, very well sorted, SILT, trace Clay, cohesive, non to slighty plastic, moist with occasional very thin lenses of Clayey Silt, moist (ML). Changing at 108.8 feet to: Dark grayish-brown, well sorted, CLAY, plastic, cohesive, moist (CL).	108.8' CLAY (CL)		
109									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	56	24/14	110-112	20-41-50		Dark grayish-brown, well sorted, CLAY, plastic, cohesive, moist (CL). Changing at 110.3 feet to: Dark grayish-brown, very well sorted, SILT, trace Clay, cohesive, non to slightly plastic, moist with occasional very thin lenses of Clayey Silt, moist (ML).	110.3' CLAY (CL) / SILT (ML)		
111									
112	57	24/15	112-114	9-30-50/5"		Dark grayish-brown, well sorted, CLAY, plastic, cohesive, moist (CL). Changing at 112.8 feet to: Dark grayish-brown, very well sorted, SILT, trace Clay, cohesive, non to slightly plastic, moist with occasional very thin lenses of Clayey Silt (ML).	112' CLAY (CL) / 112.8' SILT (ML)		
113									
114	58	24/24	114-116	15-20 36-50		Dark grayish-brown, well sorted, CLAY, plastic, coesive, moist (CL). Changing at 114.4 feet to: Dark grayish-brown, very well sorted, SILT, trace Clay, cohesive, non to slightly plastic, moist with occasional very thin lenses of Clayey Silt, moist (ML). Changing at 114.6 feet to: Dark grayish-brown, well sorted, CLAY, plastic, cohesive, moist (CL). Changing at 115.2 feet to: Dark grayish-brown, well sorted, CLAY, plastic, cohesive, moist (CL). Dark grayish-brown, very well sorted, SILT, trace Clay, cohesive, non to slightly plastic, moist with occasional very thin lenses of Clayey Silt (ML). Changing at 116.3 feet to: Grayish-brown, very well sorted, SILT, trace Clay, cohesive, non to slightly plastic, moist with occasional very thin lenses of Clayey Silt (ML). Grayish-brown, very well sorted, SILT, trace Clay, cohesive, non to slightly plastic, moist with occasional very thin lenses of Clayey Silt (ML).	114' CLAY (CL) / 114.4' SILT (ML) / 114.6' CLAY (CL) / 115.1' SILT (ML) / 115.2' CLAY (CL) / 116' SILT (ML)		
115									
116	59	24/15	116-118	1-1 2-5					
117									
118	60	24/13	118-120	4-11 23-42					
119									
120	61	24/0	120-122	17-55		NO RECOVERY.	120' NO RECOVERY		
121									
122	62	24/12	122-124	26-44-50/3"		Very dense, grayish-brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Changing at 122.8 feet to: Very dense, grayish-brown to brown, very well sorted, fine grained SAND, some Silt, wet (SM).	122' SAND (SP) / 122.8' SAND (SM) / 124'	3	
123									

REMARKS

3. Groundwater was encountered at approximately 122.0 feet below ground surface.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	63	24/12	124-126	27-50/4"		Very dense, grayish-brown to brown, very well sorted, fine to medium SAND, trace Silt, wet (SP). Changing at 124.4 feet to: Dark gray, poorly sorted, SILT & CLAY, little Sand, trace Gravel, plastic, cohesive, moist (ML). Changing at 124.6 feet to: Very dense, grayish-brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP).	SAND (SP) 124.4' 124.6' SILT & CLAY (CL) SAND (SP)		
125									
126	64	24/18	126-128	5-14-50/5"		Very dense, grayish-brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Changing at 126.3 feet to: Dark grayish-brown, very well sorted, Silty CLAY, plastic, cohesive, bedded, moist (CL). Changing at 127.0 feet to: Very dense, brown to grayish-brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP).	126.3' Silty CLAY (CL) 127' SAND (SP)		
127									
128	65	24/14	128-130	8-46-50/2"		Very dense, brown to grayish-brown, well sorted, fine to medium grained SAND, little Silt, wet (SM).	128' SAND (SM)		
129									
130	66	24/6	130-132	36-50/4"		Very dense, brown to grayish-brown, well sorted, fine to medium grained SAND, little Silt, wet (SM).			
131									
132	67	24/9	132-134	26-50/4.5"		Very dense, brown to grayish-brown, well sorted, fine to medium grained SAND, little Silt, wet (SM). Changing at 132.3 feet to: Very dense, brown to dark brown, moderately sorted, coarse to fine grained SAND, trace Silt, wet (SW). Changing at 132.5 feet to: Very dense, brown to grayish-brown, well sorted, fine to medium SAND, little Silt, wet (SM).	132.3' 132.5' SAND (SW) SAND (SP)		
133									
134	68	24/3	134-136	5-10 39-50/4"		Dense, brown to grayish-brown, well sorted, fine to medium SAND, little Silt, wet (SM).			
135									
136	69	24/6	136-138	9-32-50/5"		Very dense, brown to grayish-brown, well sorted, fine to medium SAND, little Silt, wet (SM).			
137									

REMARKS

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Boring No.: SB-9/MW-9D

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide, Inc.
US 131
Belmont, Michigan

Boring No.: SB-9/MW-9D
Page: 11 **of** 16
File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
139	70	24/4	138-140	50/5"		Very dense, grayish-brown, moderately sorted, fine to medium grained SAND, little Silt, trace Clay, trace Gravel, slightly cohesive, wet (SM).	SAND (SP)		
140	71	24/6	140-142	50/5.5"		Very dense, grayish-brown, well sorted, fine grained SAND, trace Silt, non to slightly cohesive, wet with occasional very thin seams of Silty Clay (SP-SC).			
141									
142	72	24/4	142-144	50/4.5"		Very dense, brown to dark brown, moderately sorted, fine to coarse grained SAND, trace Silt, trace Clay, trace Gravel, wet (SW).	142' SAND (SW)		
143									
144	73	24/8	144-146	12-37-50/2"		Very dense, dark grayish-brown, poorly sorted, fine to coarse grained SAND, trace Gravel, trace Silt, trace Clay, wet (SW). Changing at 144.4 feet to: Very dense, pale brown grading to brown, moderately sorted, fine to coarse grained SAND, trace Silt, trace Gravel, non to slightly cohesive, wet (SW).			
145									
146	74	24/10	146-148	32-50/3.5"		Very dense, pale brown grading to brown, moderately sorted, fine to coarse grained SAND, trace Silt, trace Gravel, non to slightly cohesive, wet (SW).			
147									
148	75	24/9	148-150	35-50/3"		Very dense, pale brown grading to brown, moderately sorted, fine to coarse grained SAND, trace Silt, trace Gravel, non to slightly cohesive, wet (SP). Changing at 148.6 feet to: Very dense, pale brown, very well sorted, fine to medium SAND, trace Silt, wet (SP).	148.6' SAND (SP)		
149									
150	76	24/4	150-152	50/5"		Very dense, pale brown, moderately sorted, fine to coase grained SAND, trace Silt, trace Gravel, wet (SW).	150' SAND (SW)		
151									
							152'		

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-9/MW-9D

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US 131
Belmont, Michigan

Boring No.: SB-9/MW-9D
Page: 12 **of** 16
File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	77	24/0	152-154	50/4"		NO RECOVERY.	NO RECOVERY		
153									
154	78	24/4	154-156	50/5.5"		Very dense, pale brown, moderately sorted, fine to coarse SAND, trace Silt, trace Gravel, wet (SW).	154' SAND (SW)		
155									
156	79	24/7	156-158	34-50/4"		Very dense, pale brown, moderately sorted, fine to coarse grained SAND, trace Silt, trace Gravel, wet (SW). Changing at 156.5 feet to: Pale brown, very well sorted, SILT, trace Clay, moderately cohesive, slightly plastic, wet (ML).	156.5' SILT (ML)		
157									
158	80	24/4	158-160	40-50/2.5"		Very dense, grayish-brown, very well sorted, fine grained SAND, little Silt, wet (SM).	158' SAND (SM)		
159									
160	81	24/3	160-162	50/5"		Very dense, grayish-brown, very well sorted, fine grained SAND, little Silt, wet (SM).			
161									
162	82	24/4	162-164	41-50/5"		Very dense, brown to dark brown, moderately well sorted, fine grained SAND, little Silt, wet (SM).			
163									
164	83	24/4	164-166	50/6"		Very dense, brown to dark brown, moderately well sorted, fine grained SAND, little Silt, wet (SM).			
165									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-9/MW-9D

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide, Inc.
US 131
Belmont, Michigan

Boring No.: SB-9/MW-9D
Page: 13 **of** 16
File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
167	84	24/3	166-168	43-50/3"		Very dense, brown to dark brown, moderately well sorted, fine grained SAND, little Silt, wet (SM).	SAND (SM)		
168	85	24/2	168-170	47-50/3"		Very dense, brown, well sorted, fine to medium SAND, little Silt, trace Clay, slightly cohesive, non to slightly plastic, wet (SM).			
169									
170	86	24/7	170-172	36-50/4"		Very dense, brown, well sorted, fine to medium SAND, little Silt, trace Clay, slightly cohesive, non to slightly plastic, wet (SM).			
171									
172	88	24/0	172-174	43-50/3"		Very dense, brown, well sorted, fine to medium SAND, little Silt, trace Clay, slightly cohesive, non to slightly plastic, wet (SM).			
173									
174	89	24/10	174-176	35-50		Very dense, brown, well sorted, fine to medium SAND, little Silt, trace Clay, slightly cohesive, non to slightly plastic, wet (SM). Changing at 174.2 feet to: Grayish-brown, very well sorted, SILT, little fine grained Sand, trace Clay, slightly cohesive, slightly plastic, moist to wet (ML).	174.2' SILT (ML)		
175									
176	90	24/0	176-178	28-50		NO RECOVERY.	176' NO RECOVERY		
177									
178	91	24/4	178-180	45-50/3.5"		Grayish-brown, very well sorted, SILT, little fine grained Sand, trace Clay, slightly cohesive, slightly plastaic, moist to wet (ML).	178' SILT (ML)		
179							180'		

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide, Inc.
US 131
Belmont, Michigan

Boring No.: SB-9/MW-9D
Page: 14 **of** 16
File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	92	24/1	180-182	45-50/3.5"		Very dense, brown, well sorted, fine to medium SAND, little Silt, trace Clay, slightly cohesive, non to slightly plastic, wet (SM).	SAND (ML)		
181									
182	93	24/6	182-184	50		Very dense, brown to dark brown, moderately well sorted, fine grained SAND, little Silt, wet (SM). Changing at 182.1 feet to: Brown to dark brown, very well sorted, SILT, moderately cohesive, wet (ML). Changing at 182.2 feet to: Brown to dark brown, moderately well sorted, fine grained SAND, little Silt, wet (SM). Changing at 182.4 feet to: Brown to dark brown, very well sorted, SILT, moderately cohesive, wet (ML). NO RECOVERY.	182.1' SILT (ML) 182.2' SAND (SM) 182.4' SILT (ML)		
183									
184	94	24/0	184-186	50/5.5"			184' NO RECOVERY		
185									
186	95	24/6	186-188	58/6"		Very dense, grayish-brown, very well sorted, fine to medium SAND, trace Silt, trace Clay, slightly cohesive, wet (SP).	186' SAND (SP)		
187									
188	96	24/5	188-190	75/6"		Very dense, grayish-brown, very well sorted, fine to medium SAND, trace Silt, trace Clay, slightly cohesive, wet (SP).			
189									
190	97	24/4	190-192	50/6"		Very dense, grayish-brown, very well sorted, fine to medium SAND, trace Silt, trace Clay, slightly cohesive, wet (SP).			
191									
192	98	24/2	192-194	50/5"		Very dense, grayish-brown, very well sorted, fine to medium SAND, trace Silt, trace Clay, slightly cohesive, wet (SP).			
193									

REMARKS

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Boring No.: SB-9/MW-9D

GZA
GeoEnvironmental, Inc.
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Wolverine World Wide, Inc.
US 131
Belmont, Michigan

Boring No.: SB-9/MW-9D
Page: 15 **of** 16
File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
195	99	24/9	194-196	42-50/3"		Grayish-brown, very well sorted, fine to medium SAND, trace Silt, trace Clay, slightly cohesive, wet (SP). Changing at 194.3 feet to: Grayish-brown, very well sorted, SILT, cohesive, moist to wet (ML).	194.3' SAND (SP) / SILT (ML)		
196	100	24/9	196-198	15-38-50/3"		Grayish-brown, very well sorted, SILT, cohesive, moist to wet (ML).			
198	101	24/9	198-200	24-50/5"		Grayish-brown, poorly sorted, CLAY & SILT, some Sand, trace Gravel, slightly plastic, moderately cohesive, moist (CL). Changing at 198.2 feet to: Grayish-brown, very well sorted, SILT, cohesive, moist to wet (ML).	198' 198.2' CLAY & SILT (CL) / SILT (ML)		
200	102	24/4	200-202	28-50/3"		Grayish-brown, poorly sorted, CLAY & SILT, some Sand, trace Gravel, slightly plastic, moderately cohesive, moist (CL).	200' CLAY & SILT (CL)		
202	103	24/3	202-204	50/6"		Grayish-brown, poorly sorted, CLAY & SILT, some Sand, trace Gravel, slightly plastic, moderately cohesive, moist (CL).			Silica Sand Filter Pack
204	104	24/7	204-206	50/6"		Grayish-brown, poorly sorted, CLAY & SILT, some Sand, trace Gravel, slightly plastic, moderately cohesive, moist (CL). Changing at 204.3 feet to: Grayish-brown, well sorted, fine to medium grained SAND, litle Silt, moderately cohesive, wet (SM). Changing at 204.4 feet to: Grayish-brown, moderately well sorted, fine to medium SAND, little Silt,	204.3' SAND (SM)		Top of Well Screen
206	105	24/12	206-208	30-50/4"		trace Gravel, non-plastic, non-cohesive, moist to wet (SM). Grayish-brown, moderately well sorted, fine to medium SAND, little Silt, trace Gravel, non-plastic, non-cohesive, moist to wet (SM). Changing at 206.4 feet to: Grayish-brown, well sorted, SILT, trace Clay, slightly coheisive, moderately	206.4' 206.5' SILT (ML) / SAND (SM)		2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)

REMARKS

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BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

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Wolverine World Wide, Inc.
US 131
Belmont, Michigan

Boring No.: SB-9/MW-9D
Page: 16 **of** 16
File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	106	24/9	208-210	19-24 23-25		cohesive, moist to wet (ML). Changing at 206.5 feet to: Dense, grayish-brown, moderately well sorted, fine to medium SAND, little Silt, trace Gravel, non-plastic, non-cohesive, moist to wet (SM).	SAND (SM) 208.4' SILT (ML) 208.8' Silty CLAY (CL)		Bottom of Well Screen
209						Dense, grayish-brown, moderately well sorted, fine to medium SAND, little Silt, trace Gravel, non-plastic, non-cohesive, moist to wet (SP). Changing at 208.4 feet to: Grayish-brown, well sorted, SILT, trace Clay, slightly cohesive, moderately cohesive, moist to wet (ML). Changing at 208.8 feet to: Grayish-brown, very well sorted, Silty CLAY, plastic, cohesive, moist (CL).			
210	107	24/8	210-212	14-18-75/6"					
211							211.3'		
						Grayish-brown, very well sorted, Silty CLAY, plastic, cohesive, moist (CL). Changing at 211.3 feet to: Grayish-brown, moderately well sorted, fine to medium SAND, little Silt, trace Gravel, non-plastic, non-cohesive, moist to wet (SM).	SAND (SM) 212'		
212	108	24/15	212-214	19-45-50/3"			Silty CLAY (CL) 212.9'		
213						Grayish-brown, very well sorted, Silty CLAY, plastic, cohesive, moist (CL). Changing at 212.9 feet to: Grayish-brown, well sorted, fine to medium SAND, little Silt, trace Clay, wet with occasional very thin Silty Clay seams (SM).	SAND (SM)		
214	109	24/12	214-216	34-50/3"					
215						Grayish-brown, well sorted, fine to medium SAND, little Silt, trace Clay, wet with occasional very thin Silty Clay seams (SM). Changing at 214.7 feet to: Grayish-brown, moderately well sorted, fine to medium SAND, little Silt, trace Gravel, non-plastic, non-cohesive, moist to wet (SM). Changing at 214.9 feet to: Grayish-brown, well sorted, SILT, trace Clay, slightly to moderately coheisve, moist to wet (ML).	214.9'		
							SILT (ML) 216'		
216	110	24/18	216-218	18-27-50/5"			Silty CLAY (CL)		
217						Grayish-brown, very well sorted, Silty CLAY, plastic, cohesive, moist (CL). Changing at 217.4 feet to: Dark gray with reddish-yellow stains, poorly sorted, CLAY & SILT, some Sand, trace Gravel, wet (CL).	217.4'		
							CLAY & SILT (CL) 218'		
218	111	24/18	218-220	15-32-50/4"			Silty CLAY (CL)		
219						Grayish-brown, very well sorted, Silty CLAY, plastic, cohesive, moist (CL).			
220							220'		
						Bottom of Borehole at 220.0 Feet		4	
221									

REMARKS

4. Monitoring well was installed in borehole upon completion. Well screen set from 203.0 to 208.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-9/MW-9D

BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

GZA
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Engineers and Scientists

Wolverine World Wide, Inc.
US 131
Belmont, Michigan

Boring No.: MW-9M
Page: 1 **of** 4
File No.: 16.0062335.52
Check: Jim Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 11-17-17 / 11-17-17
Boring Location:
GS Elev.: 817.90' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1						See SB-9/MW-9D boring log for sample description and classification.			PROTECTIVE CASING
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-9M

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Engineers and Scientists

Wolverine World Wide, Inc.
US 131
Belmont, Michigan

Boring No.: MW-9M
Page: 2 **of** 4
File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									
42									
43									
44									
45									
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49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									Grout
62									
63									
64									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-9M

BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

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Engineers and Scientists

Wolverine World Wide, Inc.
US 131
Belmont, Michigan

Boring No.: MW-9M
Page: 3 **of** 4
File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
66									
67									
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
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88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-9M

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Wolverine World Wide, Inc.
US 131
Belmont, Michigan

Boring No.: MW-9M
Page: 4 **of** 4
File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
131						Bottom of Borehole at 131.0 Feet		1	Top of Well Screen; Silica Sand Filter Pack; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 126.0 to 131.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

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Wolverine World Wide, Inc.
US 131
Belmont, Michigan

Boring No.: MW-9S
Page: 1 **of** 1
File No.: 16.0062335.52
Check: Jim Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 11-17-17 / 11-17-17
Boring Location:
GS Elev.: 817.80' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

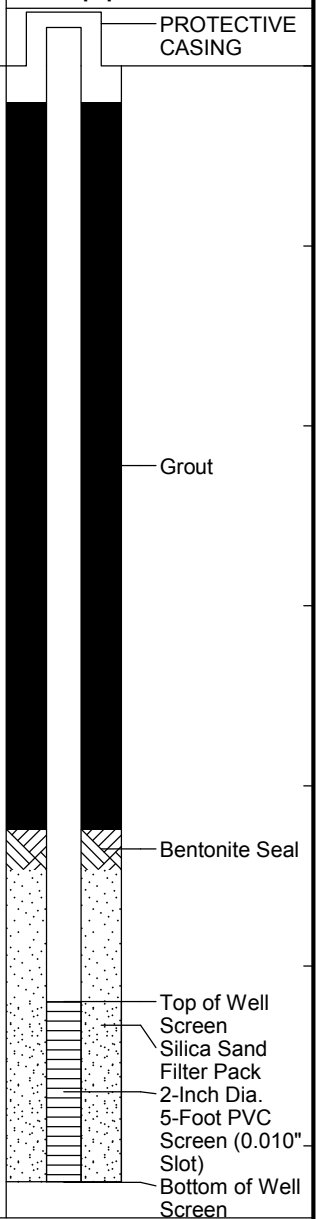
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–31						See SB-9/MW-9D boring log for sample description and classification.		
31						Bottom of Borehole at 31.0 Feet		1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 26.0 to 31.0 feet below ground surface.

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Boring No.: MW-9S

BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide, Inc.
House Street
Belmont, Michigan

Boring No.: SB-10/MW-10D
Page: 1 **of** 10
File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Julie Groenleer/Joe Workman
Date Start/Finish: 11-20-17 / 11-28-17
Boring Location: 587,298.7726 N; 12,789,357.1821 E
GS Elev.: 780.9' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/17	0-2	2-2 3-2		TOPSOIL. Changing at 0.6 feet to: Loose, brown, fine to medium SAND, trace Silt, damp (SP).	TOPSOIL 0.6' SAND (SP)		PROTECTIVE CASING
2	2	24/16	2-4	2-3 8-7		Medium dense, brown, fine to medium SAND, trace Silt, damp (SP).			
4	3	24/0	4-6	4-5 6-8		NO RECOVERY.	4' NO RECOVERY		
6	4	24/18	6-8	3-3 4-4		Loose, brown, fine to medium SAND, trace Silt, damp (SP).	6' SAND (SW)		
8	5	24/14	8-10	2-4 4-4		Loose, brown, fine to medium SAND, trace Silt, damp (SP).			
10	6	24/20	10-12	2-5 7-5		Medium dense, brown, fine to medium SAND, trace Silt, damp (SP).			
12	7	24/12	12-14	3-2 3-3		Loose, brown, fine to medium SAND, trace Silt, damp (SP).			
14	8	24/21	14-16	3-3 3-4		Loose, brown, fine to medium SAND, trace Silt, damp (SP).			
16	9	24/20	16-18	2-4 4-6		Loose, brown, fine to medium SAND, trace Silt, damp (SP).			

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/18/20

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Wolverine World Wide, Inc.
House Street
Belmont, Michigan

Boring No.: SB-10/MW-10D
Page: 2 **of** 10
File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
19	10	24/18	18-20	3-6 6-6		Medium dense, brown, fine to medium SAND, trace Silt, damp (SP).	SAND (SW)		
20	11	24/17	20-22	3-4 6-7		Loose, brown, fine to medium SAND, trace Silt, damp (SP).			
22	12	24/19	22-24	3-5 6-7		Medium dense, brown, fine to medium SAND, trace Silt, damp (SP).			
24	13	24/22	24-26	4-6 8-8		Medium dense, brown, fine to medium SAND, trace Silt, damp (SP).			
26	14	24/18	26-28	6-13 13-18		Medium dense, brown, fine to medium SAND, trace Silt, damp (SP).			
28	15	24/20	28-30	10-13 21-20		Dense, brown, fine to medium SAND, trace Silt, damp (SP).			
30	16	24/20	30-32	10-16 21-24		Dense, brown, fine to medium SAND, trace Silt, damp (SP).			
32	17	24/22	32-34	11-16 24-27		Dense, brown, fine to medium SAND, trace Silt, damp (SP).			
34	18	24/18	34-36	10-16 26-32		Dense, brown, fine to medium SAND, trace Silt, damp (SP).			
36	19	24/19	36-38	12-21 25-29		Dense, brown, fine to medium SAND, trace Silt, damp (SP).			
38	20	24/16	38-40	8-18 21-27		Dense, brown, fine to medium SAND, trace Silt, damp (SP).			

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/18/20

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
							SAND (SW)		
40	21	24/23	40-42	14-20 22-25		Dense, brown, fine to medium SAND, trace Silt, damp (SP).			
41									
42	22	24/20	42-44	8-12 17-21		Medium dense, brown, fine to medium SAND, trace Silt, damp (SP).			
43									
44	23	24/24	44-46	7-10 10-9		Medium dense, brown, fine to medium SAND, trace Silt, damp (SP).			
45									
46	24	24/18	46-48	7-13 14-14		Medium dense, brown, fine to medium SAND, trace Silt, trace Gravel, damp (SP).			
47									
48	25	24/24	48-50	9-11 11-12		Medium dense, brown, fine to medium SAND, trace Silt, trace Gravel, damp (SP).			
49									
50	26	24/16	50-52	9-11 13-10		Medium dense, brown, fine to medium SAND, trace Silt, moist (SP).			
51									
52	27	24/24	52-54	9-11 11-7		Medium dense, brown, fine to medium SAND, trace Silt, moist (SP). Changing at 53.0 feet to: Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).		1	
53									
54	28	24/17	54-56	3-3 6-8		Loose, brown, fine to medium SAND, trace Silt, wet (SP).			
55									
56	29	24/18	56-58	2-3 7-7		Loose, brown, fine to coarse SAND, trace Silt, trace fine Gravel, wet (SW).			
57									
58	30	24/13	58-60	4-8 8-10		Medium dense, brown, fine to coarse SAND, trace Silt, trace fine Gravel, wet (SW).			
59									

REMARKS

1. Groundwater was encountered at approximately 53.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
61	31	24/6	60-62	2-4 6-9		Loose, brown, fine to coarse SAND, trace Silt, trace fine Gravel, wet (SW).	SAND (SW)		
62	32	24/3	62-64	6-8 13-20		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).	62' SAND (SP)		
64	33	24/12	64-66	4-9 10-15		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
66	34	24/12	66-68	2-5 8-11		Medium dense, brown, fine to medium SAND, little Silt, wet (SM).	66' SAND (SM)		
68	35	24/8	68-70	5-7 13-15		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).	68' SAND (SP)		
70	36	24/11	70-72	3-3 7-8		Loose, brown, fine to medium SAND, trace Silt, wet (SP).			
72	37	24/13	72-74	2-4 10-10		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
74	38	24/20	74-76	2-3 5-12		Loose, brown, fine to medium SAND, trace Silt, wet (SP).			
76	39	24/17	76-78	3-8 10-13		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
78	40	24/12	78-80	4-5 8-15		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
80	41	24/21	80-82	4-12 19-22		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			

REMARKS

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BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/18/20

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
							SAND (SP)		
82	42	24/13	82-84	4-12 21-25		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			
83									
84	43	24/22	84-86	6-10 15-15		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
85									
86	44	24/18	86-88	3-7 7-15		Medium dense, brown, fine to medium SAND, trace Silt, trace coarse Sand, wet (SP).			
87									
88	45	24/19	88-90	5-11 15-16		Medium dense, brown, fine to medium SAND, trace Silt, trace coarse Sand, wet (SP).			
89									
90	46	24/16	90-92	4-8 20-22		Medium dense, brown, fine to medium SAND, trace Silt, trace coarse Sand, wet (SP).			
91									Grout
92	47	24/20	92-94	4-7 15-19		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
93									
94	48	20/20	94-95.7	4-12 38-50/4"		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			
95									
96	49	24/22	96-98	7-14 22-30		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			
97									
98	50	24/4	98-100	5-8 15-22		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
99									
100	51	24/18	100-102	3-8 13-21		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
101									

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
	52	24/20	102-104	4-5 15-19		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).	SAND (SP)		
103									
104	53	24/18	104-106	6-7 13-21		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
105									
106	54	24/13	106-108	5-13 29-45		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			
107									
108	55	24/17	108-110	5-11 21-35		Dense, brown, fine to medium SAND, little Silt, wet (SM).	108' SAND (SM)		
109									
110	56	24/20	110-112	4-13 32-56		Dense, brown, fine to medium SAND, trace Silt, wet (SP).	110' SAND (SP)		
111									
112	57	24/7	112-114	5-11 18-31		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
113									
114	58	24/18	114-116	3-7 18-35		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
115									
116	59	24/8	116-118	2-2 3-5		Loose, brown, fine to medium SAND, trace Silt, wet (SP).			
117									
118	60	24/17	118-120	2-8 36-50		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			
119									
120	61	17/8	120-121.4	4-37-50/5"		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
121									
122	62	22/20	122-123.8	11-26 34-50/4"		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
							SAND (SP)		
124	63	24/11	124-126	1-1 15-25		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
125									
126	64	24/0	126-128	2-3 8-21		NO RECOVERY.	126' NO RECOVERY		
127									
128	65	24/21	128-130	6-6 16-23		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).	128' SAND (SP)		
129									
130	66	24/13	130-132	1-10 12-15		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
131									
132	67	24/4	132-134	8-9 23-50		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			
133									
134	68	20/12	134-135.7	5-12 26-50/4"		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			
135									
136	69	20/13	136-137.7	3-7 31-50/2"		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			
137									
138	70	16/11	138-139.3	12-21-50/4"		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
139									
140	71	15/15	140-141.3	34-25-50/3"		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
141									
142	72	12/12	142-143	19-50/6"		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
143									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	73	24/21	144-146	9-13 28-27		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).	SAND (SP)		
145									
146	74	18/16	146-147.5	11-29-50/6"		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
147									
148	75	24/20	148-150	6-13 32-50		Dense, brown, fine to medium SAND, trace Silt, wet (SP). Changing at 149.7 feet to: Dense, brown, fine SAND, little Silt, wet (SM).			
149							149.7' SAND (SM)		
150	76	15/13	150-151.3	6-21-50/3"		Dense, brown, fine SAND, little Silt, wet (SM). Changing at 150.6 feet to: Very dense, brown, fine to medium SAND, trace Silt, wet (SP).	150.6' SAND (SP)		
151									
152	77	11/11	152-152.9	11-50/5"		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
153									
154	78	14/13	154-155.2	8-41-50/2"		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
155									
156	79	24/17	156-158	8-15 27-50		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			
157									
158	80	12/12	158-159	6-14		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			
159									
160	81	24/11	160-162	3-5 10-16		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
161									
162	82	16/11	162-163.3	7-43-50/4"		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
163									
164	83	16/16	164-165.3	2-50-50/4"		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			

REMARKS

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BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/18/20

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							SAND (SP)		
166	84	23/15	166-167.9	10-28 34-50/5"		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
167									
168	85	24/24	168-170	7-17 23-20		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			
169									
170	86	23/23	170-171.9	6-12 19-50/5"		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP). Changing at 171.0 feet to: Very dense, gray, fine to medium SAND, little Clay & Silt, trace coarse Sand, trace fine Gravel, wet (SC).			
171							171' SAND (SC)		
172	87	24/24	172-174	16-28 48-36		Very dense, gray, fine to medium SAND, trace Silt, wet (SP). Changing at 173.0 feet to: Very dense, gray, fine to coarse SAND, little Clay & Silt, little fine Gravel, wet (SC). Changing at 173.5 feet to: Very dense, gray, fine to medium SAND, trace Silt, wet (SP). Changing at 173.9 feet to: Very dense, gray, fine to coarse SAND, little Clay & Silt, little fine Gravel, moist (SC).	172' SAND (SP)		
173							173' SAND (SC) 173.5' SAND (SP) 173.9'		
174	88	7/7	174-174.6	50-50/1"			174' SAND (SC) SAND (SP)		
175									
176	89	24/24	176-178	12-29 31-35		Very dense, gray, fine to medium SAND, trace coarse Sand, trace Clay & Silt, wet (SP). Very dense, gray, fine to coarse SAND, some fine to coarse Gravel, trace Clay & Silt, wet (SW).	176' SAND (SW)		
177									
178	90	24/24	178-180	16-20 17-42		Very dense, gray, fine to coarse SAND, little fine Gravel, trace Clay & Silt, wet (SW).			
179									
180	91	17/17	180-181.4	3-16-50/5"		Medium dense, gray, fine to coarse SAND, little fine Gravel, trace Silt, wet (SW). Changing at 181.5 feet to: Very dense, gray, fine to medium SAND, little Silt, wet (SM).			
181							181.5' SAND (SM)		
182	92	10/10	182-182.8	11-50/4"		Very dense, fine to coarse SAND, little fine to coarse Gravel, trace Silt, wet (SW).	182' SAND (SW)		Bentonite Seal
183									
184	93	4/4	184-184.3	75/4"		Very dense, gray, fine to medium SAND, little Clay & Silt, trace coarse Sand, trace fine fine Gravel, moist (SC).	184' SAND (SC)		
185									Top of Well Screen
							186'		

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-10/MW-10D

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/18/20

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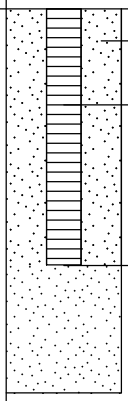
Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
187	94	3/3	186-186.3	50/3"		Very dense, gray, fine to coarse SAND, some fine to coarse Gravel, trace Cobble, trace Silt, wet (SW).	SAND (SW)		 Silica Sand Filter Pack
188	95	2/2	188-188.2	50/2"		Very dense, gray, fine to coarse SAND, some fine to coarse Gravel, trace Cobble, trace Silt, wet (SW).			2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
189									
190	96	3/1	190-190.3	50/3"		NO RECOVERY.	190' NO RECOVERY (Rock Fragment in Tip)		Bottom of Well Screen
191									
192						Bottom of Borehole at 192.0 Feet	192'	2	
193									
194									
195									
196									
197									
198									
199									
200									
201									
202									
203									
204									
205									
206									

REMARKS

2. Monitoring well installed upon completion.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Belmont, Michigan

Boring No.: MW-10M
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Check: Jim Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Joe Workman
Date Start/Finish:
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–79						See SB-10/MW-10D boring log for sample description and classification.			PROTECTIVE CASING; Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

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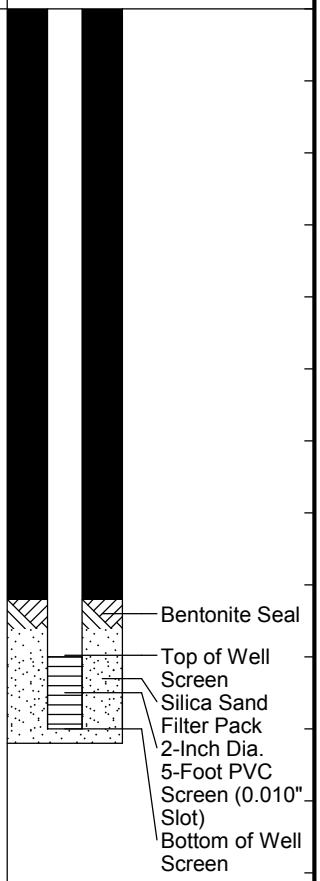
Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
131						Bottom of Borehole at 131.0 Feet		1	



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 125.0 to 130.0 feet below ground surface.

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Boring No.: MW-10M

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Check: Jim Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Joe Workman
Date Start/Finish:
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–29						See SB-10/MW-10D boring log for sample description and classification.			PROTECTIVE CASING; Grout

REMARKS

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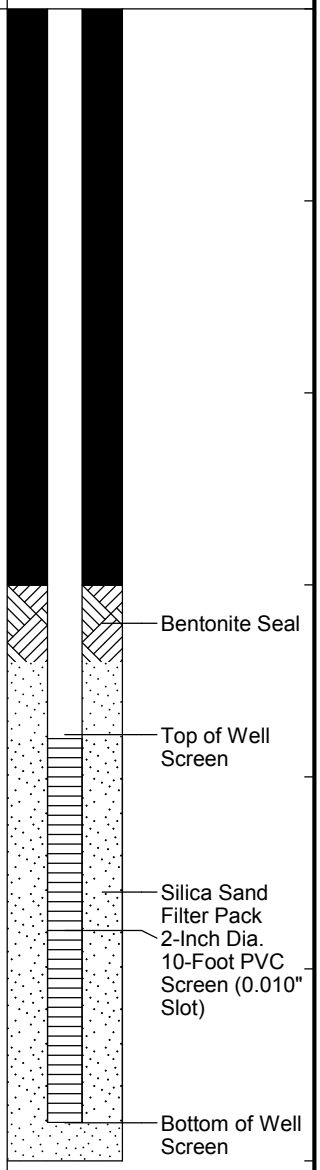
File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
60						Bottom of Borehole at 60.0 Feet		1	



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 49.0 to 59.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-10S

BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

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Engineers and Scientists

Wolverine World Wide, Inc.
US 131
Belmont, Michigan

Boring No.: SB-11/MW-11D
Page: 1 **of** 5
File No.: 16.0062335.52
Check: Jim Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Julie Groenleer
Date Start/Finish: 11-6-17 / 11-8-17
Boring Location:
GS Elev.: 742.10' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/22	0-2	0-1 1-1	1.5 tsf	TOPSOIL. Changing at 0.2 feet to: Very loose, brown, fine to medium SAND, little Silt, damp (SM). Changing at 0.8 feet to: Stiff, brown, CLAY & SILT, trace fine Sand, moist (CL). Changing at 1.4 feet to: Very loose, dark brown, fine to medium SAND, little Clay, little Silt, damp (SC).	0.2' TOPSOIL 0.8' SAND (SM) 1.4' CLAY & SILT (CL) 2' SAND (SC)	1	PROTECTIVE CASING
2	2	24/24	2-4	5-6 7-5			SAND (SM)		
3									
4	3	24/18	4-6	4-5 5-5		Medium dense, brown, fine to medium SAND, little Silt, moist (SM).	5.5'		
5									
6	4	24/24	6-8	1-1 2-2	1.0 tsf 1.0 tsf	Loose, brown, fine to medium SAND, little Silt, moist (SM). Changing at 5.5 feet to: Stiff, brown, CLAY & SILT, little fine to coarse Sand, moist (CL).	CLAY & SILT (CL)		
7							8'		
8	5	24/22	8-10	2-3 2-2		Stiff, brown, CLAY & SILT, little fine Sand, moist (CL).	SAND (SM)		
9									
10	6	24/22	10-12	2-2 2-2		Loose, brown, fine to medium SAND, little Silt, moist (SM).			
11						Very loose, brown, fine to medium SAND, little Silt, moist (SM). Changing at 11.9 feet to: Sitff, brown, CLAY & SILT, little fine to			
12	7	24/22	12-14	2-5 9-11	2.0 tsf >4.0 tsf	medium Sand, moist (CL). Hard, brown with gray mottling, CLAY & SILT, trace fine to coarse Sand, damp (CL).	11.9' CLAY & SILT (CL)		
13									
14	8	24/24	14-16	7-14 15-12	>4.0 tsf	Hard, brown with gray mottling, CLAY & SILT, trace fine to coarse Sand, damp (CL).			
15									
16	9	24/14	16-18	1-3 3-3		Loose, brown, fine to medium SAND, little Silt, moist (SM).	16' SAND (SM)		
17									
18	10	24/16	18-20	1-4 3-2	2.25 tsf	Very stiff, brown, CLAY & SILT, trace fine to coarse Sand, moist (CL). Changing at 19.5 feet to: Loose, brown, fine to medium	18' CLAY & SILT (CL)		
19							19.5'		
20	11	24/4	20-22	4-6 3-3		SAND, little Silt, moist (SM). Loose, brown, fine to medium SAND, little Silt, moist (SM).	SAND (SM)		
21									
22	12	24/24	22-24	1-7 7-7		Medium dense, brown, fine to medium Silty SAND, moist (SM). Changing at 22.9 feet to: Very stiff, brown, CLAY & SILT, little fine	22.9'		
23					2.25 tsf		CLAY & SILT (CL)		
24	13	24/12	24-26	1-1 1-1		Sand, damp (CL). Changing at 23.8 feet to: Medium dense, brown, fine to medium SAND, little Silt, moist (SM).	23.8' SAND (SM)	2	
25									
26	14	24/24	26-28	1-5 7-10		Very loose, brown, fine to medium SAND, little Silt, wet (SM).	26' SAND (SP)		
27						Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
28	15	24/18	28-30	8-9 10-11		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
29									

REMARKS

1. Pocket penetrometer readings were measured in tons per square foot (tsf) and are used to evaluate consistency of cohesive soil.
2. Groundwater was encountered at approximately 24.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

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Belmont, Michigan

Boring No.: SB-11/MW-11D
Page: 2 **of** 5
File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31	16	24/10	30-32	2-5 8-14		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).	SAND (SP)		
32 33	17	24/15	32-34	2-7 8-9		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
34 35	18	24/10	34-36	3-8 13-11		Medium dense, brown, fine to medium SAND, trace coarse Sand, trace Silt, wet (SP).			
36 37	19	24/18	36-38	7-8 10-10		Medium dense, brown, fine to medium SAND, trace coarse Sand, trace Silt, wet (SP). Changing at 37.4 feet to: Medium dense, brown, fine SAND, little Silt, wet (SM).	37.4'		
38 39	20	24/18	38-40	2-2 5-6			38' SAND (SM)		
40 41	21	24/12	40-42	2-2 5-12		Loose, brown, fine SAND, trace Silt, wet (SP). Loose, brown, fine SAND, trace Silt, wet (SP).	SAND (SP)		
42 43	22	24/16	42-44	2-4 5-7		Loose, brown, fine SAND, trace Silt, wet (SP).			
44 45	23	24/18	44-46	3-8 9-10		Medium dense, brown, fine SAND, trace Silt, wet (SP).			
46 47	24	24/24	46-48	2-7 7-9		Medium dense, brown, fine to coarse SAND, trace fine Gravel, trace Silt, wet (SW).	46' SAND (SW)		
48 49	25	24/24	48-50	2-7 10-12		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP). Changing at 49.2 feet to: Medium dense, brown, fine to coarse SAND, trace fine Gravel, trace Silt, wet (SW).	48' SAND (SP) 49.2'		
50 51	26	24/10	50-52	2-11 14-22		Medium dense, brown, fine SAND, trace Silt, wet (SP).	50' SAND (SW) SAND (SP)		
52 53	27	24/6	52-54	4-8 15-22		Medium dense, brown, fine SAND, trace Silt, wet (SP).		3	
54 55	28	24/14	54-56	2-4 7-11		Medium dense, brown, fine SAND, trace Silt, wet (SP).			
56 57	29	24/24	56-58	2-4 6-6		Loose, brown, fine SAND, little Silt, wet (SM).	56' SAND (SM)		
58 59	30	24/24	58-60	2-4 7-11		Medium dense, brown, fine SAND, trace Silt, wet (SP).	58' SAND (SP)		
60 61	31	24/18	60-62	5-8 13-22		Medium dense, brown, fine SAND, some Silt, wet (SM).	60' SAND (SM)		
62 63	32	24/20	62-64	3-6 8-10		Medium dense, brown, fine SAND, some Silt, wet (SM).			
64	33	24/18	64-66	3-5 6-6		Medium dense, brown, fine SAND, some			

REMARKS

3. Rock in tip.

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Boring No.: SB-11/MW-11D
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File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						Silt, wet (SM).	SAND (SM)		
66–67	34	24/22	66-68	3-7 13-11		Medium dense, brown, fine SAND, some Silt, wet (SM). Changing at 67.1 feet to:	67.1'		
						Medium dense, brown, fine to medium	SAND (SP)		
68–69	35	24/22	68-70	3-5 8-6		SAND, trace Silt, wet (SP).	68.8'		
						Medium dense, brown, fine to medium SAND, trace Silt, wet (SP). Changing at	SAND (SM)		
70–71	36	24/23	70-72	2-3 4-5		68.8 feet to: Medium dense, brown, fine SAND, little Silt, wet (SM).	70'		
						Loose, brown, fine SAND, trace Silt, wet	SAND (SP)		
72–73	37	24/20	72-74	3-4 6-8		(SP). Loose, brown, fine SAND, trace Silt, wet (SP).			
74–75	38	24/24	74-76	3-3 5-9		Loose, brown, fine SAND, trace Silt, wet (SP).			Grout
							76'		
76–77	39	24/0	76-78	6-10 15-13		NO RECOVERY.	NO RECOVERY		
							78'		
78–79	40	24/17	78-80	2-2 5-11		Loose, brown, fine SAND, trace Silt, wet (SP).	SAND (SP)		
80–81	41	24/12	80-82	2-4 9-10		Medium dense, brown, fine SAND, trace Silt, wet (SP).			
82–83	42	24/24	82-84	3-3 5-6		Loose, brown, fine SAND, trace Silt, wet (SP).			
							84'		
84–85	43	24/0	84-86	2-4 5-9		NO RECOVERY.	NO RECOVERY		
							86'		
86–87	44	24/18	86-88	1-2 5-12		Loose, brown, fine SAND, trace Silt, wet (SP).	SAND (SP)		
88–89	45	24/8	88-90	6-5 8-11		Medium dense, brown, fine SAND, trace Silt, wet (SP).			
90–91	46	24/18	90-92	2-4 7-11		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
							92'		
92–93	47	24/0	92-94	2-3 6-10		NO RECOVERY.	NO RECOVERY		
							94'		
94–95	48	24/16	94-96	2-4 4-8		Loose, brown, fine to medium SAND, trace Silt, wet (SP). Changing at 95.8 feet to:	SAND (SP)		
						Loose, brown fine SAND, little Silt, wet	95.8'		
96–97	49	24/12	96-98	2-3 4-5		(SM). Loose, brown fine SAND, little Silt, wet (SM).	SAND (SM)		
							98'		
98–99	50	24/16	98-100	2-3 6-8		Loose, brown, fine SAND, trace Silt, wet (SP).	SAND (SP)		

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

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US 131
Belmont, Michigan

Boring No.: SB-11/MW-11D
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Check: Jim Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
101	51	24/4	100-102	2-5 10-14		Medium dense, brown, fine SAND, trace Silt, wet (SP).	SAND (SP)		
102 103	52	24/12	102-104	2-7 13-15		Medium dense, brown, fine SAND, trace Silt, wet (SP).			
104 105	53	24/0	104-106	7-14 15-20		NO RECOVERY.	104' NO RECOVERY		
106 107	54	24/19	106-108	1-3 8-13		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).	106' SAND (SP)		
108 109	55	24/18	108-110	2-4 6-8		Loose, brown, fine to medium SAND, trace Silt, wet (SP).			
110 111	56	24/10	110-112	7-14 18-17		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			
112 113	57	24/0	112-114	4-8 10-13		NO RECOVERY.	112' NO RECOVERY		
114 115	58	24/10	114-116	8-10 11-15		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).	114' SAND (SP)		
116 117	59	24/10	116-118	1-2 2-2		Very loose, brown, fine to medium SAND, trace Silt, wet (SP).			
118 119	60	24/19	118-120	2-2 5-7		Loose, brown, fine to medium SAND, trace Silt, wet (SP).			
120 121	61	24/21	120-122	2-2 5-7		Loose, brown, fine to medium SAND, trace Silt, wet (SP).			
122 123	62	24/23	122-124	2-2 7-8		Loose, brown, fine to medium SAND, trace Silt, wet (SP).			
124 125	63	24/20	124-126	6-7 10-13		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
126 127	64	24/20	126-128	3-3 4-4		Loose, brown, fine to medium SAND, trace Silt, wet (SP). Changing at 127.5 feet to:	127.5'		
128 129	65	24/12	128-130	3-4 12-14	<0.25 tsf <0.25 tsf	Soft, gray, CLAY & SILT, little fine to medium Sand, moist (CL). Soft, gray, CLAY & SILT, little fine to medium Sand, moist (CL). Changing at 128.2 feet to: Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).	128.2' CLAY & SILT (CL) SAND (SP)		
130 131	66	24/9	130-132	2-5 13-15		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
132 133	67	24/15	132-134	4-10 18-21		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP). Changing at 133.2 feet to: Soft, gray, CLAY & SILT, some fine to medium Sand, moist (CL). Changing at 133.9 feet to: Medium dense,	133.2'		
134	68	24/16	134-136	6-13 18-23	0.25 tsf		133.9' CLAY & SILT (CL) SAND (SP)		

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-11/MW-11D

BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: SB-11/MW-11D
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File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
136						brown, fine to medium SAND, trace Silt, wet (SP).	SAND (SP)		
137	69	24/14	136-138	2-4 12-15		Dense, brown, fine to medium SAND, trace Silt, wet (SP).			
138	70	24/8	138-140	3-10 20-21		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
139						Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
140	71	24/18	140-142	3-4 15-18		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).			
141									
142	72	24/16	142-144	4-11 19-24		Medium dense, brown, fine to medium SAND, trace Silt, trace fine Gravel, wet (SP).			
143									
144	73	24/18	144-146	11-13 23-33		Dense, brown, fine to coarse SAND, trace Silt, trace Gravel, wet (SW).	144' SAND (SW)		
145									
146	74	24/10	146-148	9-13 30-30		Dense, brown, fine to medium SAND, trace Silt, trace coarse Sand, wet (SP).	146' SAND (SP)		
147									
148	75	24/10	148-150	9-18 26-34		Dense, brown, fine to medium SAND, trace Silt, trace coarse Sand, wet (SP).			
149									
150	76	24/21	150-152	9-23 29-40		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).			
151									
152	77	18/18	152-153.5	25-42-50		Very dense, brown, fine to medium SAND, trace Silt, wet (SP).		4	
153									
154	78	24/24	154-156	11-13 15-18		Medium dense, brown, fine to medium SAND, some Silt, wet (SM).	154' SAND (SM)		
155									
156	79	24/24	156-158	7-17 37-30		Very dense, brown, fine SAND, some Silt, wet (SM). Changing at 157.7 feet to: Hard, gray, CLAY & SILT, little fine Sand, moist (CL).	157.7' CLAY & SILT (CL)		
157									
158	80	24/24	158-160	8-18 27-26	>4.0 tsf >4.0 tsf	Hard, gray, CLAY & SILT, little fine Sand, moist (CL). Changing at 159.1 feet to: Dense, gray, fine SAND, some Silt, wet (SM). Changing at 159.9 feet to: Hard, gray, CLAY & SILT, little fine Sand, moist (CL).	159.1' SAND (SM) 159.9'		
159									
160	81	24/24	160-162	6-10 18-20	>4.0 tsf >4.0 tsf		CLAY & SILT (CL)		
161									
162						Hard, gray, CLAY & SILT, some fine Sand, moist (CL).	162'	5	
163						Bottom of Borehole at 162.0 Feet			
164									
165									
166									
167									
168									
169									

Top of Well Screen
Silica Sand Filter Pack
2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
Bottom of Well Screen

REMARKS

4. Only drove spoon 18 inches due to high blow counts.
5. Monitoring well was installed in borehole upon completion. Well screen set from 150.0 to 155.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-11/MW-11D

BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

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Belmont, Michigan

Boring No.: MW-11M
Page: 1 **of** 2
File No.: 16.0062335.52
Check: Jim Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Julie Groenleer/Joe Workman
Date Start/Finish: 11-8-17 / 11-9-17
Boring Location:
GS Elev.: 742.30' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–51						See SB-11/MW-11D boring log for sample description and classification.			PROTECTIVE CASING; Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-11M

BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: MW-11M
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File No.: 16.0062335.52
Check: Jim Cai

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
53–112						Bottom of Borehole at 100.0 Feet		1	Top of Well Screen Silica Sand Filter Pack 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot) Bottom of Well Screen

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 95.0 to 10.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-11M

BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

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Belmont, Michigan

Boring No.: MW-11S
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File No.: 16.0062335.52
Check: Jim Cai

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Joe Workman
Date Start/Finish: 11-9-17 / 11-9-17
Boring Location:
GS Elev.: 742.10' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

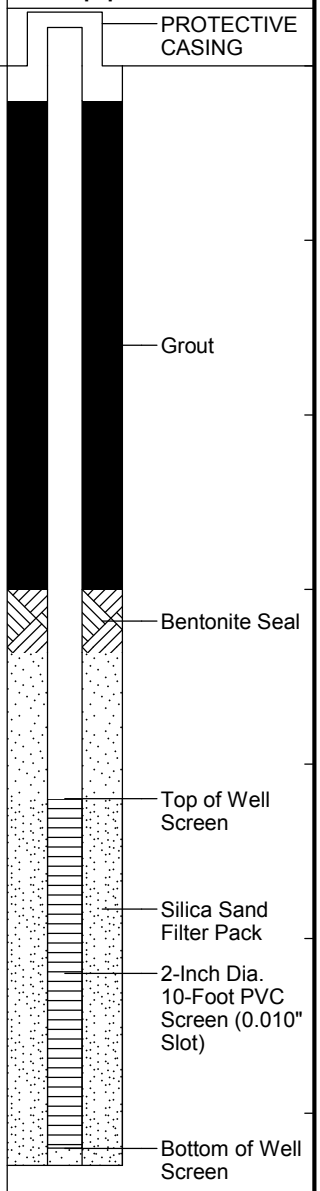
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–31						See SB-11/MW-11D boring log for sample description and classification.		
32						Bottom of Borehole at 31.5 Feet		1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 21.0 to 31.0 feet below ground surface.

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Boring No.: MW-11S

BORING_WELL 6233552 WWW US 131 SB-9 THROUGH SB-11.GPJ GZA_CORP.GDT 1/25/18

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Wolverine World Wide, Inc.
House Street
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Boring No.: HS-MW-12A
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File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: J. Markosky
Date Start/Finish:
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

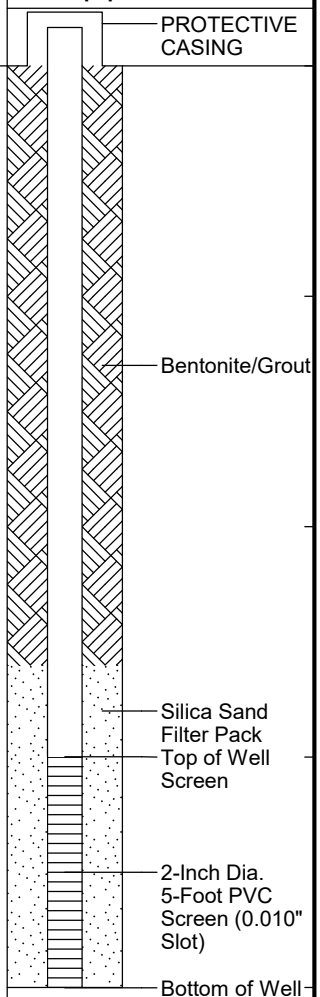
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–19						See HS-MW-12D for detailed soil descriptions.		
20						Bottom of Borehole at 20.0 Feet		1
21–24								

Equipment Installed



REMARKS

1. Monitoring well HS-MW-12A was installed in borehole upon completion. Well screen set from approximately 15.0 to 20.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Boring No.: HS-MW-12B
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File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: J. Markosky
Date Start/Finish:
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–29						See HS-MW-12D for detailed soil descriptions.			PROTECTIVE CASING; 10 Inch Casing

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31–64						Bottom of Borehole at 54.5 Feet		1	Bentonite/Grout; Silica Sand Filter Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen

REMARKS

1. Monitoring well HS-MW-12B was installed in borehole upon completion. Well screen set from approximately 49.0 to 54.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-12C
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File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: J. Markosky
Date Start/Finish: 9-3-19 / 9-20-19
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–29						See HS-MW-12D for detailed soil descriptions.			PROTECTIVE CASING

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW-12C

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									
42									
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49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									Grout
62									
63									
64									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW-12C

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
66									
67									
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
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98									
99									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
101–134						Bottom of Borehole at 130.4 Feet		1	Silica Sand Filter Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)

REMARKS

1. Monitoring well HS-MW-12C was installed in borehole upon completion. Well screen set from approximately 124.0 to 128.8 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW-12C

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Boring No.: HS-MW-12D
Page: 1 **of** 6
File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: J. Markosky
Date Start/Finish: 9-3-19 / 9-20-19
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/12	0-2	1-1 3-3	0.0 ppm	Black, TOPSOIL. Changing at 0.5 feet to: Loose, light brown, fine SAND, some Silt, dry.	0.5' TOPSOIL SAND	1	PROTECTIVE CASING
2	2	24/8	2-4	2-3 2-3	0.0 ppm	Loose, light brown, fine to medium SAND, little Silt, dry.			
4	3	24/14	4-6	3-4 4-5	0.0 ppm	Loose, light brown, fine to medium SAND, little Silt, dry.			
6	4	24/16	6-8	2-3 3-3	0.0 ppm	Loose, light brown, fine to medium SAND, little Silt, moist.			
8	5	24/18	8-10	1-2 2-2	0.0 ppm	Loose, brown, fine to medium SAND, little Silt, damp.			
10	6	24/22	10-12	1-3 4-5	0.0 ppm	Loose, brown, fine to medium SAND, little Silt, wet.			
12	7	24/14	12-14	2-2 1-2	0.0 ppm	Loose, brown, fine to medium SAND, some Silt, wet.			
14	8	24/11	14-16	WOH-1 5-8	0.0 ppm	Loose, brown, fine to medium SAND, little Silt, wet.		2 3	
16	9	24/16	16-18	4-5 8-9	0.0 ppm	Loose, brown, fine to medium SAND, little Silt, wet.			
18	10	24/24	18-20	1-4 9-10	0.0 ppm	Loose, brown, fine to medium SAND, little Silt, wet.			
20	11	24/23	20-22	3-4 7-11	0.0 ppm	Loose, brown, fine to medium SAND, little Silt, wet.			
22	12	24/20	22-24	3-6 9-12	0.0 ppm	Medium dense, brown, fine to medium SAND, little Silt, trace Gravel, wet.			
24	13	24/20	24-26	4-6 10-9	0.0 ppm	Medium dense, brown, fine to medium SAND, little Silt, trace Gravel, wet.		4	
26	14	24/23	26-28	1-2 2-3	0.0 ppm	Loose, brown, fine to medium SAND, little Silt, trace Gravel, wet.			
28	15	24/24	28-30	1-3 3-5	0.0 ppm	Loose, brown, fine to medium SAND, some Silt, wet.			

REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings are shown in parts per million (ppm) of isobutylene. Background was measured at 0.0 ppm.
2. Groundwater was encountered at approximately 14.0 feet below ground surface.
3. Temporary well set at 15.0 to 20.0 feet below ground surface. Purged 55.0 gallons. Groundwater sample submitted for laboratory analysis.
4. Temporary well set at 25.0 to 30.0 feet below ground surface. Purged 50.0 gallons. Groundwater sample submitted for laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW-12D

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/19/20

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31	16	24/24	30-32	1-3 3-5	0.0 ppm	Loose, brown, fine to medium SAND, some Silt, wet.	SAND		
32 33	17	24/20	32-34	2-5 5-6	0.0 ppm	Loose, brown, fine to medium SAND, some Silt, wet.			
34 35	18	24/18	34-36	1-2 3-5	0.0 ppm	Loose, brown, fine to medium SAND, some Silt, wet.		5	
36 37	19	24/9	36-38	3-8 12-14	0.0 ppm	Medium dense, brown, fine to medium SAND, some Silt, wet.			
38 39	20	24/20	38-40	2-4 5-10	0.0 ppm	Loose, brown and gray, fine to medium SAND, some Silt, wet.			
40 41	21	24/24	40-42	1-3 5-6	0.0 ppm	Loose, brown and gray, fine to medium SAND, some Silt, wet. Changing at 41.6 feet to: Gray, Silty CLAY, some fine Sand, wet.	41.8' Silty CLAY		
42 43	22	24/24	42-44	4-8 10-13	0.0 ppm	Gray, Silty CLAY, some fine to medium Sand, dry.		6	
44 45	23	24/24	44-46	3-11 11-13	0.0 ppm	Very stiff, gray, SILT & CLAY, little fine Sand, wet.	44' SILT & CLAY		
46 47	24	24/2	46-48	1-1 1-2	0.0 ppm	Very loose, brown and gray, fine to medium SANd, little Silt, wet.	46' SAND		
48 49	25	24/20	48-50	2-5 8-12	0.0 ppm	Medium dense, brown, fine to medium SAND, trace Silt, wet. Changing at 49.0 feet to: Medium dense, brown, fine to medim SAND, trace Silt with layers of interbedded Silty Clay, wet.		7	
50 51	26	24/14	50-52	1-7 11-14	0.0 ppm				
52 53	27	24/0	52-54	9-30 43-29	0.0 ppm	Medium dense, brown, fine to medium SAND, little Silt with interbedded Silty Clay, wet. NO RECOVERY.			
54 55	28	24/24	54-56	4-9 11-12	0.0 ppm	Medium dense, brown, fine to medium SAND, little Silt, wet. Changing at 54.5 feet to: Gray, Silty CLAY, trace fine Sand, dry.	54.5' Silty CLAY		
56 57	29	24/24	56-58	8-13 13-15	0.0 ppm	Very stiff, gray, Silty CLAY, little fine Sand, dry.			
58 59	30	24/24	58-60	4-8 10-10	0.0 ppm	Very stiff, gray, Silty CLAY, little fine Sand, dry.			
60 61	31	24/24	60-62	6-8 9-11	0.0 ppm	Very stiff, gray, Silty CLAY, little fine Sand, dry.			
62 63	32	24/24	62-64	4-10 10-11	0.0 ppm	Very stiff, gray, Silty CLAY, little fine Sand, dry.			
64	33	24/24	64-66	6-11	0.0 ppm	Very stiff, gray, Silty CLAY, little fine Sand,			

REMARKS

5. Temporary well set at 35.0 to 40.0 feet below ground surface. Purged 70.0 gallons. Groundwater sample submitted for laboratory analysis.
6. 10.0 inch casing set to 42.6 feet below ground surface.
7. Temporary well set at 49.0 to 54.0 feet below ground surface. Purged 75.0 gallons. Groundwater sample submitted for laboratory analysis.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
				15-16		dry.	Silty CLAY		
66	34	24/24	66-68	3-9 10-10	0.0 ppm	Very stiff, gray, Silty CLAY, trace fine Sand, dry.			
67									
68	35	24/24	68-70	6-6 9-11	0.0 ppm	Very stiff, gray, Silty CLAY, trace fine Sand, dry.			
69									
70	36	24/24	70-72	2-2 2-5	0.0 ppm	Very stiff, gray, Silty CLAY, trace fine Sand, dry. Changing at 71.0 feet to: Gray, fine SANd, some Silt, wet.	71' SAND		
71									
72	37	24/16	72-74	1-1 2-2	0.0 ppm	Very loose, gray and brown, fine to medium SAND, some Silt, wet.			
73									
74	38	24/20	74-76	3-3 7-11	0.0 ppm	Loose, gray and brown, fine SAND, some Silt, wet.		8	
75									
76	39	24/24	76-78	2-3 5-7	0.0 ppm	Loose, gray and brown, fine SAND, some Silt, wet.			Grout
77									
78	40	24/13	78-80	1-1 4-5	0.0 ppm	Loose, gray and brown, fine SAND, some Silt, wet.			
79									
80	41	24/24	80-82	1-1 3-5	0.0 ppm	Loose, gray and brown, fine SAND, some Silt, wet.			
81									
82	42	24/18	82-84	1-3 8-11	0.0 ppm	Medium dense, gray and brown, fine to medium SAND, some Silt, wet. Changing at 83.3 feet to: Gray and brown, fine to medium SAND, some Silt, little Gravel, wet.			
83									
84	43	24/20	84-86	2-5 6-7	0.0 ppm	Medium dense, brown, fine to coarse SAND, some Gravel, trace Silt, wet.		9	
85									
86	44	24/24	86-88	2-4 12-20	0.0 ppm	Medium dense, brown, fine to coarse SAND, some Gravel, trace Silt, wet.			
87									
88	45	24/17	88-90	3-5 9-13	0.0 ppm	Medium dense, brown, fine to coarse SAND, little Gravel, little Silt, wet.			
89									
90	46	24/92	90-92	1-4 7-14	0.0 ppm	Medium dense, brown, fine to coarse SAND, little Gravel, little Silt, wet.			
91									
92	47	24/7	92-94	1-1 2-8	0.0 ppm	Very loose, brown, fine to coarse SAND, little Gravel, little Silt, wet.			
93									
94	48	24/11	94-96	3-10 14-22	0.0 ppm	Medium dense, brown, fine to coarse SAND, little Gravel, little Silt, wet.		10	
95									
96	49	24/12	96-98	1-3 6-7	0.0 ppm	Loose, brown and gray, fine to coarse SAND, little Silt, trace Gravel, wet.			
97									
98	50	24/15	98-100	3-3 12-17	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, little Silt, trace Gravel, wet.			
99									

REMARKS

8. Temporary well set at 75.0 to 80.0 feet below ground surface. Purged 80.0 gallons. Groundwater sample submitted for laboratory analysis.
9. Temporary well set at 85.0 to 90.0 feet below ground surface. Purged 55.0 gallons. Groundwater sample submitted for laboratory analysis.
10. Temporary well set at 95.0 to 100.0 feet below ground surface. Purged 85.0 gallons. Groundwater sample submitted for laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/19/20

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
101	51	24/5	100-102	1-4 4-8	0.0 ppm	Loose, brown and gray, fine to coarse SAND, little Silt, little Gravel, wet.	SAND		
102 103	52	24/12	102-104	3-10 15-15	0.0 ppm	Medium dense, brown, fine to coarse SAND, little Silt, little Gravel, wet.			
104 105	53	24/14	104-106	2-5 10-19	0.0 ppm	Medium dense, brown, fine to coarse SAND, little Silt, little Gravel, wet.		11	
106 107	54	24/8	106-108	1-3 3-11	0.0 ppm	Loose, brown, fine to coarse SAND, little Silt, wet.			
108 109	55	24/16	108-110	1-2 5-12	0.0 ppm	Loose, brown, fine to coarse SAND, little Silt, wet. Changing at 108.4 feet to: Brown, fine to medium SAND, little Silt, wet.			
110 111	56	24/15	110-112	1-3 3-9	0.0 ppm	Loose, brown, fine to medium SAND, little Silt, wet.			
112 113	57	24/16	112-114	1-12 20-24	0.0 ppm	Dense, brown, fine to medium SAND, little Silt, wet.			
114 115	58	24/13	114-116	1-5 11-16	0.0 ppm	Medium dense, brown, fine to medium SAND, little Silt, trace Gravel, wet.		12	
116 117	60	24/23	116-118	3-14 25-38	0.0 ppm	Dense, brown, fine to medium SAND, little Silt, trace Gravel, wet. Changing at 117.8 feet to: Brown, fine to coarse SAND, some Gravel, little Silt, wet.			
118 119	61	24/9	118-120	12-19 17-17	0.0 ppm	Dense, brown, fine to coarse SAND, some Silt, little Gravel, wet.			
120 121	62	24/8	120-122	3-5 13-15	0.0 ppm	Medium dense, brown, fine to coarse SAND, little Silt, little Gravel, wet.			
122 123	63	24/12	122-124	5-9 14-22	0.0 ppm	Medium dense, brown, fine to coarse SAND, little Silt, little Gravel, wet.			
124 125	64	24/14	124-126	6-15 23-26	0.0 ppm	Dense, brown, fine to coarse SAND, some Gravel, little Siilt, wet.		13	
126 127	65	24/7	126-128	7-17 24-16	0.0 ppm	Dense, brown, fine to coarse SAND, some Gravel, little Siilt, wet.			
128 129	66	24/9	128-130	7-18 45-41	0.0 ppm	Very dense, brown, fine to coarse SAND, some Gravel, little Siilt, wet.			
130 131	67	12/12	130-131	17-50/6"	0.0 ppm	Very dense, brown, fine to coarse SAND, some Gravel, little Siilt, wet.			
132 133	68	24/9	132-134	30-33 14-10	0.0 ppm	Dense, brown, fine to coarse SAND, some Gravel, little Silt, wet.			
134	70	24/20	134-136	15-30	0.0 ppm	Very dense, brown, fine to coarse SAND,			

REMARKS

11. Temporary well set at 105.0 to 110.0 feet below ground surface. Purged 65.0 gallons. Groundwater sample submitted for laboratory analysis.
12. Temporary well set at 115.0 to 120.0 feet below ground surface. Purged 100.0 gallons. Groundwater sample submitted for laboratory analysis.
13. Temporary well set at 125.0 to 130.0 feet below ground surface. Purged 65.0 gallons. Groundwater sample submitted for laboratory analysis.
14. Temporary well set at 135.0 to 140.0 feet below ground surface. Purged - gallons. Groundwater sample submitted for laboratory analysis.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
				30-21		some Gravel, little Silt, wet.	SAND	14	
136–137	71	24/9	136-138	18-23 21-20	0.0 ppm	Dense, brown, fine to coarse SAND, some Gravel, little Silt, wet.			
138–139	72	24/13	138-140	10-15 16-17	0.0 ppm	Dense, brown, fine to coarse SAND, some Gravel, little Silt, wet.			
140–141	73	17/9	140-141.4	11-39-50/5	0.0 ppm	Very dense, brown, fine to coarse SAND, some Gravel, little Silt, wet.			
142–143	74	17/12	142-143.4	11-34-50/5	0.0 ppm	Very dense, brown, fine to coarse SAND, some Gravel, little Silt, wet. Changing at 142.6 feet to: Brown, fine SANd, some Silt, wet.			
144–145	75	12/12	144-145	10-50/6"	0.0 ppm	Very dense, brown, fine SAND, some Silt, trace Gravel, wet.			
146–147	76	18/7	146-147.5	4-15-50/6"	0.0 ppm	Very dense, brown, fine SAND, some Silt, trace Gravel, wet.			
148–149	77	10/2	148-148.8	20-50/4"	0.0 ppm	Very dense, brown, fine to medium SAND, little Silt, wet.			
150–151	78	6/6	150-150.5	50/6"	0.0 ppm	Very dense, brown, fine to medium SAND, little Silt, wet.			
152–153	79	12/10	152-153	6-50/6"	0.0 ppm	Very dense, brown, fine to medium SAND, little Silt, wet.			
154–155	80	11/11	154-154.9	29-50/5"	0.0 ppm	Very dense, brown, fine SAND, little Silt, wet.		15	
156–157	81	11/11	156-156.9	19-50/5"	0.0 ppm	Very dense, brown, fine to medium SAND, little Silt, trace Gravel, wet.			
158–159	82	12/11	158-159	27-50/6"	0.0 ppm	Very dense, brown, fine to medium SAND, little Silt, trace Gravel, wet.			
160–161	83	18/18	160-161.5	5-19-50/6"	0.0 ppm	Very dense, brown, fine to medium SAND, little Silt, trace Gravel, wet.			
162–163	84	24/20	162-164	2-8 14-14	0.0 ppm	Medium dense, brown, fine to medium SAND, little Silt, wet.			
164–165	85	12/12	164-165	15-50/6"	0.0 ppm	Very dense, brown, fine to medium SAND, little Silt, wet.			
166–167	86	23/14	166-167.9	3-10 30-50/5"	0.0 ppm	Dense, brown, fine to medium SAND, little Silt, wet.		16	
168–169	87	23/2	168-169.9	3-13 37-50/5"	0.0 ppm	Very dense, brown, fine to medium SAND, little Silt, wet.			

Silica Sand Filter Pack
Top of Well Screen
2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
Bottom of Well Screen

REMARKS

15. Temporary well set at 155.0 to 160.0 feet below ground surface. Purged 55.0 gallons. Groundwater sample submitted for laboratory analysis.
16. Temporary well set at 165.0 to 170.0 feet below ground surface. Purged 75.0 gallons. Groundwater sample submitted for laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/19/20

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Boring No.: HS-MW-12D
Page: 6 **of** 6
File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
171	88	18/14	170-171.5	1-16-50/6"	0.0 ppm	Very dense, brown, fine to medium SAND, little Silt, wet.	SAND		
172	90	12/12	172-173	11-22	0.0 ppm	Very dense, brown, fine to medium SAND, little Silt, wet.			
174	91	14/14	174-175.2	26-49-50/2	0.0 ppm	Very dense, brown, fine to medium SAND, little Silt, with small, interbedded Silty Clay layers, wet.		17	
176	92	12/12	176-177	16-50/6"	0.0 ppm	Very dense, brown, fine SAND, some Silt, wet.			
178	93	18/18	178-179.5	20-27-50/6	0.0 ppm	Very dense, brown, fine to medium SAND, little Silt, wet. Changing at 178.9 feet to: Brown, fine SANd, some Silt, wet.			
180	94	16/14	180-181.3	6-24-50/4"	0.0 ppm	Very dense, brown, fine to medium SAND, little Silt, wet.			
182	95	21/21	182-183.8	12-23 44-50/3"	0.0 ppm	Very dense, brown, fine to medium SAND, little Silt, wet.			
184	96	10/10	184-184.8	29-50/4"	0.0 ppm	Hard, gray, Silty CLAY, some fine to medium Sand, wet. Changing at 184.2 feet to: Brown and gray, fine to medium SAND, little Silt, wet.	184' 184.2 Silty CLAY SAND	18	
186	97	17/17	186-187.4	18-29-50/5	0.0 ppm	Very dense, brown and gray, fine to medium SAND, some Silt, wet.			
188	98	24/24	188-190	9-34 44-40	0.0 ppm	Very dense, brown and gray, fine to medium SAND, some Silt, wet. Changing at 189.0 feet to: Gray, Silty CLAY, little fine Sand, wet.	189' Silty CLAY		
190	99	24/24	190-192	15021-29-42	0.0 ppm	Hard, gray, Silty CLAY, some fine to medium Sand, wet. Changing at 190.5 feet to: Brown and gray, fine to medium SAND, some Silt, wet.	190.5' SAND		
192	100	17/17	192-193.4	18-30-50/5	0.0 ppm	Hard, gray, Silty CLAY, litle fine Sand, dry (weathered Bedrock).	192' Silty CLAY		
194						Bottom of Borehole at 194.0 Feet	194'	19	

REMARKS

17. Temporary well set at 175.0 to 180.0 feet below ground surface. Purged 70.0 gallons. Groundwater sample submitted for laboratory analysis.
18. Temporary well set at 185.0 to 190.0 feet below ground surface. Purged 60.0 gallons. Groundwater sample submitted for laboratory analysis.
19. Monitoring well was installed in borehole upon completion. Well screen set from 154.7 to 159.5 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/19/20

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Boring No.: HS-MW-12E
Page: 1 **of** 6
File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: J. Markosky
Date Start/Finish: 9-3-19 / 9-20-19
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1						See HS-MW-12D for detailed soil descriptions.			PROTECTIVE CASING
20						Bottom of Borehole at 194.0 Feet		1	Grout

REMARKS

1. Monitoring well HS-MW-12E was installed in borehole upon completion. Well screen set from approximately 184.0 to 189.0 feet below ground surface.

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Boring No.: HS-MW-12E

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Boring No.: HS-MW-12E
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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
31									
32									
33									
34									
35									
36									
37									
38									
39									
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41									
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63									
64									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check: JTM/JMG

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
66									
67									
68									
69									
70									
71									
72									
73									
74									
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77									
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98									
99									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/20/20

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Check: JTM/JMG

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
101									
102									
103									
104									
105									
106									
107									
108									
109									
110									
111									
112									
113									
114									
115									
116									
117									
118									Bentonite/Grout
119									
120									
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122									
123									
124									
125									
126									
127									
128									
129									
130									
131									
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133									
134									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
136									
137									
138									
139									
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141									
142									
143									
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165									
166									
167									
168									
169									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/20/20

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File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
171–204									Silica Sand Filter Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen

REMARKS

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Boring No.: HS-MW-13A
Page: 1 **of** 2
File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 1-14-20 / 1-14-20
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–39						See HS-MW-13C for detailed soil descriptions.			PROTECTIVE CASING; Bentonite/Grout

REMARKS

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BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Boring No.: HS-MW-13A
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File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
41–86						Bottom of Borehole at 84.5 Feet		1	Silica Sand Filter Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen

REMARKS

1. Monitoring well HS-MW-13A was installed in borehole upon completion. Well screen set from approximately 79.2 to 84.0 feet below ground surface.

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Boring No.: HS-MW-13B
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File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 1-13-20 / 1-14-20
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–39						See HS-MW-13C for detailed soil descriptions.			PROTECTIVE CASING

REMARKS

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BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Boring No.: HS-MW-13B
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Check: JTM/JMG

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
41–86									Bentonite/Grout

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
87									
88									
89									
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REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
134–155									Silica Sand Filter Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen
156						Bottom of Borehole at 155.5 Feet		1	

REMARKS

1. Monitoring well HS-MW-13B was installed in borehole upon completion. Well screen set from approximately 148.8 to 153.6 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Boring No.: HS-MW-13C
Page: 1 **of** 12
File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 12-16-19 / 12-17-19
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/11	0-2	1-2 2-1		Dark brown to dark yellowish brown, fine SAND, some Silt, moist. Changing at 0.2 feet to: Yellowish brown, fine SAND, some Silt, moist. Changing at 0.9 feet to: NO RECOVERY.	SAND 0.9' NO RECOVERY		PROTECTIVE CASING
2	2	24/1	2-4	4-2 3-6		Yellowish brown, fine SAND, little Silt, moist. Changing at 2.1 feet to: NO RECOVERY.	2' 2.1' SAND NO RECOVERY		
4	3	24/11	4-6	2-4 5-7		Light yellowish brown, fine SAND, trace Silt, moist. Changing at 4.9 feet to: NO RECOVERY.	4' SAND 4.9' NO RECOVERY		
6	4	24/13	6-8	5-6 7-8		Dark yellowish brown, fine to medium SAND, trace Silt, moist. Changing at 6.7 feet to: Dark yellowish brown, SILT, thin seams of Silty Clay, moist. Changing at 6.9 feet to: Dark yellowish brown, fine to medium SAND, trace Silt, moist. Changing at 7.1 feet to: NO RECOVERY.	6' SAND 6.7' 6.9' SILT 7.1' SAND NO RECOVERY		
8	5	24/16	8-10	6-4 5-6		Dark yellowish brown, fine to medium SAND, trace Silt, moist. Changing at 9.3 feet to: NO RECOVERY.	8' SAND 9.3' NO RECOVERY		
10	6	24/12	10-12	4-8 8-10		Dark yellowish brown, fine SAND, some Silt, moist. Changing at 10.5 feet to: Yellowish brown, SILT, moist. Changing at 11.6 feet to: Pale brown, fine SAND, trace Silt, moist. Changing at 11.8 feet to: NO RECOVERY.	10' SAND 10.5' SILT 11.6' 11.8' SAND		
12	7	24/17	12-14	6-8 9-11		Pale brown, fine SAND, trace Silt, moist. Changing at 13.4 feet to: NO RECOVERY.	12' NO RECOVERY SAND 13.4' NO RECOVERY		
14	8	24/14	14-16	5-8 10-12		Pale brown, fine SAND, trace Silt, moist. Changing at 15.2 feet to: NO RECOVERY.	14' SAND		

REMARKS

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BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Boring No.: HS-MW-13C
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File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							15.2' NO RECOVERY		
16	9	24/12	16-18	3-7 7-6		Pale brown, fine SAND, trace Silt, moist. Changing at 17.0 feet to: NO RECOVERY.	16' SAND		
17							17' NO RECOVERY		
18	10	24/17	18-20	5-6 9-10		Pale brown, fine SAND, trace Silt, moist. Changing at 18.5 feet to: Pale brown, fine SAND, trace Silt, very thin lenses of Silt, moist. Changing at 19.4 feet to: NO RECOVERY.	18' SAND		
19							19.4' NO RECOVERY		
20	11	24/17	20-22	7-9 11-11		Pale brown, fine SAND, trace Silt, moist. Changing at 21.2 feet to: Yellowish brown, fine to medium SAND, trace Silt, moist. Changing at 21.4 feet to: NO RECOVERY.	20' SAND		
21							21.4' NO RECOVERY		
22	12	24/18	22-24	5-8 11-14		Yellowish brown, fine SAND, trace Silt, moist. Changing at 23.5 feet to: NO RECOVERY.	22' SAND		
23							23.5' NO RECOVERY		
24	13	24/18	24-26	13-14 12-18		Yellowish brown, fine SAND, trace Silt, grading to fine to medium SAND, trace Silt, moist. Changing at 25.5 feet to: NO RECOVERY.	24' SAND		
25							25.5' NO RECOVERY		
26	14	24/19	26-28	6-15 17-18		Yellowish brown, fine to medium SAND, trace Silt, moist. Changing at 27.6 feet to: NO RECOVERY.	26' SAND		
27							27.6' NO RECOVERY		
28	15	24/16	28-30	10-22 27-34		Yellowish brown, fine to medium SAND, trace Silt, moist. Changing at 28.6 feet to: Yellowish brown, SILT, some fine Sand, moist. Changing at 29.3 feet to: NO RECOVERY.	28' SAND		
29							28.6' SILT		
							29.3' NO RECOVERY		
30	16	24/20	30-32	15-20 19-20		Brownish yellow, fine to medium SAND, trace Silt, moist. Changing at 30.3 feet to: Light yellowish brown, fine SAND, trace Silt, moist. Changing at 31.3 feet to: Brownish yellow, fine to medium SAND, trace Silt, moist. Changing at 31.7 feet to: NO RECOVERY.	30' SAND		
31							31.7' NO RECOVERY		
32	17	24/20	32-34	11-14 17-20		Brownish yellow, fine to medium SAND,	32' SAND		

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
33						trace Silt, moist. Changing at 33.2 feet to: Yellowish brown, fine to medium SAND, trace Silt, moist. Changing at 33.5 feet to: Brownish yellow, fine to medium SAND, trace Silt, moist. Changing at 33.7 feet to: NO RECOVERY.	SAND		
34	18	24/23	34-36	13-17 20-24		Brownish yellow, fine SAND, trace Silt, moist. Changing at 35.9 feet to: NO RECOVERY.	33.7' 34' NO RECOVERY SAND		
35									
36	19	24/20	36-38	9-18 22-27		Brownish yellow, fine SAND, trace Silt, moist. Changing at 36.7 to: Yellowish brown, fine to medium SAND, trace Silt, moist. Changing at 36.8 feet to: Yellowish brown, SILT, moist. Changing at 37.7 feet to: NO RECOVERY.	35.9' 36' NO RECOVERY SAND 36.8' SILT 37.7'		
37									
38	20	24/22	38-40	10-10 14-15		Brownish yellow, fine SAND, trace Silt, moist. Changing at 38.5 feet to: Yellowish brown, fine SAND, some Silt, moist. Changing at 38.8 feet to: Yellowish brown, SILT, moist. Changing at 39.7 feet to: Yellowish brown, fine SAND, trace Silt, moist. Changing at 39.8 feet to: NO RECOVERY.	38' NO RECOVERY SAND 38.8' SILT 39.7' 39.8' SAND		
39									
40	21	24/22	40-42	12-8 18-23		Dark yellowish brown, medium to coarse SAND, trace Silt, moist. Changing at 41.8 feet to: NO RECOVERY.	40' NO RECOVERY SAND		
41									
42	22	24/16	42-44	11-22 23-21		Dark yellowish brown, medium to coarse SAND, trace Silt, moist. Changing at 42.7 feet to: Yellowish brown, fine SAND, trace Silt, moist. Changing at 43.0 feet to: Yellowish brown, fine SAND, trace Silt, thin lenses of coarse SAND, moist. Changing at 43.3 feet to: NO RECOVERY.	41.8' 42' NO RECOVERY SAND 43.3'		
43							NO RECOVERY		
44	23	24/17	44-46	9-20 22-23		Yellowish brown, fine SAND, some Silt, moist. Changing at 45.4 feet to: NO RECOVERY.	44' SAND		
45							45.4'		
46	24	24/16	46-48	11-19 20-25		Yellowish brown, fine to coarse SAND, trace Silt, moist. Changing at 46.9 feet to: Brownish yellow, fine SAND, trace Silt, moist. Changing at 47.3 feet to: NO RECOVERY.	NO RECOVERY 46' SAND		
47							47.3'		
48	25	18/18	48-49.5	11-18 20-18		Yellowish brown, fine to medium SAND, trace Gravel, trace Silt, moist. Changing at 48.9 feet to: Dark yellowish brown, coarse SAND, trace Silt, moist. Changing at 49.0 feet to: Yellowish brown, fine to medium SAND, trace Gravel, trace Silt, moist.	NO RECOVERY 48' SAND		
49							49.6'		
							NO 50'		

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
51	26	24/16	50-52	11-12 12-11		Changing at 49.2 feet to: Dark yellowish brown, coarse SAND, trace Silt, moist. Changing at 49.3 feet to: Yellowish brown, fine to medium SAND, trace Gravel, trace Silt, moist. Changing at 49.6 feet to: NO RECOVERY.	RECOVERY SAND 51.1' 51.3' SILT NO RECOVERY		
52	27	24/16	52-54	6-5 6-6		Yellowish brown, fine to medium SAND, trace Gravel, trace Silt, moist. Changing at 50.6 feet to: Yellowish brown, fine to medium SAND, trace Silt, moist. Changing at 51.1 feet to: Yellowish brown, SILT, moist. Changing at 51.3 feet to: NO RECOVERY.	52' SAND 53.3' NO RECOVERY		
54	28	24/7	54-56	3-4 8-15		Yellowish brown, fine SAND, trace Silt, wet. Changing at 52.6 feet to: Dark yellowish brown, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 53.3 feet to: NO RECOVERY.	54' SAND 54.6' NO RECOVERY		
56	29	24/17	56-58	6-10 10-14		Dark yellowish brown, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 54.6 feet to: NO RECOVERY. Dark yellowish brown, fine to coarse SAND, trace Gravel, trace Silt, wet. Changing at 57.4 feet to: NO RECOVERY.	56' SAND 57.4' NO RECOVERY		
58	30	24/12	58-60	2-5 9-9		Dark yellowish brown, fine to coarse SAND, trace Gravel, trace Silt, wet. Changing at 59.0 feet to: No RECOVERY.	58' SAND 59' NO RECOVERY	1	
60	31	24/1	60-62	1-3 8-10		Yellowish brown, fine SAND, trace Silt, moist. Changing at 60.1 feet to: NO RECOVERY.	60' 60.1' SAND NO RECOVERY		
62	32	24/16	62-64	3-5 17-16		Dark yellowish brown, Silty CLAY, moist. Changing at 62.1 feet to: Dark yellowish brown, fine to coarse SAND, trace Gravel, trace Silt, wet. Changing at 62.3 feet to: Dark yellowish brown, Silty CLAY, moist. Changing at 63.2 feet to: Dark yellowish brown to dark brown, coarse SAND, trace Silt, wet. Changing at 63.3 feet to: NO RECOVERY.	62' Silty CLAY 63.2' 63.3' SAND NO RECOVERY	2	
64	33	24/14	64-66	2-6 10-13			64' SAND 65.2' NO RECOVERY		
66	34	24/11	66-68	4-10 10-12		Dark yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 64.4 feet to: Dark yellowish brown, fine to coarse SAND, trace Gravel, trace Silt, wet. Changing at 65.2 feet to: NO RECOVERY. Yellowish brown, fine to coarse SAND, some Gravel, trace Silt, wet. Changing at 66.9 feet to: NO RECOVERY.	66' SAND 66.9' NO RECOVERY		
67									

REMARKS

1. Temporary well set at 59.0 to 64.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
2. Groundwater was encountered at approximately 62.1 feet below ground surface.

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68	35	24/19	68-70	14-16 13-14		Yellowish brown, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 68.2 feet to: Dark yellowish brown, coarse SAND, trace Silt, wet. Changing at 68.3 feet to: Yellowish brown, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 69.2 feet to: Dark yellowish brown, Silty CLAY, trace Gravel, moist. Changing at 69.3 feet to: Yellowish brown, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 69.6 feet to: NO RECOVERY. Dark yellowish brown, GRAVEL, some fine to coarse Sand, trace Silt, wet. Changing at 70.8 feet to: NO RECOVERY. Yellowish brown, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 72.7 feet to: NO RECOVERY.	68' SAND		
69							69.2' Silty CLAY	3	
70	36	24/10	70-72	3-7 12-12			69.3' SAND 69.6' NO RECOVERY 70' GRAVEL		
71							70.8' NO RECOVERY		
72	37	24/8	72-74	5-8 16-17			72' SAND 72.7' NO RECOVERY		
73									
74	38	24/16	74-76	3-12 19-21		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 74.3 feet to: Brown, coarse SAND, some Gravel, trace Silt, wet. Changing at 74.6 feet to: Yellowish brown, SILT, wet. Changing at 75.3 feet to: NO RECOVERY.	74' SAND 74.6' SILT 75.3' NO RECOVERY		
75									
76	39	24/19	76-78	14-16 22-26		Dark yellowish brown, fine to coarse SAND, trace Gravel, trace Silt, wet. Changing at 76.7 feet to: Yellowish brown, SILT, trace fine Sand, trace Gravel, trace Clay, wet. Changing at 77.4 feet to: Brown to yellowish brown, fine SAND, trace Gravel, trace Silt, wet. Changing at 77.6 feet to: NO RECOVERY. Brown to yellowish brown, fine SAND, trace Gravel, trace Silt, wet. Changing at 78.5 feet to: NO RECOVERY.	76' SAND 76.7' SILT 77.4' SAND 77.6' NO RECOVERY		
77									
78	40	24/6	78-80	7-9 15-19			78' SAND 78.5' NO RECOVERY		
79								4	
80	41	24/12	80-82	0-0 9-20		Dark yellowish brown, fine SAND, trace Gravel, trace Silt, wet. Changing at 81.0 feet to: NO RECOVERY.	80' SAND 81' NO RECOVERY		
81									
82	42	24/18	82-84	2-8 16-22		Dark yellowish brown, fine SAND, trace Gravel, trace Silt, wet. Changing at 83.5 feet to: NO RECOVERY.	82' SAND 83.5' NO RECOVERY		
83									
84	43	24/6	84-86	7-13 15-18		Dark yellowish brown, fine to coarse SAND, some Gravel, trace Silt, wet. Changing at 84.5 feet to: NO RECOVERY.	84' SAND 84.5' NO RECOVERY		

REMARKS

3. Temporary well set at 69.0 to 74.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
4. Temporary well set at 79.0 to 84.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.

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86	44	24/7	86-88	5-10 19-28		Dark yellowish brown, fine to coarse SAND, some Gravel, trace Silt, wet. Changing at 86.6 feet to: NO RECOVERY.	NO RECOVERY 86' SAND 86.6' NO RECOVERY		
87									
88	45	24/19	88-90	11-20 30-45		Dark yellowish brown to yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 89.6 feet to: NO RECOVERY.	88' SAND 89.6'		
89								5	
90	46	24/17	90-92	2-11 23-43		Dark yellowish brown to yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 91.4 feet to: NO RECOVERY.	90' NO RECOVERY SAND 91.4'		
91									
92	47	24/18	92-94	0-1 6-11		Dark yellowish brown to yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 93.5 feet to: NO RECOVERY.	NO RECOVERY 92' SAND 93.5'		
93									
94	48	24/5	94-96	4-8 16-24		Dark yellowish brown to yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 94.4 feet to: NO RECOVERY.	NO RECOVERY 94' SAND 94.4' NO RECOVERY		
95									
96	49	24/7	96-98	4-13 19-31		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 96.6 feet to: NO RECOVERY.	96' SAND 96.6' NO RECOVERY		
97									
98	50	24/8	98-100	2-7 15-22		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 98.7 feet to: NO RECOVERY.	98' SAND 98.7' NO RECOVERY		Bentonite/Grout
99								6	
100	51	24/12	100-102	9-15 25-38		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 101.0 feet to: NO RECOVERY.	100' SAND 101' NO RECOVERY		
101									
102	52	24/0	102-104	7-24 39-50/4"		NO RECOVERY.			

REMARKS

5. Temporary well set at 89.0 to 94.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
6. Temporary well set at 99.0 to 104.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
103							NO RECOVERY		
104	53	24/12	104-106	11-23 32-45		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 105.0 feet to: NO RECOVERY.	104' SAND		
105							105' NO RECOVERY		
106	54	24/16	106-108	5-18 37-50/5"		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 107.3 feet to: NO RECOVERY.	106' SAND		
107							107.3' NO RECOVERY		
108	55	24/12	108-110	4-18 48-50/3"		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 109.0 feet to: NO RECOVERY.	108' SAND		
109							109' NO RECOVERY	7	
110	56	24/2	110-112	10-22 36-50/5"		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 110.2 feet to: NO RECOVERY.	110' 110.2' SAND NO RECOVERY		
111									
112	57	24/14	112-114	13-27 41-50		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 113.2 feet to: NO RECOVERY.	112' SAND		
113							113.2' NO RECOVERY		
114	58	24/20	114-116	12-27 35-50		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 115.7 feet to: NO RECOVERY.	114' SAND		
115							115.7'		
116	60	24/16	116-118	3-8 22-48		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 117.3 feet to: NO RECOVERY.	116' NO RECOVERY SAND		
117							117.3' NO RECOVERY		
118	61	24/0	118-120	5-9 16-27		NO RECOVERY.			
119								8	

REMARKS

7. Temporary well set at 109.0 to 114.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
8. Temporary well set at 119.0 to 124.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	62	24/0	120-122	5-10 25-32		NO RECOVERY.	NO RECOVERY		
121									
122	63	24/2	122-124	5-11 18-25		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 122.2 feet to: NO RECOVERY.	122' 122.2' SAND NO RECOVERY		
123									
124	64	24/0	124-126	5-12 21-25		NO RECOVERY.			
125									
126	65	24/5	126-128	4-9 19-27		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 126.4 feet to: NO RECOVERY.	126' 126.4' SAND NO RECOVERY		
127									
128	66	24/12	128-130	15-23 40-47		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 129.0 feet to: NO RECOVERY.	128' SAND 129' NO RECOVERY	9	
129									
130	67	24/5	130-132	7-9 19-33		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 130.4 feet to: NO RECOVERY.	130' 130.4' SAND NO RECOVERY		
131									
132	68	24/6	132-134	3-9 22-43		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 133.1 feet to: NO RECOVERY.	132' SAND 133.1' NO RECOVERY		
133									
134	70	24/0	134-136	2-4 14-25		NO RECOVERY.			
135									
136	71	24/13	136-138	8-25 36-45		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 137.1 feet to: NO RECOVERY.	136' SAND 137.1'		
137									

REMARKS

9. Temporary well set at 129.0 to 134.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
138	72	24/13	138-140	6-5 7-11		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 139.1 feet to: NO RECOVERY.	NO RECOVERY 138' SAND 139.1' NO RECOVERY	10	
140	73	24/13	140-142	1-4 9-17		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 141.1 feet to: NO RECOVERY.	140' SAND 141.1' NO RECOVERY		
142	74	24/0	142-144	2-8 18-26		NO RECOVERY.			
144	75	24/13	144-146	1-6 13-28		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 145.1 feet to: NO RECOVERY.	144' SAND 145.1' NO RECOVERY		
146	76	24/17	146-148	7-13 32-50		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 174.4 feet to: NO RECOVERY.	146' SAND 147.4' NO RECOVERY		
148	77	24/14	148-150	6-15 28-50		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 149.2 feet to: NO RECOVERY.	148' SAND 149.2' NO RECOVERY	11	
150	78	24/7	150-152	6-15 25-44		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 150.6 feet to: NO RECOVERY.	150' SAND 150.6' NO RECOVERY		
152	79	24/11	152-154	14-28 63-50/4"		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 152.9 feet to: NO RECOVERY.	152' SAND 152.9' NO RECOVERY		
154	80	24/6	154-156	8-19 32-50		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 154.5 feet to: NO RECOVERY.	154' SAND 154.5' NO RECOVERY		

REMARKS

10. Temporary well set at 139.0 to 144.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
11. Temporary well set at 149.0 to 154.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.

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	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
156	81	24/8	156-158	9-18 30-50/2"		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 156.7 feet to: NO RECOVERY.	NO RECOVERY 156' SAND 156.7' NO RECOVERY		
157									
158	82	24/2	158-160	3-12 25-37		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 158.2 feet to: NO RECOVERY.	158' 158.2' SAND NO RECOVERY		
159								12	
160	83	18/5	160-161.5	15-13-27		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 160.4 feet to: NO RECOVERY.	160' SAND 160.4' NO RECOVERY		
161									
162	84	24/8	162-164	6-19 32-32		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 162.7 feet to: NO RECOVERY.	162' SAND 162.7' NO RECOVERY		
163									
164	85	24/16	164-166	3-12 28-46		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 165.3 feet to: NO RECOVERY.	164' SAND 165.3' NO RECOVERY		
165									
166	86	18/8	166-167.5	8-22-40		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 166.7 feet to: NO RECOVERY.	166' SAND 166.7' NO RECOVERY		
167									
168	87	24/10	168-170	5-19 25-42		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 168.8 feet to: NO RECOVERY.	168' SAND 168.8' NO RECOVERY	13	
169									
170	88	24/20	170-172	33-30 32-34		Yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 171.3 feet to: Very dark brown, Silty CLAY, moist. Changing at 171.7 feet to: NO RECOVERY.	170' SAND 171.3' 171.6 Silty CLAY 171.7' SAND		
171									
172	89	24/8	172-174	33-43 45-47		Brown, fine to coarse SAND, some Gravel,	172' NO RECOVERY		

REMARKS

12. Temporary well set at 159.0 to 164.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
13. Temporary well set at 169.0 to 174.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

GZA
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Engineers and Scientists

Wolverine World Wide, Inc.
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Belmont, Michigan

Boring No.: HS-MW-13C
Page: 11 **of** 12
File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
173						trace Silt, wet. Changing at 172.7 feet to: NO RECOVERY.	172.7' SAND NO RECOVERY		
174	90	24/5	174-176	2-6 27-50/3"		Brown, fine to coarse SAND, some Gravel, trace Silt, wet. Changing at 174.3 feet to: NO RECOVERY.	174' 174.3' SAND NO RECOVERY		
175									
176	91	24/0	176-178	14-50/5"		NO RECOVERY.			
177									
178	92	18/4	178-179.5	6-31-50		Brown, fine to coarse SAND, some Gravel, trace Silt, wet. Changing at 178.3 feet to: NO RECOVERY.	178' 178.3' SAND NO RECOVERY		
179								14	
180	93	12/2	180-181	18-50		Brown, fine to coarse SAND, some Gravel, trace Silt, wet. Changing at 180.2 feet to: NO RECOVERY.	180' 180.2' SAND NO RECOVERY		
181									
182	94	24/7	182-184	13-50/2"		Dark grayish brown, CLAY, some Sand, little Silt, trace Gravel, moist. Changing at 182.6 feet to: NO RECOVERY.	182' CLAY 182.6' NO RECOVERY		
183									
184	95	24/19	184-186	19-43 42-50/5"		Dark yellowish brown, fine to medium SAND, trace Silt, wet. Changing at 184.7 feet to: Dark yellowish brown, fine to coarse SAND, little Gravel, trace Silt, wet. Changing at 184.9 feet to: Grayish brown, GRAVEL, some Sand, trace Silt, wet. Changing at 185.6 feet to: NO RECOVERY.	184' SAND 184.9' GRAVEL 185.6' NO RECOVERY		
185									
186	96	12/6	186-187	23-50		Grayish-brown, GRAVEL, some Sand, trace Silt, wet. Changing at 186.5 feet to: NO RECOVERY.	186' GRAVEL 186.5' NO RECOVERY		
187									
188	97	12/11	188-189	40-50/4"		Dark yellowish brown, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 188.3 feet to: Brown to dark brown, medium to coarse SAND, trace Gravel, trace Silt, wet. Changing at 188.9 feet to: NO RECOVERY.	188' SAND 188.9' NO RECOVERY 190'		
189								15	

REMARKS

14. Temporary well set at 179.0 to 184.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
15. Temporary well set at 189.0 to 194.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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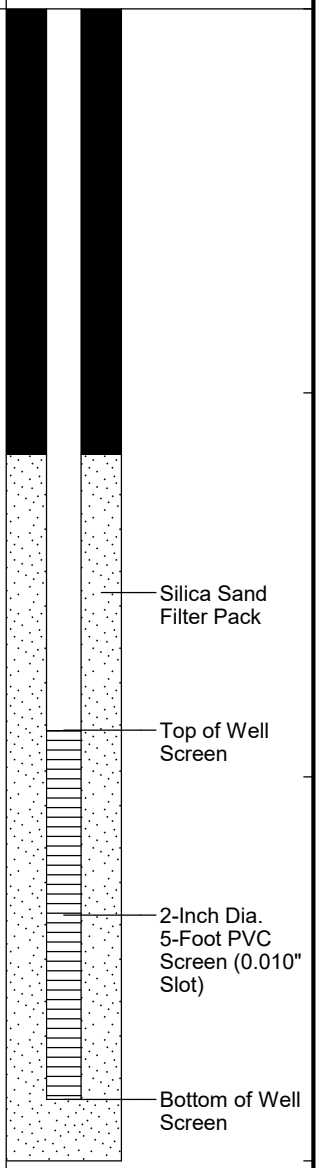
Belmont, Michigan

Boring No.: HS-MW-13C
Page: 12 **of** 12
File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
191	98	12/10	190-191	26-50/3"		Dark yellowish-brown, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 190.6 feet to: Brown, fine to medium SAND, trace Silt, wet. Changing at 190.8 feet to: NO RECOVERY.	SAND 190.8' NO RECOVERY	
192	99	12/12	192-193	25-50/3"		Brown, fine to medium SAND, trace Silt, wet. Changing at 192.6 feet to: NO RECOVERY.		
193								
194	100	12/7	194-195	29-50/2"		Brown, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 194.6 feet to: Grayish-brown, SILT, little Clay, moist. Changing at 194.7 feet to: NO RECOVERY.	194' SAND 194.6' 194.7' SILT NO RECOVERY	
195								
196	101	6/6	196-196.5	50/3"		Brown, fine to medium SAND, trace Silt, wet. Changing at 196.6 feet to: NO RECOVERY.	196' SAND 196.6' NO RECOVERY	
197								
198	102	12/7	198-199	30-50/3"		Yellowish-brown, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 198.6 feet to: NO RECOVERY.	198' SAND 198.6' NO RECOVERY	
199								
200	103	18/17	200-201.5	37-33-50/2"		Yellowish-brown, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 201.2 feet to: NO RECOVERY.	200' SAND 201.2' NO RECOVERY	
201								
202	104	12/11	202-203	37-50/2"		Yellowish-brown, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 202.1 feet to: Grayish-brown, GRAVEL, some coarse Sand, trace Silt, wet. Changing at 202.2 feet to: Brown, SILT, some fine Sand, wet. Changing at 202.3 feet to: Grayish-brown, GRAVEL, some coarse Sand, trace Silt, wet. Changing at 202.5 feet to: Brown, fine SAND, some Silt, moist. Changing at 202.7 feet to: Brown, Silty CLAY, trace Gravel, moist.	202' 202.1' SAND 202.2' GRAVEL 202.3' 202.5' SILT 202.7' GRAVEL SAND Silty CLAY	
203								
204	105	12/11	204-205	37-50/2"				
205						Dark grayish-brown, Silty CLAY, trace Gravel, moist. Changing at 204.9 feet to: NO RECOVERY. Bottom of Borehole at 205.0 Feet	204.9' 205' NO RECOVERY	16
206								
207								

Equipment Installed



REMARKS

16. Monitoring well was installed in borehole upon completion. Well screen set from 199.4 to 204.2 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Boring No.: MW-14D
Page: 1 **of** 4
File No.: 16.0062335.52
Check: John Morehouse

Contractor: Stearns Drilling Company
Foreman: Bert Graham
Logged by: Christopher Melby
Date Start/Finish: 3-15-18 / 3-15-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/24	0-2	11-5 9-10		Black, TOPSOIL. Changing at 0.3 feet to: Medium brown, fine SAND, trace, Silt.	SAND		PROTECTIVE CASING
8	2	24/24	8-10	2-2 2-1		Loose, brown, fine to medium SAND, trace Silt.		1	Backfill/Cement Pad
18	3	24/12	18-20	2-3 5-3		Loose, brown and gray, coarse SAND, trace Gravel, wet.			
23	4	24/12	23-25	3-1 1-2		Very loose, brown and gray, fine to coarse SAND, wet.			
28	5	24/16	28-30	2-4 4-5		Loose, brown, fine to medium SAND, trace Silt. Changing at 29.0 feet to: Brown, Clayey SILT, little fine Sand, wet.	29' Clayey SAND		

REMARKS

1. Groundwater encountered at approximately 14.5 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 3/1/19

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Belmont, Michigan

Boring No.: MW-14D
Page: 2 **of** 4
File No.: 16.0062335.52
Check: John Morehouse

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31							Clayey SAND		
32									
33	6	24/20	33-35	2-2 5-5		Medium stiff, Clayey SILT, little to trace fine to medium Sand, wet.			
34									
35									
36									
37									
38	7	24/10	38-40	1-1 1-1		Loose, gray, fine SAND, little Clayey Silt, wet.	38' SAND		
39									
40									
41									
42									
43	8	24/16	43-45	4-4 5-7		Loose, gray, fine to medium SAND, little Silt, wet.			
44									
45									
46									
47									
48	9	24/14	48-50	3-7 8-7		Medium dense, gray, fine to medium SAND, little Silt, wet.			
49									
50									
51									
52									
53	10	24/24	53-55	2-3 3-5		Gray, fine to medium SAND, little Silt, wet. Changing at 53.5 feet to: Gray, Clayey SILT, some fine Sand, wet.	53.5' Clayey SILT		Grout
54									
55									
56									
57									
58	11	24/14	58-60	1-1 1-1		Soft, gray, Clayey SILT, little fine Sand, wet.			
59									
60									
61									
62									
63	12	24/24	63-65	3-12 23-24		Hard, gray and brown, Clayey SILT, some fine to coarse Sand, wet.			
64									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 3/1/19

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Boring No.: MW-14D
Page: 3 **of** 4
File No.: 16.0062335.52
Check: John Morehouse

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
66							Clayey SILT		
67									
68	13	24/24	68-70	5-13 17-18		Fine to medium SAND, trace Silt, wet. Changing at 69.2 feet to: Fine to coarse SAND, trace Gravel, trace Silt, wet.	68' SAND		
69									
70									
71									
72									
73	14	24/20	73-75	31-19 24-30		Hard, gray and brown, Clayey SILT, some fine to medium Sand, wet. Changing at 74.5 feet to: Gray and brown, fine to medium SAND, little Silt, wet.	73' Clayey SILT 74.5' SAND		
74									
75									
76									
77									
78	15	24/24	78-80	4-8 20-53		Medium dense, brown and gray, fine to medium SAND, trace Silt, wet.			
79									
80									
81									
82									
83	16	24/18	83-85	2-4 8-26		Medium dense, brown and gray, fine to medium SAND, trace Silt, wet.			
84									
85									
86									
87									
88	17	24/24	88-90	3-7 13-34		Medium dense, brown and gray, fine to coarse SAND, trace Silt, wet.			
89									
90									
91									
92									
93	18	24/24	93-95	4-10 18-25		Medium dense, fine to medium SAND, trace Silt, wet.			
94									
95									
96									
97									
98	19	24/24	98-100	4-6 10-12		Medium dense, brown, fine to medium SAND, trace Silt, wet.			
99									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 3/1/19

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Belmont, Michigan

Boring No.: MW-14D
Page: 4 **of** 4
File No.: 16.0062335.52
Check: John Morehouse

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
101							SAND		
102									
103	20	24/24	103-105	19-12 19-25		Dense, fine to coarse SAND, little to trace Silt, wet.			
104									
105									
106									
107									Top of Well Screen
108	21	24/20	108-110	5-7 25-30		Dense, brown and gray, medium to coarse SAND, trace Silt, wet.			Silica Sand Filter Pack
109									
110									2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
111									
112									Bottom of Well Screen
113	22	4/6	113-113.3	12-75/3"		Hard, brown and gray, CLAY & SILT, some medium to coarse Sand embedded in Clay, wet.	113' CLAY & SILT 114'		
114						Bottom of Borehole at 114.0 Feet		2	
115									
116									
117									
118									
119									
120									
121									
122									
123									
124									
125									
126									
127									
128									
129									
130									
131									
132									
133									
134									

REMARKS

2. Monitoring well was installed in borehole upon completion. Well screen set from approximately 107.0 to 112.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 3/1/19

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House Street
Belmont, Michigan

Boring No.: MW-14M
Page: 1 **of** 3
File No.: 16.0062335.52
Check: John Morehouse

Contractor: Stearns Drilling Company
Foreman: Bert Graham
Logged by: Christopher Melby
Date Start/Finish: 3-15-18 / 3-15-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1						See PMW-14D boring log for detailed soil descriptions for the first 48.0 feet..			PROTECTIVE CASING
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 3/1/19

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Belmont, Michigan

Boring No.: MW-14M
Page: 2 **of** 3
File No.: 16.0062335.52
Check: John Morehouse

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
31–64									Grout
48–49	1	24/12	48-50	2-2 3-2		Loose, brown and gray, fine to medium SAND, trace Silt, wet.	SAND		
50–51	2	24/24	50-52	1-2 1-2		Very loose, brown and gray, fine to medium SAND, trace Silt, wet.			
52–53	3	24/24	52-54	2-2 3-5		Medium stiff, gray and brown, Clayey SILT, some fine to medium Sand, wet.	52.5' Clayey SILT		

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 3/1/19

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Belmont, Michigan

Boring No.: MW-14M
Page: 3 **of** 3
File No.: 16.0062335.52
Check: John Morehouse

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
66							Clayey SILT		
67									
68	4	24/20	68-70	7-8 10-12		Medium dense, gray and brown, fine to coarse SAND, some Silt, wet.	68' Silty SAND		Top of Well Screen Silica Sand Filter Pack
69									
70	5	24/24	70-72	2-2 6-15		Loose, gray and brown, fine to medium SAND, little Silt, wet.			2-Inch Dia. 10-Foot PVC Screen (0.010" Slot)
71									
72	6	24/18	72-74	9-12 25-35		Brown and gray, fine to medium SAND, some Silt, wet. Changing at 73.0 feet to: Brown and gray, Clayey SILT, some medium to coarse Sand, embedded in Clayey Silt, wet.	73' Clayey SILT		
73							74'		Bottom of Well Screen
74						Bottom of Borehole at 74.0 Feet		1	
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									
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96									
97									
98									
99									

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from approximately 68.0 to 73.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 3/1/19

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House Street
Belmont, Michigan

Boring No.: MW-14S
Page: 1 **of** 1
File No.: 16.0062335.52
Check: John Morehouse

Contractor: Stearns Drilling Company
Foreman: Bert Graham
Logged by: Christopher Melby
Date Start/Finish: 3-15-18 / 3-15-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

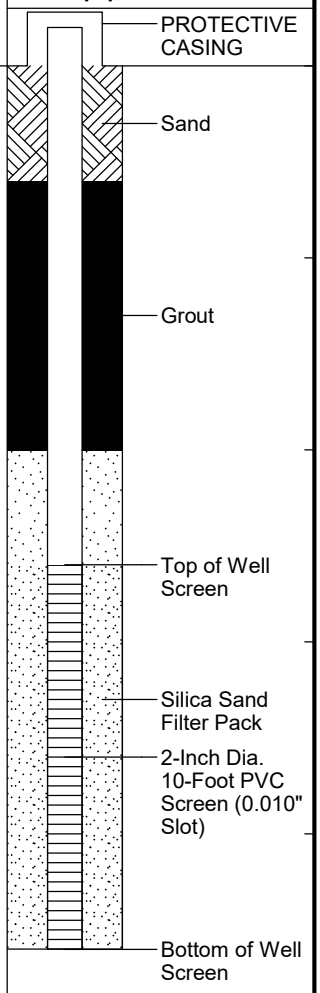
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–29						See PMW-14D boring log for detailed soil descriptions.		
23						Bottom of Borehole at 23.0 Feet		1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from approximately 13.0 to 23.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 3/1/19

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Packer Drive
Plainfield, Michigan

Boring No.: MW-15D
Page: 1 **of** 4
File No.: 16.0062335.52
Check:

Contractor: Cascade Drilling
Foreman: Jason
Logged by: Ken Oanes
Date Start/Finish: 12-19-18 / 12-21-17
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	60/60	0-5		0.4 ppm	Loose, dark brown, Silty SAND with Organics (plant roots), moist (SM). Changing at 1.4 feet to: Loose, light brown, poorly graded, fine to medium SAND and GRAVEL, with Lithics, moist (SP).	SAND (SM)	1	PROTECTIVE CASING
2					0.3 ppm		1.4' SAND (SW)		
5	2	60/42	5-10		0.2 ppm	Loose, light brown, well graded, fine to medium SAND with GRAVEL, sub-angular to sub-rounded, moist (SW). Changing at 7.5 feet to: Loose, light brown, well graded, SAND with coarse GRAVEL, sub-rounded, moist (SW).			
8					0.3 ppm				
10	3	60/60	10-15		0.4 ppm	Loose, light brown, Silty SAND with Gravel, wet (SM). Changing at 11.7 feet to: Loose, light brown, well graded, medium to coarse SAND and GRAVEL, sub-angular to sub-rounded, moist (SW).	10' SAND (SM)	2	
11.7'							SAND (SW)		
13					0.4 ppm				
15	4	60/60	15-20		0.4 ppm	Loose, light brown, poorly graded, medium SAND, some Lithics, trace Gravel, moist (SP).	15' SAND (SP)		
18					0.5 ppm				
20	5	60/60	20-25		0.5 ppm	Loose, light brown, poorly graded, medium SAND, some Lithics, trace Gravel, moist (SP).			
23					0.3 ppm				
25	6	60/60	25-30		0.3 ppm	Loose, tan, poorly graded, medium to coarse SAND, with lithics, sub-angular, moist (SP).		3	
28					0.1 ppm				

REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings are shown in parts per million (ppm) of isobutylene. Background was measured at 0.0 ppm.
2. Groundwater was encountered at approximately 10.0 feet below ground surface.
3. Temporary well set at 25.0 to 30.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

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Engineers and Scientists

Wolverine World Wide, Inc.
Packer Drive
Plainfield, Michigan

Boring No.: MW-15D
Page: 2 **of** 4
File No.: 16.0062335.52
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31	7	60/60	30-35			Loose, tan, poorly graded, medium to coarse SAND, with lithics, sub-angular, moist (SP).	SAND (SP)		
32									
33					0.4 ppm				
34									
35	8	60/60	35-40		0.3 ppm	Loose, brown, Silty fine SAND, sub-rounded, wet (SM). Changing at 35.5 feet to: Loose, brown, well graded, medium to coarse SAND and GRAVEL, sub-rounded to sub-angular, wet (SW). Changing at 37.5 feet: Loose, brown, well graded, coarse SAND, some fine to coarse Gravel, with Clay layers, wet (SW).	35' 35.5' SAND (SM) SAND (SW)		
36									
37									
38					0.5 ppm				
39									
40	9	60/60	40-45		0.5 ppm	Loose, brown, well graded, fine to coarse SAND with fine GRAVEL, sub-angular, wet (SW). Changing at 43.3 feet to: Loose, light brown, poorly graded, medium SAND, some lithics, sub-angular, wet (SP).			
41									
42									
43					0.5 ppm		43.3' SAND (SP)		
44									
45	10	60/60	45-50		0.3 ppm	Loose, brown, well graded, medium SAND with Gravel, with layers of Silt and Cobbles, wet (SW).	45' SAND (SW)	4	
46									
47									
48					0.3 ppm				
49									
50	11	60/60	50-55			Loose, coarse GRAVEL and COBBLES up to 6.0 inch diameter, wet (GP). Changing at 51.0 feet to: Stiff, dark brown, SILT, little fine to coarse Gravel, rounded, moist (ML).	50' GRAVEL/COBBLES 51' (GP) SILT (ML)		
51									
52									
53					2.1 ppm				Grout
54									
55	12	60/60	55-60		3.7 ppm	Stiff, dark brown, SILT, little fine to coarse Gravel, rounded, moist (ML).			
56									
57									
58					2.7 ppm				
59									
60	13	60/60	60-65		1.6 ppm	Stiff, dark brown, SILT, little fine to coarse Gravel, rounded, moist (ML).		5	
61									
62									
63					2.7 ppm				
64							65'		

REMARKS

4. Temporary well set at 45.0 to 50.0 feet below ground surface. Heaving sands pushed casing to 47.5 feet only exposing lower 2.0 feet of well screen. Left overnight to purge after pumping dry.
5. Insufficient groundwater yield. No temporary well or sample.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-15D

BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: MW-15D
Page: 3 **of** 4
File No.: 16.0062335.52
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
66	14	60/60	65-70		1.4 ppm	Stiff, dark gray, Silty fine SAND, trace fine Gravel, moist (SM).	Silty SAND (SM)		
67									
68					0.7 ppm				
69									
70	15	60/60	70-75		1.5 ppm	Stiff, dark gray, Silty fine SAND, moist (SM).			
71									
72									
73					1.2 ppm				
74									
75	16	60/60	75-80		1.2 ppm	Stiff, dark gray, Silty fine SAND, moist (SM).			
76									
77									
78					1.4 ppm				
79									
80	17	60/60	80-85		0.7 ppm	Stiff, dark gray, Silty fine SAND, moist (SM).			
81									
82									
83					0.5 ppm				
84									
85	18	60/60	85-90		0.1 ppm	Very stiff, dark gray, Silty fine SAND, trace medium to coarse Sand, trace coarse Gravel, moist (SM).			
86									
87									
88					0.1 ppm				
89									
90	19	60/60	90-95		0.7 ppm	Stiff, dark gray, SILT, trace Sand, moist (ML). Changing at 92.5 feet to: Stiff, dark gray, SILT transitioning to lean CLAY, moist (CL).	90' SILT (ML)		
91									
92							92.5'		
93					0.9 ppm		Lean CLAY (CL)		
94									
95	20	60/60	95-100		1.3 ppm	Stiff, dark gray, lean CLAY, trace fine Gravel, sub-rounded, moist (CL).			
96									
97									
98					1.1 ppm				
99									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-15D

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Boring No.: MW-15D
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File No.: 16.0062335.52
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
101	21	60/60	100-105		0.2 ppm	Stiff, dark gray, lean CLAY, trace fine Gravel, sub-rounded, moist (CL). Changing at 104.0 feet to: Stiff, dark gray, SILT, wet (ML).	Lean CLAY (CL)		
103					0.3 pm				Bentonite Seal
104							104' SILT (ML)		
105	22	60/60	105-110		1.0 ppm	Stiff, SILT with Gravel, small lenses (3-8mm) of white chystaline mineral, dry (ML). Changing at 107 feet to: Loose, dark brown, SILT with coarse Gravel,			
108					0.8 ppm	sub-rounded, wet (ML).			Top of Well Screen
110	23	60/60	110-115		112.5 ppm	Loose, SILT with coarse Gravel and Cobbles, sub-rounded, small lenses of white crystalline mineral, wet (ML).		6	
115	24	24/24	115-117		0.5 ppm	Loose, SILT with GRAVEL and COBBLES, sub-rounded, small lenses of white crystalline mineral, wet (ML).	117'		Silica Sand Filter Pack 2-Inch Dia. 10-Foot PVC Screen (0.010" Slot)
117						Bottom of Borehole at 117.0 Feet		7	Bottom of Well Screen

REMARKS

6. Temporary well set at 110.0 to 115.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
7. Monitoring well was installed in borehole upon completion. Well screen set from 108.0 to 118.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-15D

BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: MW-15M
Page: 1 **of** 2
File No.: 16.0062335.52
Check:

Contractor: Cascade Drilling
Foreman: Jason
Logged by: John Morehouse
Date Start/Finish: 1-17-18 / 1-17-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–29						See MW-15D boring log for sample description and classification.			PROTECTIVE CASING; Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

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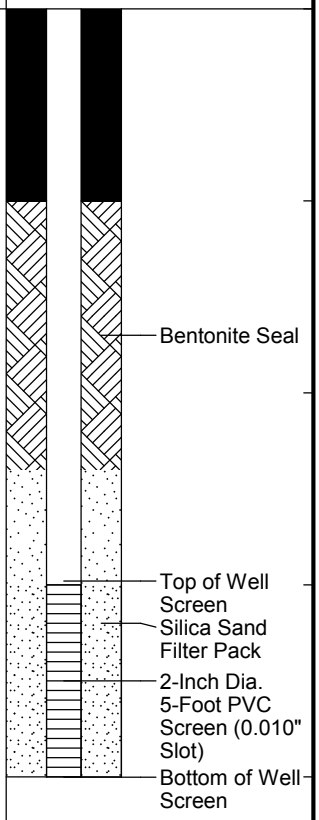
Boring No.: MW-15M
Page: 2 **of** 2
File No.: 16.0062335.52
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
31–64						Bottom of Borehole at 50.0 Feet		1	



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 45.0 to 50.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-15M

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Boring No.: MW-15S
Page: 1 **of** 1
File No.: 16.0062335.52
Check:

Contractor: Cascade Drilling
Foreman: Jason
Logged by: John Morehouse
Date Start/Finish: 1-17-18 / 1-17-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:	NA	NA

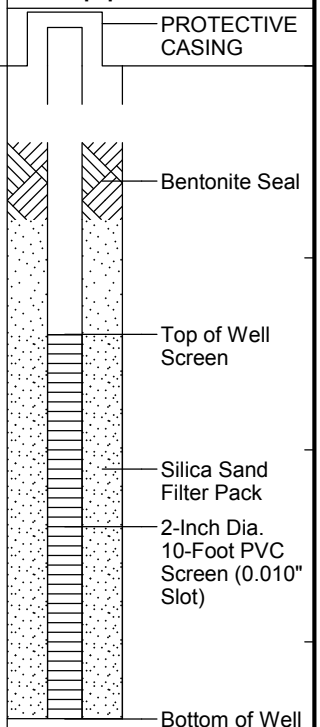
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–16						See MW-15D boring log for sample description and classification.		
17						Bottom of Borehole at 17.0 Feet		1
18–29								

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 7.0 to 17.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-15S

BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: HS-MW-17D
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File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Christopher Melby / John Morehouse
Date Start/Finish: 1-29-18 / 2-26-18
Boring Location: 583,275.2942 N; 12,789,270.2772 E
GS Elev.: 784.6' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0"
Hammer Wt.:	140lbs	1 3/8"
Hammer Fall:	30.0"	NA
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks
0	1	24/24	0-2	2-3 2-3		Dark brown, decaying LEAVES (FILL). Changing at 0.3 feet to: Very dark brown, well sorted, fine grained SAND, some Silt, some decaying Vegetation, moist (SM). Changing at 0.5 feet to: Dark yellowish brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, grading coarser, moist (SP).		
2	2	24/24	2-4	2-2 2-3		Dark yellowish brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, grading coarser, moist (SP).		
4	3	24/24	4-6	2-2 3-3		Dark yellowish brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, grading coarser, moist (SP). Changing at 4.5 feet to: Pale brown, very well sorted, fine grained SAND, trace Silt, moist (SP). Changing at 4.6 feet to: Yellowish brown, very well sorted, SILT, little fine grained Sand, slightly cohesive, non-plastic, moist (ML). Changing at 4.7 feet to: Pale brown, very well sorted, fine grained SAND, trace Silt, moist (SP). Changing at 4.8 feet to: Yellowish brown, very well sorted, SILT, little fine grained Sand, slightly cohesive, non-plastic, moist (ML). Changing at 4.9 feet to: Pale brown, very well sorted, fine grained, SAND, trace Silt, moist (SP). Changing at 5.0 feet to: Yellowish brown, very well sorted, SILT, little fine grained Sand, slightly cohesive, non-plastic, moist. Changing at 5.1 feet to: Pale brown, very well sorted, fine grained SAND, trace Silt, moist (SP). Changing at 5.2 feet to: Yellowish brown, very well sorted, SILT, little fine grained Sand, slightly cohesive, non-plastic, moist (ML). Light yellowish brown to pale brown, poorly sorted, fine to coarse grained SAND, little Gravel, trace Silt, moist (SW). Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP). Changing at 9.1 feet to: Dark yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP). Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP). Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP). Changing at 12.3 feet to: Pale brown,		
6	4	24/24	6-8	3-5 8-9				
8	5	24/24	8-10	5-5 5-5				
10	6	24/24	10-12	3-4 4-4				
12	7	24/24	12-14	5-10 9-6				
14	8	24/24	14-16	3-4 4-4				
16	9	24/24	16-18	3-3 4-4				
18	10	24/24	18-20	3-3 3-4				

Equipment Installed

PROTECTIVE CASING

Backfill/Cement Pad

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW-17D

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/15/20

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Boring No.: HS-MW-17D
Page: 2 **of** 10
File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	11	24/24	20-22	3-3 4-5		poorly sorted, medium to coarse grained SAND, little Gravel, trace Silt, moist (SW).			
21						Light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
22	12	24/24	22-24	3-6 8-8		Light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
23						Light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
24	13	24/24	24-26	6-10 11-11		Light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
25						Light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP). Changing at 22.8 feet to: Brown, poorly sorted, GRAVEL, trace coarse grained Sand, moist (GP). Changing at 22.9 feet to: Light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, moist (SP). Changing at 23.4 feet to: Brown, very poorly sorted, GRAVEL, trace coarse grained Sand, moist (GP).			
26	14	24/24	26-28	5-10 12-16					
27									
28	15	24/24	28-30	5-12 14-20					
29									
30	16	24/24	30-32	15-12 14-20		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
31						Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
32	17	24/24	32-34	5-7 8-8		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
33						Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
34	18	24/24	34-36	7-8 10-11		Light yellowish brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, moist (SP).			
35						Light yellowish brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, moist (SP).			
36	19	24/24	36-38	7-10 9-14		Light yellowish brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, moist (SP).			
37						Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, moist (SP). Changing at 39.5 feet to: Brown to yellowish brown, very well sorted, SILT, some fine grained Sand, slightly cohesive, moist (ML).			
38	20	24/24	38-40	10-10 12-12					
39									
40	21	24/24	40-42	11-11 11-10		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
41									
42	22	24/24	42-44	6-6 7-9		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
43									

REMARKS

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BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/15/20

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Boring No.: HS-MW-17D
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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
44	23	24/24	44-46	6-6 8-9		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
45									
46	24	24/24	46-48	7-9 10-10		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
47									
48	25	24/24	48-50	7-4 9-9		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
49									
50	26	24/24	50-52	5-6 8-10		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
51									
52	27	24/24	52-54	6-8 13-18		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
53									
54	28	24/24	54-56	9-12 13-17		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
55									
56	29	24/24	56-58	10-14 25-22		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP). Changing at 57.6 feet to: Brown to yellowish brown, very well sorted, SILT, some fine grained Sand, slightly cohesive, non-plastic, moist to wet (ML).			
57									
58	30	24/24	58-60	17-21 31-32		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP). Changing at 59.0 feet to: Very dark grayish brown, well sorted, fine grained SAND, trace Silt, moist (SP). Changing at 59.1 feet to: Pale brown, very sell sorted, fine to medium grained SAND, some Silt, bedded, moist (SM).			
59									
60	31	24/24	60-62	13-22 27-27					
61									
62	32	24/24	62-64	12-21 25-33		Pale brown, very sell sorted, fine to medium grained SAND, some Silt, bedded, moist (SM).			
63						Pale brown, very sell sorted, fine to medium grained SAND, some Silt, bedded, moist (SM).			
64	33	24/24	64-66	2-6 9-13		Pale brown, very sell sorted, fine to medium grained SAND, some Silt, bedded, moist (SM).			
65									
66	34	24/24	66-68	3-10		Pale brown, very sell sorted, fine to medium			

REMARKS

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BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/15/20

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House Street
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Boring No.: HS-MW-17D
Page: 4 **of** 10
File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
67				11-18		grained SAND, some Silt, bedded, moist (SM).			
68	35	24/24	68-70	7-17 21-23		Pale brown, very sell sorted, fine to medium grained SAND, some Silt, bedded, moist (SM). Changing at 68.3 feet to: Dark yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP).			
69									
70	36	24/24	70-72	5-14 22-28		Changing at 68.4 feet to: Pale brown, very well sorted, fine to medium grained SAND, some Silt, bedded, moist (SM).			
71									
72	37	24/24	72-74	8-20 22-35		Pale brown, very well sorted, fine to medium grained SAND, some Silt, bedded, moist (SM).			
73						Pale brown, very well sorted, fine to medium grained SAND, some Silt, bedded, moist (SM).			
74	38	24/24	74-76	5-16 28-41		Pale brown, very well sorted, fine to medium grained SAND, some Silt, bedded, moist (SM).			
75									
76	39	24/24	76-78	9-21 29-44		Pale brown, very well sorted, fine to medium grained SAND, some Silt, bedded, moist (SM). Changing at 76.8 feet to: Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
77									
78	40	24/24	78-80	2-10 22-24		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
79									
80	41	24/24	80-82	2-8 14-24		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
81									
82	42	24/24	82-84	1-3 6-12		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
83									
84	43	24/24	84-86	1-1 3-8		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
85									
86	44	24/24	86-88	1-2 5-12		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP). Changing at 87.6 feet to: Brown, moderately sorted, coarse grained SAND, some Gravel, wet (SW).			
87									
88	45	24/24	88-90	1-2 9-14		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP).			
89									

REMARKS

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BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/15/20

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
91	46	24/24	90-92	1-2 3-5		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP).			
92	47	24/24	92-94	1-2 4-11		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP).			
94	48	24/24	94-96	1-3 5-9		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP).			
96	49	24/24	96-98	1-4 6-12		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP).			
98	50	24/24	98-100	3-4 8-15		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP).			
100	51	24/24	100-102	2-2 3-10		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP).			
102	52	24/24	102-104	2-7 14-21		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP). Changing at 103.2 feet to: Brown to yellowish brown, very well sorted, SILT, some fine grained Sand, slightly cohesive, wet (ML). Changing at 103.5 feet to: Brown to yellowish brown, well sorted SILT, some fine grained Sand, trace Clay, moderately cohesive, non to slightly plastic, bedded, moist to wet (ML). Changing at 103.6 feet to: Brown to yellowish brown, very well sorted, SILT, some fine grained Sand, slightly cohesive, wet (ML). Yellowish brown to brown, very well sorted, fine grained SAND, trace Silt, wet (SP). Yellowish brown to brown, very well sorted, fine grained SAND, trace Silt, wet (SP). Yellowish brown to brown, very well sorted, fine grained SAND, trace Silt, wet (SP). Changing at 108.9 feet to: Yellowish brown to brown, well sorted, SILT, some fine grained Sand, wet (ML). Changing at 109.0 feet to: Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Changing at 109.5 feet to: Dark yellowish brown, well sorted, fine to medium SAND, trace Silt, wet (SP). Changing at 109.7 feet to: Yellowish brown			Bentonite/Grout
103									
104	53	24/24	104-106	2-2 3-6					
105									
106	54	24/24	106-108	1-1 3-5					
107									
108	55	24/24	108-110	3-4 8-12					
109									
110	56	24/24	110-112	1-1 3-7					
111									
112	57	24/24	112-114	1-3 5-8					
113									

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
114	58	24/24	114-116	1-4 12-18		to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
116	59	24/24	116-118	1-5 12-22		Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
118	60	24/24	118-120	1-1 1-4		Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Changing at 116.2 feet to: Dark yellowish brown, well sorted, Silty CLAY, plastic, cohesive, moist (CL). Changing at 116.3 feet: Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Changing at 116.8 feet to: Dark yellowish brown, well sorted, Silty CLAY, plastic, cohesive, moist (CL). Changing at 116.9 feet to: Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Changing at 119.0 feet to: Dark yellowish brown, well sorted SILT, some fine grained Sand, slightly cohesive, wet (ML). Changing at 119.1 feet to: Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Yellowish brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP). Changing at 121.3 feet to: Grayish brown to to light grayish brown, well sorted, SILT, some fine grained Sand, non-plastic, moderately cohesive, wet (ML). Grayish brown to to light grayish brown, well sorted, SILT, some fine grained Sand, non-plastic, moderately cohesive, wet (ML). Changing at 122.9 feet to: Brown, well sorted, fine grained SAND, some Silt, trace Clay, cohesive, slightly to moderately plastic, moist (SM).			
120	61	24/24	120-122	7-10 14-20					
122	62	24/24	122-124	4-7 13-15					
124	63	24/24	124-126	5-10 12-20					
126	64	24/24	126-128	4-10 11-10					
128	65	24/24	128-130	7-12 9-15					
130	66	24/24	130-132	2-4 7-9					
132	67	24/24	132-134	1-4 5-6		Brown, well sorted, fine grained SAND, some Silt, trace Clay, cohesive, slightly to moderately plastic, moist (SM). Gray to grayish brown, well sorted, fine grained SAND, some Silt, trace Clay, cohesive, slightly to moderately plastic, moist (SM). Changing at 126.6 feet to: Gray to grayish brown, well sorted, CLAY & SILT, little fine grained Sand, plastic, cohesive, moist (CL). Gray to grayish brown, well sorted, fine grained SAND, some Silt, trace Clay, cohesive, slightly to moderately plastic,		1	
134	68	24/24	134-136	1-3 5-6					
136	69	24/24	136-138	1-1					

REMARKS

1. Groundwater was encountered at approximately 132.4 feet below ground surface.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
137				2-6		moist (SM).			
138	70	24/24	138-140	0-1		Gray to grayish brown, well sorted, fine grained SAND, some Silt, trace Clay, cohesive, slightly to moderately plastic, moist (SM).			
139				1-5					
140	71	24/24	140-142	0-4		Gray to grayish brown, well sorted, fine grained SAND, some Silt, trace Clay, cohesive, slightly to moderately plastic, moist (SM). Changing at 132.4 feet to: Grayish brown to brown, very well sorted, SILT, trace Clay, moderately cohesive, non to slightly plastic, wet			
141				8-14					
142	72	24/24	142-144	6-10		Varved, grayish brown, very well sorted, SILT, some Clay, some fine grained Sand, cohesive and slightly to moderately plstic, moist to wet (ML).			
143				12-16					
144	73	24/24	144-146			Brown, well sorted, SILT, little Clay, moderately plastic, cohesive, moist to wet (ML). Changing at 136.3 feet to: Grayish brown, very well sorted, SILT, trace Clay, cohesive, slightly plastic, moist to wet (ML). Changing at 136.4 feet to: Grayish brown, very well sorted, fine grained SAND, little Silt, slightly cohesive, wet (SM).			
145									
146	74	24/24	146-148	3-6					
147				14-20		Grayish brown, very well sorted, fine grained SAND, little Silt, slightly cohesive, wet (SM). Changing 138.9 feet to: Grayish brown, very well sorted, fine grained SAND, trace Silt, wet (SP). Changing at 139.0 feet to: Grayish brown, very well sorted, fine grained SAND, little Silt, slightly cohesive, wet (SM).			
148	75	24/24	148-150	1-2					
149				5-15					
150	76	24/24	150-152	6-12		Yellowish brown, very well sorted, fine grained SAND, little Silt, wet (SM).			
151				25-33		Yellowish brown, very well sorted, fine grained SAND, little Silt, wet (SM). Changing at 143.5 feet to: Grayish brown, very well sorted, SILT, trace fine grained Sand, moderately cohesive, wet (ML).			
152	77	24/24	152-154	1-1					
153				3-7		Grayish brown, very well sorted, fine grained SAND, trace Silt, wet (SP). Grayish brown to brown, very well sorted, fine grained SAND, little Silt, wet (SM). Changing at 146.6 feet to: Yellowish brown, well sorted, fine grained SAND, trace Silt, wet (SP). Changing at 146.7 feet to: Grayish brown to brown, very well sorted, SILT, little fine grained SAND, wet (ML).			
154	78	24/24	154-156	1-4					
155				14-18					
156	79	24/24	156-158	1-8		Grayish brown to brown, very well sorted, SILT, little fine grained SAND, wet (ML). Grayish brown to brown, very well sorted, fine grained SAND, little Silt, slightly cohesive, wet (SM). Changing at 150.5 feet to: Grayish brown to brown, very well sorted, SILT, moderately cohesive, wet (ML). Changing at 151.9 feet to: Grayish brown to brown, very well sorted, SILT, moderately cohesive, wet (ML).			
157				24-35					
158	80	24/24	158-160	4-8					
159				9-22					
						Brown to yellowish brown, very well sorted,			

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
	81	17/17	160-161.4	7-31-87/5"		fine grained SAND, little Silt, wet (SM). Brown to yellowish brown, very well sorted,			
161						fine grained SAND, little Silt, wet (SM). Brown to yellowish brown, very well sorted,			
162	82	24/0	162-164	4-8 15-10		fine grained SAND, little Silt, wet (SM). Changing at 156.6 feet to: Dark grayish brown to dark brown, very well sorted, fine			
163						grained SAND, little Silt, wet (SM). Dark grayish brown to dark brown, very well			
164	83	12/6	164-165	13-50\6"		sorted, fine grained SAND, little Silt, wet (SM). Very dense, light brown, fine SAND, little to			
165						trace Silt, wet (SM). NO RECOVERY. Bailer soil is fine Sand, little to trace Silt.			
166	84	24/8	166-168	6-20 35-50		Very dense, brown, fine SAND, little to trace Silt, wet (SM).			
167						Very dense, brown, fine SAND, little to trace Silt wet (SM).			
168	85	17/10	168-169.4	5-23-50/5"		Very dense, brown, fine SAND, little to trace Silt, wet (SM).			
169									
170	86	16/0	170-171.3	6-23-50/4"		NO RECOVERY. Bailer soil is fine Sand, little to trace Silt.			
171									
172	87	23/12	172-173.9	3-10 35-50/5"		Very dense, brown, fine SAND, little to trace Silt, wet (SM).			
173									
174	88	17/0	174-175.4	6-31-50/5"		NO RECOVERY. Bailer soil is fine Sand, little to trace Silt.			
175									
176	89	17/0	176-177.4	4-40-50/5"		NO RECOVERY. Bailer soil is fine Sand, little to trace Silt.			
177									
178	90	12/0	178-179	15-67		NO RECOVERY. Bailer soils is fine Sand, little to trace Silt.			
179									
180	91	18/0	180-181.5	7-3-90/6"		NO RECOVERY. Bailer soil is fine Sand, little to trace Silt.			
181									
182	92	24/24	182-184	11-16 27-33		Dense, light brown, fine SAND, little to trace Silt, wet (SM).			
183									

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
184	93	24/8	184-186	9-18 30-52		Dense, light brown, fine SAND, little to trace Silt, wet (SM).			
185									
186	94	24/6	186-188	16-23 48-55		Very dense, light brown, fine SAND, little to trace Silt, wet (SM).			
187									
188	95	24/6	188-190	8-12 35-58		Dense, light brown, fine SAND, little to trace Silt, wet (SM).			
189									
190	96	24/8	190-192	5-13 19-25		Dense, light brown, gray, fine SAND, little to trace Silt, wet (SM).			
191									
192	97	24/10	192-194	13-26 35-41		Very dense, brown, fine to medium SAND, little to trace Silt, wet (SM).			
193									
194	98	24/10	194-196	9-20 42-50		Very dense, light brown, fine to medium SAND, little to trace Silt, wet (SM).			
195									
196	99	24/0	196-198	7-22-62/6"		NO RECOVERY. Bailer soil is light brown gray, fine to medium Sand, little to trace Silt, wet.			
197									
198	100	24/1	198-200	10-12 32-44		Dense, gray to light brown, fine SAND, little to trace Silt, wet (SM).			
199									
200	101	24/10	200-202	10-18 32-48		Very dense, gray to light brown, fine to medium SAND, little to trace Silt, wet (SM).			
201									
202	102	24/6	202-204	5-9 20-28		Medium dense, gray to light brown, fine to medium SAND, little to trace Silt, wet (ML).			
203									
204	103	24/16	204-206	7-14 20-33		Dense, gray to light brown, medium SAND, little to trace Silt, wet (SM).			
205									
206	104	24/14	206-208	6-17		Very dense, gray, medium to coarse SAND,			

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
207				27-40		trace Silt, wet (SW).			
208	105	24/16	208-210	9-23 32-59		Very dense, gray, medium to coarse SAND, trace Silt, wet (SW). Changing at 208.8 feet to: Very dense, gray, fine SAND, little Silt, wet (SM).			
209									
210	106	24/6	210-212	9-11 14-17		Medium dense, gray and brown, fine SAND, little to trace Silt, wet (SM).			
211									
212	107	24/0	212-214	4-7 26-33		NO RECOVERY. BAiler soil is fine to coarse Sand, little to trace Silt, wet.			
213									
214	108	24/12	214-216	4-7 26-33		Dense, gray, fine to coarse SAND, little Silt, wet (SM).			
215									
216	109	24/10	216-218	4-8 8-30		Medium dense, gray and brown, fine to medium SAND, little to trace Silt, wet (SM).			
217									Top of Well Screen
218	110	24/12	218-220	5-14 34-30		Dense, gray and brown, fine to medium SAND, little to trace Silt, wet (SM).			Silica Sand Filter Pack
219									
220	111	24/0	220-222	5-7 22-33		NO RECOVERY.			
221									2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
222	112	24/12	222-224	4-6 33-33		Dense, brown, fine SAND, little Silt, wet (SM). Changing at 223.7 feet to: GRAVEL (potential Bedrock).			
223									Bottom of Well Screen
224	113	24/14	224-226	41-35 45-48		Gray, potential weathered BEDROCK. Changing at 13.2 feet to: Brown, Clayey SILT, trace fine to coarse Sand, wet (ML).			
225									
226						Bottom of Borehole at 226.0 Feet			
227									
228									
229									

REMARKS

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Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Christopher Melby
Date Start/Finish: 3-2-18 / 3-5-18
Boring Location: 583,270.5304 N; 12,789,269.7897 E
GS Elev.: 784.2' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0"
Hammer Wt.:	140lbs	1 3/8"
Hammer Fall:	30.0"	NA
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1						See PMW-17D/MW-1D boring log for detailed soil descriptions.	SAND		PROTECTIVE CASING; Backfill/Cement Pad
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
							SAND		
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									
42									
43									

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
44							SAND		
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									
63									
64									
65									
66									

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
67							SAND		
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									Grout
81									
82									
83									
84									
85									
86									
87									
88									
89									

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
							SAND		
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									
103									
104									
105									
106									
107									
108									
109									
110									
111									
112									
113									

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
114							SAND		
115									
116									
117									
118									
119									
120									
121									
122									
123									
124									
125									
126									
127									
128									
129									
130									
131									
132									
133									
134									
135									
136									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/15/20

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House Street
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Boring No.: HS-MW-17M
Page: 7 **of** 8
File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
137							SAND		
138									
139									
140									
141									
142									
143									
144									
145									
146									
147									
148									
149									
150									
151									
152									
153									
154									
155									
156									
157									
158									
159									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/15/20

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Boring No.: HS-MW-17M
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File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
161							SAND		
162									
163									Top of Well Screen
164									Silica Sand Filter Pack
165									
166	1	24	166-168			Brown, fine SAND, little to trace Silt.		1	2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
167									
168						Bottom of Borehole at 168.0 Feet	168'	2	Bottom of Well Screen
169									
170									
171									
172									
173									
174									
175									
176									
177									
178									
179									
180									
181									
182									
183									

REMARKS

1. Soil descriptions based on auger cuttings.
2. Monitoring well was installed in borehole upon completion. Well screen set from approximately 163.0 to 168.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW-17M

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Boring No.: HS-MW-17S
Page: 1 **of** 5
File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Christopher Melby
Date Start/Finish: 2-27-18 / 2-28-18
Boring Location: 583,273.6951 N; 12,789,266.1009 E
GS Elev.: 784.8' **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0"
Hammer Wt.:	140lbs	1 3/8"
Hammer Fall:	30.0"	NA
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–19						See PMW-17D/MW-1D boring log for detailed soil descriptions.	See PMW-17D/MW-1D for Stratum Descriptions		PROTECTIVE CASING; Backfill

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/15/20

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Boring No.: HS-MW-17S
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File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
21							See PMW-17D/MW-1D for Stratum Descriptions		
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									
42									
43									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/15/20

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Boring No.: HS-MW-17S
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File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
44							See PMW-17D/MW-1D for Stratum Descriptions		
45									
46									
47									
48									
49									
50									
51									Bentonite/Grout
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									
63									
64									
65									
66									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW-17S

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Boring No.: HS-MW-17S
Page: 4 **of** 5
File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
67							See PMW-17D/MW-1D for Stratum Descriptions		
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									
85									
86									
87									
88									
89									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/15/20

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Boring No.: HS-MW-17S
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File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
91							See PMW-17D/MW-1D for Stratum Descriptions		
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									
103									Top of Well Screen
104	1	24/16	104-106	11-5 10-10		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).	104' SAND (SP)		Silica Sand Filter Pack
105									
106						Bottom of Borehole at 106.0 Feet		1	2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
107									
108							108'		Bottom of Well Screen
109									
110									
111									
112									
113									

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from approximately 103.0 to 108.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW-17S

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/15/20

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Boring No.: HS-MW-18S
Page: 1 **of** 1
File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Burt
Logged by: Kevin Hedinger
Date Start/Finish: 5-14-18 / 5-16-18
Boring Location: 582,018.9901 N; 12,791,903.6374 E
GS Elev.: 683.9' **Datum:**

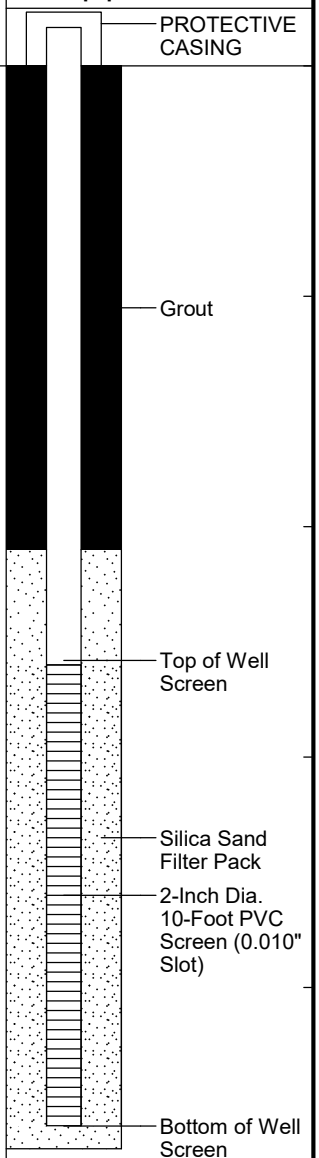
	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks
1–23						See SB-18/MW-18D boring log for sample description and classification.		
24						Bottom of Borehole at 23.5 Feet		1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 13.0 to 23.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 62355.52 HOUSE STREET COMPLETE.GPJ WI_DNR.GDT 4/15/20

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Boring No.: MW-19D
Page: 1 **of** 4
File No.: 16.0062335.52
Check:

Contractor: Cascade Drilling
Foreman: Jason
Logged by: Ken Oanes
Date Start/Finish: 1-8-18 / 1-8-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:	NA	NA

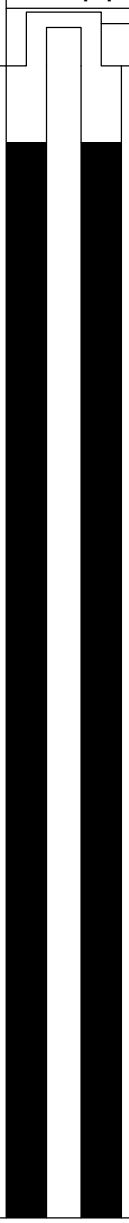
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	60/60	0-5		0.7 ppm <0.25 tsf	Very soft, black, SILT, contains Organics (topsoil), trace Gravel, moist (ML). Changing at 2.0 feet to: Loose, light brown, Silty fine to coarse GRAVEL, sub-angular, some Sand, moist (GM).	SILT (ML)	1 2
2							2' GRAVEL (GM)	
3					1.6 ppm			
4								
5	2	60/60	5-10		1.6 ppm	Loose, brown, well graded, fine to coarse SAND and GRAVEL, sub-angular to sub-rounded, some lithics, trace Silt, moist (SW).	5' SAND (SW)	
6								
7								
8					1.5 ppm			
9								
10	3	60/60	10-15		2.8 ppm	Loose, brown, well graded, fine to coarse SAND and GRAVEL, sub-angular to sub-rounded, some lithics, trace Silt, moist (SW).		
11								
12								
13								
14					2.7 ppm			
15	4	60/60	15-20		3.9 ppm	Stiff, light brown, Silty fine SAND, trace fine Gravel, moist (SM).	15' SAND (SM)	
16								
17								
18					4.3 ppm			
19								
20	5	60/60	20-25		5.8 ppm	Stiff, light brown, Silty fine SAND, trace fine Gravel, moist (SM).		
21								
22								
23					4.2 ppm			
24								
25	6	60/60	25-30		3.5 ppm >4.5 tsf	Stiff, dark gray, Silty CLAY, trace fine Sand, trace fine Gravel, moist (CL).	25' CLAY (CL)	
26								
27								
28					2.5 ppm			
29								

Equipment Installed



REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings are shown in parts per million (ppm) of isobutylene. Background was measured at 0.0 ppm.
2. Pocket penetrometer readings were measured in tons per square foot (tsf) and are used to evaluate consisency of cohesive soil.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-19D

BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: MW-19D
Page: 2 **of** 4
File No.: 16.0062335.52
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31	7	60/60	30-35		5.4 ppm >4.0 tsf	Stiff, dark gray, Silty CLAY, trace fine Sand, trace fine Gravel, moist (CL).	CLAY (CL)		
32									
33					3.3 ppm				
34									
35	8	60	35-40		5.8 ppm >4.0 tsf	Stiff, dark gray, Silty CLAY, trace fine Sand, trace fine Gravel, moist (CL).			
36									
37									
38					5.6 ppm				
39									
40	9	60/60	40-45		11.8 ppm >4.0 tsf	Stiff, dark gray, Silty CLAY, trace fine Sand, trace fine Gravel, moist (CL).			
41									
42									Grout
43					10.7 ppm				
44									
45	10	60/60	45-50		7.2 ppm >4.0 tsf	Stiff, dark gray, Silty CLAY, trace fine Sand, trace fine Gravel, moist (CL).			
46									
47									
48					11.9 ppm				
49									
50	11	60/60	50-55		2.6 ppm >4.5 tsf	Stiff, dark gray, Silty CLAY, trace fine Sand, trace fine Gravel, moist (CL).			
51									
52									
53					10.1 ppm				
54									
55	12	60/60	55-60		0.7 ppm >4.0 tsf	Hard, light gray, Silty CLAY, trace coarse Sand, trace fine Gravel, moist (CL). Changing at 57.0 feet to: Loose, gray, poorly graded, fine SAND, some lithics, sub-rounded, little Silt, wet (SM). Changing at 59.0 feet to: Stiff, gray, SILT, trace fine Sand, trace fine Gravel, wet (ML).		3	
56								4	
57							57' SAND (SM)		
58									
59					1.5 tsf		59' SILT (ML)		
60	13	60/60	60-65		3.0 ppm >4.0 tsf	Hard, gray, Silty CLAY, trace coarse Sand, trace fine Gravel, sub-angular, moist (CL).	60' CLAY (CL)		
61									
62									
63					4.8 ppm				
64									

REMARKS

3. Groundwater was encountered 55.0 feet below ground surface.
4. Temporary well set at 55.0 to 60.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-19D

BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: MW-19D
Page: 3 **of** 4
File No.: 16.0062335.52
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
66	14	60/60	65-70		4.2 ppm >4.0 tsf	Hard, gray, Silty CLAY, trace coarse Sand, trace fine Gravel, sub-angular, moist (CL).	CLAY (CL)		
67									
68					2.9 ppm				
69									
70	15	60/60	70-75		7.0 ppm >4.0 tsf	Hard, gray, Silty CLAY, trace coarse Sand, trace fine Gravel with confinement increasing with depth, sub-angular, moist (CL).			
71									
72									
73					6.5 ppm				
74									
75	16	60/60	75-80		10.8 ppm >4.0 tsf	Hard, gray, Silty CLAY, trace coarse Sand, trace fine Gravel with confinement increasing with depth, sub-angular, moist (CL).			
76									
77									
78					4.0 ppm				
79									
80	17	60/60	80-85		2.0 ppm	Loose, brown, Silty fine SAND, some medium to coarse Sand, trace Gravel, sub-angular, wet (SM). Changing at 81.0 feet to: Loose, brown, well graded, fine to coarse SAND and fine to coarse GRAVEL, sub-angular to agular gravel content increasing with depth, wet (SW).	80' SAND (SM) 81' SAND (SW)	5 6	
81									
82									Bentonite Seal
83					0.3 ppm				
84									
85	18	60/60	85-90		8.2 ppm	Loose, brown, well graded, fine to coarse SAND and fine to coarse GRAVEL, sub-angular to agular gravel content increasing with depth, wet (SW).			Top of Well Screen
86									
87									
88					0.2 ppm				
89									Silica Sand Filter Pack
90	19	60	90-95		0.4 ppm	Loose, dark gray, fine to coarse SAND and fine to coare GRAVEL, sub-angular, trace Silt, wet with 3 inch Cobble at 91.3 feet (SW).		7	2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
91									
92									
93					0.3 ppm				
94									
95	20	60/60	95-100		0.1 ppm >4.5 tsf	Hard, dark gray, CLAY, trace fine Sand, trace Gravel, easily rolls 1/8" ribbon, moist (CL).	95' CLAY (CL)		Bottom of Well Screen
96									
97									
98					0.1 ppm				
99									

REMARKS

5. Groundwater was encountered at approximately 80.0 feet below ground surface.
6. Temporary well set at 80.0 to 85.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
7. Temporary well set at 90.0 to 95.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-19D

BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: MW-19D
Page: 4 **of** 4
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Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
101	21	60/60	100-105		0.3 ppm >4.5 tsf	Hard, dark gray, lean CLAY, low plasticity, moist (CL). Changing at 104.0 feet to: Stiff, dark gray, SILT with Clay, low plasticity, wet (ML).	CLAY (CL)		
103					0.4 ppm 1.5 tsf				
104							104' SILT (ML)		
105	22	60/60	105-110		0.8 ppm 1.0 tsf	Stiff, dark gray, SILT with Clay, low plasticity, trace fine Sand increasing with depth, wet (ML).			
108					0.7 ppm				
110	23	60/60	110-115		0.4 ppm 0.5 tsf	Soft, gray, poorly graded, fine SAND, trace Silt, wet (SP). Changing at 111.3 feet to: Hard, dark gray, CLAY with some Silt, moist (CL).	110' SAND (SP) 111.3' CLAY (CL)	8	
113					0.7 ppm >4.5 tsf				
115	24	60/60	115-120		0.7 ppm 1.0 tsf	Medium stiff, dark gray, Silty CLAY, moist (CL).			
118					0.5 ppm				
120	25	60/60	120-125		0.8 ppm 4.0 tsf	Hard, gray, CLAY, some Silt, trace Gravel, moist (CL). Changing at 121.3 feet to: Hard, red, CLAY, some Silt, Gypsum inclusions, dry (CL).	125'		
123					1.0 ppm >4.5 tsf				
125						Bottom of Borehole at 125.0 Feet		9	

REMARKS

8. Insufficient groundwater yeild for temporary well.
9. Monitoring well was installed in borehole upon completion. Well screen set from 85.0 to 95.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-19D

BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: MW-19S
Page: 1 **of** 2
File No.: 16.0062335.52
Check:

Contractor: Cascade Drilling
Foreman: Jason
Logged by: John Morehouse
Date Start/Finish: 1-16-18 / 1-16-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–29						See MW-19D boring log for sample description and classification.			PROTECTIVE CASING; Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: MW-19S
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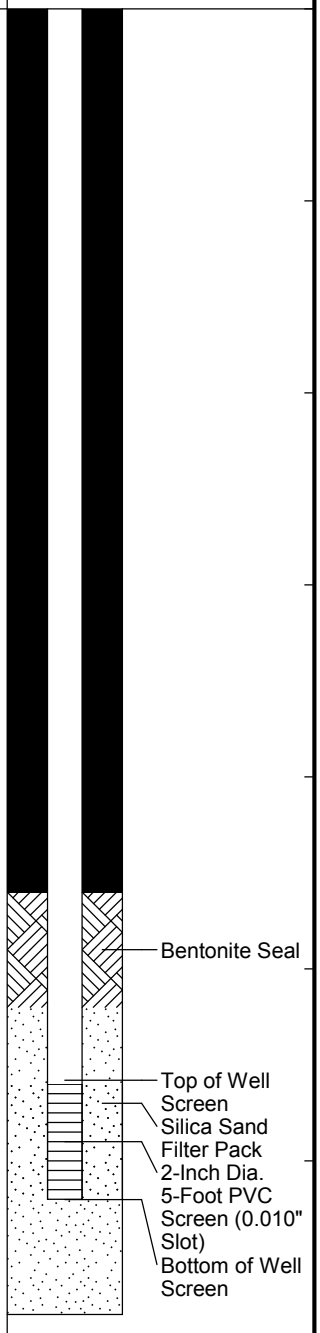
File No.: 16.0062335.52
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31–64						Bottom of Borehole at 61.0 Feet		1	



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 58.0 to 61.0 feet below ground surface.

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Boring No.: MW-19S

BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

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Engineers and Scientists

1855 House Street: Off-Site Borings
6868 Wild Wood Creek Road, NE
Belmont, Michigan

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Check: Julie Groenleer

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 11-15-18 / 11-17-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	NA
Hammer Wt.:	140 lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/10.8	0-2	0-0 1-1	0.0 ppm	Very dark brown, well sorted SILT and fine grained Sand, moist. Changing at 0.4 feet to: Yellowish-brown, moderately sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist. Changing at 0.9 feet to: NO RECOVERY.	SILT 0.4' SAND 0.9' NO RECOVERY	1	PROTECTIVE CASING
2	2	24/1.2	2-4	2-3 3-3	0.0 ppm	Yellowish-brown, moderately sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist. Changing at 2.1 feet to: NO RECOVERY.	2' 2.1' SAND NO RECOVERY		
3									
4	3	24/15.6	4-6	3-4 5-5	0.0 ppm	Yellowish-brown, moderatelty sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist. Changing at 4.5 feet to: Dark yellowish-brown, poorly sorted, SILT, some fine grained Sand, trace Gravel, trace Clay, non to slightly plastic, moderately cohesive, moist. Changing at 4.8 feet to: Yellowish-brown, moderately sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist. Changing at 5.3 feet to: NO RECOVERY.	4' SAND 4.5' SILT 4.8' SAND 5.3' NO RECOVERY		
5									
6	4	24/16.8	6-8	2-3 3-3	0.0 ppm	Dark yellowish-brown, poorly sorted, fine to coarse grained SAND, trace Gravel, trace Silt, moist. Changing at 6.6 feet to: Light yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 7.4 feet to: NO RECOVERY.	6' SAND 7.4' NO RECOVERY 8'		
7									

REMARKS

1. Field screening of samles for organic vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million (ppm) of isobutylene. Groundwater was measured at 0.0 ppm.

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BORING_WELL 6233552 HOUSE STREET OFF SITE BORINGS WILD WOOD CREEK.GPJ GZA_CORP.GDT 2/27/19

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	5	24/8.4	8-10	3-4 4-5	0.0 ppm	Light yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 8.6 feet to: Light yellowish-brown to pale brown, poorly sorted, fine to coarse grained SAND, some Gravel, trace Silt, moist. Changing at 8.7 feet to: NO RECOVERY.	SAND 8.7' NO RECOVERY		
9									
10	6	24/13.2	10-12	4-5 5-6	0.0 ppm	Light yellowish-brown to pale brown, moderately sorted fine to medium grained SAND, little coarse grained Sand, trace Silt, moist. Changing at 10.2 feet to: Light yellowish-brown to pale brown, poorly sorted, fine to coarse grained SAND, some Gravel, trace Silt, moist. Changing at 11.1 feet to: NO RECOVERY.	10' SAND 11.1' NO RECOVERY		
11									
12	7	24/12	12-14	6-10 8-8	0.0 ppm	Yellowish-brown, poorly sorted, fine to coarse grained SAND, little Gravel, trace Silt, moist. Changing at 12.5 feet to: Yellowish-brown, poorly sorted, medium to coarse grained SAND, trace Gravel, trace Silt, moist. Changing at 13.0 feet to: NO RECOVERY.	12' SAND 13' NO RECOVERY		
13									
14	8	24/14.4	14-16	4-5 9-14	0.0 ppm	Yellowish-brown, poorly sorted, medium to coarse grained SAND, trace Gravel, trace Silt, moist. Changing at 15.0 feet to: GRAVEL, fractured Cobble. Changing at 15.2 feet to: NO RECOVERY.	14' SAND 15' 15.2' GRAVEL NO RECOVERY		
15									
16	9	24/14.4	16-18	8-14 14-14	0.0 ppm	Yellowish-brown, poorly sorted, medium to coarse SAND, little Gravel, trace Silt, moist. Changing at 17.2 feet to: NO RECOVERY.	16' SAND 17.2'		
17									

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
							NO RECOVERY		
18	10	24/14.4	18-20	9-11 11-14	0.0 ppm	Yellowish-brown, poorly sorted, medium to coarse grained SAND, little Gravel, trace Silt, moist. Changing at 19.2 feet to: NO RECOVERY.	18' SAND		
19							19.2' NO RECOVERY		
20	11	24/14.4	20-22	11-22 23-19	0.0 ppm	Yellowish-brown, poorly sorted, medium to coarse grained SAND, little Gravel, trace Silt, moist. Changing at 21.2 feet to: NO RECOVERY.	20' SAND		
21							21.2' NO RECOVERY		
22	12	24/15.6	22-24	5-13 15-14	0.0 ppm	Yellowish-brown, poorly sorted, coarse grained SAND, some Gravel, trace Silt, moist. Changing at 23.3 feet to: NO RECOVERY.	22' SAND		
23							23.3' NO RECOVERY		
24	13	24/14.4	24-26	5-9 10-11	0.0 ppm	Yellowish-brown, poorly sorted, medium to coarse grained SAND, little Gravel, trace Silt, moist. Changing at 25.2 feet to: NO RECOVERY.	24' SAND		
25							25.2' NO RECOVERY		
26	14	24/12	26-28	4-7 47-17	0.0 ppm	Yellowish-brown, poorly sorted, medium to coarse grained SAND, little Gravel, trace Silt, moist. Changing at 26.9 feet to: Very pale brown to pale brown, well sorted, fine	26' SAND		

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
27						to medium grained SAND, trace Silt, moist. Changing at 27.0 feet to: NO RECOVERY.	SAND 27' NO RECOVERY		
28	15	24/19.2	28-30	3-6 8-15	0.0 ppm	Very pale brown to pale brown, well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 28.1 feet to: Very pale brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 29.6 feet to: NO RECOVERY.	28' SAND 29.6' NO RECOVERY		
30	16	24/16.8	30-32	4-7 9-11	0.0 ppm	Very pale brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 31.4 feet to: NO RECOVERY.	30' SAND 31.4' NO RECOVERY		
32	17	24/15.6	32-34	3-6 9-10	0.0 ppm	Very pale brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 33.3 feet to: NO RECOVERY.	32' SAND 33.3' NO RECOVERY		
34	18	24/18	34-36	3-6 7-9	0.0 ppm	Very pale brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 35.5 feet to: NO RECOVERY.	34' SAND 35.5' NO RECOVERY 36'		

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	19	24/18	36-38	3-6 8-8	0.0 ppm	Very pale brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 37.5 feet to: NO RECOVERY.	SAND		
37							37.5' NO RECOVERY		
38	20	24/16.8	38-40	3-6 8-10	0.0 ppm	Light yellowish-brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 39.4 feet to: NO RECOVERY.	38' SAND		
39							39.4' NO RECOVERY		
40	21	24/19.2	40-42	3-4 6-7	0.0 ppm	Light yellowish-brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 41.6 feet to: NO RECOVERY.	40' SAND		
41							41.6' NO RECOVERY		
42	22	24/15.6	42-44	4-5 7-8	0.0 ppm	Light yellowish-brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 43.3 feet to: NO RECOVERY.	42' SAND		
43							43.3' NO RECOVERY		
44	23	24/19.2	44-46	3-7 8-11	0.0 ppm	Light yellowish-brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 45.6 feet to: NO RECOVERY.	44' SAND		
45									

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							SAND		
							45.6' NO RECOVERY		
46	24	24/16.8	46-48	4-5 8-10	0.0 ppm	Light yellowish-brown, very well sorted fine to medium grained SAND, trace Silt, moist. Changing at 47.4 feet to: NO RECOVERY.	46' SAND		
47							47.4' NO RECOVERY		
48	25	24/21.6	48-50	4-6 7-11	0.0 ppm	Light yellowish-brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 49.8 feet to: NO RECOVERY.	48' SAND		
49							49.8'		
50	26	24/21.6	50-52	4-6 8-12	0.0 ppm	Light yellowish-brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 51.8 feet to: NO RECOVERY.	50' NO RECOVERY SAND		
51							51.8'		
52	27	24/20.4	52-54	6-9 10-11	0.0 ppm	Light yellowish-brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 53.7 feet to: NO RECOVERY.	52' NO RECOVERY SAND		
53							53.7'		
54	28	24/19.2	54-56	2-4 6-8	0.0 ppm	Light yellowish-brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 54.3 feet to: Brown, very well sorted, fine to medium grained SAND, trace	54' NO RECOVERY SAND	2	

REMARKS

2. Groundwater was encountered at approximately 54.3 feet below ground surface.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
55						Silt, wet. Changing at 55.6 feet: NO RECOVERY.	SAND		
							55.6' NO RECOVERY		
56	29	24/21.6	56-58	2-4 6-8	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 57.8 feet to: NO RECOVERY.	56' SAND		
57									
							57.8'		
58	30	24/22.8	58-60	1-1 2-4	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 59.9 feet to: NO RECOVERY.	58' NO RECOVERY SAND		
59									
							59.9'		
60	31	24/21.6	60-62	0-1 1-3	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 61.8 feet to: NO RECOVERY.	60' NO RECOVERY SAND		
61									Bentonite / Grout
							61.8'		
62	32	24/16.8	62-64	1-2 2-6	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 63.4 feet to: NO RECOVERY.	62' NO RECOVERY SAND		
63									
							63.4' NO RECOVERY 64'		

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	33	24/22.8	64-66	2-4 4-7	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 65.9 feet to: NO RECOVERY.	SAND		
65									
							65.9'		
66	34	24/18	66-68	2-2 4-6	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 67.5 feet to: NO RECOVERY.	66' NO RECOVERY SAND		
67									
							67.5' NO RECOVERY		
68	35	24/19.2	68-70	8-9 7-10	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 69.6 feet to: NO RECOVERY.	68' SAND		
69									
							69.6' NO RECOVERY		
70	36	24/4.8	70-72	2-3 5-8	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 70.4 feet to: NO RECOVERY.	70' SAND 70.4' NO RECOVERY		
71									
72	37	24/24	72-74	2-2 3-6	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet.	72' SAND		
73									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							SAND		
74	38	24/13.2	74-76	1-0 0-0	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 75.1 feet to: NO RECOVERY.			
75							75.1' NO RECOVERY		
76	39	24/21.6	76-78	1-2 5-7	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 77.8 feet to: NO RECOVERY.	76' SAND		
77									
78	40	24/9.6	78-80	3-5 6-9	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 78.8 feet to: NO RECOVERY.	77.8' 78' NO RECOVERY SAND		
79							78.8' NO RECOVERY		
80	41	24/19.2	80-82	1-3 7-12	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 81.6 feet to: NO RECOVERY.	80' SAND		
81									
82	42	24/10.8	82-84	1-2 5-7	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 82.9 feet to: NO RECOVERY.	81.6' NO RECOVERY 82' SAND		

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
83							SAND 82.9' NO RECOVERY		
84	43	24/22.8	84-86	3-4 9-15	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, traceSilt, wet. Changing at 85.9 feet to: NO RECOVERY.	84' SAND		
85							85.9'		
86	44	24/10.8	86-88	1-1 3-6	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 86.9 feet to: NO RECOVERY.	86' NO RECOVERY SAND		
87							86.9' NO RECOVERY		
88	45	24/13.2	88-90	2-3 5-10	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 89.1 feet to: NO RECOVERY.	88' SAND		
89							89.1' NO RECOVERY		
90	46	24/22.8	90-92	1-2 4-10	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 91.9 feet to: NO RECOVERY.	90' SAND		
91							91.9' 92'		

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	47	24/6	92-94	1-2 5-7	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 92.5 feet to: NO RECOVERY.	NO RECOVERY SAND 92.5' NO RECOVERY		
93									
94	48	24/18	94-96	2-1 4-8	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 95.5 feet to: NO RECOVERY.	94' SAND		
95							95.5' NO RECOVERY		
96	49	24/15.6	96-98	0-1 2-4	0.0 ppm	Brown, very well sorrted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 97.3 feet to: NO RECOVERY.	96' SAND		
97							97.3' NO RECOVERY		
98	50	24/18	98-100	1-0 2-4	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 99.5 feet to: NO RECOVERY.	98' SAND		
99							99.5' NO RECOVERY		
100	51	24/21.6	100-102	2-3 6-10	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 101.8 feet to: NO RECOVERY.	100' SAND		
101									

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							SAND		
							101.8'		
102	52	24/20.4	102-104	0-1 3-4	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 103.7 feet to: NO RECOVERY.	102' NO RECOVERY SAND		
103									
							103.7'		
104	53	24/24	104-106	2-3 8-15	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet.	104' NO RECOVERY SAND		
105									
106	54	24/22.8	106-108	3-3 7-10	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 107.9 feet to: NO RECOVERY.			
107									
							107.9'		
108	55	24/22.8	108-110	1-1 2-4	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 109.9 feet to: NO RECOVERY.	108' NO RECOVERY SAND		
109									
							109.9'		
110	56	24/13.2	110-112	1-3 4-9	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 111.1 feet to: NO RECOVERY.	110' NO RECOVERY SAND		

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6233552 HOUSE STREET OFF SITE BORINGS WILD WOOD CREEK.GPJ GZA_CORP.GDT 2/27/19

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

1855 House Street: Off-Site Borings
6868 Wild Wood Creek Road, NE
Belmont, Michigan

Boring No.: SB-20/MW-20D
Page: 13 **of** 16
File No.: 16.0062335.52
Check: Julie Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
111							SAND		
							111.1' NO RECOVERY		
112	57	24/19.2	112-114	2-3 7-11	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 113.6 feet to: NO RECOVERY.	112' SAND		
113							113.6' NO RECOVERY		
114	58	24/24	114-116	1-3 5-11	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet.	114' SAND		
115									
116	59	24/9.6	116-118	1-1 3-8	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 116.8 feet to: NO RECOVERY.	116.8' NO RECOVERY		
117									
118	60	24/20.4	118-120	1-2 5-9	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 119.7 feet to: NO RECOVERY.	118' SAND		
119							119.7' NO RECOVERY		
120									

REMARKS

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BORING_WELL 6233552 HOUSE STREET OFF SITE BORINGS WILD WOOD CREEK.GPJ GZA_CORP.GDT 2/27/19

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1855 House Street: Off-Site Borings
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Belmont, Michigan

Boring No.: SB-20/MW-20D
Page: 14 **of** 16
File No.: 16.0062335.52
Check: Julie Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	61	24/10.8	120-122	2-3 6-10	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 120.9 feet to: NO RECOVERY.	SAND		
121							120.9' NO RECOVERY		
122	62	24/22.8	122-124	3-4 9-15	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 123.5 feet to: Dark grayish-brown to dark brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 123.9 feet to: NO RECOVERY.	122' SAND		
123							123.5' Slty CLAY		
124	63	24/18	124-126	2-4 6-11	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 125.4 feet to: Dark grayish-brown to dark brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 125.5 feet to: NO RECOVERY.	123.9' 124' NO RECOVERY SAND		Top of Well Screen
125							125.4' 125.5' Silty CLAY NO RECOVERY		Silica Sand Filter Pack
126	64	24/16.8	126-128	1-1 3-6	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 127.4 feet to: NO RECOVERY.	126' SAND		
127							127.4' NO RECOVERY		2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
128	65	24/22.8	128-130	7-23 36-50/4.5"	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 129.5 feet to: Dark gray to dark grayish-brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 129.9 feet to: NO RECOVERY.	128' SAND		
129									

REMARKS

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BORING_WELL 6233552 HOUSE STREET OFF SITE BORINGS WILD WOOD CREEK.GPJ GZA_CORP.GDT 2/27/19

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1855 House Street: Off-Site Borings
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Belmont, Michigan

Boring No.: SB-20/MW-20D
Page: 15 **of** 16
File No.: 16.0062335.52
Check: Julie Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							129.5' SAND		Bottom of Well Screen
							CLAY & SILT		
							129.9'		
130	66	24/24	130-132	4-3 23-46	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 130.9 feet to: Dark gray to dark grayish-brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 131.1 feet to: Dark gray, poorly sorted, GRAVEL, some Sand, trace Silt, wet. Changing at 131.3 feet to: Dark gray to dark grayish-brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 131.5 feet to: Brown, well sorted, fine to coarse SAND, trace Silt, wet. Changing at 131.8 feet to: Dark grayish-brown, poorly sorted, coarse SAND, some Gravel, trace Silt, wet.	130' NO RECOVERY SAND		
							130.9'		
131							CLAY & SILT 131.1'		
							GRAVEL 131.3'		
							CLAY & SILT 131.5'		
							SAND		
132	67	24/10.8	132-134	17-50/5.5"	0.0 ppm		132.3' CLAY & SILT		
						Brown, very well sorted, fine to medium grained, SAND, trace Silt, wet. Changing at 132.3 feet to: Dark gray to dark grayish-brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 132.9 feet to: NO RECOVERY.	132.9'		
133							NO RECOVERY		
							134'		
134	68	24/6	134-136	50/6"	0.0 ppm	Brown, very well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 134.2 feet to: Dark brown, poorly sorted, GRAVEL, fractured Cobble. Changing at 134.5 feet to: NO RECOVERY.	134.2' SAND GRAVEL		
							134.5' NO RECOVERY		
135									
							136'		
136	69	24/1.2	136-138	50/5.5"	0.0 ppm	Dark grayish-brown, poorly sorted, GRAVEL, some Clay & Silt, moist. Changing at 136.1 feet to: NO RECOVERY.	136.1' GRAVEL NO RECOVERY		
137									
							138'		
138	70	24/1.2	138-140	48-50/2"	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, little Gravel, trace Sand, plastic, cohesive, moist. Changing at 138.1 feet to: NO RECOVERY.	138' CLAY & SILT NO RECOVERY		

REMARKS

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BORING_WELL 6233552 HOUSE STREET OFF SITE BORINGS WILD WOOD CREEK.GPJ GZA_CORP.GDT 2/27/19

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

1855 House Street: Off-Site Borings
6868 Wild Wood Creek Road, NE
Belmont, Michigan

Boring No.: SB-20/MW-20D
Page: 16 **of** 16
File No.: 16.0062335.52
Check: Julie Groenleer

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
139							NO RECOVERY		
140	71	24/9.6	140-142	37-50/4"	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, little Gravel, trace Sand, plastic, cohesive, moist. Changing at 140.8 feet to: NO RECOVERY.	140' CLAY & SILT		
141							140.8' NO RECOVERY		
142						Bottom of Borehole at 142.0 Feet	142'	3	
143									
144									
145									
146									
147									

REMARKS

3. Monitoring well MW-20D was installed in borehole upon completion. Well screen set from 124.5 to 129.5 feet below ground surface.

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BORING_WELL 6233552 HOUSE STREET OFF SITE BORINGS WILD WOOD CREEK.GPJ GZA_CORP.GDT 2/27/19

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1855 House Street: Off-Site Borings
6868 Wild Wood Creek Road, NE
Belmont, Michigan

Boring No.: MW-20M
Page: 1 **of** 2
File No.: 16.0062335.52
Check: Julie Groenleer

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 11-5-18 / 11-6-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	NA
Hammer Wt.:	140 lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1		0			See SB-20/MW-20D boring log for detailed soil descriptions.			PROTECTIVE CASING
2–52									Bentonite / Grout

REMARKS

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BORING_WELL 6233552 HOUSE STREET OFF SITE BORINGS WILD WOOD CREEK.GPJ GZA_CORP.GDT 2/27/19

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1855 House Street: Off-Site Borings
6868 Wild Wood Creek Road, NE
Belmont, Michigan

Boring No.: MW-20M
Page: 2 **of** 2
File No.: 16.0062335.52
Check: Julie Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
54–114						Bottom of Borehole at 105.0 Feet		1	Top of Well Screen; Silica Sand Filter Pack; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen

REMARKS

1. Monitoring well was intalled in borehole upon completion. Well screen set from approximately 100.0 to 105.0 feet below ground surface.

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BORING_WELL 6233552 HOUSE STREET OFF SITE BORINGS WILD WOOD CREEK.GPJ GZA_CORP.GDT 2/27/19

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1855 House Street: Off-Site Borings
6868 Wild Wood Creek Road, NE
Belmont, Michigan

Boring No.: MW-20S
Page: 1 **of** 2
File No.: 16.0062335.52
Check: Julie Groenleer

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 11-5-18 / 11-6-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	NA
Hammer Wt.:	140 lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1		0			See SB-20/MW-20D boring log for detailed soil descriptions.			PROTECTIVE CASING
2–39									Bentonite / Grout

REMARKS

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BORING_WELL_6233552 HOUSE STREET OFF SITE BORINGS WILD WOOD CREEK.GPJ GZA_CORP.GDT 2/27/19

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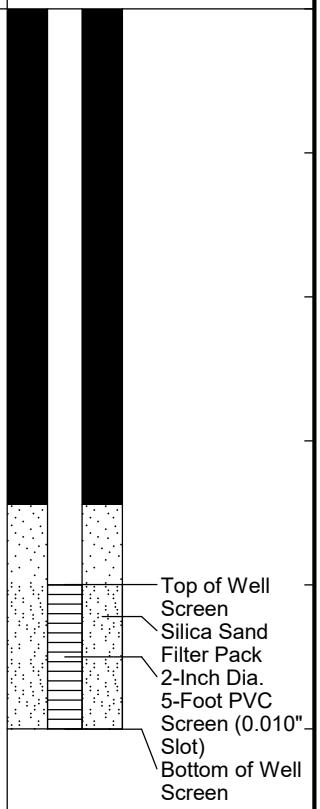
Engineers and Scientists

1855 House Street: Off-Site Borings
6868 Wild Wood Creek Road, NE
Belmont, Michigan

Boring No.: MW-20S
Page: 2 **of** 2
File No.: 16.0062335.52
Check: Julie Groenleer

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
41–86						Bottom of Borehole at 65.0 Feet		1	Top of Well Screen; Silica Sand Filter Pack; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen



REMARKS

1. Monitoring well was intalled in borehole upon completion. Well screen set from approximately 60.0 to 65.0 feet below ground surface.

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BORING_WELL 6233552 HOUSE STREET OFF SITE BORINGS WILD WOOD CREEK.GPJ GZA_CORP.GDT 2/27/19

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide, Inc.
Packer Drive
Plainfield, Michigan

Boring No.: MW-21D
Page: 1 of 3
File No.: 16.0062335.52
Check:

Contractor: Cascade Drilling
Foreman: Jason
Logged by: Ken Oanes
Date Start/Finish: 1-2-18 / 1-2-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	60/60	0-5		1.7 ppm	Loose, black, Silty SAND with Organic Matter (roots), moist (SM). Changing at 1.3 feet to: Loose, light brown, well graded, SAND, trace Gravel, sub-angular to sub-rounded, coarser at 4.5 feet (SM).	SAND (SM)	1	PROTECTIVE CASING
2							1.3' SAND (SW)		
3					0.8 ppm				
4									
5	2	60/60	5-10		1.0 ppm	Loose, light brown, poorly graded, SAND, some Silty Clumps, sub-angular to sub-rounded, moist (SM). Changing at 8.5 feet to: Loose, brown, well graded, SAND and Gravel, sub-angular to sub-rounded, wet (SW).	5' SAND (SP)		
6									
7									
8					0.9 ppm		8.5' SAND and GRAVEL (GW)		
9									
10	3	60/60	10-15		1.0 ppm	Loose, brown, well graded, SAND with Gravel, sub-rounded, wet (SW).	10' SAND (SW)		
11									
12									
13					0.5 ppm				
14									
15	4	60/60	15-20		0.7 ppm	Loose, brown, well graded, SAND with Gravel, sub-rounded, wet (SW).			
16									
17									
18					0.7 ppm				
19									
20	5	60/60	20-25		0.6 ppm	Loose, brown, well graded, SAND, sub-angular, wet (SW).			
21									
22									
23					0.7 ppm				
24									
25	6	60/60	25-30		0.5 ppm	Loose, brown, well graded, SAND, sub-angular, wet (SW). Changing at 27.0 feet to: Loose, brown, well graded, SAND, with Gravel and Cobble, sub-angular, wet (SW). Changing at 27.6 feet to: Soft, brown, SILT with Sand, wet (ML). Changing at 28.3 feet to: Loose, brown, poorly graded, SAND, little lithics, sub-rounded, wet (SP).			
26									
27							27.6'		
28					1.0 ppm		28.3' SILT (ML)		
29							SAND (SP)		

REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings are shown in parts per million (ppm) of isobutylene. Background was measured at 0.0 ppm.

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BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide, Inc.
Packer Drive
Plainfield, Michigan

Boring No.: MW-21D
Page: 2 **of** 3
File No.: 16.0062335.52
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31	7	60/60	30-35		0.8 ppm	Loose, brown, poorly graded, SAND, trace Gravel, little lithics, sub-angular, wet (SP).	SAND (SP)		
32									
33					0.6 ppm				
34									
35	8	60/60	35-40		0.4 ppm	Loose, brown, well graded, SAND with Gravel, sub-angular, some lithics, wet (SW). Changing at 37.5 feet to: Stiff, brown, SILT with Sand, trace Gravel, moist (ML).	35' SAND (SW)		
36									Grout
37							37.5'		
38					0.4 ppm 2.0 tsf		SILT (ML)	2	
39									
40	9	60/60	40-45		1.3 ppm	Hard, brown, Silty CLAY with Gravel, sub-rounded, becoming more Clay than Silt towards bottom, moist (OL).	40' CLAY (OL)		
41									
42									
43					1.7 ppm				
44									
45	10	60/60	45-50		1.1 ppm 3.5 tsf	Very stiff, brown, Silty CLAY with Gravel, sub-rounded, trace Sand, moist (CL).			
46									
47									
48					3.9 ppm				
49									
50	11	60/60	50-55		1.1 ppm 0.5 tsf	Soft, brown, Silty CLAY with Gravel, little Sand, sub-rounded, moist (OL). Changing at 51.0 feet to: Very stiff, brown, lean CLAY, trace Gravel, moist (CL). Changing at 53.5 feet to: Stiff, brown, SILT, trace Gravel, moist (ML).	51' CLAY (CL)		
51									
52									
53					1.3 ppm 3.0 tsf 2.0 tsf		53.5' SILT (ML)		
54									
55	12	60/60	55-60		0.9 ppm >4.0 tsf	Hard, brown, SILT, little Sand, trace Gravel, moist (ML). Changing at 56.8 feet to: Loose, brown, poorly graded SAND, sub-rounded, some lithetics, 2.0 " Cobbles at 58.9 feet, Wet (SP).	56.8' SAND (SP)		
56									
57									
58					1.8 ppm				
59									
60	13	60/60	60-65		1.1 ppm	Loose, brown, poorly graded, SAND, trace Gravel, sub-rounded, some lithics, wet (SP). Changing at 64.0 feet to: Hard, dark gray, SILT, trace Gravel, grading to Clay, wet (ML).			
61									
62									
63					>4.0 tsf 1.0 ppm				
64							64' SILT (SM) 65'		

REMARKS

2. Pocket penetrometer readings were measured in tons per square foot (tsf) and are used to evaluate consisency of cohesive soil.

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Boring No.: MW-21D

BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide, Inc.
Packer Drive
Plainfield, Michigan

Boring No.: MW-21D
Page: 3 **of** 3
File No.: 16.0062335.52
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
66	14	60/60	65-70		3.0 ppm 3.5 tsf	Very stiff, dark gray, CLAY, trace Gravel, trace Sand, moist (CL).	CLAY (CL)		
67									
68					1.7 ppm				
69									
70	15	60/60	70-75		0.3 ppm >4.0 tsf	Hard, dark brown, Clayey Gravel, dark brown, sub-round, moist (GL).	70' GRAVEL (GL)		
71									
72									Bentonite Seal
73					0.7 ppm				
74									
75	16	60/60	75-80		1.2 ppm >4.0 tsf	Hard, dark brown, lean CLAY, little Gravel, moist (CL). Changing at 79.0 feet to: Very stiff, dark brown, Clayey GRAVEL, some Sand, trace Cobbles, moist (GC).	75' CLAY (CL)		
76									Top of Well Screen
77									
78					1.7 ppm				
79							79' GRAVEL (GL)		
80	17	60/60	80-85		1.6 ppm	Medium dense, dark brown, Clayey SAND with Gravel, Cobbles at 81.0 feet, moist (SC).	80' SAND (SC)		Silica Sand Filter Pack
81									2-Inch Dia. 10-Foot PVC Screen (0.010" Slot)
82									
83					2.3 ppm				
84									
85	18	60/60	85-90		1.1 ppm	Loose, dark brown, SAND, trace Gravel, wet (SW). Changing at 85.8 feet to: Hard, dark gray, lean CLAY, low plasticity, moist (CL). Changing at 86.6 feet to: Hard, dark red with gray mottles, lean CLAY, small inclusions of white precipitate in gray mottles, possible gypsum Wet (CL).	85' 85.5SAND (SW) CLAY (CL) 86.6' CLAY (CL)		
86									Bottom of Well Screen
87									
88					1.0 ppm				
89									
90	19	60/60	90-95		1.9 ppm	Hard, dark reddish brown with gray mottles, lean CLAY, small inclusions of white precipitate material inclusions, dry to moist (CL).			
91									
92									
93					1.3 ppm				
94									
95	20	48/48	95-99		1.1 ppm >4.0 tsf	Hard, dark reddish brown with gray mottles, lean CLAY, small inclusions of white precipitate material inclusions, dry to moist (CL).			
96									
97									
98					1.2 ppm				
99							99'		
						Bottom of Borehole at 99.0 Feet		3 4	

REMARKS

3. Groundwater was not encountered during drilling or upon completion.
4. Monitoring well was installed in borehole upon completion. Well screen set from 76.0 to 86.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-21D

BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide, Inc.
Packer Drive
Plainfield, Michigan

Boring No.: MW-21M
Page: 1 **of** 2
File No.: 16.0062335.52
Check:

Contractor: Cascade Drilling
Foreman: Jason
Logged by: John Morehouse
Date Start/Finish: 1-18-18 / 1-18-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–29						See MW-21D boring log for sample description and classification.			PROTECTIVE CASING; Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6233552 WWW PACKER DR_PLAINFIELD MI.GPJ GZA_CORP.GDT 1/25/18

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Boring No.: MW-21M
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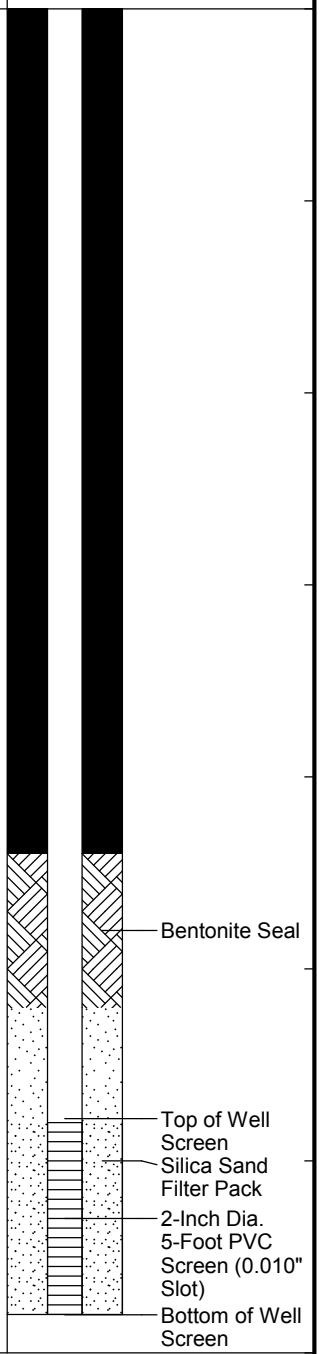
File No.: 16.0062335.52
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
64						Bottom of Borehole at 64.0 Feet		1	Bentonite Seal; Top of Well Screen; Silica Sand Filter Pack; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 59.0 to 64.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: MW-21S
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File No.: 16.0062335.52
Check:

Contractor: Cascade Drilling
Foreman: Jason
Logged by: John Morehouse
Date Start/Finish: 1-18-18 / 1-18-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:	NA	NA

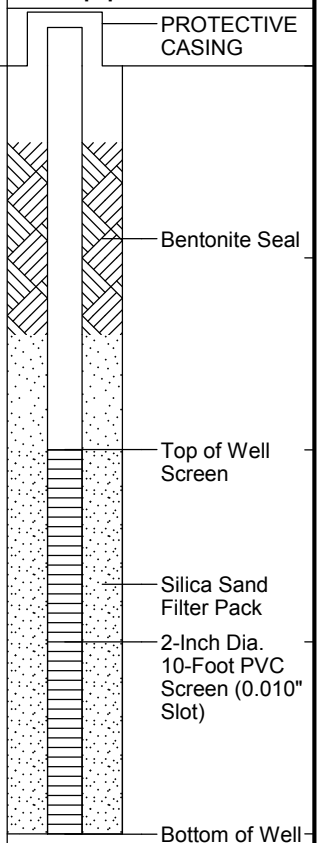
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–19						See MW-21D boring log for sample description and classification.		
20						Bottom of Borehole at 20.0 Feet		1
21–29								

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 10.0 to 20.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-21S

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Boring No.: HS-MW-23A
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File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: S. Stephenson
Date Start/Finish: 6-20-19 / 6-20-19
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
NA				

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–39						SeeHS-MW-23D boring log for sample description and classification.			PROTECTIVE CASING; Bentonite/Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-23A
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Check: JTM/JMG

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
41–86						Bottom of Borehole at 75.0 Feet		1	Silica Sand Filter Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 70.0 to 75.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-23B
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File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 7-31-19 / 8-1-19
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–49						SeeHS-MW-23D boring log for sample description and classification.			PROTECTIVE CASING

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				

51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108

Bentonite / Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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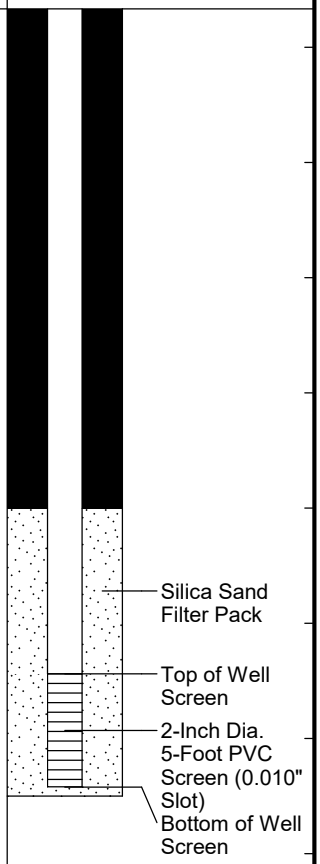
Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
109–142									
143						Bottom of Borehole at 142.5 Feet		1	
144–166									



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 137.2 to 142.1 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-23C
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File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 7-30-19 / 7-31-19
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–49						SeeHS-MW-23D boring log for sample description and classification.			PROTECTIVE CASING

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
51–108									Bentonite / Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
109–166									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
168–224						Bottom of Borehole at 215 Feet		1	Silica Sand Filter Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 209.6 to 214.4 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-23D
Page: 1 **of** 12
File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: S. Stephenson
Date Start/Finish: 6-10-19 / 6-18-19
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
NA				

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/24	0-2	3-4 5-7		TOPSOIL, dry. Changing at 0.4 feet to: Loose, tan, fine SAND, little Silt, moist.	0.4' TOPSOIL SAND		PROTECTIVE CASING
2	2	24/24	2-4	3-5 8-11		Loose, tan, fine SAND, little Silt, moist. Changing at 3.0 feet to: Medium dense, tan, fine to medium SAND, trace, Silt, moist.			
4	3	24/24	4-6	1-4 5-7		Medium dense, tan, fine to medium SAND, trace, Silt, moist. Changing at 5.3 feet to: Stiff, brown, CLAY & SILT, trace fine Sand, dry.	4.8' CLAY & SILT		
6	4	24/20	6-8	2-6 7-6		Medium dense, tan, fine to medium SAND, trace Silt, moist.	6' SAND		
8	5	24/12	8-10	5-6 5-5		Medium dense, tan, fine to medium SAND, trace Silt, moist.			
10	6	24/12	10-12	3-4 4-6		Medium dense, tan, fine to medium SAND, trace Silt, moist.		1	
12	7	24/12	12-14	7-4 4-2		Medium dense, tan, fine to medium SAND, trace Silt, moist.			
14	8	24/12	14-16	2-4 3-3		Loose, brown, fine to medium SAND, little Silt, wet.		2	
16	9	24/15	16-18	5-1 1-2		Loose, brown, fine to medium SAND, little Silt, wet. Changing at 16.4 feet to: Loose, brown, SILT, wet. Changing at 16.6 feet to: Loose, brown, fine to medium SAND, wet. Changing at 17.6 feet to: Brown, Silty CLAY,	16.4' 16.6' SILT SAND 17.6' 17.8' Silty CLAY		

REMARKS

1. Temporary well set at 10.0 to 20.0 feet below ground surface. Purged 15.0 gallons. Groundwater sample submitted for laboratory analysis.
2. Groundwater was encountered at approximately 14.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Boring No.: HS-MW-23D
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Check: JTM/JMG

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
19	10	24/20	18-20	3-2 1-1		wet. Changing at 17.8 feet to: Brown, fine to coarse SAND, some Silt, wet. Brown, fine to coarse SAND, some Silt, trace fine Gravel, wet.	SAND		
20 21	11	24/19	20-22	1-1 1-3		Brown, fine to coarse SAND, some Silt, trace fine Gravel, wet. Changing at 21.5 feet to: Brown, CLAY & SILT, little fine to coarse Sand, trace fine Gravel, dry.	21.4' CLAY & SILT		
22 23	12	24/20	22-24	8-4 5-6		Brown, CLAY & SILT, little fine to coarse Sand, trace fine Gravel, dry (wet on outside).			
24 25	13	24/19	24-26	3-4 5-6		Brown, CLAY & SILT, little fine to coarse Sand, trace fine Gravel, dry (wet on outer layer).			
26 27	14	24/0	26-28	7-8 12-13		NO RECOVERY.	26' NO RECOVERY		
28 29	15	24/20	28-30	4-7 7-7		Stiff, brown, CLAY & SILT, little fine to medium Sand, dry (wet on outer layer).	28' CLAY & SILT		
30 31	16	24/12	30-32	6-6 10-10		Stiff, brown, CLAY & SILT, little fine to medium Sand, dry (wet on outer layer).			
32 33	17	24/17	32-34	4-5 7-8		Stiff, brown, CLAY & SILT, little fine to medium Sand, dry (wet on outer layer). Changing at 33.0 feet to: Brown, fine to medium SAND, little Silt, trace fine Gravel, wet.	32.4' SAND		
34 35	18	24/6	34-36	10-16 18-24		Brown, CLAY & SILT, some fine to medium Sand, wet.	34' CLAY & SILT		
36 37	19	24/24	36-38	3-5 9-12		Stiff, brown, CLAY & SILT, some fine to medium Sand, trace fine Gravel (wet on outer layer).			
38	20	24/12	38-40	7-10 17-14		Stiff, brown, CLAY & SILT, some fine to medium Sand, trace fine Gravel (wet on	38.7' SAND		

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						outer layer). Changing at 38.7 feet to: Light brown, fine to medium SAND, little Silt, trace fine Gravel, moist to dry.	SAND		
40	21	24/12	40-42	10-22 22-29		Light brown, fine to medium SAND, little Silt, trace fine Gravel, dry.			
41									
42	22	24/12	42-44	19-21 22-20		Very dense, light brown, fine to medium SAND, trace Silt, dry.			
43									
44	23	24/12	44-46	9-15 21-21		Very dense, brown, fine SAND, little Silt, moist.			
45									
46	24	24/12	46-48	12-14 21-18		Very dense, brown, fine SAND, little Silt, moist.			
47									
48	25	24/17	48-50	22-43-50/5"		Very dense, brown, fine SAND, little Silt, moist (sluff).			
49									
50	26	24/12	50-52	13-24 24-42		Very dense, light brown, fine to coarse SAND, some fine to coarse Gravel, little Silt & Clay, dry with large clumps of Clay.			
51									
52	27	24/12	52-54	11-18 27-29		Very dense, light brown, fine to coarse SAND, some fine to coarse Gravel, little Silt & Clay, dry, with Clay lenses from 6.0 to 6.9" feet and wet.			
53									
54	28	24/12	54-56	12-20 23-30		Very dense, light brown, fine to coarse SAND, some fine to coarse Gravel, little Silt & Clay, dry. Changing at 54.2 feet to: Light brown, CLAY, dry. Changing at 54.7 feet to: Light brown, fine to coarse SAND, some Clay, dry.Changing at 54.8 feet to: Tan, fine to coarse SAND, trace Silt, dry.			
55									
56	29	24/8	56-58	29-21 17-19		Tan, fine to coarse SAND, trace Silt, dry.			
57									
58	30	24/12	58-60	7-11 16-17		Tan, fine to coarse SAND, trace Silt, dry.			
59									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check: JTM/JMG

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
60	31	24/12	60-62	18-17 16-19		Tan, fine to coarse SAND, trace Silt, dry.	SAND		
61									
62	32	24/19	62-64	6-12 13-17		Tan, fine to coarse SAND, trace Silt, dry.			
63									
64	33	24/18	64-66	8-14 19-22		Dense, tan, fine to coarse SAND, trace Silt, moist.			
65									
66	34	24/17	66-68	5-11 12-13		Dense, tan, fine to coarse SAND, trace Silt, moist.			
67									
68	35	24/2	68-70	8-15 18-17		Dense, tan, fine to medium SAND, trace Silt, moist.			
69									
70	36	24/20	70-72	8-8 9-10		Medium dense, tan, fine to medium SAND, little Silt, wet.		3	
71									
72	37	24/20	72-74	5-7 12-10		Medium dense, gray and light brown, fine to coarse SAND, trace Silt, wet.			
73									
74	38	24/22	74-76	8-10 13-15		Medium dense, gray and light brown, fine to coarse SAND, trace Silt, wet.			
75									
76	39	24/12	76-78	6-13 18-24		Medium dense, gray and light brown, fine to coarse SAND, trace Silt, wet.			
77									
78	40	24/24	78-80	9-17 24-30		Medium dense, gray and light brown, fine to coarse SAND, trace Silt, wet.			
79									
80	41	24/20	80-82	3-13 24-31		Medium dense, gray and light brown, fine to coarse SAND, trace Silt, wet.		4 5	

REMARKS

3. Temporary well set at 70.0 to 80.0 feet below ground surface. Purged 35.0 gallons. Groundwater sample submitted for laboratory analysis.
4. 2.0 inch sampler used from 80.0 to 82.0 feet.
5. Temporary well set at 80.0 to 90.0 feet below ground surface. Purged 35.0 gallons. Groundwater sample submitted for laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check: JTM/JMG

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							SAND		
82	42	24/18	82-84	5-6 10-10		Medium dense, gray and light brown, fine to coarse SAND, trace Silt, wet.			
83									
84	43	24/12	84-86	2-5 10-14		Medium dense, gray and light brown, fine SAND, trace Silt, wet.			
85									
86	44	24/20	86-88	3-6 14-15		Medium dense, gray and light brown, fine SAND, trace Silt, wet.			
87									
88	45	24/20	88-90	2-4 7-8		Medium dense, gray and light brown, fine SAND, trace Silt, wet.			
89									
90	46	24/12	90-92	1-2 5-6		Medium dense, gray and light brown, fine SAND, trace Silt, wet.		6	
91									
92	47	24/5	92-94	3-3 6-6		Medium dense, gray and light brown, fine SAND, trace Silt, wet.			
93									
94	48	24/20	94-96	6-2 4-8		Medium dense, gray and light brown, fine SAND, trace Silt, wet.			
95									
96	49	24/20	96-98	3-2 7-13		Medium dense, gray and light brown, fine SAND, trace Silt, wet.			
97									
98	50	24/20	98-100	2-2 5-10		Loose, brown, fine SAND, trace Silt, wet.			
99									
100	51	24/20	100-102	1-2 3-5		Loose, brown, fine SAND, trace Silt, wet.		7	
101									

REMARKS

6. Temporary well set at 90.0 to 100.0 feet below ground surface. Purged 40.0 gallons. Groundwater sample submitted for laboratory analysis.
7. Temporary well set at 100.0 to 110.0 feet below ground surface. Purged 40.0 gallons. Groundwater sample submitted for laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Check: JTM/JMG

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	52	24/8	102-104	1-2 3-5		Loose, brown, fine SAND, trace Silt, wet.	SAND		
103									
104	53	24/12	104-106	1-1 4-7		Loose, tan, fine to medium SAND, trace Silt, wet.			
105									
106	54	24/12	106-108	1-1 7-11		Loose, tan, fine to medium SAND, trace Silt, wet.			
107									
108	55	24/20	108-110	1-2 4-5		Loose, tan, fine to medium SAND, trace Silt, wet.			
109									
110	56	24/7	110-112	1-1 3-6		Loose, tan, fine to medium SAND, trace Silt, wet.		8	
111									
112	57	24/12	112-114	3-10 17-11		Loose, tan, fine to medium SAND, trace Silt, wet.			
113									
114	58	24/12	114-116	1-2 5-9		Loose, tan, fine to medium SAND, trace Silt, wet.			
115									
116	60	24/15	116-118	3-7 12-10		Loose, tan, fine to medium SAND, trace Silt, wet.			Bentonite/Grout
117									
118	61	24/8	118-120	2-3 7-8		Loose, tan, fine to medium SAND, trace Silt, wet.			
119									
120	62	24/5	120-122	2-4 5-6		Loose, tan, fine to medium SAND, trace Silt, wet.		9	
121									
122	63	24/8	122-124	1-1 2-1		Loose, tan, fine to medium SAND, trace Silt, wet.			

REMARKS

8. Temporary well set at 110.0 to 120.0 feet below ground surface. Purged 40.0 gallons. Groundwater sample submitted for laboratory analysis.
9. Temporary well set at 120.0 to 130.0 feet below ground surface. Purged 40.0 gallons. Groundwater sample submitted for laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							SAND		
124	64	24/14	124-126	1-1 3-4		Loose, tan, fine to medium SAND, trace Silt, wet.			
125									
126	65	24/8	126-128	1-2 3-6		Loose, tan, fine to medium SAND, trace Silt, wet.			
127									
128	66	24/8	128-130	1-4 3-5		Loose, tan, fine to medium SAND, trace Silt, wet.			
129									
130	67	24/1	130-132	1-1 5-5		Loose, tan, fine to medium SAND, trace Silt, wet.		10	
131									
132	68	24/0	132-134	1-2 2-3		NO RECOVERY.	132' NO RECOVERY		
133									
134	70	24/6	134-136	1-3 4-5		Loose, brown, fine to medium SAND, trace Silt, wet.	134' SAND		
135									
136	71	24/12	136-138	1-1 3-4		Loose, brown, fine to medium SAND, trace Silt, wet.			
137									
138	72	24/12	138-140	1-4 4-7		Loose, brown, fine to medium SAND, trace Silt, wet.			
139									
140	73	24/20	140-142	4-4 6-7		Loose, brown, fine to medium SAND, trace Silt, wet.		11	
141									
142	74	24/20	142-144	3-7 13-8		Loose, brown, fine to medium SAND, trace Silt, wet.			
143									

REMARKS

10. Temporary well set at 130.0 to 140.0 feet below ground surface. Purged 45.0 gallons. Groundwater sample submitted for laboratory analysis.
11. Temporary well set at 140.0 to 150.0 feet below ground surface. Purged 45.0 gallons. Groundwater sample submitted for laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
145	75	24/20	144-146	2-2 2-4		Loose, brown, fine to medium SAND, trace Silt, wet.	SAND		
146	76	24/18	146-148	0-2 3-5		Loose, brown, fine to medium SAND, trace Silt, wet.			
148	77	24/20	148-150	1-2 4-5		Loose, brown, fine to medium SAND, trace Silt, wet.			
150	78	24/20	150-152	1-3 7-11		Loose, brown, fine to medium SAND, trace Silt, wet.		12	
152	79	24/10	152-154	3-3 7-7		Loose, brown, fine to medium SAND, trace Silt, wet.			
154	80	24/6	154-156	2-3 5-6		Loose, brown, fine to medium SAND, trace Silt, wet.			
156	81	24/10	156-158	4-9 12-10		Loose, brown, fine to medium SAND, trace Silt, wet.			
158	82	24/3	158-160	3-6 6-9		Loose, brown, fine to medium SAND, trace Silt, wet.			
160	83	24/5	160-162	1-1 5-5		Loose, brown, fine to medium SAND, trace Silt, wet.		13	
162	84	24/2	162-164	6-11 12-13		Loose, brown, fine to medium SAND, trace Silt, wet.			
164	85	24/5	164-166	1-2 5-7		Loose, brown, fine to medium SAND, trace Silt, wet.			

REMARKS

12. Temporary well set at 150.0 to 160.0 feet below ground surface. Purged 40.0 gallons. Groundwater sample submitted for laboratory analysis.
13. Temporary well set at 160.0 to 170.0 feet below ground surface. Purged 70.0 gallons. Groundwater sample submitted for laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							SAND		
166	86	24/6	166-168	2-7 9-8		Loose, brown, fine to medium SAND, trace Silt, wet.			
167									
168	87	24/12	168-170	2-3 7-8		Loose, brown, fine to medium SAND, trace Silt, wet.			
169									
170	88	24/1	170-172	1-2 3-3		Loose, brown, fine to medium SAND, trace Silt, wet.		14	
171									
172	90	24/12	172-174	1-1 4-4		Loose, brown, fine to medium SAND, trace Silt, wet.			
173									
174	91	24	174-176	3-7 10-12		Loose, brown, fine to medium SAND, trace Silt, wet.			
175									
176	92	24/12	176-178	5-9 12-13		Loose, brown, fine to medium SAND, trace Silt, wet.			
177									
178	93	24/12	178-180	1-1 3-8		Loose, brown, fine to medium SAND, trace Silt, wet.			
179									
180	94	24/12	180-182	2-4 6-7		Loose, brown, fine to medium SAND, trace Silt, wet. Changing at 181.9 feet to: Brown, fine to coarse SAND, trace Silt,wet.		15	
181									
182	95	24/21	182-184	5-10 10-11		Medium dense, brown, fine to coarse SAND, trace Silt, wet. Changing at 183.8 feet to: Medium dense, brown, fine to coarse SAND, some fine Gravel, trace Silt, wet.			
183									
184	96	24/12	184-186	4-7 8-11		Medium dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
185									

REMARKS

14. Temporary well set at 170.0 to 180.0 feet below ground surface. Purged 80.0 gallons. Groundwater sample submitted for laboratory analysis.
15. Temporary well set at 180.0 to 190.0 feet below ground surface. Purged 100.0 gallons. Groundwater sample submitted for laboratory analysis.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
187	97	24/12	186-188	3-6 8-11		Medium dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.	SAND		
188	98	24/4	188-190	3-5 6-8		Medium dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
190	99	24/1	190-192	1-2 3-7		Medium dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.		16	
192	100	24/8	192-194	2-3 5-8		Medium dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
194	101	24/10	194-196	2-13 27-31		Medium dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
196	102	24/18	196-198	0-12 28-21		Dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
198	104	24/0	198-200	3-20-50/5'		NO RECOVERY.	198' NO RECOVERY		
200	105	24/10	200-202	8-20-50/5"		Dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.	200' SAND	17	
202	106	24/6	202-204	18-50/5"		Dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
204	107	24/7	204-206	3-30-50/4"		Dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
206	108	24/0	206-208	3-6 11-18		NO RECOVERY.	206' NO RECOVERY		

REMARKS

16. Temporary well set at 190.0 to 200.0 feet below ground surface. Purged 100.0 gallons. Groundwater sample submitted for laboratory analysis.
17. Temporary well set at 200.0 to 210.0 feet below ground surface. Purged 100.0 gallons. Groundwater sample submitted for laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							NO RECOVERY		
208	109	24/12	208-210	0-6 27-50/4"		Dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.	208' SAND		
209									
210	110	24/4	210-212	3-13 26-22		Dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.		18	
211									
212	111	24/0	212-214	6-11 18-26/3"		NO RECOVERY.	212' NO RECOVERY		
213									
214	112	24/10	214-216	6-23-50/4"		Dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.	214' SAND		
215									
216	113	24/0	216-218	4-16 31-29/2"		NO RECOVERY.	216' NO RECOVERY		
217									
218	114	24/0	218-220	19-50/3"		NO RECOVERY with some fine to medium SAND in bailer.			
219									
220	115	24/18	220-222	9-22 24-25		Dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.	220' SAND		
221									
222	116	24/8	222-224	4-10 20-28		Dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
223									
224	117	24/20	224-226	10-25 37-50/5"		Dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
225									
226	118	24/6	226-228	12-44/5"		Dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
227									

REMARKS

18. Temporary well set at 210.0 to 220.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	119	24/6	228-230	44-6"		Dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.	SAND		
229									
230	120	24/6	230-232	19-39/4"		Very dense, brown, fine to coarse SAND, trace Silt, trace Gravel, wet.		19	
231									
232									Silica Sand Filter Pack
233									
234									Top of Well Screen
235									
236	121	24/11	236-238	20-36/5"		Very dense, brown, fine to coarse SAND, trace Silt, trace Gravel, wet.			
237									2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
238	122	24/24	238-240	0-11 19-26		Very dense, brown, fine to coarse SAND, trace Silt, trace Gravel, wet. Changing at 238.8 feet to: Very stiff, Clayey SILT, little fine Sand, dry.	238.8' Clayey SILT		
239									Bottom of Well Screen
240						Bottom of Borehole at 240.0 Feet	240'	20	
241									
242									
243									
244									
245									
246									
247									
248									

REMARKS

19. Temporary well set at 230.0 to 240.0 feet below ground surface. Purged 100.0 gallons. Groundwater sample submitted for laboratory analysis.
20. Monitoring well was installed in borehole upon completion. Well screen set from 234.0 to 239.0 feet below ground surface.

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Boring No.: HS-MW-24A
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Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Christine Cano
Date Start/Finish: 10-1-19 / 10-2-19
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–29						See HS-MW-24D for detailed soil descriptions.			PROTECTIVE CASING; Bentonite Slurry / Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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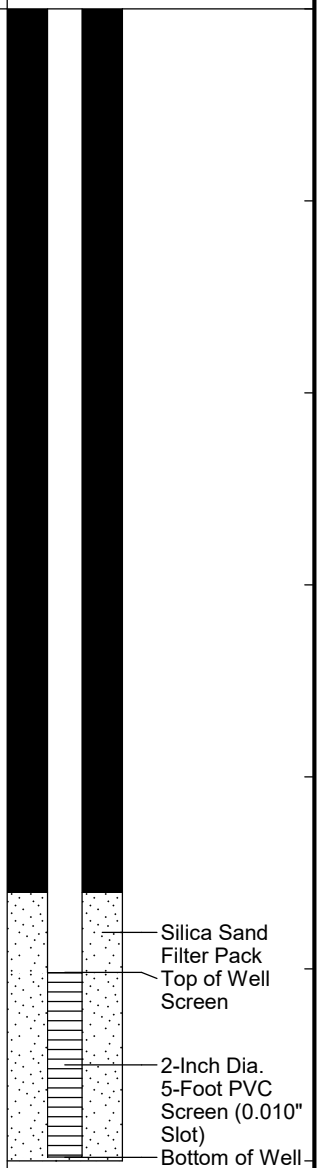
Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31–64									
60						Bottom of Borehole at 60.0 Feet		1	



REMARKS

1. Monitoring well HS-MW-24A was installed in borehole upon completion. Well screen set from approximately 55.1 to 59.9 feet below ground surface.

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Boring No.: HS-MW-24B
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File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Christine Cano/John Morehouse
Date Start/Finish: 9-23-19 / 10-1-19
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

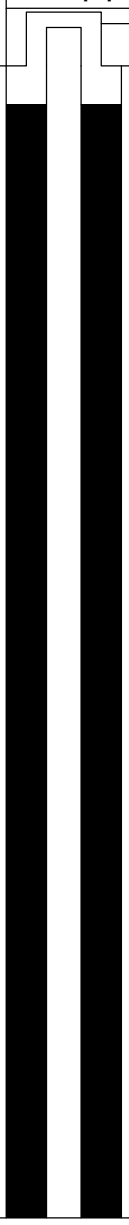
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/16	0-2	1-1 1-2	0.0 ppm	Very loose, brown, fine SAND, some Silt, moist. Changing at 0.3 feet to: Very loose, light brown to tan, fine SAND, trace Silt, moist.	SAND	1
2	2	24/16	2-4	2-2 3-8	0.0 ppm	Loose, light tan, very fine SAND, trace Silt, moist.		
3								
4	3	24/20	4-6	9-10 12-9	0.0 ppm	Medium dense, light tan, very fine SAND and SILT, moist.		
5								
6	4	24/24	6-8	5-7 10-10	0.0 ppm	Medium dense, light brown, fine SAND, trace Clay, moist.		
7								
8	5	24/24	8-10	7-12 13-12	0.0 ppm	Medium dense, light brown, fine SAND, trace Clay, moist.		
9								
10	6	24/24	10-12	6-3 4-4	0.0 ppm	Loose, light brown, fine SAND, trace Clay, moist. Changing at 11.0 feet to: Loose, tan, fine to medium SAND, trace Silt, moist.		
11								
12	7	24/12	12-14	1-3 2-2	0.0 ppm	Loose, tan, fine to coarse SAND, trace Silt, moist.		
13								
14	8	24/20	14-16	2-3 4-5	0.0 ppm	Loose, brown, fine SAND, trace Clay, moist. Changing at 15.0 feet to: Loose, tan, fine to medium SAND, trace Silt, moist.		
15								
16	9	24/10	16-18	3-6 5-4	0.0 ppm	Medium dense, tan, fine to medium SAND, trace Silt, moist.		
17								
18	10	24/12	18-20	2-3 3-2	0.0 ppm	Loose, tan, fine to medium SAND, trace Silt, moist.		
19								
20	11	24/14	20-22	1-2 2-3	0.0 ppm	Very loose, tan, fine to medium SAND, trace Silt, moist.		
21								
22	12	24/14	22-24	1-2 2-3	0.0 ppm	Very loose, tan, fine to medium SAND, trace Silt, moist.		
23								
24	13	24/14	24-26	3-4 4-4	0.0 ppm	Loose, light tan, fine to medium SAND, trace Silt, moist.		
25								
26	14	24/14	26-28	1-3 3-3	0.0 ppm	Loose, light tan, fine to medium SAND, trace Silt, moist.		
27								
28	15	24/20	28-30	1-4 3-3	0.0 ppm	Loose, light tan, fine to medium SAND, trace Silt, moist.		
29								

Equipment Installed



REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings are shown in parts per million (ppm) of isobutylene. Background was measured at 0.0 ppm.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Belmont, Michigan

Boring No.: HS-MW-24B
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File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31	16	24/19	30-32	3-2 3-4	0.0 ppm	Loose, light tan, fine to medium SAND, trace Silt, moist.	SAND		
32 33	17	24/14	32-34	4-5 7-4	0.0 ppm	Medium dense, light tan, fine to medium SAND, trace Silt, moist.			
34 35	18	24/22	34-36	4-5 7-8	0.0 ppm	Medium dense, light tan, fine to medium SAND, trace Silt, trace Gravel, moist.			
36 37	19	24/17	36-38	4-5 5-6	0.0 ppm	Loose, tan, fine to medium SAND, trace Silt, moist. Changing at 37.5 feet to: Loose, tan, fine to coarse SAND, trace Silt, moist.			
38 39	20	24/16	38-40	5-7 7-9	0.0 ppm	Medium dense, tan, fine to coarse SAND, trace Silt, moist.			
40 41	21	24/14	40-42	4-7 7-9	0.0 ppm	Medium dense, tan, Silty fine to medium SAND, trace Gravel, moist.			
42 43	22	24/13	42-44	5-9 9-10	0.0 ppm	Medium dense, tan, Silty fine to coarse SAND, some Gravel, moist.			
44 45	23	24/5	44-46	6-10 20-20	0.0 ppm	Medium dense, tan, Silty fine to coarse SAND, trace Gravel, moist.			
46 47	24	24/12	46-48	5-16 33-16	0.0 ppm	Dense, tan, Sandy GRAVEL, trace Silt, moist.	46' GRAVEL		
48 49	25	24/4	48-50	11-23 21-13	0.0 ppm	Dense, tan, Sandy GRAVEL, trace Silt, moist.			
50 51	26	24/0	50-52	17-11 10-9		NO RECOVERY.	50' NO RECOVERY		
52 53	27	24/1	52-54	18-15 12-9	0.0 ppm	Medium dense, tan, coarse SAND, wet.	52' SAND	2	
54 55	28	24/4	54-56	15-9 7-7	0.0 ppm	Medium dense, tan, fine to coarse SAND, trace Gravel, wet.		3	
56 57	29	24/18	56-58	2-2 2-4	0.0 ppm	Loose, tan, fine to coarse SAND, trace Silt, wet.			
58 59	30	24/17	58-60	1-1 2-3	0.0 ppm	Very loose, tan, fine to coarse SAND, trace Silt, wet.			
60 61	31	24/0	60-62	1-2 4-6		NO RECOVERY.	60' NO RECOVERY		
62 63	32	24/5	62-64	2-2 4-4	0.0 ppm	Loose, tan, fine to coarse SAND, trace Silt, wet.	62' SAND		
64	33	24/8	64-66	3-3 4-5	0.0 ppm	Loose, tan, fine to coarse SAND, trace Silt,			

REMARKS

2. Groundwater was encountered at approximately 52.0 feet below ground surface.
3. Temporary well set at 55.0 to 60.0 feet below ground surface. Purged 70.0 gallons. Groundwater sample submitted for laboratory analysis.
4. Temporary well set at 65.0 to 70.0 feet below ground surface. Purged 35.0 gallons. Groundwater sample submitted for laboratory analysis.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						wet.	SAND	4	
66	34	24/14	66-68	1-2 2-3	0.0 ppm	Loose, tan, fine to coarse SAND, trace Silt, wet.			
67									
68	35	24/14	68-70	1-2 3-10	0.0 ppm	Loose, tan, fine to coarse SAND, trace Silt, wet.			
69									
70	36	24/24	70-72	7-9 10-12	0.0 ppm	Medium dense, tan, fine to coarse SAND, trace Silt, wet.			
71									
72	37	24/15	72-74	4-3 2-2	0.0 ppm	Loose, tan, fine to coarse SAND, trace Silt, wet. Changing at 73.5 feet to: Loose, brown, Sandy GRAVEL, wet.			
73							73.5'		
74	38	24/14	74-76	6-8 8-8	0.0 ppm	Medium dense, brown, fine to coarse SAND and Gravel, trace Silt, wet.	74' GRAVEL SAND		
75								5	
76	39	24/2	76-78	2-3 3-4	0.0 ppm	Loose, brown, fine to coarse SAND and Gravel, trace Silt, wet.			
77									
78	40	24/14	78-80	4-5 5-5	0.0 ppm	Medium dense, brown to gray, GRAVEL, some fine to coarse Sand, wet.	78' GRAVEL		
79									
80	41	24/3	80-82	5-5 5-7	0.0 ppm	Medium dense, brown to gray, GRAVEL, some fine to coarse Sand, wet.			
81									
82	42	24/16	82-84	2-3 4-4	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.	82' SAND		
83									
84	43	24/24	84-86	2-2 2-4	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
85								6	
86	44	24/16	86-88	2-1 2-2	0.0 ppm	Very loose, brown and gray, coarse SAND, some Gravel, wet.			
87									
88	45	24/12	88-90	3-3 3-5	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
89									
90	46	24/8	90-92	2-3 6-7	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
91									
92	47	24/16	92-94	1-1 2-3	0.0 ppm	Very loose, brown and gray, coarse SAND, some Gravel, wet.			
93									
94	48	24/7	94-96	1-2 3-4	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
95								7	
96	49	24/20	96-98	2-2 5-6	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
97									
98	50	24/16	98-100	4-2 4-5	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
99									

REMARKS

5. Temporary well set at 75.0 to 80.0 feet below ground surface. Purged 45.0 gallons. Groundwater sample submitted for laboratory analysis.
6. Temporary well set at 85.0 to 90.0 feet below ground surface. Purged 75.0 gallons. Groundwater sample submitted for laboratory analysis.
7. Temporary well set at 95.0 to 100.0 feet below ground surface. Purged 90.0 gallons. Groundwater sample submitted for laboratory analysis.

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BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
101	51	24/10	100-102	3-7 11-13	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.	SAND		
102 103	52	24/12	102-104	2-2 3-7	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
104 105	53	24/10	104-106	3-4 5-7	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.		8	
106 107	54	24/14	106-108	3-9 10-10	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			
108 109	55	24/16	108-110	2-4 8-9	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			
110 111	56	24/3	110-112	3-7 9-11	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			Bentonite Slurry / Grout
112 113	57	24/4	112-114	1-4 5-5	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
114 115	58	24/14	114-116	6-12 19-23	0.0 ppm	Dense, brown and gray, coarse SAND, some Gravel, wet.		9	
116 117	60	24/18	116-118	2-4 12-15	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			
118 119	61	24/10	118-120	11-17 13-10	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			
120 121	62	24/12	120-122	4-7 11-13	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			
122 123	63	24/10	122-124	2-12 20-13	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			
124 125	64	24/8	124-126	9-15 15-13	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.		10	
126 127	65	24/13	126-128	3-11 16-17	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			
128 129	66	24/10	128-130	11-20 20-21	0.0 ppm	Dense, brown and gray, coarse SAND, some Gravel, trace Silt, wet.			
130 131	67	24/12	130-132	5-18 28-30	0.0 ppm	Dense, brown and gray, coarse SAND, some Gravel, trace Silt, wet.			
132 133	68	24/5	132-134	9-16 21-24	0.0 ppm	Dense, brown and gray, coarse SAND, some reddish brown, fine Sand, some Gravel, trace Silt, wet.			
134	70	24/4	134-136	5-13 20-31	0.0 ppm	Dense, brown and gray, GRAVEL, some	134' GRAVEL		

REMARKS

8. Temporary well set at 105.0 to 110.0 feet below ground surface. Purged 60.0 gallons. Groundwater sample submitted for laboratory analysis.
9. Temporary well set at 115.0 to 120.0 feet below ground surface. Purged 55.0 gallons. Groundwater sample submitted for laboratory analysis.
10. Temporary well set at 125.0 to 130.0 feet below ground surface. Purged 55.0 gallons. Groundwater sample submitted for laboratory analysis.
11. Temporary well set at 135.0 to 140.0 feet below ground surface. Purged 65.0 gallons. Groundwater sample submitted for laboratory analysis.

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BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						medium to coarse Sand, wet.	GRAVEL	11	
136–137	71	24/7	136-138	4-12 16-23	0.0 ppm	Medium dense, brown and gray, GRAVEL, some medium to coarse Sand, wet.			
138–139	72	24/8	138-140	4-7 18-32	0.0 ppm	Medium dense, brown and gray, GRAVEL, some medium to coarse Sand, wet.			
140–141	73	24/7	140-142	5-11 21-22	0.0 ppm	Dense, brown and gray, GRAVEL, some medium to coarse Sand, wet.			
142–143	74	24/12	142-144	7-13 21-23	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, some Gravel, wet.	142' SAND		
144–145	75	24/10	144-146	6-17 21-22	0.0 ppm	Dense, brown and gray, fine to coarse SAND, some Gravel, wet.		12	
146–147	76	24/10	146-148	8-15 16-21	0.0 ppm	Dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
148–149	77	24/8	148-150	5-16 21-24	0.0 ppm	Dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
150–151	78	24/14	150-152	4-9 16-14	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
152–153	79	24/4	152-154	6-10 8-8	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
154–155	80	24/18	154-156	4-12 21-20	0.0 ppm	Dense, brown and gray, fine to coarse SAND, some Gravel, wet.		13	
156–157	81	24/6	156-158	5-8 13-10	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
158–159	82	24/6	158-160	7-11 11-12	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
160–161	83	24/7	160-162	5-8 9-9	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
162–163	84	24/5	162-164	5-10 19-26	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
164–165	85	24/0	164-166	5-13 22-36		NO RECOVERY.	164' NO RECOVERY	14	
166–167	86	24/0	166-168	7-19 25-39		NO RECOVERY; Switched to bailer for recovery. Bailer: brown and gray, fine to medium SAND, wet.			
168–169	87	24/0	168-170	2-8 16-22		NO RECOVERY; Bailer: brown and gray, fine to medium SAND, wet.			

REMARKS

12. Temporary well set at 145.0 to 150.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
13. Temporary well set at 155.0 to 160.0 feet below ground surface. Purged 120.0 gallons. Groundwater sample submitted for laboratory analysis.
14. Temporary well set at 165.0 to 170.0 feet below ground surface. Purged 80.0 gallons. Groundwater sample submitted for laboratory analysis.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
171	88	24/0	170-172	7-11 19-22		NO RECOVERY: Bailer: brown and gray, fine to medium SAND, wet.	NO RECOVERY		
172							172'		
173	89	24/5	172-174	2-4 7-10	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.	SAND		
174							174'		
175	90	24/0	174-176	5-7 11-16		NO RECOVERY; Bailer: brown and gray, fine to medium SAND, wet.	NO RECOVERY	15	
176							176'		
177	91	24/10	176-178	4-7 17-21	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.	SAND		
178	92	24/20	178-180	4-10 28-35	0.0 ppm	Dense, brown and gray, fine to medium SAND, wet.			
179									
180	93	24/16	180-182	3-10 17-23	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
181									
182	94	24/7	182-184	3-8 12-17	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
183									
184	95	24/6	184-186	8-10 13-31	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
185								16	
186	96	24/0	186-188	5-8 19-20		NO RECOVERY; Bailer: brown and gray, fine to medium SAND, wet.	186' NO RECOVERY		
187									
188	97	24/3	188-190	5-5 12-14	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.	188' SAND		
189									
190	98	24/10	190-192	3-12 20-28	0.0 ppm	Dense, brown and gray, fine to medium SAND, wet.			
191									
192	99	24/4	192-194	2-5 9-13	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
193									
194	100	24/2	194-196	2-6 9-11	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
195								17	
196	101	24/6	196-198	5-11 17-21	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
197									
198	102	24/4	198-200	3-3 8-9	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
199									
200	103	24/6	200-202	4-12 15-22	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
201									
202	104	24/16	202-204	4-4 7-12	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
203									
204	105	24/16	204-206	4-9 17-24	0.0 ppm	Medium dense, brown and gray, fine to			

REMARKS

15. Temporary well set at 175.0 to 180.0 feet below ground surface. Purged 125.0 gallons. Groundwater sample submitted for laboratory analysis.
16. Temporary well set at 185.0 to 190.0 feet below ground surface. Purged 135.0 gallons. Groundwater sample submitted for laboratory analysis.
17. Temporary well set at 195.0 to 200.0 feet below ground surface. Purged 135.0 gallons. Groundwater sample submitted for laboratory analysis.
18. Temporary well set at 205.0 to 210.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.

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BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						medium SAND, wet.	SAND	18	
206–207	106	24/10	206-208	5-11 25-27	0.0 ppm	Dense, brown and gray, fine to medium SAND, wet.			
208–209	107	24/14	208-210	6-15 34-37	0.0 ppm	Dense, brown and gray, fine to medium SAND, wet.			
210–211	108	24/18	210-212	7-24 35-50	0.0 ppm	Very dense, brown and gray, fine to medium SAND, wet.			
212–213	109	24/22	212-214	2-9 17-30	0.0 ppm	Medium dense, brown, fine to medium SAND, trace Gravel, trace Silt, wet.			
214–215	110	24/6	214-216	5-22-42/5"		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.		19	
216–217	111	24/16	216-218	9-34-50/4"		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
218–219	112	18/6	218-219.5	3-17-41		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
220–221	113	24/12	220-222	10-41-50/5"		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
222–223	114	18/6	222-223.5	9-20-33		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			Silica Sand Filter Pack
224–225	115	24/10	224-226	6-24-50/5"		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.		20	Top of Well Screen
226–227	116	18/5	226-227.5	4-17-35		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
228–229	117	18/12	228-229.5	8-18-43		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
230–231	118	24/12	230-232	16-35-50/5"		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			Bottom of Well Screen
232							232'		
232–239						Bottom of Borehole at 232.0 Feet		21	

REMARKS

19. Temporary well set at 215.0 to 220.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
20. Temporary well set at 225.0 to 230.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
21. Monitoring well was installed in borehole upon completion. Well screen set from 224.6 to 229.4 feet below ground surface.

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Boring No.: HS-MW-24D
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Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Christine Cano/John Morehouse
Date Start/Finish: 9-23-19 / 10-1-19
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

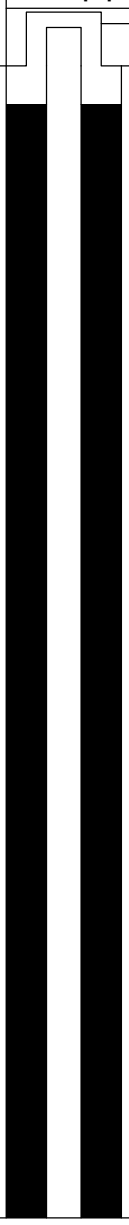
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/16	0-2	1-1 1-2	0.0 ppm	Very loose, brown, fine SAND, some Silt, moist. Changing at 0.3 feet to: Very loose, light brown to tan, fine SAND, trace Silt, moist.	SAND	1
2	2	24/16	2-4	2-2 3-8	0.0 ppm	Loose, light tan, very fine SAND, trace Silt, moist.		
3	3	24/20	4-6	9-10 12-9	0.0 ppm	Medium dense, light tan, very fine SAND and SILT, moist.		
4	4	24/24	6-8	5-7 10-10	0.0 ppm	Medium dense, light brown, fine SAND, trace Clay, moist.		
5	5	24/24	8-10	7-12 13-12	0.0 ppm	Medium dense, light brown, fine SAND, trace Clay, moist.		
6	6	24/24	10-12	6-3 4-4	0.0 ppm	Loose, light brown, fine SAND, trace Clay, moist. Changing at 11.0 feet to: Loose, tan, fine to medium SAND, trace Silt, moist.		
7	7	24/12	12-14	1-3 2-2	0.0 ppm	Loose, tan, fine to coarse SAND, trace Silt, moist.		
8	8	24/20	14-16	2-3 4-5	0.0 ppm	Loose, brown, fine SAND, trace Clay, moist. Changing at 15.0 feet to: Loose, tan, fine to medium SAND, trace Silt, moist.		
9	9	24/10	16-18	3-6 5-4	0.0 ppm	Medium dense, tan, fine to medium SAND, trace Silt, moist.		
10	10	24/12	18-20	2-3 3-2	0.0 ppm	Loose, tan, fine to medium SAND, trace Silt, moist.		
11	11	24/14	20-22	1-2 2-3	0.0 ppm	Very loose, tan, fine to medium SAND, trace Silt, moist.		
12	12	24/14	22-24	1-2 2-3	0.0 ppm	Very loose, tan, fine to medium SAND, trace Silt, moist.		
13	13	24/14	24-26	3-4 4-4	0.0 ppm	Loose, light tan, fine to medium SAND, trace Silt, moist.		
14	14	24/14	26-28	1-3 3-3	0.0 ppm	Loose, light tan, fine to medium SAND, trace Silt, moist.		
15	15	24/20	28-30	1-4 3-3	0.0 ppm	Loose, light tan, fine to medium SAND, trace Silt, moist.		

Equipment Installed



REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings are shown in parts per million (ppm) of isobutylene. Background was measured at 0.0 ppm.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/3/20

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House Street
Belmont, Michigan

Boring No.: HS-MW-24D
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Check: JTM/JMG

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31	16	24/19	30-32	3-2 3-4	0.0 ppm	Loose, light tan, fine to medium SAND, trace Silt, moist.	SAND		
32 33	17	24/14	32-34	4-5 7-4	0.0 ppm	Medium dense, light tan, fine to medium SAND, trace Silt, moist.			
34 35	18	24/22	34-36	4-5 7-8	0.0 ppm	Medium dense, light tan, fine to medium SAND, trace Silt, trace Gravel, moist.			
36 37	19	24/17	36-38	4-5 5-6	0.0 ppm	Loose, tan, fine to medium SAND, trace Silt, moist. Changing at 37.5 feet to: Loose, tan, fine to coarse SAND, trace Silt, moist.			
38 39	20	24/16	38-40	5-7 7-9	0.0 ppm	Medium dense, tan, fine to coarse SAND, trace Silt, moist.			
40 41	21	24/14	40-42	4-7 7-9	0.0 ppm	Medium dense, tan, Silty fine to medium SAND, trace Gravel, moist.			
42 43	22	24/13	42-44	5-9 9-10	0.0 ppm	Medium dense, tan, Silty fine to coarse SAND, some Gravel, moist.			
44 45	23	24/5	44-46	6-10 20-20	0.0 ppm	Medium dense, tan, Silty fine to coarse SAND, trace Gravel, moist.			
46 47	24	24/12	46-48	5-16 33-16	0.0 ppm	Dense, tan, Sandy GRAVEL, trace Silt, moist.	46' GRAVEL		
48 49	25	24/4	48-50	11-23 21-13	0.0 ppm	Dense, tan, Sandy GRAVEL, trace Silt, moist.			
50 51	26	24/0	50-52	17-11 10-9		NO RECOVERY.	50' NO RECOVERY		
52 53	27	24/1	52-54	18-15 12-9	0.0 ppm	Medium dense, tan, coarse SAND, wet.	52' SAND	2	
54 55	28	24/4	54-56	15-9 7-7	0.0 ppm	Medium dense, tan, fine to coarse SAND, trace Gravel, wet.		3	
56 57	29	24/18	56-58	2-2 2-4	0.0 ppm	Loose, tan, fine to coarse SAND, trace Silt, wet.			
58 59	30	24/17	58-60	1-1 2-3	0.0 ppm	Very loose, tan, fine to coarse SAND, trace Silt, wet.			
60 61	31	24/0	60-62	1-2 4-6		NO RECOVERY.	60' NO RECOVERY		
62 63	32	24/5	62-64	2-2 4-4	0.0 ppm	Loose, tan, fine to coarse SAND, trace Silt, wet.	62' SAND		
64	33	24/8	64-66	3-3 4-5	0.0 ppm	Loose, tan, fine to coarse SAND, trace Silt,			

REMARKS

2. Groundwater was encountered at approximately 52.0 feet below ground surface.
3. Temporary well set at 55.0 to 60.0 feet below ground surface. Purged 70.0 gallons. Groundwater sample submitted for laboratory analysis.
4. Temporary well set at 65.0 to 70.0 feet below ground surface. Purged 35.0 gallons. Groundwater sample submitted for laboratory analysis.

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BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/3/20

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Boring No.: HS-MW-24D
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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						wet.	SAND	4	
66	34	24/14	66-68	1-2 2-3	0.0 ppm	Loose, tan, fine to coarse SAND, trace Silt, wet.			
67									
68	35	24/14	68-70	1-2 3-10	0.0 ppm	Loose, tan, fine to coarse SAND, trace Silt, wet.			
69									
70	36	24/24	70-72	7-9 10-12	0.0 ppm	Medium dense, tan, fine to coarse SAND, trace Silt, wet.			
71									
72	37	24/15	72-74	4-3 2-2	0.0 ppm	Loose, tan, fine to coarse SAND, trace Silt, wet. Changing at 73.5 feet to: Loose, brown, Sandy GRAVEL, wet.			
73							73.5'		
74	38	24/14	74-76	6-8 8-8	0.0 ppm	Medium dense, brown, fine to coarse SAND and Gravel, trace Silt, wet.	74' GRAVEL SAND		
75								5	
76	39	24/2	76-78	2-3 3-4	0.0 ppm	Loose, brown, fine to coarse SAND and Gravel, trace Silt, wet.			
77									
78	40	24/14	78-80	4-5 5-5	0.0 ppm	Medium dense, brown to gray, GRAVEL, some fine to coarse Sand, wet.	78' GRAVEL		
79									
80	41	24/3	80-82	5-5 5-7	0.0 ppm	Medium dense, brown to gray, GRAVEL, some fine to coarse Sand, wet.			
81									
82	42	24/16	82-84	2-3 4-4	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.	82' SAND		
83									
84	43	24/24	84-86	2-2 2-4	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
85								6	
86	44	24/16	86-88	2-1 2-2	0.0 ppm	Very loose, brown and gray, coarse SAND, some Gravel, wet.			
87									
88	45	24/12	88-90	3-3 3-5	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
89									
90	46	24/8	90-92	2-3 6-7	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
91									
92	47	24/16	92-94	1-1 2-3	0.0 ppm	Very loose, brown and gray, coarse SAND, some Gravel, wet.			
93									
94	48	24/7	94-96	1-2 3-4	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
95								7	
96	49	24/20	96-98	2-2 5-6	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
97									
98	50	24/16	98-100	4-2 4-5	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
99									

REMARKS

5. Temporary well set at 75.0 to 80.0 feet below ground surface. Purged 45.0 gallons. Groundwater sample submitted for laboratory analysis.
6. Temporary well set at 85.0 to 90.0 feet below ground surface. Purged 75.0 gallons. Groundwater sample submitted for laboratory analysis.
7. Temporary well set at 95.0 to 100.0 feet below ground surface. Purged 90.0 gallons. Groundwater sample submitted for laboratory analysis.

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BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/3/20

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Boring No.: HS-MW-24D
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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
101	51	24/10	100-102	3-7 11-13	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.	SAND		
102 103	52	24/12	102-104	2-2 3-7	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
104 105	53	24/10	104-106	3-4 5-7	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.		8	
106 107	54	24/14	106-108	3-9 10-10	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			
108 109	55	24/16	108-110	2-4 8-9	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			
110 111	56	24/3	110-112	3-7 9-11	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			Bentonite Slurry / Grout
112 113	57	24/4	112-114	1-4 5-5	0.0 ppm	Loose, brown and gray, coarse SAND, some Gravel, wet.			
114 115	58	24/14	114-116	6-12 19-23	0.0 ppm	Dense, brown and gray, coarse SAND, some Gravel, wet.		9	
116 117	60	24/18	116-118	2-4 12-15	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			
118 119	61	24/10	118-120	11-17 13-10	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			
120 121	62	24/12	120-122	4-7 11-13	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			
122 123	63	24/10	122-124	2-12 20-13	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			
124 125	64	24/8	124-126	9-15 15-13	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.		10	
126 127	65	24/13	126-128	3-11 16-17	0.0 ppm	Medium dense, brown and gray, coarse SAND, some Gravel, wet.			
128 129	66	24/10	128-130	11-20 20-21	0.0 ppm	Dense, brown and gray, coarse SAND, some Gravel, trace Silt, wet.			
130 131	67	24/12	130-132	5-18 28-30	0.0 ppm	Dense, brown and gray, coarse SAND, some Gravel, trace Silt, wet.			
132 133	68	24/5	132-134	9-16 21-24	0.0 ppm	Dense, brown and gray, coarse SAND, some reddish brown, fine Sand, some Gravel, trace Silt, wet.			
134	70	24/4	134-136	5-13 20-31	0.0 ppm	Dense, brown and gray, GRAVEL, some	134' GRAVEL		

REMARKS

8. Temporary well set at 105.0 to 110.0 feet below ground surface. Purged 60.0 gallons. Groundwater sample submitted for laboratory analysis.
9. Temporary well set at 115.0 to 120.0 feet below ground surface. Purged 55.0 gallons. Groundwater sample submitted for laboratory analysis.
10. Temporary well set at 125.0 to 130.0 feet below ground surface. Purged 55.0 gallons. Groundwater sample submitted for laboratory analysis.
11. Temporary well set at 135.0 to 140.0 feet below ground surface. Purged 65.0 gallons. Groundwater sample submitted for laboratory analysis.

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BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/3/20

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						medium to coarse Sand, wet.	GRAVEL	11	
136–137	71	24/7	136-138	4-12 16-23	0.0 ppm	Medium dense, brown and gray, GRAVEL, some medium to coarse Sand, wet.			
138–139	72	24/8	138-140	4-7 18-32	0.0 ppm	Medium dense, brown and gray, GRAVEL, some medium to coarse Sand, wet.			
140–141	73	24/7	140-142	5-11 21-22	0.0 ppm	Dense, brown and gray, GRAVEL, some medium to coarse Sand, wet.			
142–143	74	24/12	142-144	7-13 21-23	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, some Gravel, wet.	142' SAND		
144–145	75	24/10	144-146	6-17 21-22	0.0 ppm	Dense, brown and gray, fine to coarse SAND, some Gravel, wet.		12	
146–147	76	24/10	146-148	8-15 16-21	0.0 ppm	Dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
148–149	77	24/8	148-150	5-16 21-24	0.0 ppm	Dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
150–151	78	24/14	150-152	4-9 16-14	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
152–153	79	24/4	152-154	6-10 8-8	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
154–155	80	24/18	154-156	4-12 21-20	0.0 ppm	Dense, brown and gray, fine to coarse SAND, some Gravel, wet.		13	
156–157	81	24/6	156-158	5-8 13-10	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
158–159	82	24/6	158-160	7-11 11-12	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
160–161	83	24/7	160-162	5-8 9-9	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
162–163	84	24/5	162-164	5-10 19-26	0.0 ppm	Medium dense, brown and gray, fine to coarse SAND, some Gravel, wet.			
164–165	85	24/0	164-166	5-13 22-36		NO RECOVERY.	164' NO RECOVERY	14	
166–167	86	24/0	166-168	7-19 25-39		NO RECOVERY; Switched to bailer for recovery. Bailer: brown and gray, fine to medium SAND, wet.			
168–169	87	24/0	168-170	2-8 16-22		NO RECOVERY; Bailer: brown and gray, fine to medium SAND, wet.			

REMARKS

12. Temporary well set at 145.0 to 150.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
13. Temporary well set at 155.0 to 160.0 feet below ground surface. Purged 120.0 gallons. Groundwater sample submitted for laboratory analysis.
14. Temporary well set at 165.0 to 170.0 feet below ground surface. Purged 80.0 gallons. Groundwater sample submitted for laboratory analysis.

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BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/3/20

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
171	88	24/0	170-172	7-11 19-22		NO RECOVERY: Bailer: brown and gray, fine to medium SAND, wet.	NO RECOVERY		
172							172'		
173	89	24/5	172-174	2-4 7-10	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.	SAND		
174							174'		
175	90	24/0	174-176	5-7 11-16		NO RECOVERY; Bailer: brown and gray, fine to medium SAND, wet.	NO RECOVERY	15	
176							176'		
177	91	24/10	176-178	4-7 17-21	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.	SAND		
178	92	24/20	178-180	4-10 28-35	0.0 ppm	Dense, brown and gray, fine to medium SAND, wet.			
179									
180	93	24/16	180-182	3-10 17-23	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
181									
182	94	24/7	182-184	3-8 12-17	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
183									
184	95	24/6	184-186	8-10 13-31	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
185								16	
186	96	24/0	186-188	5-8 19-20		NO RECOVERY; Bailer: brown and gray, fine to medium SAND, wet.	186' NO RECOVERY		
187									
188	97	24/3	188-190	5-5 12-14	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.	188' SAND		
189									
190	98	24/10	190-192	3-12 20-28	0.0 ppm	Dense, brown and gray, fine to medium SAND, wet.			
191									
192	99	24/4	192-194	2-5 9-13	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
193									
194	100	24/2	194-196	2-6 9-11	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
195								17	
196	101	24/6	196-198	5-11 17-21	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
197									
198	102	24/4	198-200	3-3 8-9	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
199									
200	103	24/6	200-202	4-12 15-22	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
201									
202	104	24/16	202-204	4-4 7-12	0.0 ppm	Medium dense, brown and gray, fine to medium SAND, wet.			
203									
204	105	24/16	204-206	4-9 17-24	0.0 ppm	Medium dense, brown and gray, fine to			

REMARKS

15. Temporary well set at 175.0 to 180.0 feet below ground surface. Purged 125.0 gallons. Groundwater sample submitted for laboratory analysis.
16. Temporary well set at 185.0 to 190.0 feet below ground surface. Purged 135.0 gallons. Groundwater sample submitted for laboratory analysis.
17. Temporary well set at 195.0 to 200.0 feet below ground surface. Purged 135.0 gallons. Groundwater sample submitted for laboratory analysis.
18. Temporary well set at 205.0 to 210.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.

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BORING_WELL_62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/3/20

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						medium SAND, wet.	SAND	18	
206–207	106	24/10	206-208	5-11 25-27	0.0 ppm	Dense, brown and gray, fine to medium SAND, wet.			
208–209	107	24/14	208-210	6-15 34-37	0.0 ppm	Dense, brown and gray, fine to medium SAND, wet.			
210–211	108	24/18	210-212	7-24 35-50	0.0 ppm	Very dense, brown and gray, fine to medium SAND, wet.			
212–213	109	24/22	212-214	2-9 17-30	0.0 ppm	Medium dense, brown, fine to medium SAND, trace Gravel, trace Silt, wet.			
214–215	110	24/6	214-216	5-22-42/5"		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.		19	
216–217	111	24/16	216-218	9-34-50/4"		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
218–219	112	18/6	218-219.5	3-17-41		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
220–221	113	24/12	220-222	10-41-50/5"		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
222–223	114	18/6	222-223.5	9-20-33		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			Silica Sand Filter Pack
224–225	115	24/10	224-226	6-24-50/5"		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.		20	Top of Well Screen
226–227	116	18/5	226-227.5	4-17-35		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
228–229	117	18/12	228-229.5	8-18-43		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			
230–231	118	24/12	230-232	16-35-50/5"		Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt, wet.			Bottom of Well Screen
232							232'		
232–239						Bottom of Borehole at 232.0 Feet		21	

REMARKS

19. Temporary well set at 215.0 to 220.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
20. Temporary well set at 225.0 to 230.0 feet below ground surface. Groundwater sample submitted for laboratory analysis.
21. Monitoring well was installed in borehole upon completion. Well screen set from 224.6 to 229.4 feet below ground surface.

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BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/3/20

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1855 House Street: Off-Site Borings
2805 Rogue River Road, NE
Belmont, Michigan

Boring No.: SB-25/MW-25M
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File No.: 16.0062335.52
Check: Julie Groenleer

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 11-1-18 / 11-9-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	NA
Hammer Wt.:	140 lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

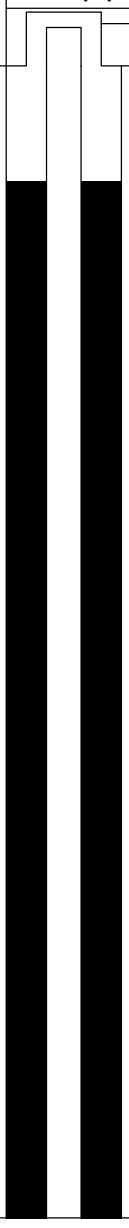
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/14.4	0-2	1-2 1-1	0.0 ppm	Very dark grayish-brown, moderately sorted, fine to mediumm grained SAND, some Silt, trace Gravel, moist; grading at 1.0 feet to: Dark yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, grading coarser, moist. Changing at 1.2 feet to: NO RECOVERY.	SAND 1.2' NO RECOVERY	1
2	2	24/6	2-4	2-2 1-2	0.0 ppm	Dark yellowish-brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist. Changing at 2.4 feet to: Yellowish-brown, poorly sorted, fine to coarse grained SAND, little Gravel, trace Silt, moist. Changing at 2.5 feet to: NO RECOVERY.	2' SAND 2.5' NO RECOVERY	
4	3	24/6	4-6	3-1 2-2	0.0 ppm	Yellowish-brown, poorly sorted, fine to coarse grained SAND, little Gravel, trace Silt, moist. Changing at 4.4 feet to: Dark yellowish-brown, poorly sorted, SILT, trace Clay, trace Gravel, slightly plastic, moderately cohesive, moist. Changing at 4.5 feet to: NO RECOVERY.	4' SAND 4.4' 4.5' SILT NO RECOVERY	
6	4	24/7.2	6-8	11-16 29-23	0.0 ppm	Pale brown to light yellowish-brown to grayish-brown to brown to dark yellowish-brown, poorly sorted, medium to coarse grained SAND, some Gravel, trace Silt, moist. Changing at 6.6 feet to: NO RECOVERY.	6' SAND 6.6' NO RECOVERY	
8	5	24/0	8-10	50/6"	0.0 ppm	NO RECOVERY.	10'	

Equipment Installed



REMARKS

1. Field screening of samles for organic vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million (ppm) of isobutylene. groundwater was measured at 0.0 ppm.

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BORING_WELL 6233552 HOUSE STREET OFF SITE BORINGS ROGUE RIVER RD.GPJ GZA_CORP.GDT 2/27/19

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

1855 House Street: Off-Site Borings
2805 Rogue River Road, NE
Belmont, Michigan

Boring No.: SB-25/MW-25M
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File No.: 16.0062335.52
Check: Julie Groenleer

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
11	6	24/10.8	10-12	10-19 20-13	0.0 ppm	Grayish-brown to brown, poorly sorted, coarse to medium grained SAND, some Gravel, trace Silt, moist. Changing at 10.8 feet to: Pale brown to light yellowish-brown, moderately sorted, coarse to medium grained SAND, trace Silt, moist. Changing at 10.9 feet to: NO RECOVERY.	SAND 10.9' NO RECOVERY		
12	7	24/9.6	12-14	11-10 12-11	0.0 ppm	Pale brown to light yellowish-brown, poorly sorted, coarse to medium grained SAND, some Gravel, trace Silt, moist. Changing at 12.8 feet to: NO RECOVERY.	12' SAND 12.8' NO RECOVERY		
14	8	24/6	14-16	11-12 8-8	0.0 ppm	Pale brown to light yellowish-brown, poorly sorted, coarse to medium grained SAND, some Gravel, trace Silt, moist. Changing at 14.5 feet to: NO RECOVERY.	14' SAND 14.5' NO RECOVERY		
16	9	24/10.8	16-18	13-15 13-13	0.0 ppm	Pale brown to light yellowish-brown, poorly sorted, coarse to medium grained SAND, some Gravel, trace Silt, moist. Changing at 16.9 feet to: NO RECOVERY.	16' SAND 16.9' NO RECOVERY		
18	10	24/8.4	18-20	9-29 24-23	0.0 ppm	Pale brown to light yellowish-brown, poorly sorted, coarse to medium grained SAND, some Gravel, trace Silt, moist. Changing at 18.7 feet to: NO RECOVERY.	18' SAND 18.7' NO RECOVERY		
20	11	24/8.4	20-22	21-19 14-16	0.0 ppm	Pale brown to light yellowish-brown, poorly sorted, coarse to medium grained SAND, some Gravel, trace Silt, moist. Changing at 20.7 feet to: NO RECOVERY.	20' SAND 20.7' NO RECOVERY		
21									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
22	12	24/9.6	22-24	6-15 12-12	0.0 ppm	Pale brown to light yellowish-brown, poorly sorted, coarse to medium grained SAND, some Gravel, trace Silt, moist. Changing at 22.3 feet to: Very pale brown, very well sorted, fine grained SAND, trace Silt, moist. Changing at 22.4 feet to: Pale brown to light yellowish-brown, poorly sorted, coarse to medium grained SAND, some Gravel, trace Silt, moist. Changing at 22.8 feet to: NO RECOVERY.	22' SAND 22.8' NO RECOVERY		
23									
24	13	24/4.8	24-26	14-5 5-8	0.0 ppm	Pale brown to light yellowish-brown, poorly sorted, coarse to medium grained SAND, some Gravel, trace Silt, moist. Changing at 24.4 feet to: NO RECOVERY.	24' SAND 24.4' NO RECOVERY		
25									
26	14	24/18	26-28	4-6 6-5	0.0 ppm	Dark reddish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 26.3 feet to: Dark brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 27.5 feet to: NO RECOVERY.	26' CLAY & SILT 27.5' NO RECOVERY		
27									
28	15	24/19.2	28-30	4-3 3-5	0.0 ppm	Dark brown, porly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 29.6 feet to: NO RECOVERY.	28' CLAY & SILT 29.6' NO RECOVERY		
29									
30	16	24/21.6	30-32	14-21 16-25	0.0 ppm	Strong brown, poorly sorted, SILT & CLAY, little Sand, trace Gravel, moderately plastic, moderately cohesive, moist. Changing at 31.7 feet to: Dark yellowish-brown, poorly sorted, fine grained SAND, some Silt, trace Gravel, non-plastic, moderately cohesive, moist to wet. Changing at 31.8 feet to: NO RECOVERY.	30' SILT & CLAY 31.7' SAND		Bentonite / Grout
31									
32	17	24/15.6	32-34	7-10 15-22	0.0 ppm	Strong brown, poorly sorted, SILT & CLAY, little Sand, trace Gravel, moderately plastic, moderately cohesive, moist. Changing 33.2 feet to: Dark yellowish-brown, moderately sorted, fine to coarse grained SAND, trace Silt, wet. Changing at 33.3 feet to: NO	32' NO RECOVERY SILT & CLAY 33.2'		
33									

REMARKS

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BORING_WELL 6233552 HOUSE STREET OFF SITE BORINGS ROGUE RIVER RD.GPJ GZA_CORP.GDT 2/27/19

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Boring No.: SB-25/MW-25M
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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						RECOVERY.	SAND / NO RECOVERY		
34	18	24/19.2	34-36	15-32-50/5"	0.0 ppm	Strong brown, poorly sorted, SILT & CLAY, little Sand, trace Gravel, moderately plastic, moderately cohesive, moist. Changing at 34.2 feet to: Dark yellowish-brown, poorly sorted SILT & CLAY, some Sand, trace Gravel, slightly plastic, cohesive, moist. Changing at 35.6 feet to: NO RECOVERY.	34' SILT & CLAY		
35							35.6' NO RECOVERY		
36	19	24/10.8	36-38	1-9 21-19	0.0 ppm	Dark yellowish-brown, poorly sorted, SILT & CLAY, some Sand, trace Gravel, slightly plastic, cohesive, moist. Changing at 36.9 feet to: NO RECOVERY.	36' SILT & CLAY		
37							36.9' NO RECOVERY		
38	20	24/15.6	38-40	22-37 38-37	0.0 ppm	Brown to yellowish-brown, very well sorted, fine to medium grained SAND, trace Silt, moist to wet. Changing at 38.3 feet to: Dark yellowish-brown, poorly sorted, SILT & CLAY, some Sand, trace Gravel, occasional very thin Sand partings, slightly plastic, cohesive, moist. Changing at 39.3 feet to: NO RECOVERY.	38' SAND 38.3' SILT & CLAY		
39							39.3' NO RECOVERY		
40	21	24/21.6	40-42	13-29 39-50	0.0 ppm	Dark yellowish-brown to brown, well sorted, Silty CLAY, plastic, cohesive, bedding, moist. Changing at 40.6 feet to: Yellowish-brown to brown, well sorted, fine to medium grained, SAND, trace Silt, wet. Changing at 40.7 feet to: Dark yellowish-brown, well sorted, Silty CLAY, plastic, cohesive, bedded, moist. Changing at 40.8 feet to: Yellowish-brown to brown, well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 41.8 feet to: NO RECOVERY.	40' Silty CLAY 40.6' 40.7' SAND 40.8' SiltyCLAY / SAND		
41							41.8'		
42	22	24/20.4	42-44	1-2 12-21	0.0 ppm	Yellowish-brown to brown, well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 43.4 feet to: Dark yellowish-brown, well sorted, Silty CLAY, plastic, cohesive, bedded, moist. Changing at 43.7 feet to: NO RECOVERY.	42' NO RECOVERY / SAND		
43							43.4' Silty CLAY 43.7'		
44	23	24/24	44-46	5-19 41-50/3"	0.0 ppm	Dark yellowish-brown, well sorted, Silty CLAY, plastic, cohesive, bedded, moist. Changing at 45.6 feet to: Dark yellowish-brown, very well sorted, fine grained SAND, some Silt, slightly cohesive,	44' NO RECOVERY / Silty CLAY		

REMARKS

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BORING_WELL 6233552 HOUSE STREET OFF SITE BORINGS ROGUE RIVER RD.GPJ GZA_CORP.GDT 2/27/19

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1855 House Street: Off-Site Borings
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Belmont, Michigan

Boring No.: SB-25/MW-25M
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Check: Julie Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						wet.	Silty CLAY		
							45.6'		
							SAND	2	
46	24	24/21.6	46-48	14-37-50/5"	0.0 ppm	Dark yellowish-brown, very well sorted, fine grained SAND, some Silt, slightly cohesive, wet. Changing at 46.6 feet to: Dark brown to yellowish-brown, well sorted, Silty CLAY, plastic, cohesive, varved with Silt & Clay, wet. Changing at 47.6 feet to: Dark yellowish-brown, very well sorted, fine grained SAND, some Silt, slightly cohesive, wet. Changing at 47.8 feet to: NO RECOVERY.	46.6'		
47							Silty CLAY		
							47.6'		
							47.8' SAND		
48	25	24/16.8	48-50	8-22 27-35	0.0 ppm	Dark yellowish-brown, very well sorted, fine grained SAND, some Silt, slightly cohesive, wet. Changing at 48.4 feet to: Dark yellowish-brown, well sorted, SILT, some Sand, moist to wet. Changing at 49.0 feet to: Dark yellowish-brown, very well sorted, fine grained SAND, some Silt, slightly cohesive, wet. Changing at 49.4 feet to: NO RECOVERY.	48' NO RECOVERY		
							SAND		
							48.4'		
							SILT		
49							49'		
							SAND		
							49.4'		
							NO RECOVERY		
							50'		
50	26	24/15.6	50-52	8-23 32-37	0.0 ppm	Dark yellowish-brown, very well sorted, fine grained SAND, some Silt, lightly cohesive, wet. Changing at 51.3 feet to: NO RECOVERY.	SAND		
51							51.3'		
							NO RECOVERY		
							52'		
52	27	24/18	52-54	6-14 21-35	0.0 ppm	Dark yellowish-brown, very well sorted, fine grained SAND, some Silt, slighty cohesive, wet. Changing at 53.5 feet to: NO RECOVERY.	SAND		
53							53.5'		
							NO RECOVERY		
							54'		
54	28	24/19.2	54-56	4-14 21-33	0.0 ppm	Dark yellowish-brown, very well sorted, fine grained SAND, some Silt, slightly cohesive, wet. Changing at 55.6 feet to: NO RECOVERY.	SAND		
55							55.6'		
							NO RECOVERY		
56	29	24/19.2	56-58	4-12 17-21	0.0 ppm	Dark yellowish-brown, very well sorted, fine grained SAND, some Silt, slightly cohesive, wet. Changing at 56.5 feet to: Dark	56' SAND		

REMARKS

2. Groundwater was encountered at approximately 45.6 feet below ground surface.

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Engineers and Scientists

1855 House Street: Off-Site Borings
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Belmont, Michigan

Boring No.: SB-25/MW-25M
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Check: Julie Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
57						yellowish-brown, moderately sorted, fine to coarse grained SAND, little Silt, trace Gravel, wet, with occasional lenses discontinuous Silty Clay, plastic, cohesive, moist. Changing at 56.8 feet to: Dark yellowish-brown, moderately sorted, fine to medium grained SAND, little Silt, wet, with occasional lenses of Silty Clay. Changing at 57.6 feet to: NO RECOVERY. Dark yellowish-brown, well sorted, fine to medium grained SAND, little Silt, wet. Changing at 59.9 feet to: NO RECOVERY.	SAND		
58	30	24/22.8	58-60	5-10 13-18	0.0 ppm		57.6' NO RECOVERY 58' SAND		
59									
60	31	24/14.4	60-62	4-9 18-2	0.0 ppm	Dark yellowish-brown, well sorted, fine to medium grained SAND, little Silt, wet. Changing at 61.2 feet to: NO RECOVERY.	59.9' 60' NO RECOVERY SAND		
61							61.2' NO RECOVERY		
62	32	24/24	62-64	2-6 15-27	0.0 ppm	Dark yellowish-brown, well sorted, fine to medium grained SAND, little Silt, wet.	62' SAND		
63									
64	33	24/24	64-66	3-7 23-31	0.0 ppm	Dark yellowish-brown, well sorted, fine to medium grained SAND, little Silt, wet.			
65									Top of Well Screen
66	34	24/12	66-68	3-13 29-35	0.0 ppm	Dark yellowish-brown, well sorted, fine to medium grained SAND, little Silt, wet. Changing at 66.9 feet to: Dark brown to dark yellowish-brown, very well sorted, fine grained SAND, trace Silt, wet with Silty Clay varves, plastic, cohesive, moist. Changing at 67.0 feet to: NO RECOVERY.			Silica Sand Filter Pack
67							67' NO RECOVERY		2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
68	35	24/22.8	68-70	5-20-50/6"	0.0 ppm	Dark yellowish-brown, well sorted, fine to	68' SAND		

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
69						medium grained SAND, little Silt, wet. Changing at 68.5 feet to: Dark brown to dark yellowish-brown, very well sorted, fine grained SAND, trace Silt, wet with Silty Clay varves, plastic, cohesive, moist. Changing at 68.6 feet to: Dark yellowish-brown, well sorted, fine to medium grained SAND, little Silt, wet. Changing at 69.9 feet to: NO RECOVERY.	SAND 69.9'		
70	36	24/20.4	70-72	13-19 31-50/3"	0.0 ppm	Dark yellowish-brown, well sorted, fine to medium grained SAND, little Silt, wet. Changing at 70.4 feet to: Very dark grayish-brown to dark grayish-brown, well sorted, varved Silty CLAY, plastic, cohesive, moist. Changing at 71.7 feet to: NO RECOVERY.	70' NO RECOVERY 70.4' SAND Silty CLAY		Bottom of Well Screen
71							71.7'		
72	37	24/16.8	72-74	42-20 19-24	0.0 ppm	Brown to grayish-brown, very well sorted, SILT, trace Clay, slightly plastic, cohesive, moist. Changing at 72.6 feet to: Dark yellowish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 73.0 feet to: Brown to yellowish-brown, poorly sorted, fine to coarse grained SAND, some Gravel, moist to wet. Changing at 73.2 feet to: Mottled yellowish-red to light gray to light grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 73.4 feet to: NO RECOVERY.	NO RECOVERY 72' SILT 72.6' CLAY & SILT 73' 73.2' SAND 73.4' Silty CLAY NO RECOVERY		
73							74'		
74	38	24/13.2	74-76	16-22 45-50/4"	0.0 ppm		Silty CLAY 74.8'		
75						Mottled yellowish-red to light gray to light grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 74.8 feet to: NO RECOVERY.	NO RECOVERY		
76	39	24/9.6	76-78	4-32-50	0.0 ppm	Yellowish-red, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 76.6 feet to: NO RECOVERY.	76' Silty CLAY 76.6'		
77							NO RECOVERY		
78	40	24/7.2	78-80	43-50/4"	0.0 ppm	Yellowish-red, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 78.6 feet to: NO RECOVERY.	78' Silty CLAY 78.6'		
79							NO RECOVERY 80'		

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
	41	24/3.6	80-82	50/5"	0.0 ppm	Yellowish-red, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 80.3 feet to: NO RECOVERY.	Silty CLAY 80.3' NO RECOVERY		
81									
82	42	24/7.2	82-84	20-50	0.0 ppm	Yellowish-red, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 82.6 feet to: NO RECOVERY.	82' Silty CLAY 82.6' NO RECOVERY		
83									
84	43	24/21.6	84-86	12-33-50/4"	0.0 ppm	Yellowish-red, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 85.6 feet to: NO RECOVERY.	84' Silty CLAY 85.6' NO RECOVERY		
85									
86	44	24/10.8	86-88	20-50/5"	0.0 ppm	Yellowish-red, well sorted, Silty CLAY, plastic, cohesive, moist. Changing 86.9 feet to: NO RECOVERY.	86' Silty CLAY 86.9' NO RECOVERY		
87									
88	45	24/4.8	88-90	50/5"	0.0 ppm	Mottled yellowish-red to light gray to light grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 88.9 feet to: NO RECOVERY.	88' Silty CLAY 88.9' NO RECOVERY		
89									
90	46	24/10.8	90-92	23-50/5"	0.0 ppm	Mottled yellowish-red to light gray to light grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 90.9 feet to: NO RECOVERY.	90' Silty CLAY 90.9' NO RECOVERY		
91									

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
92	47	24/8.4	92-94	25-50	0.0 ppm	Mottled yellowish-red to light gray to light grayish-brown, well sorted,Silty CLAY, plastic, cohesive, moist. Changing at 92.7 feet to: NO RECOVERY.	92' Silty CLAY 92.7' NO RECOVERY		
93									
94	48	24/3.6	94-96	36-50/2"	0.0 ppm	Mottled yellowish-red to light gray to light grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 94.3 feet to: NO RECOVERY.	94' Silty CLAY 94.3' NO RECOVERY		
95									
96						Bottom of Borehole at 96.0 Feet	96'	3	
97									
98									
99									
100									
101									
102									
103									

REMARKS

3. Monitoring well MW-25M was installed in borehole upon completion. Well screen set from 65.0 to 70.0 feet below ground surface.

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Boring No.: MW-25S
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Check: Julie Groenleer

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 11-1-18 / 11-9-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	NA
Hammer Wt.:	140 lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–29						See SB-25/MW-25M for detailed soil descriptions.			PROTECTIVE CASING; Bentonite / Grout

REMARKS

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BORING_WELL 6233552 HOUSE STREET OFF SITE BORINGS ROGUE RIVER RD.GPJ GZA_CORP.GDT 2/27/19

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1855 House Street: Off-Site Borings
2805 Rogue River Road, NE
Belmont, Michigan

Boring No.: MW-25S
Page: 2 **of** 2
File No.: 16.0062335.52
Check: Julie Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31–64						Bottom of Borehole at 55.0 Feet		1	Top of Well Screen; Silica Sand Filter Pack; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen

REMARKS

1. Monitoring well MW-25S was installed in borehole upon completion. Well screen set from 49.6 to 54.6 feet below ground surface.

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Boring No.: SB-26/MW-26D
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File No.: 16.0062335.52
Check: John Morehouse

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 11-8-18 / 11-15-18
Boring Location: NW Corner of Rogue River & Jupiter Intersection
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:** _____

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/16	0-2	2-1 2-1	0.0 ppm	Very dark brown, moderately sorted, fine-grained SAND, some Silt, non to slightly cohesive, moist. Changing at 0.7 feet to: Dark yellowish-brown, moderately sorted, fine to medium-grained SAND, some Silt, moist. Changing at 1.3 feet to: NO RECOVERY.	SAND 1.3' NO RECOVERY 2'		PROTECTIVE CASING Filter Sand
2	2	24/12	2-4	2-2 3-5	0.0 ppm	Dark yellowish-brown, moderately sorted, fine to medium-grained SAND, some Silt, moist. Changing at 2.7 feet to: Brown to pale brown, poorly sorted, GRAVEL, little to some coarse to medium-grained Sand, trace Silt, moist. Changing at 3.0 feet to: NO RECOVERY.	SAND 2.7' GRAVEL 3' NO RECOVERY 4'		
4	3	24/11	4-6	4-3 2-2	0.0 ppm	Brown to pale brown, poorly sorted, GRAVEL, little to some coarse to medium-grained Sand, trace Silt, moist. Changing at 4.4 feet to: Brownish-yellow, poorly sorted, fine to medium-grained SAND, trace Silt, moist. Changing at 4.6 feet to: Dark yellowish-brown, poorly sorted, fine to medium-grained SAND, trace Silt. moist. Changing at 4.9 feet to: NO RECOVERY.	GRAVEL 4.4' SAND 4.9' NO RECOVERY 6'		
6	4	24/12	6-8	2-4 10-13	0.0 ppm	Dark yellowish-brown, poorly sorted, fine to medium-grained SAND, trace Silt, moist. Changing at 7.0 feet to: NO RECOVERY.	SAND 7' NO RECOVERY 8'		
8	5	24/16	8-10	9-11 9-8	0.0 ppm	Dark yellowish-brown, poorly sorted, medium to coarse-grained SAND, little Gravel, trace Silt, moist. Changing at 9.3 feet to: NO RECOVERY.	SAND 9.3' NO RECOVERY 10'		

REMARKS

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Boring No.: SB-26/MW-26D
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File No.: 16.0062335.52
Check: John Morehouse

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	6	24/14	10-12	5-7 5-6	0.0 ppm	Dark yellowish-brown, poorly sorted, medium to coarse-grained SAND, little Gravel, trace Silt, moist. Changing at 10.9 feet to: Brown to pale brown, moderately sorted, coarse-grained SAND, some Gravel, trace Silt, moist. Changing at 11.2 feet to: NO RECOVERY.	SAND 11.2' NO RECOVERY 12'		
12	7	24/14	12-14	5-13 23-24	0.0 ppm	Dark yellowish-brown, poorly sorted, coarse to medium-grained SAND, little to some Gravel, trace Silt, moist. Changing at 13.2 feet to: NO RECOVERY.	SAND 13.2' NO RECOVERY 14'		
14	8	24/18	14-16	12-19 10-8	0.0 ppm	Dark yellowish-brown, poorly sorted, coarse to medium-grained SAND, little to some Gravel, trace Silt, moist. Changing at 15.5 feet to: NO RECOVERY.	SAND 15.5' NO RECOVERY 16'		
16	9	24/16	16-18	12-19 21-50/5.5"	0.0 ppm	Dark yellowish-brown, poorly sorted, coarse to medium-grained SAND, little to some Gravel, trace Silt, moist. Changing at 17.2 feet to: Dark yellowish-brown, poorly sorted, coarse to medium-grained SAND, little to some Gravel, trace Silt, wet. Changing at 17.3 feet to: NO RECOVERY.	SAND 17.3' NO RECOVERY 18'		
18	10	24/17	18-20	12-18 17-15	0.0 ppm	Dark yellowish-brown, poorly sorted, coarse to medium-grained SAND, little to some Gravel, trace Silt, wet. Changing at 18.4 feet to: Strong, brown, poorly sorted, SILT & CLAY, some Sand, non to slightly plastic, cohesive, grading to reddish-brown, moderately well sorted, CLAY & SILT, little Sand, plastic, cohesive, moist. Changing at 19.4 feet to: NO RECOVERY.	SAND 18.4' SILT & CLAY grading to CLAY & SILT 19.4' NO RECOVERY 20'		
20	11	24/18	20-22	12-20 20-26	0.0 ppm	Dark yellowish-brown, poorly sorted, coarse to medium-grained SAND, little to some Gravel, trace Silt, wet. Changing at 20.6 feet to: Reddish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 20.9 feet to: Dark gray, well sorted, Silty CLAY, laminated, plastic, cohesive, moist. Changing at 21.5 feet to:	SAND 20.9' Silty CLAY 21.5'		

REMARKS

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Boring No.: SB-26/MW-26D
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File No.: 16.0062335.52
Check: John Morehouse

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
22						NO RECOVERY.	NO RECOVERY		
	12	24/20	22-24	11-13 17-20	0.0 ppm	Dark grayish-brown, poorly sorted, Clayey SAND, little Silt, trace Gravel, slightly plastic, cohesive, moist. Changing at 23.2 feet to: Brown, well sorted, fine to medium-grained SAND, trace Silt, moist to wet. Changing at 23.3 feet to: Dark grayish-brown, poorly sorted, Clayey SAND, little Silt, trace Gravel, slightly plastic, coheisve, moist. Changing at 23.6 feet to: NO RECOVERY.	SAND		
23							23.6'		
24	13	24/17	24-26	4-13 20-25	0.0 ppm	Grayish-brown to dark grayish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 25.2 feet to: Dark grayish-brown to grayish-brown, very well sorted, SILT, some fine-grained Sand, slightly cohesive, wet. Changing at 25.4 feet to: NO RECOVERY.	NO RECOVERY 24' SAND	1	
25							25.2' 25.4' SILT		
26	14	24/18	26-28	14-22 23-19	0.0 ppm	Dark grayish-brown to grayish-brown, very well sorted, SILT, some fine-grained Sand, slightly cohesive, wet with occuring thin, layers of Silty CLAY, plastic, cohesive, moist. Changing at 27.5 feet to: NO RECOVERY.	NO RECOVERY 26' Silty CLAY		
27							27.5'		
28	15	24/24	28-30	10-16 23-20	0.0 ppm	Grayish-brown to dark grayish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 28.3 feet to: Dark gray, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 28.9 feet to: Grayish-brown to dark grayish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 29.2 feet to: Dark gray, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 29.3 feet to: Grayish-brown to dark grayish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 29.6 feet to: Dark gray, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 29.8 feet to: Grayish-brown to dark grayish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 29.9 feet to: Dark gray, well sorted, Silty CLAY, plastic, cohesive, moist.	NO RECOVERY 28' SAND 28.3' Silty CLAY		
29							28.9' SAND 29.2' 29.3' Silty CLAY 29.6' SAND 29.8' Silty CLAY 29.9' SAND		
30	16	24/22	30-32	8-20 20-27	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, plastic, cohesive, moist. Changing at 31.8 feet to: NO RECOVERY. Dark gray, poorly sorted, SILT & CLAY, some Sand, plastic, cohesive, moist. changing at 32.4 feet to: Grayish-brown to	30' Silty CLAY CLAY & SILT		
31							31.8'		
32	17	24/23	32-34	9-16 24-34	0.0 ppm		32' NO RECOVERY SILT & CLAY 32.4' 32.5' SAND SILT & CLAY		
33							32.9' SAND 33.2'		

REMARKS

1. Groundwater was encountered at approximately 24.0 feet below ground surface.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
34	18	24/18	34-36	12-14 27-42	0.0 ppm	dark grayish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 32.5 feet to: Dark gray, poorly sorted, SILT & CLAY, some Sand, plastic, cohesive, moist. Changing at 32.9 feet to: Grayish-brown to dark grayish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 33.2 feet to: Dark gray, poorly sorted, SILT & CLAY, some Sand, plastic, coheisve, moist. Changing at 33.9 feet to: NO RECOVERY.	SILT & CLAY 33.9' 34' NO RECOVERY SILT 34.8' Silty CLAY 35.5' SAND		
36	19	24/22	36-38	2-13 23-19	0.0 ppm	Dark grayish-brown to brown, well sorted, SILT, little fine-grained Sand, non-plastic, cohesive, wet. Changing at 34.8 feet to: Dark brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 35.5 feet to: Dark grayish-brown to grayish-brown, well sorted, fine-grained SAND, some Silt, non-plastic, cohesive, wet. Changing at 35.9 feet to: NO RECOVERY.	35.9' 36' NO RECOVERY 36.4' Silty CLAY 36.6' Alternating Silty CLAY and SAND SAND		
38	20	24/24	38-40	8-14 19-23	0.0 ppm	Dark brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 36.4 feet to: Alternating seams of dark brown, well sorted, Silty CLAY and grayish-brown, well sorted, fine-grained SAND, moist. Changing at 36.6 feet to: Dark grayish-brown to grayish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 37.5 feet to: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 37.8 feet to: NO RECOVERY.	37.5' Silty CLAY 37.8' 38' NO RECOVERY Silty CLAY		Bentonite/Grout
40	21	24/24	40-42	5-13 21-36	0.0 ppm	Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist.			
42	22	24/24	42-44	9-19 27-45	0.0 ppm	Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist.			
44	23	24/24	44-46	11-17 30-50/5.5"	0.0 ppm	Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist.			

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							Silty CLAY		
46	24	24/18	46-48	3-16 29-27	0.0 ppm	Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 47.3 feet to: Dark yellowish-brown, poorly sorted, SILT & CLAY, some Sand, moderately plastic, cohesive, moist. Changing at 47.4 feet to: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 47.5 feet to: NO RECOVERY.	47.3' 47.4' SILT & CLAY 47.5' Silty CLAY		
47							NO RECOVERY		
48	25	24/24	48-50	10-15 28-29	0.0 ppm	Alernating seams of dark yellowish-brown, well sorted, fine to medium-grained Sand, trace Silt, wet, and dark yellowish-brown, poorly sorted, SILT & CLAY, some Sand, moderately plastic, cohesive, moist. Changing at 49.8 feet to: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist.	48' Alternating SAND and Silty CLAY		
49							49.8'		
50	26	24/23	50-52	11-25 37-48	0.0 ppm	Dark yellowish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 50.4 feet to: Dark yellowish-brown, moderately well sorted, fine to medium-grained SAND, some Silt, wet. Changing at 50.5 feet to: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 50.7 feet to: Dark yellowish-brown, moderately well sorted, fine to medium-grained SAND, some Silt, wet. Changing at 51.3 feet to: Grayish-brown to light grayish-brown, well sorted, fine-grained SAND, some Silt, wet. Changing at 51.9 feet to: NO RECOVERY. Grayish-brown to light grayish-brown, well sorted, fine-grained SAND, some Silt, wet; very thin lenses of Silty Clay at 52.5 feet and 52.9 feet. Changing at 53.0 feet to: NO RECOVERY.	50' Silty CLAY SAND 50.5' 50.7' Silty CLAY SAND		
51							51.9'		
52	27	24/12	52-54	7-8 9-18	0.0 ppm		52' NO RECOVERY SAND/lenses of Silty Clay		
53							53' NO RECOVERY		
54	28	24/20	54-56	45-36-50/6"	0.0 ppm	Grayish-brown to light grayish-brown, well sorted, fine-grained SAND, some Silt, wet. Changing at 54.8 feet to: Dark grayish-brown to light grayish-brown, poorly sorted, SILT & CLAY, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 55.7 feet to: NO RECOVERY.	54' SAND 54.8' SILT & CLAY		
55							55.7'		
56	29	24/20	56-58	3-11 20-21	0.0 ppm	Dark yellowish-brown to grayish-brown, poorly sorted, SILT & CLAY, little Sand, trace Gravel, plastic, cohesive, moist.	NO RECOVERY 56.2' SILT & CLAY SAND		

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
57						Changing at 56.2 feet to: Yellowish-brown, poorly sorted, fine to coarse-grained SAND, some Gravel, trace Silt, wet. Changing at 57.6 feet to: NO RECOVERY.	SAND 57.6' NO RECOVERY		
58	30	24/13	58-60	5-1 7-34	0.0 ppm	Yellowish-brown, poorly sorted, fine to coarse-grained SAND, some Gravel, trace Silt, wet. Changing at 58.8 feet to: Brown, poorly sorted, fine to coarse-grained SAND, little Gravel, trace Silt, wet. Changing at 59.1 feet to: NO RECOVERY.	58' SAND 59.1' NO RECOVERY		
60	31	24/22	60-62	31-44 44-42	0.0 ppm	Brown to dark yellowish-brown to yellowish-brown, poorly sorted, fine to coarse-grained SAND, little Gravel, trace Silt, wet. Changing at 61.8 feet to: NO RECOVERY.	60' SAND 61.8'		
62	32	24/20	62-64	3-16 36-50	0.0 ppm	Brown to dark yellowish-brown to yellowish-brown, poorly sorted, fine to coarse-grained SAND, little Gravel, trace Silt, wet. Changing at 62.2 feet to: Dark yellowish-brown, well sorted, fine-grained SAND, some Silt, slightly cohesive, moist to wet. Changing at 62.8 feet to: Brown to dark yellowish-brown to yellowish-brown, poorly sorted, fine to coarse-grained SAND, little Gravel, trace Silt, wet. Changing at 63.7 feet to: NO RECOVERY.	62' NO RECOVERY SAND 63.7'		
64	33	24/16	64-66	11-30 39-50/5.5"	0.0 ppm	Dark yellowish-brown, moderately well sorted, fine to medium-grained SAND, trace Silt, trace Gravel, wet. Changing at 65.3 feet to: NO RECOVERY.	64' NO RECOVERY SAND 65.3'		
66	34	24/7	66-68	3-18-50/5"	0.0 ppm	Dark yellowish-brown, moderately well sorted, fine to medium-grained SAND, trace Silt, trace Gravel, wet. Changing at 66.6 feet to: NO RECOVERY.	NO RECOVERY 66' SAND 66.6' NO RECOVERY		
68	35	24/12	68-70	26-50/5.5"	0.0 ppm	Yellowish-brown, moderately well sorted,	68' SAND		

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
69						fine to medium-grained SAND, trace Silt, trace Gravel, wet. Changing at 68.4 feet to: Yellowish-brown, moderately well sorted, coarse-grained SAND, trace Silt, wet. Changing at 68.5 feet to: Dark yellowish-brown, moderately well sorted, fine to medium-grained SAND, trace Silt, trace Gravel, wet. Changing at 68.6 feet to:	68.6' SAND / NO RECOVERY		
70	36	24/10	70-72	18-38 45-50/5"	0.0 ppm	NO RECOVERY. Dark yellowish-brown, poorly sorted, fine to coarse-grained SAND, trace Gravel, trace Silt, wet. Changing at 70.8 feet to: NO RECOVERY.	70' SAND / 70.8' NO RECOVERY		
71									
72	37	24/22	72-74	17-34 36-40	0.0 ppm	Dark yellowish-brown, poorly sorted, fine to coarse-grained SAND, trace Gravel, trace Silt, wet. Changing at 72.7 feet to: Yellowish-brown, poorly sorted, fine to coarse-grained SAND, some Silt, trace Gravel, moist. Changing at 72.8 feet to: Dark yellowish-brown, poorly sorted, fine to coarse-grained SAND, trace Gravel, trace Silt, grading coarser, wet. Changing 73.8 feet to: NO RECOVERY.	72' SAND / 73.8'		
73									
74	38	24/23	74-76	13-20 28-33	0.0 ppm	Dark grayish-brown, poorly sorted, coarse to medium-grained SAND, trace Gravel, trace Silt, wet. Changing at 75.7 feet to: Dark grayish-brown to dark brown, poorly sorted, fine-grained SAND, some Silt, trace Clay, non to slightly plastic, cohesive, moist. Changing at 75.8 feet to: Dark grayish-brown, poorly sorted, coarse to medium-grained SAND, trace Gravel, trace Silt, wet. Changing at 75.9 feet to: NO RECOVERY.	74' NO RECOVERY / SAND		
75									
76	39	24/17	76-78	30-48-50/4"	0.0 ppm	Dark grayish-brown, poorly sorted, coarse to medium-grained SAND, trace Gravel, trace Silt, wet. Changing at 77.4 feet to: NO RECOVERY.	75.9' / 76' NO RECOVERY / SAND / 77.4' NO RECOVERY		Silica Sand Filter Pack
77									
78	40	24/22	78-80	12-46-50/4"	0.0 ppm	Dark grayish-brown, poorly sorted, coarse to medium-grained SAND, trace Gravel, trace Silt, wet. Changing at 78.3 feet to: Dark grayish-brown, poorly sorted, fine to medium-grained SAND, little Gravel, little Silt, trace Clay, slightly plastic, cohesive, moist. Changing at 79.2 feet to: Dark grayish-brown, poorly sorted, coarse to medium-grained SAND, trace Gravel, trace Silt, wet. Changing at 79.8 feet to: NO	78' SAND / 79.8' / 80' NO		Top of Well Screen
79									

REMARKS

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Check: John Morehouse

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
81	41	24/17	80-82	10-32-50	0.0 ppm	RECOVERY. Dark grayish-brown, moderately well sorted, fine to medium-grained SAND, trace Silt, moist to wet. Changing at 81.4 feet to: NO RECOVERY.	RECOVERY SAND 81.4' NO RECOVERY		2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
82	42	24/14	82-84	12-27 45-50/3"	0.0 ppm	Light yellowish-brown, poorly sorted, fine to medium-grained SAND, some Silt, little Gravel, little Clay, cohesive, moist. Changing at 83.2 feet to: NO RECOVERY.	82' SAND 83.2' NO RECOVERY		Bottom of Well Screen
84	43	24/10	84-86	26-50/3"	0.0 ppm	Dark yellowish-brown, poorly sorted, fine to medium-grained SAND, some Silt, little Gravel, little Clay, cohesive, moist. Changing at 84.8 feet to: NO RECOVERY.	84' SAND 84.8' NO RECOVERY		
86	44	24/12	86-88	30-50/3"	0.0 ppm	Dark grayish-brown, poorly sorted, SILT & CLAY, some Sand, trace Gravel, moderately plastic, cohesive, moist. Changing at 87.0 feet to: NO RECOVERY.	86' SILT & CLAY 87' NO RECOVERY		
88						Bottom of Borehole at 88.0 Feet	88'	2	
89									
90									
91									

REMARKS

2. Monitoring well was installed in borehole upon completion. Well screen set from approximately 78.0 to 83.0 feet below ground surface.

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Engineers and Scientists

Wolverine World Wide, Inc.
House Street
Belmont, Michigan

Boring No.: MW-26M
Page: 1 **of** 2
File No.: 16.0062335.52
Check: John Morehouse

Contractor: Stearns Drilling Company
Foreman: Darrell Krause
Logged by: John Morehouse
Date Start/Finish: 12-10-18 / 12-11-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1						See SB-26/MW-26D boring log for sample description and classification.			PROTECTIVE CASING
2									Filter Sand
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									Bentonite/Grout
30									
31									
32									
33									
34									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 3/1/19

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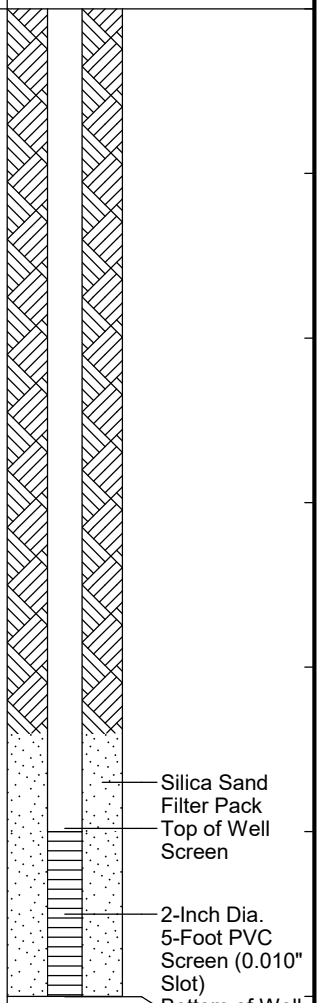
Belmont, Michigan

Boring No.: MW-26M
Page: 2 **of** 2
File No.: 16.0062335.52
Check: John Morehouse

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
36–75						Bottom of Borehole at 65.0 Feet		1	



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 60.0 to 65.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 3/1/19

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Wolverine World Wide, Inc.
House Street
Belmont, Michigan

Boring No.: MW-26S
Page: 1 **of** 1
File No.: 16.0062335.52
Check: John Morehouse

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 11-12-18 / 11-12-18
Boring Location: NW Corner of Intersection
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

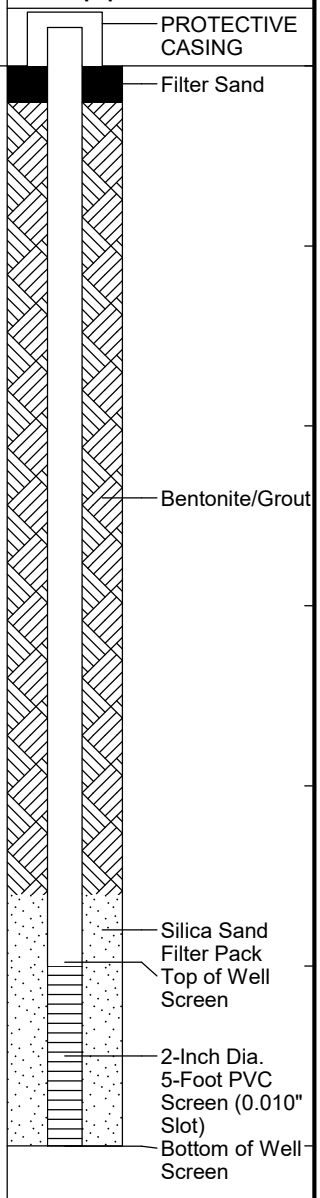
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:** _____

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–30						See SB-26/MW-26D boring log for sample description and classification.		
30–31						Bottom of Borehole at 30.0 Feet		1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 25.0 to 30.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 2/27/19

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Rockford, Michigan

Boring No.: HS-MW27A
Page: 1 **of** 1
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 6-20-19 / 6-20-19
Boring Location: 6390 Belmont Ave. NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
1						See HS-MW27E boring log for sample description and classification.			0 20 40 60 80	PROTECTIVE CASING
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26						Bottom of Borehole at 26.0 Feet		1		
27										
28										
29										

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 21.1 to 25.7 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

COPY OF GAMMA LOG 62335.52 MDEQ WWW.GPJ GZA_CORP.GDT 4/17/20

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Rockford, Michigan

Boring No.: HS-MW27B
Page: 1 **of** 1
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 6-20-19 / 6-20-19
Boring Location: 6390 Belmont Ave. NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80	Well Diagram
1–37						See HS-MW27E boring log for sample description and classification.				PROTECTIVE CASING
38						Bottom of Borehole at 37.5 Feet		1		

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 34.8 to 37.4 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Rockford, Michigan

Boring No.: HS-MW27C
Page: 1 **of** 1
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 6-20-19 / 6-20-19
Boring Location: 6390 Belmont Ave. NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80	Well Diagram
1–45						See HS-MW27E boring log for sample description and classification.				PROTECTIVE CASING
46						Bottom of Borehole at 45.5 Feet		1		
47										

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 40.8 to 45.4 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Rockford, Michigan

Boring No.: HS-MW27D
Page: 1 **of** 2
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 6-19-19 / 6-19-19
Boring Location: 6390 Belmont Ave. NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
1–29						See HS-MW27E boring log for sample description and classification.			0 20 40 60 80	PROTECTIVE CASING

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Rockford, Michigan

Boring No.: HS-MW27D
Page: 2 **of** 2
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80 100	Well Diagram
31–64										
63						Bottom of Borehole at 63 Feet		1		

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 59.0 to 63.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW27D

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Rockford, Michigan

Boring No.: HS-MW27E
Page: 1 **of** 4
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 6-17-19 / 6-19-19
Boring Location: 6390 Belmont Ave. NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
1–29		1	120/89			Very dark, grayish-brown, poorly sorted, SILT, some fine Sand, trace Gravel, moist. Changing at 1.0 feet to: Dark yellowish-brown, poorly sorted, SILT, some fine Sand, trace Clay, slightly plastic, slightly coheisve, moist. Changing at 1.5 feet to: Dark brown to dark yellowish-brown, moderately sorted, fine to medium SAND, little Silt, trace Gravel, moist. Changing at 6.0 feet to: Dark yellowish-brown, moderately sorted, fine to medium SAND, trace Silt, trace Gravel, moist. Changing at 7.0 feet to: Yellowish-brown, well sorted, fine to medium SAND, trace Silt, moist. Changing at 7.4 feet to: NO RECOVERY.	SILT 1.5' SAND 7.4' NO RECOVERY		0 20 40 60 80	PROTECTIVE CASING
10		2	120/70			Dark yellowish-brown, poorly sorted, fine to coarse SAND, some Gravel, trace Silt, moist. Changing at 15.0 feet to: Yellowish-brown, moderately well sorted, fine to medium SAND, trace Silt, trace Gravel (silty clay on large gravel), moist. Changing at 15.8 feet to: NO RECOVERY.	10' SAND 15.8' NO RECOVERY			
20		3	120/115			Yellowish-brown, moderately well sorted, fine to medium SAND, trace Silt, trace Gravel (silty clay on large gravel), moist. Changing at 25.4 feet to: Yellowish-brown, poorly sorted, fine to coarse SAND, some Gravel, trace Silt, wet. Changing at 27.1 feet to: Hard, dark yellowish-brown, poorly sorted, Silty CLAY, trace Gravel, plastic, cohesive, moist. Changing at 28.6 feet to: Hard, dark grayish-brown, poorly sorted, Silty CLAY, trace Gravel, plastic, cohesive, moist. Changing at 29.6 feet to: NO RECOVERY.	20' SAND 27.1' Silty CLAY 29.6' 30'	1		

REMARKS

1. Groundwater sample was collected from approximately 21.0 to 25.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Rockford, Michigan

Boring No.: HS-MW27E
Page: 2 **of** 4
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
31–36		4	120/120			Hard, dark grayish-brown, poorly sorted, Silty CLAY, trace Gravel, plastic, cohesive, moist. Changing at 33.7 feet to: Grayish-brown to brown, poorly sorted, fine to coarse SAND, little Silt, trace Gravel, moist to wet. Changing at 36.4 feet to: Hard, dark grayish-brown, poorly sorted, Silty CLAY, trace Gravel, plastic, cohesive, moist. Changing at 36.9 feet to: Grayish-brown to brown, poorly sorted, fine to medium SAND, little Silt, trace Gravel, moist to wet. Changing at 37.0 feet to: Dark grayish-brown, poorly sorted, Silty CLAY, trace Gravel, plastic, cohesive, moist. Changing at 39.8 feet to: NO RECOVERY.	NO RECOVERY / Silty CLAY; 33.7' SAND; 36.4' Silty CLAY; 36.9' SAND; 37' Silty CLAY	2
36–41		5	120/120			Brown, well sorted, fine to medium SAND, little Silt, lightly cohesive, wet. Changing at 45.6 feet to: Hard, dark grayish-brown, poorly sorted, Silty CLAY, trace Gravel, plastic, coheisve, moist. Changing at 48.8 feet to: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist, occasional very thin fine Sand, moist.	39.8' 40' NO RECOVERY / SAND; 45.6' Silty CLAY	3
41–51		6	120/120			Brown, well sorted, fine to medium SAND, little Silt, lightly cohesive, wet. Changing at 51.1 feet to: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 51.5 feet to: Brown, well sorted, fine to medium SAND, little Silt, lightly cohesive, wet. Changing at 52.9 feet to: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 53.5 feet to: Brown, well sorted, fine to medium SAND, little Silt, lightly cohesive, wet. Changing at 54.8 feet to: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist.	50' SAND; 51.1' 51.5' Silty CLAY / SAND; 52.9' 53.5' Silty CLAY / SAND; 54.8' Silty CLAY	4
51–64		7	120/112			Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 60.6 feet to: Brown, well sorted, fine to medium SAND, little Silt, lightly cohesive, wet. Changing at 63.8 feet to: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 67.8 feet to: Alternating layers of dark	60.6' SAND; 63.8' Silty CLAY	5

Gamma (API-GR): 0, 20, 40, 60, 80, 100

Well Diagram

REMARKS

2. Groundwater sample was collected from approximately 34.0 to 38.0 feet below ground surface and submitted for analytical laboratory testing.
3. Groundwater sample was collected from approximately 41.0 to 45.0 feet below ground surface and submitted for analytical laboratory testing.
4. Groundwater sample was collected from approximately 52.0 to 56.0 feet below ground surface and submitted for analytical laboratory testing.
5. Groundwater sample was collected from approximately 60.0 to 64.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Wolverine World Wide
MDEQ Drilling
Rockford, Michigan

Boring No.: HS-MW27E
Page: 3 **of** 4
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
66–69						grayish-brown, well sorted, Silty CLAY, plastic, cohesive, and brown moderate sorted fine to medium SAND, little Silt, moist. Changing at 68.1 feet to: Dark grayish-brown, well sorted, Silty CLAY, well sorted, Silty CLAY, plastic, cohesive moist. Changing at 69.3 feet to: NO RECOVERY.	Silty CLAY		0 20 40 60 80 100	
69.3'										
70'		8	120/112			Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 79.3 feet to: NO RECOVERY.	NO RECOVERY			
71–78							Silty CLAY			
79–79.3										
79.3'										
80'		9	120/120			Brown, well sorted, fine to medium SAND, little Silt, lightly cohesive, moist. Changing at 80.3 feet to: Dark brown to dark yellowish-brown, poorly sorted, Silty CLAY, plastic, cohesive, moist.	NO RECOVERY			
80.3'							SAND			
81–89							Silty CLAY			
90–99		10	120/120			Reddish-brown, moderately sorted, Silty CLAY (possible Red Beds), plastic, cohesive, moist.				

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW27E

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Rockford, Michigan

Boring No.: HS-MW27E
Page: 4 **of** 4
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
101		11	60/60			Reddish-brown, moderately sorted, Silty CLAY (possible Red Beds), plastic, cohesive, moist. Changing at 103.8 feet to: White GYPSUM, fractured.	Silty CLAY		0 20 40 60 80 100	
102										
103										
104							103.8' GYPSUM			
105						Bottom of Borehole at 105.0 Feet	105'	6	-999.25	
106										
107										
108										
109										
110										
111										
112										
113										
114										
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131										
132										
133										
134										

REMARKS

6. Monitoring well was installed in borehole upon completion. Well screen set from 59.0 to 63.0 feet below surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW27E

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MDEQ Drilling
Rockford, Michigan

Boring No.: HS-MW28A
Page: 1 **of** 1
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 6-11-19 / 6-12-19
Boring Location: 6272 Belshire Ave. NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80	Well Diagram
1–42						See HS-MW28E boring log for sample description and classification.				PROTECTIVE CASING
43						Bottom of Borehole at 42.5 Feet		1		

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 37.5 to 42.1 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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MDEQ Drilling
Rockford, Michigan

Boring No.: HS-MW28B
Page: 1 **of** 1
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 6-25-19 / 6-25-19
Boring Location: 6272 Belshire Ave. NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
1–47						See HS-MW28E boring log for sample description and classification.			0 20 40 60 80	PROTECTIVE CASING
47						Bottom of Borehole at 47.0 Feet		1		
48										

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 41.9 to 46.5 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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MDEQ Drilling
Rockford, Michigan

Boring No.: HS-MW28C
Page: 1 **of** 1
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 6-25-19 / 6-25-19
Boring Location: 6272 Belshire Ave. NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
1–52						See HS-MW28E boring log for sample description and classification.			0 20 40 60 80	PROTECTIVE CASING
53						Bottom of Borehole at 52.5 Feet		1		
54										

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 47.5 to 52.1 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Rockford, Michigan

Boring No.: HS-MW28D
Page: 1 **of** 3
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 6-11-19 / 6-11-19
Boring Location: 6272 Belshire Ave. NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
1–44						See HS-MW-28E boring log for sample description and classification.			0 20 40 60 80	PROTECTIVE CASING

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW28D
Page: 2 **of** 3
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80 100	Well Diagram
46–97										

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW28D
Page: 3 **of** 3
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80 100	Well Diagram
110						Bottom of Borehole at 110.0 Feet		1		

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 80.6 to 85.2 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW28E
Page: 1 **of** 6
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 6-5-19 / 6-11-19
Boring Location: 6272 Belshire Ave. NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
0		1	120/30			Dark yellowish-brown, poorly sorted, fine to coarse SAND, some Gravel, trace Silt, moist. Changing at 1.2 feet to: Dark yellowish-brown, well sorted, fine to medium SAND, trace Silt, moist. Changing at 1.4 feet to: Yellowish-brown, poorly sorted, fine to coarse SAND, some Gravel, trace Silt, moist. Changing at 2.5 feet to: NO RECOVERY.	SAND	
2.5							NO RECOVERY	
10		2	120/118			Yellowish-brown grading to dark yellowish-brown, moderately sorted, fine to medium SAND, trace Gravel, trace Silt, grading coarser, moist. Changing at 12.6 feet to: Dark yellowish-brown, poorly sorted, fine to coarse SAND, little Gravel, trace Silt, moist. Changing at 14.6 feet to: Dark grayish-brown, poorly sorted, SILT, little Sand, trace Clay, trace Gravel, non-plastic, slightly cohesive, moist around cobble. Changing at 15.0 feet to: Yellowish-brown, well sorted, brown, well sorted, fine to medium SAND, trace Silt, moist. Changing at 19.8 feet to: NO RECOVERY.	10' SAND	
14.6							SILT	
15							SAND	

Gamma (API-GR) 0 20 40 60 80

Well Diagram
PROTECTIVE CASING

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW28E

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Boring No.: HS-MW28E
Page: 2 **of** 6
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
18							SAND			
19										
20		3	120/101			Yellowish-brown, well sorted, fine to medium SAND, trace Silt, trace Gravel, moist. Changing at 28.4 feet to: NO RECOVERY.	19.8' 20' NO RECOVERY SAND			
21										
22										
23										
24										
25										
26										
27										
28							28.4' NO RECOVERY			
29										
30		4	120/118			Pale brown to light yellowish-brown, well sorted, fine to medium SAND, trace Silt, moist. Changing at 39.8 feet to: NO RECOVERY.	30' SAND			
31										
32										
33										
34										
35										
36										

Gamma (API-GR) scale: 0, 20, 40, 60, 80, 100

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW28E
Page: 3 **of** 6
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
37							SAND		0 20 40 60 80 100	
38										
39										
40		5	120/41			Pale brown to light yellowish-brown, well sorted, fine to medium SAND, trace Silt, trace Gravel, moist. Changing at 40.5 feet to: Yellowish-brown, poorly sorted, fine to coarse SAND, some Gravel, trace Silt, moist to wet. Changing at 41.5 feet to: Yellowish-brown, well sorted, fine to medium SAND, trace Silt, wet. Changing at 42.0 feet to: Dark yellowish-brown, poorly sorted, GRAVEL, little coarse Sand, trace Silt, wet. Changing at 43.4 feet to: NO RECOVERY.	39.8' 40' NO RECOVERY SAND			
41										
42							42' GRAVEL	1		
43							42.9' SAND 43.4' NO RECOVERY			
44										
45										
46										
47										
48										
49										
50		6	120/115			Yellowish-brown, well sorted, fine to medium SAND, trace Silt, wet. Changing at 52.5 feet to: Grayish-brown, poorly sorted, Sandy CLAY, little Silt, moderately plastic, cohesive, moist to wet. Changing at 59.6 feet to: NO RECOVERY.	50' SAND			
51								2		
52							52.5' CLAY & SILT			
53										
54										
55										
56							56.4'			

REMARKS

1. Groundwater sample was collected from approximately 42.0 to 44.0 feet below ground surface and submitted for analytical laboratory testing.
2. Groundwater sample was collected from approximately 51.0 to 53.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW28E
Page: 4 **of** 6
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
57–76		7	120/74			Brown, well sorted, fine to medium SAND, trace Silt, wet. Changing at 60.7 feet to: Brown, moderately well sorted, SILT, some fine Sand, non-plastic, moderately cohesive, wet. Changing at 60.9 feet to: Brown, well sorted, fine to medium SAND, trace Silt, wet. Changing at 61.7 feet to: Brown, moderately well sorted, SILT, some fine Sand, non-plastic, moderately cohesive, wet. Changing at 62.0 feet to: Brown, well sorted, fine to medium SAND, trace Silt, wet. Changing at 62.5 feet to: Dark yellowish-brown, poorly sorted, fine to coarse SAND, little Gravel, trace Silt, wet. Changing at 63.3 feet to: Brown, well sorted, fine to medium SAND, trace Silt, wet. Changing at 63.8 feet to: Dark yellowish-brown, poorly sorted, GRAVEL, little fine to coarse Sand, trace Silt, wet. Changing at 63.9 feet to: Brown, well sorted, fine to medium SAND, trace Silt, wet. Changing at 64.6 feet to: Dark yellowish-brown, poorly sorted, GRAVEL, little fine to coarse Sand, trace Silt, wet. Changing at 65.1 feet to: Brown, well sorted, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 66.2 feet to: NO RECOVERY.	Sandy CLAY 59.6' 60' NO RECOVERY SAND 60.7' 60.9 SILT SAND 61.7' 62' SILT SAND 63.8' 63.9 GRAVEL SAND 64.6' GRAVEL 65.1' SAND 66.2' NO RECOVERY			
70–71		8	120/83			Brown, well sorted, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 76.9 feet to: NO RECOVERY.	70' SAND	3		

REMARKS

3. Groundwater sample was collected from approximately 70.5 to 72.5 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW28E
Page: 5 **of** 6
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
77							76.5' SAND			
78							NO RECOVERY			
79										
80		9	120/120			Brown, well sorted, fine to medium SAND, trace Gravel, trace Silt, wet. Changing at 85.0 feet to: Dark grayish-brown, poorly sorted, Silty CLAY, trace Sand, trace Gravel, plastic, cohesive, moist.	80' SAND	4		
81										
82										
83										
84										
85							85' Silty CLAY			
86										
87										
88										
89										
90		10	120/120			Dark grayish-brown, poorly sorted, Silty CLAY, trace Sand, trace Gravel, plastic, cohesive, moist.				
91										
92										
93										
94										
95										
96										

Gamma (API-GR): 0, 20, 40, 60, 80, 100

REMARKS

4. Groundwater sample was collected from approximately 81.0 to 85.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW28E
Page: 6 **of** 6
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
97–116		11	120/120			Dark grayish-brown, poorly sorted, Silty CLAY, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 102.7 feet to: Brownish-red, poorly consolidated, weathered SHALE, some gypsum, trace Gravel, moist.	Silty CLAY 102.7' SHALE			
110						Bottom of Borehole at 110.0 Feet	110'	5		

Gamma (API-GR) scale: 0, 20, 40, 60, 80, 100

-1

-999.25

REMARKS

5. Monitoring well was installed in borehole upon completion. Well screen set from 80.6 to 85.2 feet below surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-29A
Page: 1 **of** 1
File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Gary Geerligs
Logged by: Christopher Melby
Date Start/Finish: 10-4-19 / 10-4-19
Boring Location:
GS Elev.: **Datum:**

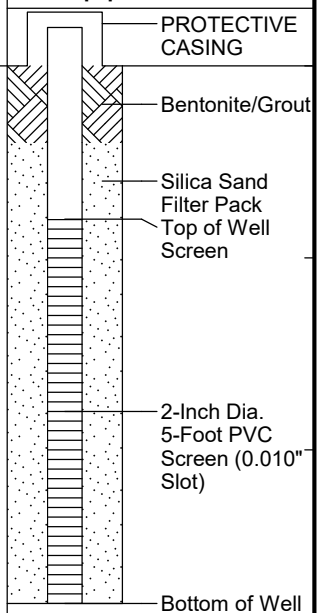
	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–13						See HS-MW-29D for detailed soil descriptions.			
14						Bottom of Borehole at 14.0 Feet		1	



REMARKS

1. Monitoring well HS-MW-29A was installed in borehole upon completion. Well screen set from approximately 4.0 to 14.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Boring No.: HS-MW-29B
Page: 1 **of** 1
File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Gary Geerligs
Logged by: Christopher Melby
Date Start/Finish: 10-4-19 / 10-4-19
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–21						See HS-MW-29D for detailed soil descriptions.			PROTECTIVE CASING; Bentonite/Grout; Silica Sand Filter Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen
22						Bottom of Borehole at 22.0 Feet		1	
23–29									

REMARKS

1. Monitoring well HS-MW-29A was installed in borehole upon completion. Well screen set from approximately 17.0 to 22.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Boring No.: HS-MW-29C
Page: 1 **of** 1
File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Gary Geerligs
Logged by: Christopher Melby
Date Start/Finish: 10-2-19 / 10-3-19
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–32						See HS-MW-29D for detailed soil descriptions.			PROTECTIVE CASING; Bentonite/Grout; Silica Sand Filter Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen
32						Bottom of Borehole at 32.0 Feet		1	

REMARKS

1. Monitoring well HS-MW-29A was installed in borehole upon completion. Well screen set from approximately 27.0 to 32.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Boring No.: HS-MW-29D
Page: 1 **of** 2
File No.: 16.0062335.52
Check: JTM/JMG

Contractor: Stearns Drilling Company
Foreman: Gary Geerligs
Logged by: Christopher Melby
Date Start/Finish: 10-1-19 / 10-2-19
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	60/33	0-5		0.0 ppm	Dark brown, fine to medium SAND, little Organic Matter (TOPSOIL). Changing at 1.2 feet to: Brown and gray, CLAY & SILT, little fine Sand, wet with Gravel in tip of sleeve at 2.7 feet.	SAND (TOPSOIL) 1.2' SAND	1	PROTECTIVE CASING
5	2	60/48	5-10		0.0 ppm	Brown and gray, fine to medium SAND, little Silt, wet.			
10	3	60/60	10-15		0.0 ppm	Brown, fine to medium SAND, little Silt, wet.		2	
15	4	60/57	15-20		0.0 ppm	Brown, fine to medium SAND, little to trace Silt, wet (SM).			Bentonite/Grout
20	5	60/60	20-25		0.0 ppm	Brown, fine to medium SAND, trace Silt, wet.		3	
25	6	60/60	25-30		0.0 ppm	Brown, fine to medium SAND, trace Silt, wet.			

REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings are shown in parts per million (ppm) of isobutylene. Background was measured at 0.0 ppm.
2. Soil sample was collected from approximately 11.0 to 15.0 feet below ground surface and submitted for analtyical laboratory testing.
3. Groundwater sample was collected from approximately 21.0 to 25.0 feet below ground surface and submitted for analytical laboratory analysis.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-29D
Page: 2 **of** 2
File No.: 16.0062335.52
Check: JTM/JMG

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31–34	7	60/60	30-35		0.0 ppm	Brown, fine to medium SAND, trace Silt, wet with small Gravel layer from 33.0 to 33.4 feet.	SAND	4	
35–39	8	60/60	35-40		0.0 ppm	Brown, fine to medium SAND, trace Silt, wet.			Silica Sand Filter Pack; Top of Well Screen
40–44	9	60/60	40-45		0.0 ppm	Brown, fine to medium SAND, trace Silt, wet.		5	2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen
45–49	10	60/60	45-50		0.0ppm	Brown, fine to medium SAND, trace Silt, wet.		6	
50							50'		
50–64						Bottom of Borehole at 50.0 Feet		7	

REMARKS

4. Groundwater sample was collected from approximately 31.0 to 35.0 feet below ground surface and submitted for analytical laboratory analysis.
5. Groundwater sample was collected from approximately 41.0 to 45.0 feet below ground surface and submitted for analytical laboratory analysis.
6. Soil sample was collected from approximately 46.0 to 50.0 feet below ground surface and submitted for analtyical laboratory testing.
7. Monitoring well was installed in borehole upon completion. Well screen set from 76.0 to 86.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 4/15/20

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Boring No.: HS-MW30A
Page: 1 **of** 2
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 5-22-19 / 5-22-19
Boring Location: 6205 Packer Drive, NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
1						See HS-MW-30E boring log for sample description and classification.			0 20 40 60 80	PROTECTIVE CASING
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
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16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW30A
Page: 2 **of** 2
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80 100	Well Diagram
29–60										
50						Bottom of Borehole at 50.0 Feet		1		

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 45.1 to 49.7 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW30B
Page: 1 **of** 2
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 5-30-19 / 5-30-19
Boring Location: 6205 Packer Drive, NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
1–29						See HS-MW-30E boring log for sample description and classification.			0 20 40 60 80	PROTECTIVE CASING

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW30B
Page: 2 **of** 2
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80 100	Well Diagram
55						Bottom of Borehole at 55.0 Feet		1		

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 49.3 to 53.9 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW30C
Page: 1 **of** 2
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 5-29-19 / 5-29-19
Boring Location: 6205 Packer Drive, NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
1						See HS-MW-30E boring log for sample description and classification.			0 20 40 60 80	PROTECTIVE CASING
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
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38										
39										
40										

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW30C

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Boring No.: HS-MW30C
Page: 2 **of** 2
File No.: 16.0062335.52
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Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80 100	Well Diagram
80						Bottom of Borehole at 80.0 Feet		1		

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 74.3 to 78.9 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW30D
Page: 1 **of** 2
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 5-31-19 / 6-3-19
Boring Location: 6205 Packer Drive, NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
1–56						See HS-MW-30E boring log for sample description and classification.			0 20 40 60 80	PROTECTIVE CASING

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW30D
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File No.: 16.0062335.52
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Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80 100	Well Diagram
58–123										
115						Bottom of Borehole at 115.0 Feet		1		

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 109.5 to 114.1 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW30D

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Boring No.: HS-MW30E
Page: 1 **of** 6
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 5-13-19 / 5-28-19
Boring Location: 6205 Packer Drive, NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
0		1	120/56		0.0 ppm	Very dark brown to dark brown, moderately well sorted, fine to medium SAND, some Silt, moist. Changing at 1.0 feet to: Dark yellowish-brown, moderately sorted, fine to medium SAND, little Silt, moist. Changing at 3.0 feet to: Yellowish-brown, poorly sorted, fine to coarse SAND, trace Gravel, trace Silt, moist. Changing at 4.7 feet to: NO RECOVERY.	SAND	1
4.7'							NO RECOVERY	
10'		2	120/48		0.0 ppm	Brown to yellowish-brown, poorly sorted, coarse to medium SAND, some Gravel, trace Silt, moist. Changing at 10.8 feet to: Brown to yellowish-brown, poorly sorted, coarse to medium SAND, some Gravel, some Silt, non-plastic, cohesive, moist. Changing at 11.0 feet to: Brown to yellowish-brown, poorly sorted, coarse to medium SAND, some Gravel, trace Silt, moist. Changing at 11.4 feet to: Light yellowish-brown, moderately well sorted, fine to medium SAND, trace Silt, moist. Changing at 12.4 feet to: Yellowish-brown, poorly sorted, fine to coarse SAND, little Gravel, trace Silt, moist. Changing at 14.0 feet to: NO RECOVERY.	SAND	
14'							NO RECOVERY	
20'		3	120/65		0.0 ppm	Yellowish-brown to dark yellowish-brown, poorly sorted, fine to coarse SAND, little Gravel, moist. Changing at 21.7 feet to: Yellowish-brown to brown, poorly sorted, fine to medium SAND, trace Gravel, trace Silt, moist. Changing at 22.8 feet to: Dark yellowish-brown to dark brown, poorly sorted, fine to coarse SAND, some gravel,	SAND	

Gamma (API-GR) 0 20 40 60 80

Well Diagram: PROTECTIVE CASING

REMARKS

1. Field screening of samples for organic vapors was peformed with a MiniRae 3000 photoionization dector equipped with a 10.6 eV lamp. Readings above levels are shown in parts per million (ppm) isobutylene. Background was measured at 0.0 ppm.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW30E
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File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
25						trace Silt, moist. Changing at 25.4 feet to: NO RECOVERY.	SAND			
							25.4' NO RECOVERY			
30		4	120/58		0.0 ppm	Yellowish-brown to dark yellowish-brown, poorly sorted, fine to coarse SAND, little Gravel, trace Silt, moist. Changing at 31.3 feet to: Light yellowish-brown, moderately well sorted, fine to medium SAND, trace Silt, moist. Changing at 34.8 feet to: NO RECOVERY.	30' SAND			
							34.8' NO RECOVERY			
40		5	120/0			NO RECOVERY.				
50		6	120/19		0.0 ppm	Yellowish-brown, poorly sorted, medium to coarse SAND, some Gravel, trace Silt, wet. Changing at 50.9 feet to: Dark yellowish-brown, poorly sorted, medium to	50' SAND			
							51.6'			

REMARKS

2. Groundwater sample collected from 52.0 to 54.0 feet and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW30E

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Boring No.: HS-MW30E
Page: 3 **of** 6
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
53–79						coarse SAND, some Gravel, trace Silt, wet. Changing at 51.6 feet to: NO RECOVERY.	NO RECOVERY	2	0 20 40 60 80 100	
60		7	120/97		0.0 ppm	Yellowish-brown, poorly sorted, GRAVEL, some fine to coarse grained Sand, trace Silt, wet. Changing at 60.5 feet to: Yellowish-brown, moderately well sorted, fine to medium SAND, trace Silt, wet. Changing at 62.5 feet to: Grayish-brown to dark brown, poorly sorted, Silty CLAY, little Sand, plastic, cohesive, moist. Changing at 63.5 feet to: Grayish-brown to dark grayish-brown, poorly sorted, Silty CLAY, trace Gravel, trace Sand, plastic, cohesive, moist. Changing at 68.1 feet to: NO RECOVERY.	60' GRAVEL 60.5' SAND 62.5' CLAY 68.1' NO RECOVERY	3		
70		8	120/119		0.0 ppm	Grayish-brown to dark grayish-brown, poorly sorted, Silty CLAY, trace Gravel, trace Sand, plastic, cohesive, moist. Changing at 72.6 feet to: Dark yellowish-brown to dark red, poorly sorted, coarse SAND, little Gravel, trace Silt, wet. Changing at 77.9 feet to: Brown to yellowish-brown, well sorted, fine SAND, little Silt, wet. Changing at 79.9 feet to: NO RECOVERY.	70' Silty CLAY 72.6' SAND 79.9'	4		

REMARKS

3. Groundwater sample collected from 61.0 to 63.0 feet and submitted for analytical laboratory testing.
4. Groundwater sample collected from 75.0 to 77.0 feet and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW30E
Page: 4 **of** 6
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
81		9	120/114		0.0 ppm	Brown to yellowish-brown, well sorted, fine SAND, little Silt, wet. Changing at 83.7 feet to: Dark red, very well sorted, fine SAND, trace Silt, wet. Changing at 83.8 feet to: Dark grayish-brown to dark brown, poorly sorted, Silty CLAY, trace Gravel, trace Sand, plastic, cohesive, moist. Changing at 84.2 feet to: Dark grayish-brown to dark brown, very well sorted, SILT, wet. Changing at 85.2 feet to: Dark grayish-brown to dark brown, poorly sorted, Silty CLAY, trace Gravel, trace Sand, plastic, cohesive, moist. Changing at 86.9 feet to: Yellowish-brown, moderately sorted, SILT, wet, with thin dark brown, Silty Clay stringers, moist. Changing at 87.2 feet to: Brown, very well sorted, SILT, some fine grained Sand, wet. Changing at 89.5 feet to: NO RECOVERY.	80' NO RECOVERY SAND 83.8' 84.2 Silty CLAY SILT 85.2 Silty CLAY 86.9' SILT 89.5'			
90		10	120/108		0.0 ppm	Yellowish-brown, very well sorted, fine SAND, little Silt, wet. Changing at 99.0 feet to: NO RECOVERY.	90' NO RECOVERY SAND 99' NO RECOVERY			
100		11	120/96		0.0 ppm	Yellowish-brown, very well sorted, fine SAND, little Silt, wet. Changing at 108.0 feet to: NO RECOVERY.	100' SAND 108'	5		

REMARKS

5. Groundwater sample collected from 100.0 to 102.0 feet and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW30E
Page: 5 **of** 6
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
109–110							NO RECOVERY	
110–111		12	120/95		0.0 ppm	Yellowish-brown, very well sorted, fine SAND, little Silt, wet. Changing at 111.3 feet to: Yellowish-brown, very well sorted SILT, little fine grained Sand, slightly cohesive, wet. Changing at 111.8 feet to: Yellowish-brown, very well sorted, fine SAND, little Silt, wet. Changing at 117.9 feet to: NO RECOVERY.	110' SAND; 111.3' SILT; 111.8' SAND	6
111–112								
112–113								
113–114								
114–115								
115–116								
116–117								
117–118								
118–119								
119–120								
120–121		13	120/76		0.0 ppm	Yellowish-brown, very well sorted, fine SAND, little Silt, grading slightly coarser (fine to medium grained SAND, trace Gravel, little Silt), wet. Changing at 126.3 feet to: NO RECOVERY.		7
121–122								
122–123								
123–124								
124–125								
125–126								
126–127							126.3' NO RECOVERY	
127–128								
128–129								8
129–130								
130–131		14	120/77		0.0 ppm	Yellowish-brown, moderately sorted, fine to medium SAND, little Silt, trace Gravel, wet. Changing at 131.0 feet to: Dark yellowish-brown, moderately sorted, fine to medium SAND, little Silt, trace Gravel, wet. Changing at 131.6 feet to: Yellowish-brown, moderately sorted, fine to medium SAND, little Silt, wet. Changing at 136.4 feet to: NO RECOVERY.	130' SAND	
131–132								
132–133								
133–134								
134–135								

Gamma (API-GR) 0 20 40 60 80 100

Well Diagram

REMARKS

6. Groundwater sample collected from 111.0 to 113.0 feet and submitted for analytical laboratory testing.
7. Groundwater sample collected from 121.0 to 123.0 feet and submitted for analytical laboratory testing.
8. Groundwater sample collected from 128.0 to 130.0 feet and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW30E
Page: 6 **of** 6
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
137–144							136.4' NO RECOVERY	9	0 20 40 60 80 100	
140		15	60/34		0.0 ppm	Dark gray, with some dark red iron staining, SHALE. Changing at 142.8 feet to: NO RECOVERY	140' SHALE			
142–144							142.8' NO RECOVERY.			
145						Bottom of Borehole at 145.0 Feet	145'	10	-999.25	
146–163										

REMARKS

9. Groundwater sample collected from 138.0 to 140.0 feet and submitted for analytical laboratory testing.
10. Monitoring well HS-MW30E was installed in borehole upon completion. Well screen set from 120.7 to 125.2 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW31A
Page: 1 **of** 1
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 6-4-19 / 6-4-19
Boring Location: 6205 Packer Drive, NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80	Well Diagram
1–20						See HS-MW-31E boring log for sample description and classification.				PROTECTIVE CASING
21						Bottom of Borehole at 21.0 Feet		1		
22–23										

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 16.1 to 20.6 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-31B
Page: 1 **of** 1
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 5-20-19 / 5-20-19
Boring Location: 6205 Packer Drive, NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	254125	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80	Well Diagram
1–30						See HS-MW31E boring log for sample description and classification.				PROTECTIVE CASING
30						Bottom of Borehole at 30.0 Feet		1		
31–32										

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 24.2 to 28.7 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Rockford, Michigan

Boring No.: HS-MW-31C
Page: 1 **of** 2
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 6-4-19 / 6-4-19
Boring Location: 6205 Packer Drive, NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80	Well Diagram
1–29						See HS-MW31E boring log for sample description and classification.				PROTECTIVE CASING

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW-31C

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Boring No.: HS-MW-31C
Page: 2 **of** 2
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80 100	Well Diagram
31–64										
45						Bottom of Borehole at 45.0 Feet		1		

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 39.4 to 43.9 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW-31C

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Boring No.: HS-MW-31D
Page: 1 **of** 2
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 6-3-19 / 6-4-19
Boring Location: 6205 Packer Drive, NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80	Well Diagram
1–39						See HS-MW31E boring log for sample description and classification.				PROTECTIVE CASING

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-31D
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Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80 100	Well Diagram
41–67										
68						Bottom of Borehole at 68.0 Feet		1		
69–86										

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 61.8 to 66.4 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-31E
Page: 1 **of** 3
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 5-16-19 / 5-21-19
Boring Location: 6205 Packer Drive, NE, Belmont, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Info: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
1–5		1	120/71		0.0 ppm	Very dark brown, moderately well sorted, SILT, some fine grained Sand, moist. Changing at 2.5 feet to: Dark reddish-brown, poorly sorted, fine to medium SAND, little Silt, moist. Changing at 3.2 feet to: Dark yellowish-brown, poorly sorted, fine to coarse SAND, little Gravel, trace Silt, moist. Changing at 5.3 feet to: Yellowish-brown, poorly sorted, fine to coarse SAND, trace Silt, moist. Changing at 5.9 feet to: NO RECOVERY.	SILT 2.5' SAND 5.9' NO RECOVERY		0 20 40 60 80	PROTECTIVE CASING
10–15		2	120/78		0.0 pm	Yellowish-brown, poorly sorted, fine to coarse SAND, trace Silt, moist. Changing at 13.2 feet to: Dark yellowish-brown, well sorted, fine to medium SAND, trace Silt, moist to wet. Changing at 16.5 feet to: NO RECOVERY.	10' SAND 16.5' NO RECOVERY			
20–25		3	120/67		0.0 ppm	Yellowish-brown, well sorted, well sorted, fine to medium SAND, trace Silt, moist to wet. Changing at 25.6 feet to: NO RECOVERY.	20' SAND 25.6' NO RECOVERY 30'	1		

REMARKS

1. Groundwater sample collected from 21.0 to 22.5 feet and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-31E
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Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
31–36		4	120/76		0.0 ppm	Dark yellowish-brown, well sorted, fine to medium SAND, trace Silt, moist to wet. Changing at 36.3 feet to: NO RECOVERY.	SAND	2		
36–40							36.3' NO RECOVERY			
40–47		5	120/85		0.0 ppm	Dark yellowish-brown, well sorted, fine to medium SAND, trace Silt, moist to wet. Changing at 47.1 feet to: NO RECOVERY.	40' SAND	3		
47–50							47.1' NO RECOVERY			
50–57		6	120/108		0.0 ppm	Dark yellowish-brown, well sorted, fine to medium SAND, trace Silt, moist to wet. Changing at 53.3 feet to: Very dark grayish-brown, poorly sorted, Silty CLAY, trace Gravel, trace Sand, plastic, cohesive, moist. Changing at 57.4 feet to: Dark grayish-brown to dark brown, well sorted, fine to medium SAND, trace Silt, wet. Changing at 57.9 feet to: Very dark grayish-brown, poorly sorted, Silty CLAY, trace Gravel, trace Sand, plastic, cohesive, moist. Changing at 59.0 feet to: NO RECOVERY.	50' SAND	4		
							53' Silty CLAY			
							57.4' SAND			
							57.9' Silty CLAY			
							59' NO RECOVERY			
60–64		7	120/120		0.0 ppm	Very dark, grayish brown to dark grayish-brown, poorly sorted, Silty CLAY, trace Gravel, trace Sand, plastic, cohesive, moist. Changing at 62.7 feet to: Grayish-brown to brown, moderately well sorted, fine to medium SAND, trace Silt, moist to wet. Changing at 63.4 feet to: Dark brown, poorly sorted, fine to coarse SAND,	60' Silty CLAY			
							62.7' SAND			

REMARKS

2. Groundwater sample collected from 31.0 to 32.5 feet and submitted for analytical laboratory testing.
3. Groundwater sample collected from 41.0 to 42.5 feet and submitted for analytical laboratory testing.
4. Groundwater sample collected from 51.0 to 52.5 feet and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-31E
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File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
66–69						some Gravel, little Silt, trace Clay, non-plastic, moderately cohesive, moist to wet. Changing at 66.5 feet to: Hard, dark brown, poorly sorted, Silty CLAY, trace Gravel, plastic, cohesive, moist. Changing at 68.3 feet to: Very hard, brown, poorly sorted, Silty CLAY, trace Gravel, possible red Bedrock, dry to moist.	SAND 66.5' Silty CLAY 68.3'		0 20 40 60 80 100	
70						Bottom of Borehole at 70.0 Feet		5	-999.25	
71–99										

REMARKS

5. Monitoring well HS-MW31B was installed in borehole upon completion. Well screen set from 24.2 to 28.8 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-32A
Page: 1 **of** 2
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 5-9-19 / 5-9-19
Boring Location: 1332 10 Mile Road NE, Comstock Park, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80	Well Diagram
1–44						See HS-MW-32D boring log for sample description and classification.				PROTECTIVE CASING

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-32A
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File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80 100	Well Diagram
46–64										
65						Bottom of Borehole at 65.0 Feet		1		
66–97										

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 57.8 to 62.4 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-32B
Page: 1 **of** 2
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 5-8-19 / 5-8-19
Boring Location: 1332 10 Mile Road NE, Comstock Park, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80	Well Diagram
1–49						See HS-MW-32D boring log for sample description and classification.				PROTECTIVE CASING

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80 100	Well Diagram
51–82										
83						Bottom of Borehole at 83.0 Feet		1		
84–108										

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 78.2 to 82.8 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-32C
Page: 1 **of** 2
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: JTM
Date Start/Finish: 5-8-19 / 5-8-19
Boring Location: 1332 10 Mile Road NE, Comstock Park, MI
GS Elev.: _____ **Datum:** _____

	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80	Well Diagram
1–54						See HS-MW-32D boring log for sample description and classification.				PROTECTIVE CASING

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR) 0 20 40 60 80 100	Well Diagram
56–118										
112						Bottom of Borehole at 112.0 Feet		1		

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 107.2 to 111.8 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-32D
Page: 1 **of** 6
File No.: 16.0062335.52
Check: Lori Powers

Contractor: Stock
Foreman: Ryan
Logged by: MJS/KWO
Date Start/Finish: 5-6-19 / 5-6-19
Boring Location: 1332 10 Mile Road NE, Comstock Park, MI
GS Elev.: _____ **Datum:** _____

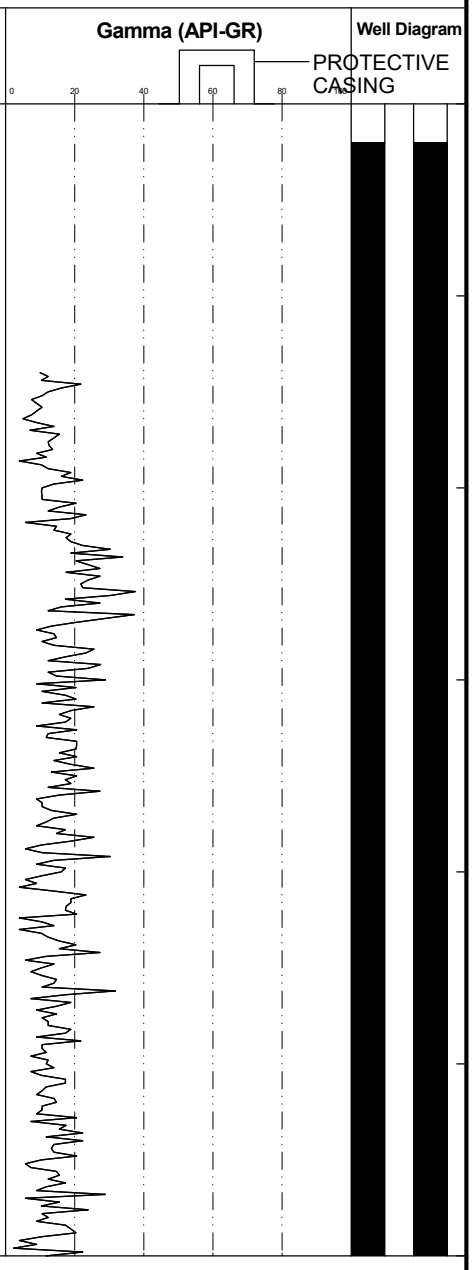
	Auger/ Casing	Sampler
Type:	Sonic	NA
O.D. / I.D.:	NA	NA
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
TOC Elev.:		

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
3-2-99	17:00	7.2	5	5 min.
3-3-99	08:00	6.5	5	15 hours
3-3-99	12:00	6.8	---	20 min.

Surveyed By: _____ **Survey Date:** _____

Depth	Elevation (ft.)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1		1	24/24			Black, TOPSOIL with Roots and Grass. Changing at 0.5 feet to: Loose, brown, fine to medium SAND, trace fine Gravel, moist.	0.5' TOPSOIL SAND	
2		2	96/48		0.0 ppm	Loose, brown, fine to medium SAND, trace Silt, moist. Changing at 3.5 feet to: Loose, brown, fine to medium SAND and GRAVEL, moist.		1
3								
4					0.0 ppm		3.5' SAND and GRAVEL	
5								
6								
7								
8								
9								
10		3	120/72		1.0 ppm	Loose, brown, fine to coarse SAND, trace Gravel, trace Silt, moist.	10' SAND	
11								
12					1.3 ppm			
13								
14								
15								
16								
17								
18								
19								
20		4	120/90		1.7 ppm	Loose, brown, fine to coarse SAND and GRAVEL, trace Clay & Silt, moist.	20' SAND and GRAVEL	
21								
22								
23								
24					1.6 ppm			
25								
26								
27								
28								
29								



REMARKS

1. Field screening of samples for organic vapors was peformed with a MiniRae 3000 photoionization dector equipped with a 10.6 eV lamp. Readings above levels are shown in parts per million (ppm) isobutylene. Background was measured at 0.0 ppm.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: HS-MW-32D
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Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
31–34		5	120/120		0.4 ppm	Loose, gray, fine to coarse SAND and GRAVEL, moist. Changing at 38.0 feet to: Soft, gray, Silty SAND, moist. Changing at 35.0 feet to: Loose, gray, fine to medium SAND, moist to wet.	SAND and GRAVEL	
35–37					0.5 ppm			
38							38' SAND	
39–41		6	120/120		1.5 ppm 1.8 ppm	Loose, gray, Silty SAND, moist.		
42–49								
50–54		7	120/120		0.4 ppm	Loose, gray, Silty SAND, moist.		2
55–59					0.3 ppm			
60–64		8	120/120		1.4 ppm	Loose, brown, fine to coarse SAND and Gravel, wet. Changing at 65.0 feet to: Loose, gray, fine to medium SAND, wet.		

Gamma (API-GR) — 0 20 40 60 80 100

Well Diagram

REMARKS

2. Temporary well pushed to 64.0 feet below ground surface. Groundwater collected for laboratory analytical testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
66					2.2 ppm		SAND			
67										
68										
69										
70		9	120/120		1.5 ppm	Gray, medium stiff, SILT, trace Gravel, trace Sand, wet. Changing at 72.5 feet to: Stiff, gray, Silty SAND, moist.	70' SILT			
71										
72							72.5' SAND			
73										
74								3		
75					2.0 ppm					
76										
77										
78										
79										
80		10	120/120		1.0 ppm	Loose, gray, fine to medium SAND, wet. Changing at 83.3 feet to: Stiff, gray, SILT, trace fine Sand, moist.				
81										
82										
83							83.3' SILT			
84										
85					4.5 ppm					
86										
87										
88										
89										
90		11	120/120		2.5 ppm	Stiff, gray, SILT, trace fine to coarse Sand, moist.				
91										
92										
93										
94										
95					3.0 ppm					
96										
97										
98										
99										

REMARKS

3. Temporary well pushed to 74.0 feet below ground surface. Groundwater collected for laboratory analytical testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
101		12	120/120		0.6 ppm	Stiff, gray, SILT, trace fine Sand, moist. Changing at 107.0 feet to: Loose, fine to coarse SAND, trace Silt, moist.	SILT	
105					1.2 ppm			
107							107' SAND	
110		13	60/60		5.1 ppm	Loose, gray, fine to coarse SAND, wet.		4
115		14	60/60		7.1 ppm	Loose, gray, fine to coarse SAND, trace Silt, moist.		
120		15	120/120		0.5 ppm	Loose, gray, fine to coarse SAND, moist.		5
125					0.4 ppm			
130		16	120/120		1.0 ppm	Loose, gray, Silty SAND, some fine Gravel, moist.		

Gamma (API-GR) 0 20 40 60 80 100

Well Diagram

REMARKS

4. Temporary well pushed to 112.0 feet below ground surface. Groundwater collected for laboratory analytical testing.
5. Temporary well pushed to 122.0 feet below ground surface. Groundwater collected for laboratory analytical testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Rockford, Michigan

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Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
136					0. ppm		SAND	
137								
138								
139								
140		17	120/120		0.9 ppm	Loose, gray, fine to coarse SAND, black and gray, some Silt, moist. Changing at 145.0 feet to: Dense, gray and black, SAND and SILT, trace coarse Gravel, , moist.		6
141								
142								
143								
144								
145					0.5 ppm			
146								
147								
148								
149								
150		18	120/120		1.7 ppm	Dense, gray, CLAY, some fine to coarse SAND, moist. Changing at 151.7 feet to: Loose, gray, fine to coarse SAND, some Silt, wet.	150' CLAY	
151							151.7' SAND	
152								
153								
154								
155					1.5 ppm			
156								
157								
158								
159								
160		19	120/120		1.4 ppm	Loose, gray, Silty SAND, moist. Changing at 165.0 feet to: Dense, gray, CLAY, some fine Sand, moist.		
161								
162								
163								
164								
165					3.9 ppm		165' CLAY	
166								
167								
168								
169								

Gamma (API-GR) 0 20 40 60 80 100

Well Diagram

REMARKS

6. Temporary well pushed to 140.0 feet below ground surface. Groundwater collected for laboratory analytical testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

COPY OF GAMMA LOG 62335.52 MDEQ WWW.GPJ GZA_CORP.GDT 4/20/20

GZA
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Engineers and Scientists

Wolverine World Wide
MDEQ Drilling
Rockford, Michigan

Boring No.: HS-MW-32D
Page: 6 **of** 6
File No.: 16.0062335.52
Check: Lori Powers

Depth	Elevation (ft,)	Sample Information: No.	Pen./ Rec. (in.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Gamma (API-GR)	Well Diagram
171		20	120/120		2.9 ppm	Dense, gray, CLAY, trace fine Sand, moist.	CLAY			
175					1.7 ppm					
180		21	120/120		1.9 ppm	Dense, gray CLAY, moist.				
185					2.3 ppm					
190		22	60/60		2.1 ppm	Dense, gray, CLAY, moist.		7		
193					2.8 ppm					
195							195'			
195						Bottom of Borehole at 195.0 Feet				

Gamma (API-GR) scale: 0, 20, 40, 60, 80, 100

REMARKS

7. Driller mentioned possible bedrock at 195.0 feet.
Monitoring well was installed in borehole upon completion. Well screen set from 137.6 to 142.2 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW-32D

COPY OF GAMMA LOG 62335.52 MDEQ WWW.GPJ GZA_CORP.GDT 4/20/20

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV1
Page: 1 of 5
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: SAC / JTM
Date Start/Finish: 1-29-18 / 2-5-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/24	0-2	8-7 3-3	ND	SAND, TOPSOIL and ORGANIC MATTER (roots)(FILL). Changing at 0.2 feet to: Loose, orange, fine SAND, moist (FILL).	0.2' SAND / TOPSOIL / ORGANIC MATTER (FILL)	1	PROTECTIVE CASING
2	2	24/18	2-4	4-3 3-4	ND	Loose, brown, SILT and SAND, moist.	2' SAND (FILL)		Concrete
3							SAND		
4	3	24/24	4-6	2-2 2-2	ND	Very loose, brown, fine SAND, some Silt, moist.			
5									
6	4	24/24	6-8	6-9 11-15	ND	Medium dense, brown, fine SAND, some Silt, trace small Gravel, dry.			
7									
8	5	24/24	8-10	4-7 10-3	ND	Medium dense, brown, fine SAND, some Silt, trace small Gravel, dry. (1.0 inch Gravel at 9.0 feet)			
9									
10	6	24/24	10-12	2-4 10-12	ND	Medium dense, brown, SILT, some fine Sand, trace Gravel, dry.	10' SILT		
11									
12	7	24/24	12-14	2-4 14-17	ND	Medium dense, brown, SILT, some fine Sand, trace Gravel, Iron staining in fractures, dry.			
13									
14	8	24/24	14-16	6-12 20-21	ND	Dense, brown, SILT, some fine Sand, trace Gravel, Iron staining in fractures, dry.			
15									
16	9	24/24	16-18	6-10 15-19	ND	Medium dense, brown, SILT, some fine Sand, trace Gravel, Iron staining in fractures, dry.			
17									
18	10	24/24	18-20	3-8 15-17	ND	Medium dense, brown, SILT, some fine Sand, trace Gravel, dry. (1.0 inch Gravel at 19.0 feet)			
19									
20	11	24/24	20-22	4-13 16-18	ND	Medium dense, brown, SILT, some fine Sand, trace Gravel, Iron staining in fractures, dry.			
21									
22	12	24/24	22-24	28-10 19-20	ND	Medium dense, brown grading to grayish brown at 23.5 feet, SILT, some very fine Sand, trace Gravel, dry.			
23									
24	13	24/24	24-26	5-8 11-12	ND	Medium dense, grayish brown, SILT, some fine Sand (Gray, Clay from 24.5 to 24.75 feet, dry).			
25									
26	14	24/24	26-28	5-7 11-13	ND	Medium dense, gray, SILT, some Clay, trace fine Sand, trace Gravel, dry.			
27									
28	15	24/24	28-30	3-4 6-7	ND	Medium dense, gray, SILT, some Clay, moist to wet.			
29									

REMARKS

1. Field screeing of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV1
Page: 2 **of** 5
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
31	16	24/24	30-32	2-3 6-0	ND	Loose, gray, SILT, some Clay, moist.	SILT	2	
32 33	18	24/0	32-34	27-37 41-27	-	Rock stuck in tip of split spoon.			
34 35	19	24/24	34-36	2-5 12-12	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
36 37	20	24/24	36-38	4-7 11-12	ND	Medium dense, gray, SILT, some Clay, moist. (1.0 inch Gravel at 36.5 feet)			
38 39	21	24/24	38-40	3-9 12-13	ND	Medium dense, gray, SILT, some Clay, some Gravel, moist.			
40 41	22	24/24	40-42	5-9 11-16	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
42 43	23	24/24	42-44	4-8 10-13	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist. (Sand from 43.0 to 43.25 feet)			
44 45	24	24/24	44-46	5-11 15-18	ND	Medium dense, gray, SILT, some Clay, trace Gravel. (1.0-inch Sand seam at 45.0 feet)			
46 47	25	24/24	46-48	4-7 14-15	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
48 49	26	24/24	48-50	6-4 14-15	ND	Medium dense, gray, SILT, some Clay, moist. (very moist to wet ground Rock at 49.0 feet)			
50 51	27	24/24	50-52	2-2 5-9	ND	Loose, gray, SILT, some Clay, trace Gravel, moist. (very moist Sand seams from 51.0 to 51.2 feet)			
52 53	28	24/24	52-54	2-8 11-14	ND	Medium dense, gray, SILT, some Clay, moist. (trace Gravel at 53.5 feet)			
54 55	30	24/24	54-56	6-10 14-15	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
56 57	31	24/24	56-58	5-8 14-16	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
58 59	32	24/24	58-60	5-11 16-17	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
60 61	33	24/24	60-62	3-8 13-13	ND	Loose, gray, SILT, some Clay, trace Gravel, moist.			
62 63	34	24/24	62-64	5-7 14-15	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
64	35	24/24	64-66	6-11 15-18	ND	Medium dense, gray, SILT, some Clay,			Bentonite Grout

REMARKS

2. Groundwater was encountered at approximately 31.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV1
Page: 3 **of** 5
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
66	36	24/24	66-68	4-10 14-15	ND	trace Gravel, moist. Changing at 64.5 feet to: Gray, SILT, some Clay, trace Gravel, moist.	SILT		
67						Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
68	37	24/24	68-70	4-5 11-14	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
69									
70	38	24/24	70-72	6-12 10-21	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
71									
72	39	24/24	72-74	5-8 22-17	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist. (loose, wet seam at 73.0 feet)			
73									
74	40	24/24	74-76	12-20 21-24	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
75									
76	41	24/24	76-78	6-11 16-22	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
77									
78	42	24/24	78-80	5-13 17-20	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
79									
80	43	24/24	80-82	8-12 15-21	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
81									
82	44	24/24	82-84	4-9 13-18	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
83									
84	45	24/24	84-86	6-13 17-26	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
85									
86	46	24/24	86-88	7-14 22-28	ND	Dense, gray, SILT, some Clay, trace Gravel, moist. (1.0-inch Gravel at 87.5 feet)			
87									
88	47	24/24	88-90	7-15 28-27	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
89									
90	48	24/24	90-92	10-18 26-29	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
91									
92	49	24/12	92-94	8-16 24-31	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
93									
94	50	24/24	94-96	11-27 33-37	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
95									
96	51	24/24	96-98	10-24 36-39	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
97									
98	52	24/24	98-100	7-17 26-27	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
99									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV1
Page: 4 **of** 5
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
101	53	24/24	100-102	8-20 25-28	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.	SILT		
102 103	54	24/24	102-104	10-21 27-39	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
104 105	55	24/21	104-106	8-17 23-27	ND	Dense, gray, SILT, some Clay, trace Gravel, moist. (0.5-inch sand seam at 105.3 feet)			
106 107	56	24/24	106-108	9-18 27-35	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
108 109	58	24/12	108-110	10-28 36-45	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
110 111	59	24/24	110-112	15-23 31-47	ND	Very dense, gray, SILT, some Clay, trace Gravel, moist.			
112 113	60	24/24	112-114	10-22 29-44	ND	Very dense, gray, SILT, some Clay, trace Gravel, moist.			
114 115	61	24/24	114-116	7-24 27-35	ND	Very dense, gray, SILT, some Clay, trace Gravel, moist. (1.0 inch gravel piece at 115.0 feet)			
116 117	62	24/24	116-118	18-28 34-40	ND	Very dense, gray, SILT, some Clay, trace Gravel, moist.			
118 119	63	24/18	118-120	10-12 15-27	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
120 121	64	24/24	120-122	14-23 27-35	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
122 123	65	24/24	122-124	13-19 25-32	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
124 125	65	24/24	124-126	9-14 21-27	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
126 127	66	24/24	126-128	11-15 22-30	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
128 129	67	24/24	128-130	6-10 16-24	ND	Medium dense, grayish brown, SILT, some Clay, little fine Sand, trace Gravel, moist. Changing at 129.0 feet to: Grayish brown,			2--Inch PVC Riser
130 131	68	24/24	130-132	6-8 9-9	ND	SILT, some Clay, little fine Sand, trace Gravel, moist to wet.	131'		
132 133	70	24/0	132-134	6-7 8-11	-	Medium dense, grayish brown, SILT, some Clay, little fine Sand, trace Gravel, moist to wet. Changing at 131.0 feet to: Tan, fine SAND, wet.	SAND		
134	71	24/12	134-136	18-25 42-50	ND	NO RECOVERY. Very dense, tan, fine SAND, wet.			

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV1
Page: 5 **of** 5
File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
136	72	24/24	136-138	4-50/3"	ND	Very dense, tan, fine SAND, wet.	SAND		Filter Sand; 2-Inch PVC Well Screen
140	73	24/12	140-142	42-50/5"	3.2 ppmv	Very dense, Grayish brown, well sorted, fine to medium SAND, trace Silt, trace Clay, moist to wet.			
142	74	24/18	142-144	23-37 20/6"--	3.4 ppmv	Hard, dark gray, SILT & CLAY, trace Sand, trace Gravel, moist.	142' SILT & CLAY		
144	75	24/18	144-146	22-41-50->50	4.1 ppmv	Hard, dark gray, SILT & CLAY, trace Sand, trace Gravel, moist.			
148	76	24/18	148-150	23-31-50->50	4.3 ppmv	Hard, dark gray, poorly sorted, SILT & CLAY, trace Sand, trace Gravel, plastic, cohesive, moist.	150'		
150						Bottom of Borehole at 150.0 Feet		3	

REMARKS

3. Monitoring well was installed in borehole upon completion. Well screen set from 135.0 to 140.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV2
Page: 1 **of** 2
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 2-14-18 / 2-14-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

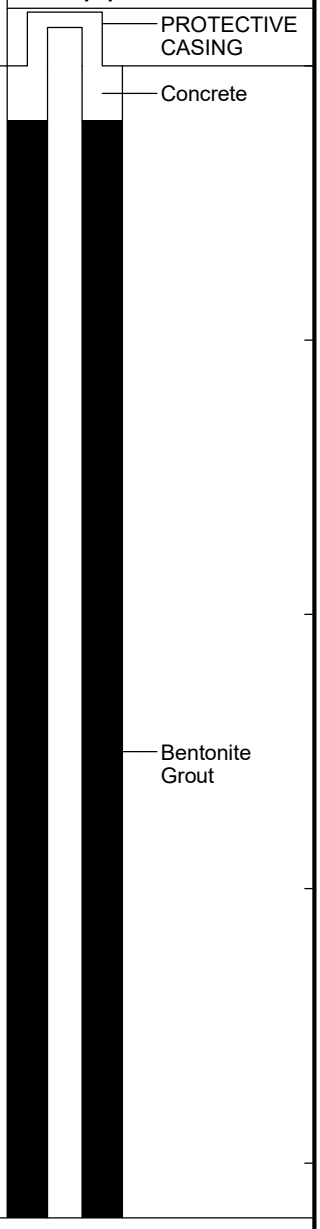
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
0	1	24/24	0-2	1-1 1-1	ND	Very loose, black, fine to medium SAND and SILT, trace Clay.	SAND and SILT	1
2	2	24/18	2-4	1-1 1-1	ND	Very loose, black, fine to medium SAND and SILT, some Wood Fragments.		
4	3	24/4	4-6	0-1 1-1	ND	Very loose, black, SILT and fibrous PEAT.	4' SILT and PEAT	
6	4	24/12	6-8	0-0 1-1	ND	Very loose, black, SILT and fibrous PEAT, wet.		
8	5	24/18	8-10	1-0 1-1	ND	Very loose, brown, fine SAND, some Silt, wet.	8' SAND and SILT	
10	6	24/18	10-12	2-2 1-1	ND	Very loose, brown, fine SAND and SILT, wet.		
12	7	24/24	12-14	1-4 4-4	ND	Loose, brown, fine to medium SAND and SILT, some Gravel, Some Clay lenses, wet.		2
14	8	24/17	14-16	1-2 3-2	ND	Loose, brown, fine to medium SAND and SILT, some Gravel, wet.		
16	9	24/12	16-18	1-1 3-3	ND	Loose, brown, fine SAND and SILT, wet.		
18	10	24/18	18-20	1-2 2-3	ND	Loose, brown, fine SAND and SILT, trace Clay, wet.		
20	11	24/12	20-22	1-2 2-2	ND	Loose, brown, fine SAND and SILT, trace Clay, wet.		

Equipment Installed



REMARKS

1. Field screeing of samples for organic vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).
2. A groundwater sample was collected from a temporary monitoring with a well screen set at approximately 13.0 to 18.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV2

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV2
Page: 2 **of** 2
File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
22	12	24/12	22-24	1-1 1-1	ND	Very loose, brown, fine SAND and SILT, wet.	SAND and SILT		
24	13	24/24	24-26	2-3 2-3	ND	Loose, brown, fine to medium SAND and SILT, wet. Changing at 25.5 feet to: Tan, CLAY, wet.	25.5' CLAY		2-Inch PVC Riser
26	14	24/18	26-28	2-2 2-2	ND	Soft, tan, CLAY, wet (CL).			
28	15	24/12	28-30	2-3 11-10	ND	Stiff, tan, CLAY, wet. Changing at 28.5 feet to: Fine to coarse SAND and GRAVEL, wet.	28.5' SAND and GRAVEL	3	Bentonite
30	16	24/0	30-32	8-17 18-21	ND	NO RECOVERY.		4	
32	17	24/13	32-34	6-8 9-12	ND	Medium dense, brown, fine to coarse SAND and Gravel, trace Silt, wet.			Filter Sand 2-Inch PVC Well Screen
34	18	24/6	34-36	7-9 10-21	ND	Medium dense, gray, SILT, trace fine to medium Sand, wet.	34' SILT		
36	19	24/15	36-38	10-16 22-45	ND	Hard, gray, CLAY, some Silt, some fine to medium Sand, wet.	36' CLAY		Bentonite and Sand
38	20	18/18	38-39.5	12-32-75/6"	ND	Very dense, gray, fine to medium SAND and SILT, some Gravel, wet (GLACIAL TILL).	38' SAND (GLACIAL TILL)		
40						Bottom of Borehole at 39.5 Feet	39.5'		

REMARKS

3. Gravel stuck in tip of split spoon.
4. Groundwater sample was collected from temporary monitoring well with screen set at approximately 31.0 to 36.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV2

BORING_WELL_6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV2S
Page: 1 **of** 1
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 2-14-18 / 2-14-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

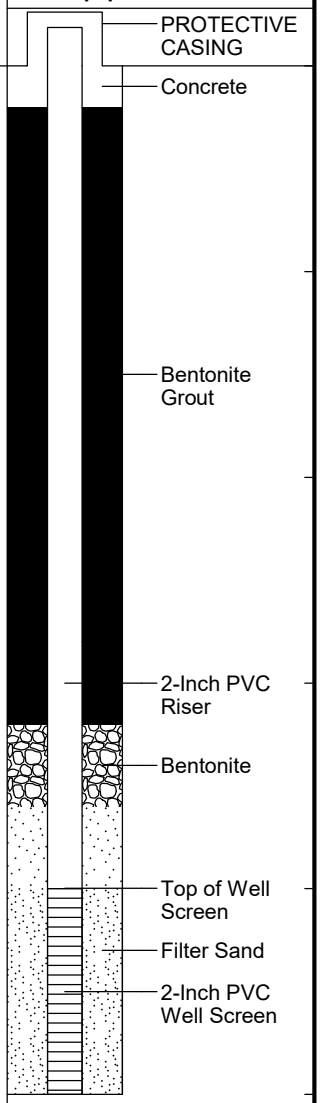
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–24						See MW-WV2 boring log for soil descriptions.		
25						Bottom of Borehole at 25.0 Feet		1
26–27								

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 20.0 to 25.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV2S

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV3
Page: 1 **of** 3
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse/Anthony Leonido
Date Start/Finish:
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

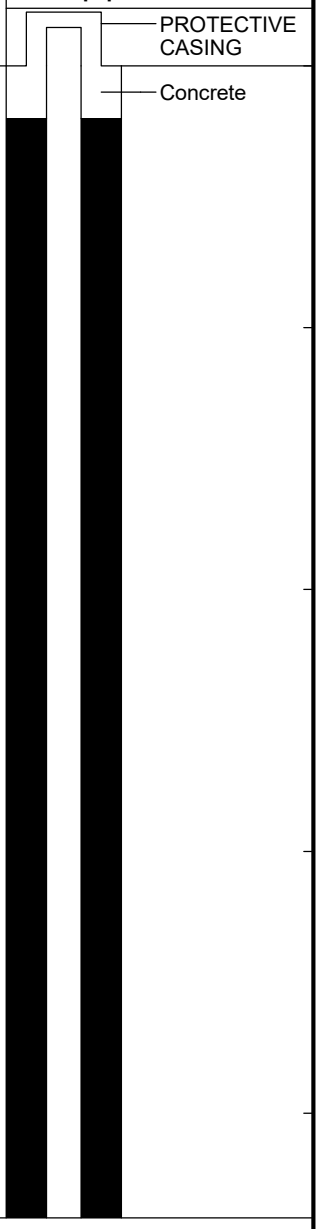
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/24	0-2	1-1 3-3	ND	Very loose, dark brown, fine to medium SAND, little Clay, little Silt, little Organic Matter (wood, leaves), moist. Changing at 0.3 feet to: Brown, fine to medium SAND, little Silt, moist. Changing at 1.5 feet to: Brown and gray, CLAY & SILT, little fine to medium Sand, trace Organic Matter (roots), moist. Changing at 1.8 feet to: Brown, fine to medium SAND, trace Silt, wet.	SAND 1.5' 1.8' CLAY & SILT SAND	1
2	2	24/19	2-4	3-4 5-6	ND			2
3								
4	3	24/15	4-6	1-1 2-2	ND	Loose, brown, fine to medium SAND, trace Silt, wet.		
5						Very loose, gray, fine to medium SAND, trace Silt, trace fine Gravel, wet.		3
6	4	24/16	6-8	0-1 1-2	ND	Very loose, brown, fine to medium SAND, trace Silt, trace Organic Matter (wood fragments, leaves), trace Hair, wet.		
7								
8	5	24/19	8-10	0-0 1-1	ND	Very loose, brown, fine to medium SAND, trace Silt, trace Organic Matter (leaves), trace Hair, wet.		
9								
10	6	24/21	10-12	2-3 3-3	ND	Loose, gray, fine to medium SAND, trace Silt, wet.		
11								
12	7	24/16	12-14	0-1 1-2	ND	Very loose, brown, fine to medium SAND, trace Silt, trace fine Gravel, wet.		
13								
14	8	24/16	14-16	2-3 3-4	ND	Loose, brown, fine to medium SAND, trace Silt, wet.		
15								4
16	9	24/24	16-18	4-6 9-10	ND	Medium dense, fine to medium SAND, trace Silt, wet. Changing at 17.0 feet to: Gray, Silty CLAY, trace fine to coarse Sand, moist.	17' Silty CLAY	
17								
18	10	24/18	18-20	4-8 8-9	ND	Very stiff, gray, Silty CLAY, trace fine to coarse Sand, moist.		
19								
20	11	24/18	20-22	4-8 9-9	ND	Very stiff, gray, SILT, trace Gravel, trace Clay, wet.		
21								

Equipment Installed



REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).
2. Groundwater was encountered at approximately 1.8 feet below ground surface.
3. A groundwater sample was collected from a temporary well with a well screen set at approximately 5.0 to 10.0 feet below ground surface and submitted for laboratory analytical testing.
4. A groundwater sample was collected from a temporary well with a well screen set at approximately 15.0 to 20.0 feet below ground surface and submitted for laboratory analytical testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV3

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV3
Page: 2 **of** 3
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
23	12	24/18	22-24	3-5 6-9	ND	Stiff, gray, Silty CLAY, trace fine Sand, wet.	Silty CLAY		
24 25	13	24/18	24-26	3-8 9-10	ND	Very stiff, brown to gray bands, Silty CLAY, trace fine Sand, wet.			Bentonite Grout
26 27	14	24/17	26-28	5-6 9-7	ND	Stiff, gray, SILT, trace medium Sand, wet.	26' SILT		
28 29	15	24/15	28-30	2-3 4-4	ND	Loose, gray, fine SAND and SILT, trace Clay, wet.	28' SAND and SILT		
30 31	16	24/8	30-32	1-2 2-3	ND	Very loose, brown, fine SAND, trace Silt, wet.	30' SAND		
32 33	17	24/8	32-34	1-2 2-4	ND	Very loose, brown, fine SAND, trace Silt, wet.			
34 35	18	24/12	34-36	1-3 3-5	ND	Loose, brown, fine SAND, trace Silt, wet.		5	
36 37	19	24/9	36-38	1-2 4-5	ND	Loose, brown, fine SAND, trace Silt, wet.			
38 39	20	24/10	38-40	1-1 2-6	ND	Very loose, brown, fine to medium SAND, trace Silt, wet.			
40 41	21	24/11	40-42	3-8 10-11	ND	Medium dense, brown, fine SAND, trace Gravel, trace Silt, wet.			
42 43	22	24/12	42-44	15-19 21-20	ND	Dense, brown, fine to medium SAND, trace Silt, wet.			
44 45	23	24/15	44-46	6-14 21-25	ND	Dense, brown, fine to medium SAND, trace Silt, wet.		6	
46 47	24	24/20	46-48	4-16 23-24	ND	Dense, brown, fine to medium SAND, trace Silt, wet.			

REMARKS

5. A groundwater sample was collected from a temporary well with a well screen from approximately 34.0 to 39.0 feet below ground surface and submitted for laboratory analytical testing.
6. A groundwater sample was collected from a temporary well with a well screen from approximately 44.0 to 49.0 feet below ground surface and submitted for laboratory analytical testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV3
Page: 3 **of** 3
File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
48	25	24/15	48-50	4-8 11-15	ND	Medium dense, brown, fine SAND, wet.	SAND		
50	26	24/15	50-52	8-18 22-35	ND	Dense, fine to medium SAND, trace Silt, wet.			2-Inch PVC Riser
52	27	24/20	52-54	4-9 21-29	ND	Dense, brown, fine SAND, trace Silt, wet.			Bentonite
54	28	24/20	54-56	2-6 17-21	ND	Medium dense, brown, fine to medium SAND, trace Silt, wet.		7	
56	29	24/3	56-58	3-8 12-15	ND	Medium dense, gray and brown, fine to coarse SAND and GRAVEL, wet.	56' SAND and GRAVEL	8	Filter Sand
58	30	24/12	58-60	3-4 13-16	ND	Medium dense, brown, fine to coarse SAND and GRAVEL, wet.			2-Inch PVC Well Screen
60	31	24/18	60-62	4-6 8-9	ND	Medium dense, brown, fine to coarse SAND and Gravel, trace Silt, wet. Changing at 61.0 feet to: Tan, CLAY, wet.	61' CLAY		
62	32	24/20	62-64	8-11 11-12	ND	Very stiff, tan, CLAY, wet.	64'		Bentonite and Sand
64						Bottom of Borehole at 64.0 Feet		8	
65									
66									
67									
68									
69									
70									
71									
72									
73									

REMARKS

7. A groundwater sample was collected from a temporary well with a well screen from approximately 54.0 to 59.0 feet below ground surface and submitted for laboratory analytical testing.
8. Gravel stuck in tip of split spoon.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV3S
Page: 1 **of** 1
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Anthony Leonido
Date Start/Finish:
Boring Location:
GS Elev.: **Datum:**

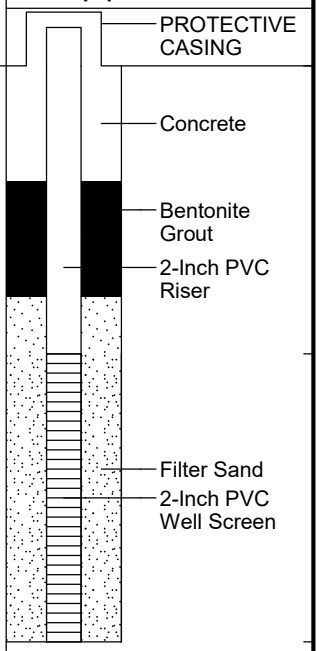
	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–10						See MW-WV3 boring log for soil descriptions.			PROTECTIVE CASING; Concrete; Bentonite Grout; 2-Inch PVC Riser; Filter Sand; 2-Inch PVC Well Screen
10						Bottom of Borehole at 10.1 Feet		1	



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 5.0 to 10.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV3S

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV4
Page: 1 **of** 6
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Anthony Leonido
Date Start/Finish: 3-12-18 / 3-12-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
3/16/18	1600	84.0'	Open	

Surveyed By: NA **Survey Date:**

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/24	0-2	1-1 1-1	ND	TOPSOIL. Changing at 0.5 feet to: Very loose, brown and black, fine to medium SAND and SILT, dry.	0.5' TOPSOIL (LOAM) SAND and SILT	
4	2	24/18	4-6	1-1 2-3	0.1	Very loose, brown, fine SAND, little Silt, dry.		1
9	3	24/20	9-11	3-4 6-6	ND	Loose, brown, fine SAND, trace Silt, dry.	9' SAND	
13							13' SAND and SILT	
14	4	24/18	14-16	4-5 5-7	ND	Loose, brown, fine SAND, dry. Changing at 15.0 feet to: Tan, fine SAND and SILT, dry (SM).		
19	5	24/20	19-21	5-10 19-21	ND	Medium dense, brown, SILT, trace fine Sand, dry.	19' SILT	

Equipment Installed

PROTECTIVE CASING
Concrete

REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million per volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV4

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV4
Page: 2 **of** 6
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
23							SILT		
24	6	24/20	24-26	8-13 13-17	0.1	Medium dense, brown, fine SAND, trace Silt, dry.	24' SAND		
25									
26									
27									
28									
29	7	24/22	29-31	2-5 8-12	ND	Medium dense, brown, fine SAND, trace Silt, dry.			
30									
31									
32									
33									
34	8	24/20	34-36	3-10 14-15	ND	Medium dense, brown, fine SAND, trace Silt, dry.			
35									
36									
37									
38									
39	9	24/24	39-41	5-12 17-21	ND	Medium dense, brown, fine SAND, trace Silt, dry.			
40									
41									
42									
43									
44	10	24/22	44-46	8-21 22-30	ND	Dense, brown, fine SAND and fine GRAVEL, trace Silt.			
45									
46									
47									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV4
Page: 3 **of** 6
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
48							SAND		
49	11	24/21	49-51	3-11 22-28	ND	Dense, brown, fine to medium SAND and SILT, dry.	49' SAND and SILT		
50									
51									
52									
53									
54	12	11/11	54-54.9	16-50/5"	ND	Very dense, brown, fine SAND and SILT, some medium Gravel, dry.		2	
55									
56									
57									
58									
59	13	24/24	59-61	21-30 39-50	ND	Very dense, brown, fine to coarse SAND and SILT, trace medium Gravel, dry (GLACIAL TILL).	59' SAND and SILT (GLACIAL TILL)		
60									
61									Bentonite Grout
62									
63									
64	14	24/24	64-66	11-21 24-27	ND	Hard, gray, Silty CLAY, dry.	64' Silty CLAY		
65									
66									
67									
68									
69	15	24/19	69-71	19-43 38-46	ND	Very dense, gray, fine SAND and SILT with Clay lenses, trace medium Sand, dry (GLACIAL TILL).	69' SAND and SILT (GLACIAL TILL)		
70									
71									
72									
73									

REMARKS

2. Split spoon refusal at approximately 55.0 feet.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV4
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File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
74	16	24/24	74-76	8-14 24-31	ND	Dense, gray, fine to medium SAND and SILT, some Clay, damp (GLACIAL TILL).	SAND and SILT (GLACIAL TILL)		
79	17	18/18	79-80.5	13-27 37-0	ND	Dense, gray, fine to medium SAND and SILT, some Clay, damp (GLACIAL TILL).		4	
84	18	10/0	84-84.8	28-50/4"	ND	NO RECOVERY.		3	
89	19	24/24	89-91	8-13 19-25	ND	Dense, gray, fine SAND and SILT, some medium Gravel, moist (GLACIAL TILL).			
94	20	24/24	94-96	14-24 28-41	ND	Very dense, gray, fine SAND and SILT, some medium Gravel, moist (GLACIAL TILL).			

REMARKS

4. Split spoon refusal at approximately 80.5 feet.
3. Gravel stuck in tip of split spoon.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV4

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV4
Page: 5 **of** 6
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
100	21	24/24	99-101	19-18 20-31	ND	Dense, gray, fine SAND and SILT, some medium Gravel, dry (GLACIAL TILL).	SAND and SILT (GLACIAL TILL)		
104	22	24/24	104-106	13-20 30-50	ND	Very dense, gray, fine SAND and SILT, some medium Gravel, dry (GLACIAL TILL).			
109	23	24/24	109-111	9-12 24-42	ND	Dense, gray, fine SAND and SILT, some medium Gravel, damp (GLACIAL TILL).			
114	24	24/24	114-116	9-17 28-41	ND	Dense, gray, fine SAND and SILT, some medium Gravel, damp (GLACIAL TILL).			
119	25	24/24	119-121	8-15 31-50	ND	Dense, gray, fine SAND and SILT, some medium Gravel, damp (GLACIAL TILL).			
124	26	18/18	124-125.5	9-27-50/6"	10.7	Very dense, gray, fine SAND and SILT,		5	2-Inch PVC Riser

REMARKS

5. Groundwater was encountered at approximately 123.5 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV4
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File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
125						some medium Gravel, damp, with green, fine Sand and Silt lenses and blue, fine Sand and Silt lenses, damp (GLACIAL TILL).	SAND and SILT (GLACIAL TILL)	6	Bentonite
126									
127									
128	27	15/12	128-129.3	15-35-50/3"	5.0	Very dense, brown, fine to medium SAND, trace Silt, wet, with layer of green, fine SAND.	128' SAND		
129									
130									Filter Sand
131									
132									
133							133' Silty SAND and CLAY		2-Inch PVC Well Screen
134	28	12/12	134-135	17-50+	ND	Very dense, red and green, fine Silty SAND, some Silty Clay, wet.			
135						Bottom of Borehole at 135.0 Feet	135'	7	
136									
137									
138									
139									
140									
141									
142									
143									
144									
145									
146									
147									
148									
149									
150									

REMARKS

6. A temporary well screen was set from 125.0 to 130.0 below ground surface. Groundwater sample was collected and submitted for laboratory analytical testing.
7. Monitoring well was installed in the borehole upon completion. Well screen set from 130.0 to 135.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV4

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV5D
Page: 1 **of** 3
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Joe Workman
Date Start/Finish: 3-14-18 / 3-14-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

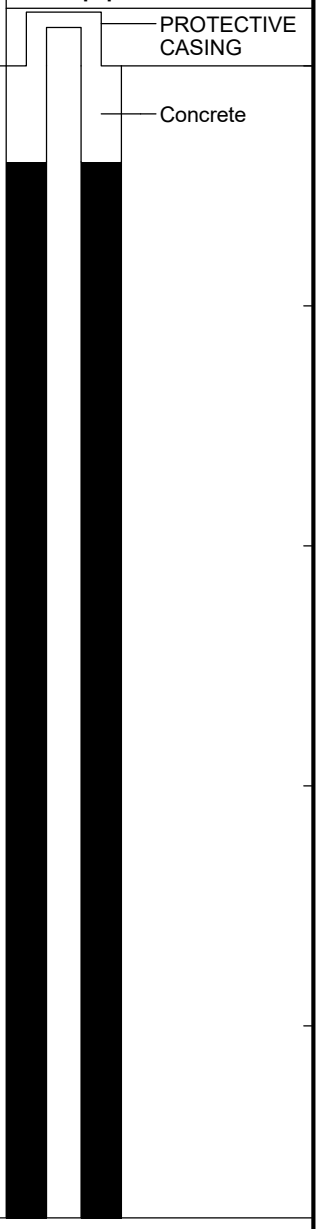
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
3/14/18	1005	64.4'	Top of PVC	

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/13	0-2	2-3 5-6	9.0	Loose, dark brown, fine to medium SAND, trace Organic Matter (roots), trace Clay, trace Silt, damp. Changing at 1.0 foot to: Brown, fine to medium SAND, trace Silt, damp.	SAND	1
2	2	24/11	2-4	3-4 4-5	3.0	Loose, brown, fine to medium SAND, trace Silt, damp (rock fragment in tip of spoon).		
4	3	24/21	4-6	2-2 3-3	10.0	Loose, tan, fine to medium SAND, trace Silt, damp.		
6	4	24/15	6-8	2-2 3-3	ND	Loose, brown, fine to medium SAND, trace fine to coarse Gravel, moist.		
8	5	24/18	8-10	2-2 3-4	ND	Loose, brown, fine to medium SAND, trace Silt, moist.		
10	6	24/22	10-12	3-2 2-2	3.0	Loose, brown, fine to medium SAND, trace Silt, moist.		
12	7	24/23	12-14	2-1 2-3	ND	Loose, brown, fine to medium SAND, trace Silt, moist.		
14	8	24/24	14-16	2-3 3-3	ND	Loose, tan, fine to medium SAND, trace Silt, moist. Changing at approximately 15.8 feet to: Loose, brown, fine to coarse SAND, trace Silt, moist.		
16	9	24/24	16-18	4-5 8-10	ND	Medium dense, brown, fine to medium SAND, trace Silt, damp.		
18	10	24/22	18-20	5-10 11-11	ND	Medium dense, brown, fine to coarse SAND, trace Silt, damp. Changing at approximately 19.7 feet to: Brown, fine to coarse SAND, trace Silt, damp.		
20	11	24/20	20-22	10-9 13-12	ND	Medium dense, brown, fine to medium SAND, trace Silt, damp. Changing at approximately 21.5 feet to: Medium dense, brown, fine to coarse SAND, trace fine to		
22	12	24/20	22-24	4-5 10-9	ND	coarse Gravel, trace Silt, damp with 1.0 inch layer of CLAY and SILT at approximately 21.7 feet. Medium dense, tan, fine to medium SAND,		

Equipment Installed



REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV5D
Page: 2 **of** 3
File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
25	13	24/21	24-26	5-5 9-13	ND	trace Silt, damp. Medium dense, tan, fine to medium SAND, trace Silt, damp.	SAND		
26 27	14	24/18	26-28	3-7 7-7	ND	Loose, brown, fine to coarse SAND, trace Silt, trace fine Gravel, damp. Changing at approximately 27.0 feet to: Medium dense, brown, fine to medium SAND, trace Silt,			
28 29	15	24/19	28-30	2-3 4-4	ND	damp. Loose, brown, fine to coarse SAND, trace fine Gravel, trace Silt, damp.			
30 31	16	24/17	30-32	2-3 4-4	ND	Loose, brown, fine to coarse SAND, trace fine Gravel, trace Silt, damp.			Bentonite Grout
32 33	17	24/19	32-34	2-2 2-2	ND	Loose, brown, fine to coarse SAND, trace fine Gravel, trace Silt, damp.		3	
34 35	18	24/24	34-36	2-3 4-7	ND ND	Loose, brown, fine to coarse SAND, trace fine Gravel, trace Silt, moist. Changing at approximately 34.2 feet to: Brown, Silty CLAY, little fine to coarse Sand, trace fine	34.2' Silty CLAY		
36 37	19	24/24	36-38	1-4 3-3	ND	Gravel, damp. Medium, brown, CLAY & SILT, some fine Sand, moist. Changing at approximately 36.4 feet to: Brown, fine to medium SAND,	36' CLAY & SILT	4	
38 39	20	24/20	38-40	1-2 5-5	ND	trace Silt, wet. Changing at approximately 36.6 feet to: Brown, CLAY & SILT, some fine to medium Sand, moist.			
40 41	21	24/24	40-42	4-9 9-11	ND	Medium, brown, CLAY & SILT, some fine to medium Sand, moist. Changing at approximately 39.2 feet to: Medium SAND, trace Silt, damp.	40' SAND		
42 43	22	24/22	42-44	10-13 18-19	ND	Medium dense, brown, fine SAND, trace Silt, wet. Medium dense, brown, fine SAND, trace Silt, wet.			
44 45	23	24/24	44-46	6-10 10-13	ND	Medium dense, brown, fine SAND, trace Silt, wet.			
46 47	24	24/20	46-48	5-12 17-22	ND	Medium dense, brown, fine SAND, trace Silt, wet.			
48 49	25	24/22	48-50	7-16 21-22	ND	Medium dense, brown, fine SAND, trace Silt, wet.			
50 51	26	24/24	50-52	10-11 16-21	ND	Medium dense, brown, fine SAND, trace Silt, wet.			

REMARKS

3. Driller noted some clay present in tip of spoon.
4. Groundwater was encountered at approximately 36.4 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV5D

BORING_WELL 6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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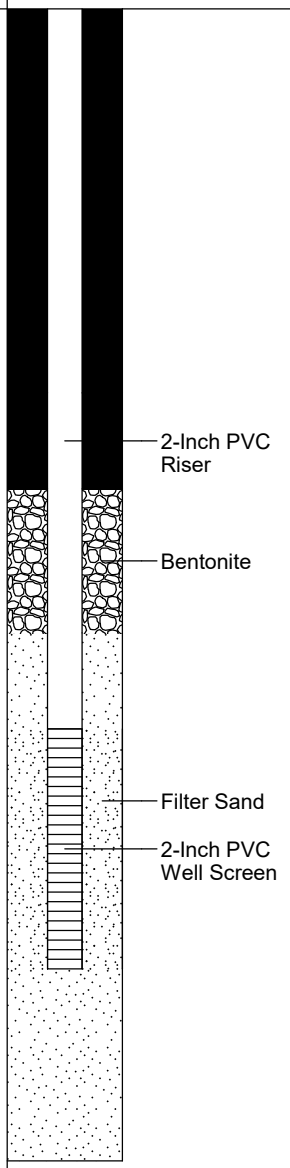
Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV5D
Page: 3 **of** 3
File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
53	27	24/24	52-54	4-11 14-14	ND	Medium dense, brown, fine SAND, trace Silt, wet.	SAND		
54	28	24/24	54-56	5-8 13-19	ND	Medium dense, brown, fine SAND, trace Silt, wet.			
56	29	24/24	56-58	3-5 13-27	ND	Medium dense, brown, fine SAND, trace Silt, wet.			
58	30	24/21	58-60	9-18 10-16	ND	Medium dense, brown, fine SAND, trace Silt, wet. Changing at approximately 58.5 feet to: Brown, fine to coarse SAND, some fine Gravel, wet.			
60	31	24/24	60-62	12-18 19-12	ND	Dense, brown, medium to coarse SAND, some fine Gravel, trace Silt, wet.			
62	32	24/15	62-64	2-3 6-9	ND	Loose, brown, medium to coarse SAND, some fine Gravel, trace Silt, wet.			
64	33	24/18	64-66	1-2 5-9	ND	Loose, brown and gray, fine SAND, trace Silt, wet.			
66	34	24/12	66-68	2-4 7-12	ND	Medium dense, brown and gray, fine SAND, trace Silt, wet.			
68	35	24/10	68-70	1-4 7-10	ND	Medium dense, brown and gray, fine SAND, trace Silt, wet.			
70	36	24/15	70-72	2-4 7-14	ND	Medium dense, brown and gray, fine SAND, trace Silt, wet.			
72	37	24/24	72-74	2-5 10-13	ND	Medium dense, brownish gray, fine SAND, trace Silt, wet. Changing at approximately 73.0 feet to: Brown, CLAY.	73' CLAY		
74	38	24/24	74-76	11-14 26-27	ND	Hard, brown, CLAY. Changing at approximately 75.5 feet to: Gray, CLAY.			
76						Bottom of Borehole at 76.0 Feet	76'	5	
77									
78									
79									



REMARKS

5. Monitoring well was installed in borehole upon completion. Well screen set from 67.0 to 72.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV5D

BORING_WELL 6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV5S
Page: 1 **of** 2
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Joe Workman/Anthony Leonido
Date Start/Finish: 3-14-18 / 3-14-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1						See MW-WV5D boring log for soil descriptions.		
2								
3								
4								
5								
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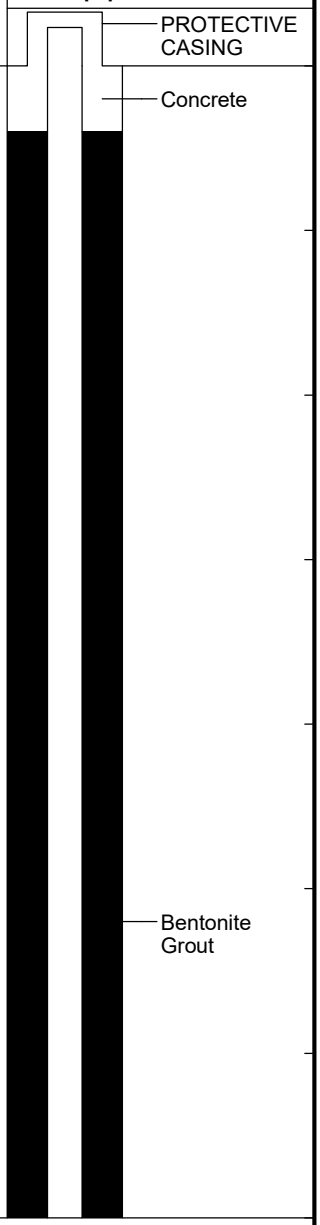
34								

Equipment Installed



REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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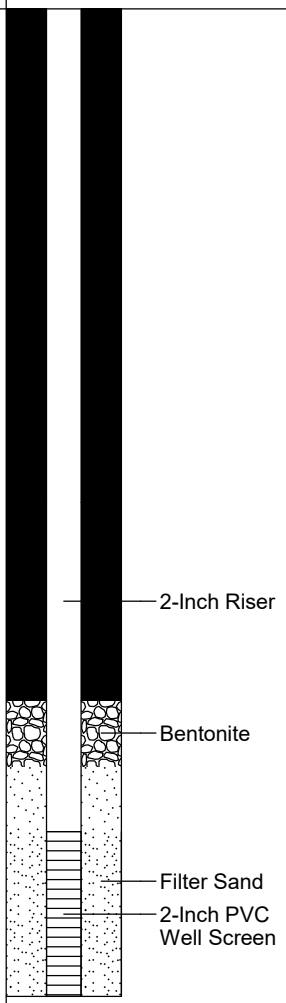
Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV5S
Page: 2 **of** 2
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
36–75						Bottom of Borehole at 65.0 Feet		1	2-Inch Riser; Bentonite; Filter Sand; 2-Inch PVC Well Screen



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 60.0 to 65.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV6D
Page: 1 of 3
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Anthony Leonido
Date Start/Finish: 3-19-18 / 3-20-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/8	0-2	1-1 2-2	ND	Top 2.0 inches LOAM. Changing to: Loose, brown, fine to medium SAND and SILT, dry.	SAND and SILT	1	PROTECTIVE CASING; Concrete
4	2	24/12	4-6	2-2 1-1	ND	Loose, brown, fine SAND, trace Silt, dry.	4' SAND and GRAVEL		
9	3	24/12	9-11	2-5 7-7	ND	Medium dense, brown, fine SAND and fine GRAVEL, trace Silt, wet.			
14	4	24/15	14-16	2-5 7-7	ND	Medium dense, brown, fine to coarse SAND and fine GRAVEL, some Silt, wet.		2	
19	5	24/18	19-21	2-3 5-16	ND	Medium, brown, SILT, wet.	19' SILT		
24	6	24/18	24-26	4-10 20-11	ND	Very stiff, brown, SILT, trace fine Sand, wet.			
29	7	24/19	29-31	11-25 25-32	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).	29' GLACIAL TILL		
34	8	24/19	34-36	4-14 25-34	ND	Very dense, brown, fine Silty SAND and			

REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).
2. A groundwater sample was collected from a temporary monitoring with well screen set at approximately 13.0 to 18.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV6D

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV6D
Page: 2 **of** 3
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
36						SILT, some Clay, wet (GLACIAL TILL).	GLACIAL TILL		
37									
38									
39	9	12/12	39-40	21-97	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
40									
41									
42									
43									
44									
45									
46									
47									Bentonite Grout
48									
49	10	24/18	49-51	21-38 44-53	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
50									
51									
52									
53									
54	11	24/16	54-56	20-27 44-50	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
55									
56									
57									
58									
59	12	24/17	59-61	20-24 30-46	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
60									
61									
62									
63									
64	13	16/16	64-65.3	45-32-50/4"	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
65									
66									
67									
68									
69	14	16/14	69-70.3	28-46-50/4"	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
70									
71									
72									
73									
74	15	12/10	74-75	35-68	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
75									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV6D

BORING_WELL 6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV6D
Page: 3 **of** 3
File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
77							GLACIAL TILL		
78									
79	16	17/15	79-80.4	14-25-50/5"	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
80									
81									
82									
83									
84	17	6/6	84-84.5	50-100/0"	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
85									
86									
87									
88									
89	18	14/10	89-90.2	20-40-50/4"	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
90									
91									
92									
93									2-Inch PVC Riser
94	19	19/17	94-95.6	40-48 50-40/1"	ND	Very dense, brown, fine SAND, trace Silt, wet.	94' SAND		Bentonite
95									
96									
97									
98									
99	20	24/20	99-101	2-11 26-33	ND	Very dense, brown, fine SAND, trace Silt, wet.			Filter Sand
100									2-Inch PVC Well Screen
101									
102									
103									
104	21	24/18	104-106	16-16 21-21	ND	Dense, brown, fine SAND, trace Silt, wet. Changing at approximately 105.0 feet to: Gray, CLAY, wet.	105' CLAY 106'	3	
105									
106						Bottom of Borehole at 106.0 Feet		4	
107									
108									
109									
110									
111									
112									
113									
114									
115									
116									

REMARKS

3. Groundwater was encountered at approximately 104.0 feet below ground surface.
4. Monitoring well was installed in borehole upon completion. Well screen set from 98.0 to 103.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV6D

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV6S
Page: 1 **of** 1
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Burt Graham
Logged by: Christopher Melby
Date Start/Finish:
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

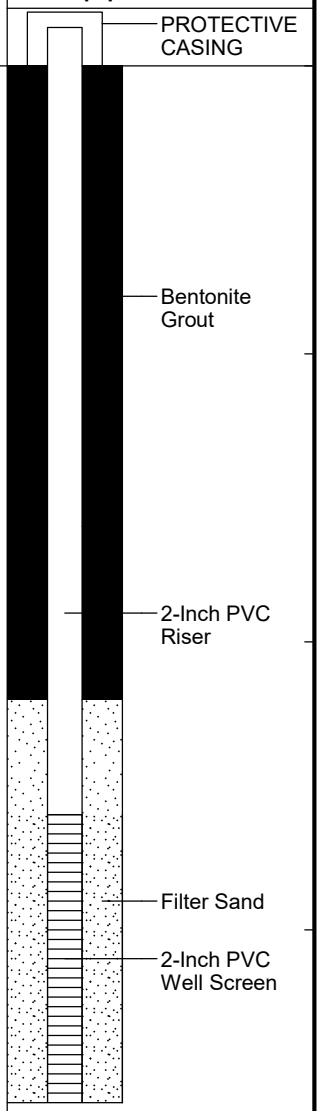
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–18						See MW-WV6D boring log for soil descriptions.		
18						Bottom of Borehole at 18.0 Feet		1
19								

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 13.0 to 18.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV6S

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: PMW-WV-7/MW-WV-7D
Page: 1 **of** 6
File No.: 16.0062677.81
Check: Leslie Nelson

Contractor: Stearns Drilling Company
Foreman: Jerry Zach/Travis
Logged by: John Morehouse
Date Start/Finish: 10-23-18 / 10-25-18
Boring Location:
GS Elev.: **Datum:** NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

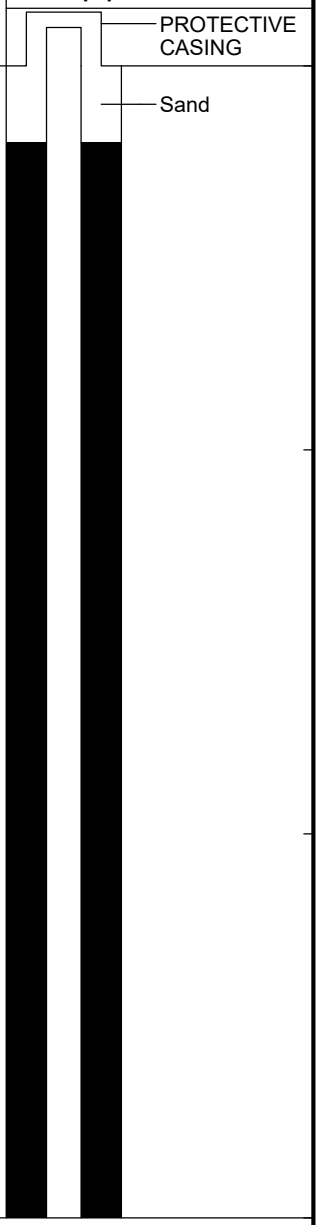
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
NM	NM	NM	NM	NM

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/20.4	0-2	2-2 2-2	ND	Very dark brown, fine grained SAND, some Silt, trace Gravel, moist. Changing at 0.4 feet to: Dark yellowish-brown to yellowish-brown, very fine grained SAND and SILT, moist. Changing at 1.7 feet to: NO RECOVERY.	SAND 0.4' SAND and SILT 1.7'	1
2	2	24/15.6	2-4	1-2 1-1	ND	Yellowish-brown, very fine grained SAND and SILT, moist. Changing at 3.3 feet to: NO RECOVERY.	2' NO RECOVERY SAND and SILT 3.3'	
3							NO RECOVERY 4'	
4	3	24/19.2	4-6	1-4 3-2	ND	Yellowish-brown to brown, CLAY & SILT, moist. Changing at 4.6 feet to: Yellowish-brown, fine to medium grained SAND, trace Silt, moist. Changing at 5.6 feet to: NO RECOVERY.	CLAY & SILT 4.6' SAND 5.6'	
5								
6	4	24/12	6-8	1-1 1-1	ND	Yellowish-brown, fine to coarse grained SAND, little Gravel, trace Silt, moist. Changing at 7.0 feet to: NO RECOVERY.	6' NO RECOVERY SAND 7'	
7							NO RECOVERY 8'	
8	5	24/6	8-10	1-1 1-1	ND	Yellowish-brown, fine to coarse grained SAND, little Gravel, trace Silt, moist. Changing at 8.5 feet to: NO RECOVERY.	SAND 8.5' NO RECOVERY	
9							10'	
10	6	24/12	10-12	1-1 2-2	ND	Yellowish-brown, fine to coarse grained SAND, little Gravel, trace Silt, moist. Changing at 10.6 feet to: Pale brown to light yellowish-brown, fine SAND, trace Silt, moist. Changing at 11.0 feet to: NO RECOVERY.	SAND 11'	
11							NO RECOVERY 12'	
12	7	24/16.8	12-14	2-3 3-3	ND	Pale brown to light yellowish-brown, fine SAND, trace Silt, moist. Changing at 12.7 feet to: Brown, fine to medium SAND, trace Silt, wet. Changing at 13.4 feet to: NO RECOVERY.	SAND 13.4'	2
13								
14	8	24/15.6	14-16	3-2 3-4	ND	Brown, fine to medium SAND, trace Silt, wet. Changing at 15.3 feet to: NO RECOVERY.	NO RECOVERY 14' SAND	

Equipment Installed



REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).
2. Groundwater was encountered at approximately 12.7 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 3/25/19

GZA
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Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: PMW-WV-7/MW-WV-7D
Page: 2 **of** 6
File No.: 16.0062677.81
Check: Leslie Nelson

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							15.3' SAND		
16	9	24/16.8	16-18	2-2 3-4	ND	Brown, fine to medium SAND, trace Silt, wet. Changing at 17.4 feet to: NO RECOVERY.	NO RECOVERY 16' SAND		
17							17.4' NO RECOVERY		
18	10	24/19.2	18-20	0-2 3-6	ND	Brown, fine to medium SAND, trace Silt, wet. Changing at 19.6 feet to: NO RECOVERY.	18' SAND		
19							19.6'		
20	11	24/16.8	20-22	5-6 5-11	ND	Brown, fine to medium SAND, trace Silt, wet. Changing at 21.4 feet to: NO RECOVERY.	20' NO RECOVERY SAND		
21							21.4'		
22	12	24/19.2	22-24	8-12 13-11	ND	Brown, fine to medium SAND, trace Silt, trace Gravel, wet. Changing at 23.6 feet to: NO RECOVERY.	NO RECOVERY 22' SAND		
23							23.6'		
24	13	24/15.6	24-26	1-1 1-1	ND	Brown, fine to medium SAND, trace Silt, trace Gravel, wet. Changing at 25.3 feet to: NO RECOVERY.	24' NO RECOVERY SAND		
25							25.3'		
26	14	24/14.4	26-28	1-1 2-0	ND	Brown, fine to medium SAND, trace Silt, trace Gravel, wet. Changing at 27.2 feet to: NO RECOVERY.	NO RECOVERY 26' SAND		
27							27.2' NO RECOVERY		
28	15	24/21.6	28-30	1-1 1-2	ND	Brown, fine to medium SAND, trace Silt, trace Gravel, wet. Changing at 29.8 feet to: NO RECOVERY.	28' SAND		
29							29.8'		
30	16	24/16.8	30-32	0-0 1-1	ND	Brown, fine to medium SAND, trace Silt, trace Gravel, wet. Changing at 31.4 feet to: NO RECOVERY.	30' NO RECOVERY SAND		
31							31.4'		
32	17	24/20.4	32-34	0-1 3-4	ND	Brown, fine to medium SAND, trace Silt,	NO RECOVERY 32' SAND		

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 3/25/19

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: PMW-WV-7/MW-WV-7D
Page: 3 **of** 6
File No.: 16.0062677.81
Check: Leslie Nelson

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
33						trace Gravel, wet. Changing at 33.7 feet to: NO RECOVERY.	SAND		
							33.7'		
34	18	24/22.8	34-36	1-2 4-5	ND	Brown, fine to medium SAND, trace Silt, trace Gravel, wet. Changing at 35.9 feet to: NO RECOVERY.	34' NO RECOVERY SAND		
35							35.9'		
36	19	24/10.8	36-38	1-2 1-4	ND	Brown, fine to medium SAND, trace Silt, trace Gravel, wet. Changing at 36.9 feet to: NO RECOVERY.	36' NO RECOVERY SAND		
37							36.9' NO RECOVERY		
38	20	24/12	38-40	1-0 4-4	ND	Brown, fine to medium SAND, trace Silt, trace Gravel, wet. Changing at 38.9 feet to: Brown, GRAVEL, some fine to coarse grained Sand, trace Silt, wet. Changing at 38.9 feet to: NO RECOVERY.	38' SAND		
39							38.9' 39' GRAVEL NO RECOVERY		
40	21	24/15.6	40-42	1-1 1-2	ND	Brown, fine to medium SAND, trace Silt, trace Gravel, wet. Changing at 41.3 feet to: NO RECOVERY.	40' SAND		
41							41.3' NO RECOVERY		
42	22	24/15.6	42-44	1-1 1-1	ND	Brown, fine to medium SAND, trace Silt, trace Gravel, wet. Changing at 43.3 feet to: NO RECOVERY.	42' SAND		
43							43.3' NO RECOVERY		
44	23	24/6	44-46	1-1 1-1	ND	Brown, fine to medium SAND, trace Silt, wet. Changing at 44.3 feet to: Brown, fine to medium SAND, little coarse grained Sand, little Gravel, trace Silt, wet. Changing at 44.5 feet to: NO RECOVERY.	44' SAND 44.5'		Bentonite Grout
45							NO RECOVERY		
46	24	24/9.6	46-48	1-1 3-5	ND	Brown, fine to medium SAND, little coarse grained Sand, little Gravel, trace Silt, wet. Changing at 46.6 feet to: Brown, GRAVEL and fine to coarse grained Sand, trace Silt, wet. Changing at 46.8 feet to: NO RECOVERY.	46' SAND 46.6'		
47							46.8' GRAVEL NO RECOVERY		
48	25	24/10.8	48-50	2-3 4-7	ND	Brown, fine to medium SAND, trace coarse grained Sand, trace Gravel, trace Silt, wet. Changing at 48.9 feet to: NO RECOVERY.	48' SAND		
49							48.9' NO RECOVERY		
							50'		

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 3/25/19

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
51	26	24/15.6	50-52	1-1 2-2	ND	Brown, fine to medium grained SAND, trace coarse grained Sand, trace Gravel, trace Silt, wet; with thin lenses of yellowish-brown, Silty Clay, moist. Changing at 51.3 feet to: NO RECOVERY.	SAND 51.3' NO RECOVERY 52'		
52 53	27	24/15.6	52-54	0-0 2-9	ND	Brown, fine to medium grained SAND, trace coarse grained Sand, trace Gravel, trace Silt, wet. Changing at 53.2 feet to: Brown, GRAVEL and fine to coarse grained Sand, trace Silt, wet. Changing at 53.3 feet to: No RECOVERY.	SAND 53.2' 53.3' GRAVEL NO RECOVERY 54'		
54 55	28	24/10.8	54-56	1-1 2-3	ND	Brown, fine to medium grained SAND, trace coarse grained Sand, trace Silt, wet. Changing at 54.9 feet to: NO RECOVERY.	SAND 54.9' NO RECOVERY 56'		
56 57	29	24/4.8	56-58	1-0 2-4	ND	Brown, fine to medium grained SAND, trace coarse grained Sand, trace Gravel, trace Silt, wet. Changing at 56.3 feet to: Brown, GRAVEL, trace Silt, wet. Changing at 56.4 feet to: NO RECOVERY.	56.3' SAND 56.4' GRAVEL NO RECOVERY 58'		
58 59	30	24/13.2	58-60	1-2 2-3	ND	Brown, fine to medium grained SAND, trace coarse grained Sand, trace Gravel, trace Silt, wet. Changing at 59.1 feet to: NO RECOVERY.	SAND 59.1' NO RECOVERY 60'		
60 61	31	24/9.6	60-62	1-2 6-11	ND	Brown, fine to medium grained SAND, trace coarse grained Sand, trace Gravel, trace Silt, wet. Changing at 60.8 feet to: NO RECOVERY.	SAND 60.8' NO RECOVERY 62'		
62 63	32	24/18	62-64	1-4 7-11	ND	Brown, fine to medium grained SAND, trace coarse grained Sand, trace Gravel, trace Silt, wet. Changing at 63.5 feet to: NO RECOVERY.	SAND 63.5' NO RECOVERY 64'		
64 65	33	24/13.2	64-66	1-2 3-6	ND	Brown, fine to medium grained SAND, trace coarse grained Sand, trace Gravel, trace Silt, wet. Changing at 65.1 feet to: NO RECOVERY.	SAND 65.1' NO RECOVERY 66'		
66 67	34	24/16.8	66-68	2-3 5-8	ND	Brown, fine to medium grained SAND, trace coarse grained Sand, trace Gravel, trace Silt, wet. Changing at 67.4 feet to: NO RECOVERY.	SAND 67.4'		

REMARKS

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BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 3/25/19

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: PMW-WV-7/MW-WV-7D
Page: 5 **of** 6
File No.: 16.0062677.81
Check: Leslie Nelson

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
68	35	24/21.6	68-70	1-1 2-3	ND	Brown, fine to medium grained SAND, trace coarse grained Sand, trace Gravel, trace Silt, wet. Changing at 69.8 feet to: NO RECOVERY.	68' NO RECOVERY SAND		
69							69.8'		
70	36	24/21.6	70-72	1-2 2-4	ND	Brown, fine to medium grained SAND, trace coarse grained Sand, trace Gravel, trace Silt, wet. Changing at 71.8 feet to: NO RECOVERY.	70' NO RECOVERY SAND		
71							71.8'		
72	37	24/12	72-74	1-0 0-1	ND	Brown, fine to medium grained SAND, trace coarse grained Sand, trace Gravel, trace Silt, wet. Changing at 73.0 feet to: NO RECOVERY.	72' NO RECOVERY SAND		
73							73' NO RECOVERY		
74	38	24/15.6	74-76	2-3 4-9	ND	Brown, fine to medium grained SAND, trace coarse grained Sand, trace Gravel, trace Silt, wet. Changing at 75.3 feet to: NO RECOVERY.	74' SAND		
75							75.3' NO RECOVERY		
76	39	24/19.2	76-78	1-2 5-6	ND	Brown, fine to medium grained SAND, trace coarse grained Sand, trace Gravel, trace Silt, wet. Changing at 77.2 feet to: Brown, fine to coarse grained SAND, some Gravel, trace Silt, wet. Changing at 77.6 feet to: NO RECOVERY.	76' SAND		
77							77.6'		
78	40	24/12	78-80	2-1 4-5	ND	Brown, fine to coarse grained SAND, some Gravel, trace Silt, wet. Changing at 79.0 feet to: NO RECOVERY.	78' NO RECOVERY SAND		
79							79' NO RECOVERY		
80	41	24/24	80-82	2-3 5-18	ND	Brown, fine to medium grained SAND, some Gravel, trace Silt, wet.	80' SAND		
81									
82	42	24/10.8	82-84	7-11 15-27	ND	Brown, GRAVEL, some fine to coarse grained SAND, wet. Changing at 82.9 feet to: NO RECOVERY.	82' GRAVEL		
83							82.9' NO RECOVERY		
84	43	24/19.2	84-86	23-27 35-25	ND	Yellowish-brown, GRAVEL, some Silty Sand, wet. Changing at 85.5 feet to: Yellowish-brown, GRAVEL, trace Silt, wet.	84' GRAVEL		

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 3/25/19

GZA
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Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: PMW-WV-7/MW-WV-7D
Page: 6 **of** 6
File No.: 16.0062677.81
Check: Leslie Nelson

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
86	44	24/8.4	86-88	6-8 19-29	ND	Changing at 85.6 feet to: NO RECOVERY. Brown, fine to coarse grained SAND, some Gravel, trace Silt, wet. Changing at 86.7 feet to: NO RECOVERY.	GRAVEL 85.6' NO RECOVERY 86' SAND 86.7' NO RECOVERY		
88	45	24/24	88-90	3-4 10-17	ND	Brown, fine to coarse grained SAND, some Gravel, trace Silt, wet. Changing at 88.8 feet to: Yellowish-brown, GRAVEL, trace Silt, wet.	88' SAND 88.8' GRAVEL		
90	46	24/7.2	90-92	14-35 40-50/5"	ND	Yellowish-brown, GRAVEL and fine to coarse grained SAND, little Silt, moist to wet. Changing at 90.6 feet to: NO RECOVERY.	90.6' NO RECOVERY		Filter Sand
92	47	24/14.4	92-94	4-8 12-10	ND	Yellowish-brown, GRAVEL and fine to coarse grained SAND, little Silt, moist to wet. Changing at 93.0 feet to: Very dark grayish-brown, Silty CLAY, moist. Changing at 93.2 feet to: NO RECOVERY.	92' GRAVEL 93' 93.2' CLAY NO RECOVERY		2-Inch PVC Well Screen
94	48	24/24	94-96	17-24 26-50	ND	Very dark grayish-brown, Silty CLAY, moist.	94' Silty CLAY		
96						Bottom of Borehole at 96.0 Feet	96'	3	
97									
98									
99									
100									
101									
102									

REMARKS

3. Monitoring well was installed in borehole upon completion. Well screen set from 90.2 to 95.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 3/25/19

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-7M
Page: 1 **of** 2
File No.: 16.0062677.81
Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry H.
Logged by: John Morehouse
Date Start/Finish: 3-18-19 / 3-18-19
Boring Location:
GS Elev.: **Datum:** MI State Plane S Zone NAD 83

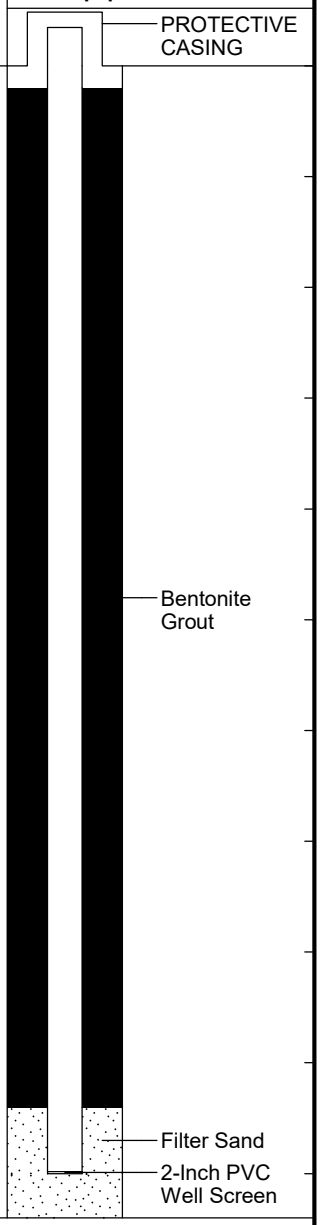
	Auger/ Casing	Sampler
Type:	Direct Push	MacroCore
O.D. / I.D.:	NA	2.25"
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks
1–51						See MW-WV7D boring log for soil descriptions.		

Equipment Installed



REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV-7M

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/15/20

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-7M
Page: 2 **of** 2
File No.: 16.0062677.81
Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
53									
54									
55						Bottom of Borehole at 55.0 Feet		1	
56									
57									
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112									

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 50.0 to 55.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/15/20

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV7S
Page: 1 **of** 1
File No.: 16.0062677.81
Check: Leslie Nelson

Contractor: Stearns Drilling Company
Foreman: Jerry Zach/Travis
Logged by: John Morehouse
Date Start/Finish: 10-25-18 / 10-25-18
Boring Location:
GS Elev.: **Datum:** NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
NM	NM	NM	NM	NM

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–21						See boring log PMW-WV-7/MW-WV-7D for soil descriptions.			PROTECTIVE CASING; Bentonite Grout; Filter Sand; 2-Inch PVC Well Screen
22						Bottom of Borehole at 21.5 Feet		1	

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 15.7 to 20.5 feet below ground surface.

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BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 3/25/19

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Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV8D
Page: 1 **of** 8
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Burt Graham
Logged by: Christopher Melby
Date Start/Finish: / 5-9-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/21	0-2	3-4 4-3		Dark, yellowish brown, moderately well sorted fine to medium grained SAND, little Silt, slightly cohesive, moist (FILL). Changing at 1.2 feet to: Yellowish brown with occasional dark grayish brown, moderately well sorted fine to medium grained SAND, little Silt, moist.	SAND (FILL) 1.2' SAND		PROTECTIVE CASING Concrete
2	2	24/14	2-4	1-1 1-3		Yellowish brown, well sorted fine to medium grained SAND, trace Silt, moist.			
4	3	24/17	4-6	1-2 2-2		Yellowish brown, well sorted fine to medium grained SAND, trace Silt, moist.			
6	4	24/17	6-8	2-3 2-3		Yellowish brown, well sorted fine to medium grained SAND, trace Silt, moist.			
8	5	24/24	8-10	3-2 3-4		Yellowish brown, well sorted fine to medium grained SAND, trace Silt, moist.			
10	6	24/19	10-12	4-4 4-4		Yellowish brown, well sorted fine to medium grained SAND, trace Silt, moist. Changing at 11.2 feet to: Brown tho yellowish brown, moderately sorted CLAY & SILT, little Sand, plastic, cohesive, moist.	11.2' 11.4' CLAY & SILT SAND		
12	7	24/19	12-14	1-5 5-5		Brown to yellowish brown, moderately sorted CLAY & SILT, little Sand, plastic, cohesive, moist. Changing at 13.0 feet to: Brown to yellowish brown, very well sorted SILT, cohesive, non plastic, moist.	13' 13.2' SILT SAND		
14	8	24/21	14-16	3-4 5-7		Brown to yellowish brown, very well sorted SILT, cohesive, non plastic, moist. Changing at 15.3 feet to: Pale brown to			

REMARKS

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Boring No.: MW-WV8D

BORING_WELL 6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV8D
Page: 2 **of** 8
File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						brown, moderately sorted, fine to coarse grained SAND, trace Silt, moist.	SAND		
16	9	24/17	16-18	2-3 7-7		Pale brown to light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 17 feet o: Yellowish brown, well sorted, CLAY & SILT, trace Sand, plastic, cohesive, moist. Changing at 17.1 feet o: Pale brown to light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, moist.	17' 17.1' CLAY & SILT SAND		
17									
18	10	24/20	18-20	5-5 6-7					
19						Pale brown to light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, moist.			
20	11	24/20	20-22	7-7 8-10		Pale brown to light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 21.1 feet to: Pale brown to brown, moderately well sorted, fine to coarse grained SAND, trace Silt, moist.			
21									
22	12	24/19	22-24	4-7 9-12		Pale brown to brown, moderately well sorted, fine to coarse grained SAND, trace Silt, moist. Changing at 23.3 feet to: Yellowish brown to brown, moderately sorted, fine to coarse grained SAND, some Gravel, trace Silt, moist to wet.		1	
23									
24	13	24/14	24-26	11-12 8-9		Yellowish brown to brown, moderately sorted, fine to coarse grained SAND, some Gravel, trace Silt, moist to wet.			
25									
26	14	24/20	26-28	3-4 6-7		Brown to dark brown, poorly sorted, medium to coarse grained SAND, some Gravel, trace Silt, wet; grains finer.			
27									
28	15	24/19	28-30	4-4 7-8		Brown to dark brown, moderately well sorted, fine to medium SAND, trace Silt, wet.			
29									
30	16	24/19	30-32	3-5 5-8		Brown to dark brown, moderately well sorted, fine to medium SAND, trace Silt, wet. Changing at 30.5 feet to: Brown, poorly sorted, coarse grained SAND, some Gravel, trace Silt, wet. Changing at 30.6 feet to: Brown to dark brown, moderately well sorted, fine to medium SAND, trace Silt, wet.			
31									
32	17	24/14	32-34	6-5 7-6					

REMARKS

1. Groundwater was encountered at approximately 23.3 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV8D
Page: 3 **of** 8
File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
33						Brown to dark brown, moderately well sorted, fine to medium SAND, trace Silt, wet. Changing at 33.2 feet to: Brown, well sorted, fine to medium grained SAND, trace Silt, wet.	SAND		
34	18	24/18	34-36	1-2 2-5		Brown, well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 34.3 feet to: Brown, poorly sorted, fine to coarse grained SAND, little Gravel, trace Silt, wet. Changing at 34.4 feet to: Brown, well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 34.8 feet to: Brown, poorly sorted, fine to coarse grained SAND, little Gravel trace Silt, wet. Changing at 35.5 feet to: Brown, well sorted, fine to medium grained SAND, trace Silt, wet.			
35									
36	19	24/18	36-38	5-7 9-10					
37									
38	20	24/21	38-40	7-7 8-9		Brown, well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 36.2 feet to: Dark brown, poorly sorted, medium to coarse grained SAND, some Gravel, trace Silt, wet.			
39						Dark brown, poorly sorted, medium to coarse grained SAND, some Gravel, trace Silt, wet.			
40	21	24/12	40-42	6-6 6-6		Brown, well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 41.0 feet to: Brown, well sorted, fine to medium grained SAND, trace Silt, wet.			
41									
42	22	24/2	42-44	1-1 1-1		Brown, well sorted, fine to medium grained SAND, trace Silt, wet.			
43									
44	23	24/14	44-46	3-5 6-9		Brown, well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 44.5 feet to: Dark brown, poorly sorted, medium to coarse grained SAND, some Gravel, trace Silt, wet. Changing at 44.6 feet to: Brown, well sorted, fine to medium grained SAND, trace Silt, wet.			
45									
46	24	24/15	46-48	2-4 6-6		Dark yellowish brown, moderately well sorted, fine to coarse grained SAND, litle Gravel, trace Silt, wet; grading coarser.			
47									
48	25	24/12	48-50	4-7 6-7		Dark yellowish brown, moderately well sorted, fine to coarse grained SAND, litle Gravel, trace Silt, wet; grading coarser.			
49									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV8D

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Algoma Twp, Kent County, Michigan

Boring No.: MW-WV8D
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File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
51	26	24/24	50-52	3-10 15-18		Brown, moderately well sorted, fine to coarse grained SAND, little Silt, trace Gravel, trace Silt, wet. Changing at 51.9 feet to: Brown, poorly sorted, fine to coarse SAND, little Silt, trace Gravel, moist to wet.	SAND		
52	27	24/7	52-54	3-7-50/4"		Dark brown, poorly sorted, medium to coarse grained SAND, some Gravel, trace Silt, wet. Changing at 52.6 feet to: Brown, moderately well sorted, fine to coarse SAND, trace Gravel, trace Silt, wet.			
54	28	24/24	54-56	4-7 23-50		Brown, moderately well sorted, fine to coarse SAND, trace Gravel, trace Silt, wet. Changing at 55.2 feet to: Yellowish brown to dark yellowish brown, very well sorted, fine grained SAND, some Silt, bedded, wet. Changing at 55.7 feet to: Brown, very well sorted, SILT, little fine grained Sand, moderately cohesive, wet; grades coarser. Yellowish brown, very well sorted, fine grained SAND and Silt, moderately cohesive, wet.	55.7' 56' SILT SAND		
56	29	24/14	56-58	4-17-50/6"					Bentonite Grout
58	30	24/23	58-60	16-27 33-45		Yellowish brown, very well sorted, fine grained SAND and Silt, moderately cohesive, wet. Changing at 58.5 feet to: Yellowish brown, very well sorted, SILT, moderately cohesive, non plastic, wet. Changing at 58.6 feet to: Yellowish brown, very well sorted, fine grained SAND and Silt, moderately cohesive, wet. Yellowish brown, very well sorted, fine grained SAND and Silt, moderately cohesive, wet.	58.5' 58.6' SILT SAND		
60	31	24/9	60-62	5-8 38-50/3"					
62	32	24/13	62-64	3-14 42-41		Yellowish brown, very well sorted, fine grained SAND and Silt, moderately cohesive, wet.			
64	33	24/11	64-66	38-50/4.5"		Yellowish brown, very well sorted, fine grained SAND and Silt, moderately cohesive, wet. Changing at 64.5 feet to: Light yellowish brown, very well sorted, SILT, moderately cohesive, non plastic, wet. Changing at 64.7 feet to: Light yellowish brown, well sorted, SILT & CLAY, slightly plastic, moderately cohesive, moist. Changing at 64.9 feet to: Yellowish brown, very well sorted, fine grained SAND and Silt, moderately cohesive, wet.	64.5' 64.7' SILT 64.9' SILT & CLAY SAND 66' SILT 66.5' SAND		
66	34	24/9	66-68	4-15 34-40					

REMARKS

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Boring No.: MW-WV8D

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV8D
Page: 5 **of** 8
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
68	35	24/11	68-70	8-14 44-50/4"		Grayish brown very well sorted, SILT, trace fine grained Sand, cohesive, non plastic, bedded, moist. Changing at 66.5 feet to: Grayish brown, very well sorted, fine grained SAND, trace Silt, moist.	SAND		
69						Grayish brown, very well sorted, fine grained SAND, trace Silt, moist. Changing at 68.3 feet to: Grayish brown, moderately sorted, fine to medium SAND, some Silt, trace Gravel, slightly cohesive, moist to wet.	70'		
70	36	24/9	70-72	49-50/4"			SILT & CLAY		
71						Grayish brown, poorly sorted, SILT & CLAY, little Sand, trace Gravel, slightly plastic, cohesive, moist.			
72	37	24/24	72-74	8-10 20-29		Dark grayish brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist.	72' CLAY & SILT		
73									
74	38	24/24	74-76	13-24 35-45		Hard, brown, Clayey SILT, some medium Sand, trace Gravel (embedded in Clayey SILT), wet.	74' Clayey SILT		
75									
76									
77									
78									
79	39	24/24	79-81	6-13 27-41		Hard, brown, Clayey SILT, some medium Sand (embedded in Clayey Silt), wet.			
80									
81									
82									
83									
84	40	24/18	84-86	2-2 5-6		Medium stiff, brown, Clayey SILT, some medium Sand, wet.			

REMARKS

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Algoma Twp, Kent County, Michigan

Boring No.: MW-WV8D
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File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
							Clayey SILT		
86									
87									
88									
89	41	24/24	89-91	9-16 44-45		Hard, brown, Clayey SILT, some medium Sand, wet.			
90									
91									
92									
93									
94	42	24/24	94-96	8-16 30-55		Hard, brown, Clayey SILT, some medium Sand, wet.			
95									
96									
97									
98									
99	43	24/24	99-101	8-19 34-42		Hard, brown, Clayey SILT, some medium Sand, wet.			
100									
101									
102									

REMARKS

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Algoma Twp, Kent County, Michigan

Boring No.: MW-WV8D
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File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
103							Clayey SILT		
104	44	24/24	104-106	6-14 20-20		Hard, brown, Clayey SILT, some medium to coarse Sand, wet. Changing at 105.0 feet to: Brown, fine to medium SAND, little Silt, wet.			
105							105' SAND		
106									
107									
108									
109	45	24/20	109-111	7-10 15-37		Medium dense, brown, fine to coarse SAND, little Silt, wet.			
110									
111									
112									
113									
114	46	22/22	114-115.8	3-5 24-50/4"		Medium dense, brown, fine to medium SAND, trace Silt, wet.			
115									
116									Filter Sand
117									
118									2-Inch PVC Well Screen
119	47	11/11	119-119.9	6-63/5"		Very dense, brown, fine to medium SAND, trace Silt, wet. Changing at 119.6 feet to: Very dense, gray, fine to medium SAND and			

REMARKS

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Boring No.: MW-WV8D

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Algoma Twp, Kent County, Michigan

Boring No.: MW-WV8D
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File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						Silt, wet.	SAND		
121	48	6/6	121-121.5	74		Very dense, gray, fine to medium SAND and Silt, wet.		2	
122									
123									
124	49	9/9	124-124.8	35-50/3"		Very dense, gray, fine to medium SAND and Silt.			
125									
126									
127									
128									
129	50	16/16	129-130.3	17-42-50/4"		Hard, gray, SILT & CLAY, some fine to medium Sand, wet.	129' SILT & CLAY		
130						Bottom of Borehole at 130.3 Feet	130.3'	3	
131									
132									
133									
134									
135									
136									
137									

REMARKS

2. Auger advancement slows at 120.0 fee below ground surface. Harder material. Collected in spoon.
3. Monitoring well was installed in borehole upon completion. Well screen set from 115.0 to 120.0 feet below ground surface.

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Boring No.: MW-WV8D

BORING_WELL_6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV8M
Page: 1 **of** 2
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Burt Graham
Logged by: Christopher Melby
Date Start/Finish: 5-9-18 / 5-10-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

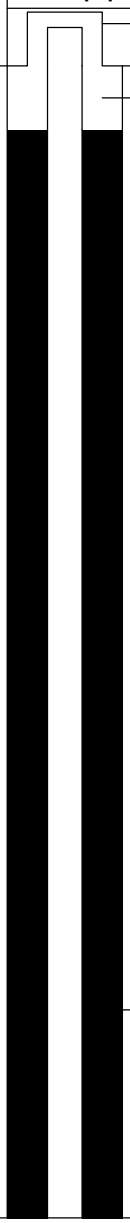
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–35						See MW-WV8D boring log for soil descriptions from 0.0 to 63.0 feet.		

Equipment Installed



REMARKS

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Boring No.: MW-WV8M

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV8M
Page: 2 **of** 2
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
37–77	S-1	24/24	63-65	15-23 36-51		Very dense, brown, fine to medium SAND, trace Silt, wet.	SAND		
65						Bottom of Borehole at 65.0 Feet	65'	1	

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 60.0 to 65.0 feet below ground surface.

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Boring No.: MW-WV8M

BORING_WELL_6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV8S
Page: 1 **of** 1
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Burt Graham
Logged by: Christopher Melby
Date Start/Finish: 5-9-18 / 5-9-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

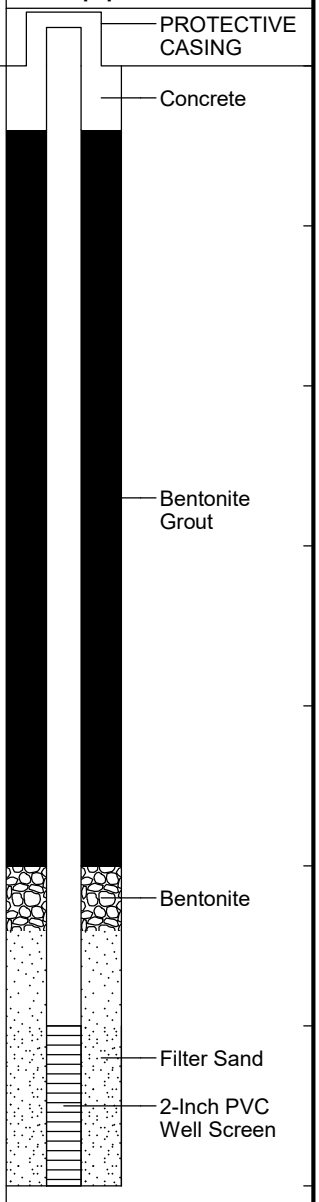
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–34						See MW-WV8D boring log for soil descriptions from 0.0 to 33.0 feet.		
33–34	S-1	24/12	33-35	2-3 4-6		Loose, brown and gray, fine to coarse SAND, trace Silt.	SAND	
35						Bottom of Borehole at 35.0 Feet	35'	1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 30.0 to 35.0 feet below ground surface.

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Boring No.: MW-WV8S

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Algoma Twp, Kent County, Michigan

Boring No.: MW-WV9D
Page: 1 **of** 8
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Zach/Travis
Logged by: John Morehouse
Date Start/Finish:
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

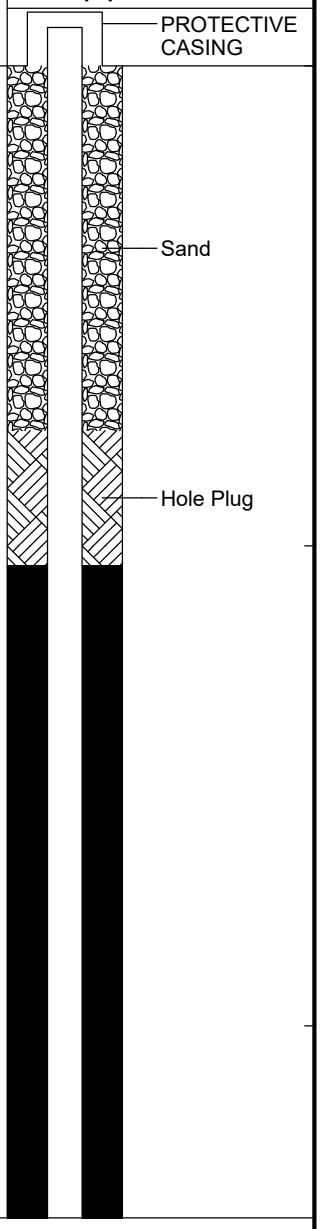
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
0	1	24/21	0-2	2-2 2-3		Very dark grayish brown, moderately well sorted, SILT, some fine to medium grained Sand, trace Gravel, moist.	SILT	
2	2	24/19	2-4	2-1 1-1		Dark yellowish brown, poorly sorted, fine grained SAND, some Silt, trace Clay, slightly plastic, moderately cohesive, moist.	2' SAND	
4	3	24/20	4-6	3-2 2-3		Yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist.		
6	4	24/17	6-8	2-2 2-3		Yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist.		
8	5	24/18	8-10	2-3 2-2		Yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist.		
10	6	24/23	10-12	2-2 3-3		Yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist.		

Equipment Installed



REMARKS

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Boring No.: MW-WV9D

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Boring No.: MW-WV9D
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File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	7	24/17	12-14	3-4 5-4		Pale brown, well sorted, fine to medium grained SAND, bedded, moist.	SAND		
13									
14	8	24/19	14-16	3-4 5-5		Pale brown, well sorted, fine to medium grained SAND, bedded, moist.			
15									
16	9	24/23	16-18	3-7 7-7		Pale brown, well sorted, fine to medium grained SAND, bedded, moist.			
17									
18	10	24/17	18-20	3-4 6-7		Pale brown, well sorted, fine to medium grained SAND, bedded, moist.			
19									
20	11	24/23	20-22	3-5 5-7		Pale brown, well sorted, fine to medium grained SAND, bedded, moist. Changing at 21.2 feet to: Yellowish brown, very well sorted, SILT & CLAY, moderately plastic, moderately cohesive, moist. Changing at 21.3 feet to: Pale brown grading to very pale brown, well sorted, fine to medium grained SAND, bedded, moist.	21.2' 21.3' SILT & CLAY SAND		
21									
22	12	24/17	22-24	8-13 17-22		Pale brown grading to very pale brown, well sorted, fine to medium grained SAND, bedded, moist.			
23									
24	13	24/23	24-26	15-20 18-21		Pale brown grading to very pale brown, well sorted, fine to medium grained SAND, bedded, moist. Changing at 25.1 feet to: Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
25									

REMARKS

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Boring No.: MW-WV9D
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Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
27	14	24/23	26-28	6-11 14-17		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.	SAND		
28	15	24/22	28-30	10-18 17-18		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
30	16	24/18	30-32	11-16 19-22		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
32	17	24/23	32-34	11-14 15-16		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist. Changing at 32.6 feet to: Yellowish brown to brown, very well sorted, fine grained SAND, trace Silt, moist to wet. Changing at 33.2 feet to: Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
34	18	24/24	34-36	13-17 21-25		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
36	19	24/24	36-38	8-12 22-24		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
38	20	24/23	38-40	17-18 23-25		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.	38' CLAY & SILT		

REMARKS

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BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

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Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
41	21	24/19	40-42	6-13 21-28		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.	CLAY & SILT		
42	22	24/19	42-44	5-11 17-20		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
43									
44	23	24/22	44-46	7-15 20-23		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
45									
46	24	24/20	46-48	5-6 9-13		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist. Changing at 46.3 feet to: Brown, well sorted, fine to medium grained SAND, trace Silt, moist to wet. Changing at 46.9 feet to: Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist.	46.3' SAND 46.9' CLAY & SILT		Bentonite Grout
47									
48	25	24/24	48-50	8-16 24-30		Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist.			
49									
50	26	24/11	50-52	5-11 19-25		Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist.			
51									
52	27	24/24	52-54	7-17 23-32		Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist.			
53									

REMARKS

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Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
	28	24/24	54-56	7-16 25-26		Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist. Changing at 55.5 feet to: Brown, poorly sorted, fine to coarse grained SAND, little Gravel, little Silt, moist to wet. Changing at 55.6 feet to: Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist. Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist. Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist. Changing at 59.5 feet to: Dark yellowish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 59.7 feet to: Yellowish brown, well sorted, SILT, trace Sand, non plastic, moderately cohesive, moist. Dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 60.6 feet to: Brown, poorly sorted, fine to medium grained SAND, little Silt, trace Clay, soft, moist to wet. Changing at 60.7 feet to: Dark yellowish brown grading to dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Dark yellowish brown grading to dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 62.4 feet to: Dark yellowish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 62.7 feet to: Brown, poorly sorted, fine to medium grained, SAND, little Silt, trace Clay, slightly plastic, moist to wet. Changing at 62.8 feet to: Dark yellowish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 63.5 feet to: Dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, grades softer, moist. Dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, grades softer, moist. Dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, grades softer, moist.	CLAY & SILT 55.5' 55.6' SAND CLAY & SILT 59.7' 60' SILT CLAY & SILT 60.6' 60.7' SAND CLAY & SILT 62.7' 62.8' SAND CLAY & SILT		
55									
56	29	24/24	56-58	5-13 19-25					
57									
58	30	24/24	58-60	9-15 31-43					
59									
60	31	24/24	60-62	11-15-50/5"					
61									
62	32	24/24	62-64	5-13 23-22					
63									
64	33	24/24	64-66	8-16 30-45					
65									
66	34	24/24	66-68	13-23 32-35					
67									

REMARKS

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Boring No.: MW-WV9D

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	35	24/24	68-70	11-18 24-32		Dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, grades softer, moist.	CLAY & SILT		
69									
70	36	24/24	70-72	12-10 11-18		Dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, grades softer, moist.			
71									
72	37	24/24	72-74	12-14 17-20		Dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, grades softer, moist.			
73									
74	38	24/11	74-76	0-2 3-5		Yellowish brown, moderately sorted, fine to coarse grained SAND, little Silt trace Gravel, moist to wet.	74' SAND		
75									
76	39	24/15	76-78	8-15 23-26		Yellowish brown, moderately sorted, fine to coarse grained SAND, little Silt trace Gravel, moist to wet. Changing at 76.9 feet to: Yellowish brown, moderately well sorted, fine to medium grained SAND, little Silt, moderately cohesisve, moist to wet.			
77								1	
78	40	24/15	78-80	8-20 29-37		Yellowish brown, moderately well sorted, fine to medium grained SAND, little Silt, moderately cohesisve, moist to wet.			
79									
80	41	24/9	80-82	14-33-50/3"		Yellowish brown, moderately well sorted, fine to medium grained SAND, little Silt, moderately cohesisve, moist to wet.			
81									

REMARKS

1. Groundwater was encountered at approximately 76.9 feet below ground surface.

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Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	42	24/3	82-84	21-44-50/3"		Yellowish brown, moderately well sorted, fine to medium grained SAND, little Silt, moderately cohesisve, moist to wet.	SAND		
83									
84	43	24/8	84-86	50/5"		Yellowish brown, poorly sorted, fine to medium grained SAND, little Silt, trace Gravel, trace Clay, non to slighty plastic, slightly cohesive, moist to wet.			
85									
86	44	24/7	86-88	12-35-50/6"		Yellowish brown, poorly sorted, fine to medium grained SAND, little Silt, trace Gravel, trace Clay, non to slighty plastic, slightly cohesive, moist to wet.			
87									
88	47	24/7	88-90	21-50/3"		Light yellowish brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, wet.			
89									
90	48	24/2	90-92	13-34-50/3"		Yellowish brown, poorly sorted, fine to medium grained SAND, little Silt, trace Gravel, trace Clay, non to slighty plastic, slightly cohesive, moist to wet.			
91									
92	49	24/17	92-94	5-14 30-50/3"		Yellowish brown, poorly sorted, fine to medium grained SAND, little Silt, trace Gravel, trace Clay, non to slighty plastic, slightly cohesive, moist to wet.			
93									Filter Sand
94	50	24/13	94-96	35-34 32-30		Light yellowish brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, occasional very thin Silt seams, wet.			
95									2-Inch PVC Well Screen

REMARKS

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Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
97	51	24/24	96-98	7-12 9-11		Light yellowish brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, occasional very thin Silt seams, wet. Changing at 96.6 feet to: Dark grayish brown, poorly sorted, SILT & CLAY, little Sand, trace Gravel, slightly plastic, moderately cohesive, moist. Changing at 96.8 feet to: Light yellowish brown to pale brown, very well sorted, fine to medium grained SANd, trace Silt, wet. Changing at 97.3 feet to: Dark grayish brown, poorly sorted, medium to coarse grained SAND, trace Gravel, trace Silt, wet. Changing at 97.8 feet to: Dark grayish brown, poorly sorted, medium to coarse grained SAND, trace Gravel, moderately plastic, cohesive, hard, moist.	SAND 96.6' 96.8' SILT & CLAY SAND 97.8' SILT & CLAY		
98	52	24/15	98-100	8-16 21-28					
99									
100						Dark grayish brown, poorly sorted, medium to coarse grained SAND, trace Gravel, moderately plastic, cohesive, hard, moist. Bottom of Borehole at 100.0 Feet	100'	2	
101									
102									
103									
104									
105									
106									
107									
108									
109									

REMARKS

2. Monitoring well was installed in borehole upon completion. Well screen set from 92.3 to 97.3 feet below ground surface.

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

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Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry H.
Logged by: John Morehouse
Date Start/Finish: 3-5-19 / 3-13-19
Boring Location:
GS Elev.: **Datum:** MI State Plane S Zone NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–39						See MW-WV-10S for soil descriptions from 0.0 to 78.8 feet.	BLIND DRILL	1	PROTECTIVE CASING

REMARKS

1. Blind drilled from 0.0 to 78.0 feet below ground surface.

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Boring No.: MW-WV-10D

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
41							BLIND DRILL		
42									
43									
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
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69									
70									
71									
72									
73									
74									
75									
76									
77									
78	1	24/22	78-80	11-24	2.3 ppmv	Gray, CLAY, moist. Changing at 78.2 feet	78' 78.2' CLAY		
79				36-50		to: Very dense, brown, fine to coarse SAND,	SAND		
80	2	24/24	80-82	12-48-50	1.7 ppmv	moist.	80.2' CLAY		
81						Very dense, fine to coarse SAND, moist.			Bentonite/Grout
82	3	24/24	82-84	42-50	0.1 ppmv	Changing at 80.2 feet to: Hard, gray, CLAY, wet.	82' Clayey SILT		
83						Hard, gray, Clayey SILT, wet. Changin gat	83.8'		
84	4	24/12	84-86	19-50	1.7 ppmv	83.8 feet to: Very dense, gray, fine to coarse	84' SAND		
85						SAND, wet.	Clayey SILT		
86						Hard, gray, Clayey SILT, trace fine to	86' CLAY		

REMARKS

Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
87	5	24/24	86-88	3-10	2.3 ppmv	coarse Sand, wet.	CLAY		
88	6	24/24	88-90	28-45 19-29 38-50	1.5 ppmv	Hard, gray, CLAY, trace Silt, trace Rock fragments, moist. Changing at 86.2 feet to: Gray, SAND, moist. Changing at 87.2 feet	88' Clayey SILT		
89							90'		
90	7	24/24	90-92	10-18 32-41	2.3 ppmv	to: Stiff, gray, Silty CLAY, wet.	Silty CLAY		
91						Hard, gray, Clayey SILT, trace fine to coarse Sand, moist.			
92	8	24/24	92-94	3-8 21-27	2.5 ppmv	Hard, gray, Silty CLAY, little fine to coarse Sand, moist.			
93									
94	9	24/24	94-96	3-8 21-27	1.9 ppmv	Hard, gray, Silty CLAY, trace Rock fragments, wet.			
95									
96	10	24/24	96-98	20-21 26-38	0.9 ppmv	Hard, gray, Silty CLAY, trace Rock fragments, wet.			
97									
98	11	24/24	98-100	27-32 40-80	7.1 ppmv	Hard, gray, Silty CLAY, trace fine to coarse Sand, wet.			
99						Hard, gray, Silty CLAY, wet.			
100	12	24/24	100-102	1-2 11-22	1.6 ppmv	Hard, gray, Silty CLAY, trace fine to coarse Sand, wet.			
101									
102	13	24/12	102-104	5-40 48-50	0.9 ppmv	Hard, gray, Silty CLAY, wet.			
103									
104	14	24/24	104-106	5-19 18-26	1.7 ppmv	Hard, gray, Silty CLAY, trace Gravel, wet.			
105									
106	15	24/24	106-108	2-2 18-24	1.6 ppmv	Hard, gray, Silty CLAY, trace fine to coarse Sand, wet.			
107									
108	16	24/24	108-110	6-13 25-46	1.8 ppmv	Hard, gray, Silty CLAY, moist.			
109									
110	17	24/20	110-112	7-28-50	0.6 ppmv	Hard, gray, Silty CLAY, wet.			
111									
112	18	24/24	112-114	3-19 50-21	1.4 ppmv	Hard, gray, Silty CLAY, moist. Changing at 113.7 feet to: Very loose, fine to coarse SAND, trace Gravel, moist.			
113							114'		
114	19	24/24	114-116	2-4 10-16	2.2 ppmv	Medium dense, gray, fine to coarse SAND, trace Silt, wet.	SAND		
115									
116	20	24/10	116-118	6-27-50/4	0.7 ppmv	Medium dense, gray, fine to coarse SAND, trace Silt, wet. Changing at 116.5 feet to:	116.5' Clayey SAND		
117							118'		
118	21	24/23	118-120	5-26 29-32	0.5 ppmv	Gray, fine to coarse Clayey SAND, some Gravel, wet.	SAND		
119							119.8'		
120	22	24/10	120-122	24-50	0.4 ppmv	Dense, gray, SAND, wet. Changing at 119.8 feet to: Hard, gray, CLAY, little fine to coarse Sand, trace Gravel, moist.	120' CLAY Silty CLAY		
121									
122	23	24/24	122-124	6-27-50	0.4 ppmv	Hard, gray, Silty CLAY, trace Rock fragments, wet.			
123									
124	24	24/24	124-126	23-50/6"	0.6 ppmv	Hard, gray, Silty CLAY, trace Gravel, wet. Medium dense, gray and brown, SAND, wet. Changing at 123.8 feet to: Hard, gray, Silty	124' SAND		
125									
126	25	24/24	126-128	9-30-50/6	0.4 ppmv	CLAY, trace Gravel, wet.			
127						Dense, gray and brown, SAND, trace Gravel, wet. Changing at 127.5 feet to:			
128	26	24/4	128-130	4-40-50/6	0.4 ppmv	Hard, gray, Silty CLAY, trace fine to coarse Sand, wet.			
129									
130	27	24/24	130-132	13-31-52/6	0.4 ppmv	Gray and brown, fine to coarse SAND, wet. Hard, gray, Silty CLAY, trace fine to coarse SAND, wet.	130' Silty CLAY		
131									
132	28	24/24	132-134	11-26	0.4 ppmv	Hard, gray, Silty CLAY, trace fine to coarse			
133									

REMARKS

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Algoma Twp, Kent County, Michigan

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
134				29-50/6"		SAND, wet.	Silty CLAY		
135	29	24/24	134-136	16-34-50/6"	0.3 ppmv	Hard, gray, Silty CLAY, trace fine to coarse SAND, wet.	136'		
136	30	24/14	136-138	5-17 28-33	1.5 ppmv	Very stiff, Clayey SILT, little fine to coarse Sand, wet. Changing at 137.8 feet to: Hard, gray, Silty CLAY, wet.	Clayey SILT 138'		
138	31	24/22	138-140	14-50/6"	1.1 ppmv	Hard, gray, Silty CLAY, wet with Rock fragments at top of spoon.	Silty CLAY		
140	32	24/24	140-142	8-20 25-34	1.2 ppmv	Hard, gray, Silty CLAY, wet.			
142	33	24/24	142-144	22-27 40-45	2.0 ppmv	Hard, gray, Silty CLAY, wet with fine Sand at bottom of spoon.			
144	34	24/24	144-146	9-22 44-50/3"	0.8 ppmv	Hard, gray, Silty CLAY, little Gravel, wet with 2-inch of Gravel at top of spoon.			
146	35	24/24	146-148	9-38-50/3"	1.6 ppmv	Hard, gray, Silty CLAY, wet.			
148	36	24/24	148-150	2-22 29-32	1.2 ppmv	Hard, gray, Silty CLAY, wet.			
150	37	24/24	150-152	2-7 19-31	2.3 ppmv	Very stiff, gray, Silty CLAY, wet.			
152	38	24/24	152-154	18-30 44-50/6"	1.9 ppmv	Hard, gray, Silty CLAY, trace Gravel, wet.	154'		
154	39	24/24	154-156	8-14 45-50/6"	1.5 ppmv	Very dense, gray, Clayey fine to coarse SAND, some Gravel, wet.	SAND		
156	40	24/18	156-158	22-50/4"	1.5 ppmv	Very dense, gray, Clayey fine to coarse SAND, some Gravel, wet.	158'		
158	41	24/15	158-160	24-50/3"	1.0 ppmv	Very dense, gray, Clayey fine to coarse SAND and GRAVEL, wet.	SAND and GRAVEL	2	
160	42	24/24	160-162	50/4"	0.4 ppmv	Very dense, gray, Clayey fine to coarse SAND and GRAVEL, wet.			
162	43	24/24	162-164	14-50/4"	0.2 ppmv	Very dense, gray, Clayey fine to coarse SAND and GRAVEL, wet.	164'		Filter Sand
164	44	24/10	164-166	50/3"	0.4 ppmv	Hard, Silty CLAY, some Gravel, some fine to coarse Sand, wet.	CLAY 166'		
166	45	24/12	166-168	50/6"	0.9 ppmv	Very dense, red, Clayey fine to coarse SAND, some Gravel, wet.	SAND		2-Inch PVC Well Screen
168	46	24/12	168-170	50	0.7 ppmv	Very dense, red, Clayey fine to coarse SAND, some Gravel, trace Shells, wet.	170'		
170	47	24/0	170-172	50/3"	NA	NO RECOVERY.	NO RECOVERY	3	
172	48	24/0	172-174	50/3"	NA	NO RECOVERY.			
174	49	24/0	174-176	50/3"	NA	NO RECOVERY.	176'		
176						Bottom of Borehole at 176.0 Feet		4	
178									

REMARKS

2. Temporary well installed from 158.0 to 168.0 feet below ground surface. Well screen interval from 163.0 to 168.0 feet below ground surface. Purged 80.0 gallons of water.
3. Likely ecountered sandstone bedrock at 170.0 feet below ground surface with a well screen set from 165.0 to 170.0 feet below ground surface.
4. Monitoring well was installed in borehole upon completion. Well screen set from approximately 165.0 to 170.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV-10D

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-10M
Page: 1 of 2
File No.: 16.0062677.81
Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry H.
Logged by: John Morehouse
Date Start/Finish: 3-5-19 / 3-13-19
Boring Location:
GS Elev.: **Datum:** MI State Plane S Zone NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/12	0-2	3-1 1-4	ND	Very loose, dark brown, TOPSOIL. Changing at 0.5 feet to: Brown, fine SAND, some Silt, trace Gravel, dry.	0.5' TOPSOIL SAND 2'	1	PROTECTIVE CASING
2 3	2	24/0	2-4	3-2 2-4	NA	NO RECOVERY.	NO RECOVERY 4'	2	
4 5	3	24/24	4-6	1-2 2-4	ND	Loose, light brown, fine to medium SAND, little Silt, moist.	SAND 6'		
6 7	4	24/0	6-8	3-2 4-4	NA	NO RECOVERY.	NO RECOVERY 8'		
8 9	5	24/18	8-10	2-3 3-3	ND	Loose, light brown, fine SAND, some Silt, wet.	SAND	3 4	
10 11	6	24/24	10-12	1-1 1-1	ND	Very loose, light brown, fine SAND, some Silt, wet. Changing at 11.5 feet to: Brown, fine to coarse SAND, some Silt, wet.			
12 13	7	24/24	12-14	3-7 4-6	ND	Medium dense, brown, fine to coarse SAND, some Silt, trace Rock fragments, wet.			
14 15	8	24/24	14-16	1-3 5-8	ND	Loose, brown, fine to coarse SAND, little Silt, trace Rock fragments, wet.			
16 17	9	24/24	16-18	7-11 13-36	ND	Medium dense, fine to coarse SAND, little Silt, wet.			
18 19	10	24/24	18-20	4-10 9-11	ND	Medium dense, brown, fine to coarse SAND, little fine Gravel, little Silt, wet.		5	
20 21	11	24/24	20-22	6-19 21-18	ND	Dense, brown, fine to coarse SAND, little Gravel, little Silt, wet.			
22 23	12	24/24	22-24	6-16 15-15	ND	Dense, brown, fine to coarse SAND, little Gravel, little Silt, wet.			
24 25	13	24/24	24-26	10-17 18-16	ND	Dense, brown, fine to coarse SAND, little Gravel, little Silt, wet.			
26 27	14	24/24	26-28	2-6 10-9	ND	Dense, brown, fine to coarse SAND, little Gravel, little Silt, wet. Changing at 26.5 feet to: Brown, fine SAND and Silt with 17 to 18-inch brown, Silty CLAY lenses.		6	
28 29	15	24/24	28-30	4-6 6-15	ND		28.8' Silty CLAY 30.5'		
30 31	16	24/24	30-32	5-8 8-10	ND	Medium dense, brown, fine to coarse SAND, little Silt, wet. Changing at 28.8 feet to: Brown, Silty CLAY, little fine Sand, wet.	CLAY & SILT 32'		
32 33	17	24/12	32-34	2-4 10-13	ND	Medium dense, brown, fine to coarse SAND, little Silt, wet. Changing at 30.5 feet to: Brown, CLAY & SILT, little fine Sand, wet.	Clayey SILT 34'		
34 35	18	24/24	34-36	8-9 22-40	ND	Stiff, brown, Clayey SILT, little fine Sand, wet.	SAND 36'	7	Filter Sand Bentonite/Grout
36 37	19	24/24	36-38	7-16 26-21	ND	Dense, brown, fine SAND and SILT, wet.	Silty CLAY		
38 39	20	24/24	38-40	4-9 15-17	ND	Hard, gray, Silty CLAY, wet. Very stiff, brown and gray, Silty CLAY, wet.			

REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).
2. During drilling to 4.0 feet below ground surface, sediment appeared to be Sand.
3. Groundwater was encountered at approximately 8.0 feet below ground surface.
4. Temporary well installed from 8.0 to 18.0 feet below ground surface. Well screen interval from 13.0 to 18.0 feet below ground surface. Purged 30.0 gallons of water.
5. Temporary well installed from 18.0 to 28.0 feet below ground surface. Well screen interval from 23.0 to 28.0 feet below ground surface. Purged 20.0-25.0 gallons of water.
6. Temporary well installed from 26.0 to 36.0 feet below ground surface. Well screen interval from 31.0 to 36.0 feet below ground surface. Purged 20.0-25.0 gallons of water.
7. Casing was set at 36.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 4/20/20

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Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-10M
Page: 2 **of** 2
File No.: 16.0062677.81
Check: Kate McDonald

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
41	21	24/24	40-42	5-10 14-15	ND	Very stiff, brown and gray, Silty CLAY, wet.	Silty CLAY		
42 43	22	24/24	42-44	3-6 8-13	ND	Stiff, brown and gray, Silty CLAY, wet.			
44 45	23	24/24	44-46	3-3 6-11	ND	Stiff, brown and gray, Silty CLAY, wet.			
46 47	24	24/24	46-48	2-5 10-15	ND	Stiff, brown and gray, Silty CLAY, wet. Changing at 47.5 feet to: Stiff, brown and gray, Silty CLAY, trace fine Sand, wet.			
48 49	25	24/24	48-50	6-7 11-16	ND	Very stiff, brown and gray, Silty CLAY, trace Fine Sand, wet.			
50 51	26	24/24	50-52	12-17 <1-21	ND	Hard, brown and gray, Silty CLAY, trace fine Sand, wet.			
52 53	27	24/24	52-54	4-15 21-19	ND	Hard, brown and gray, Silty CLAY, trace fine Sand, wet. Changing at 53.5 feet to: Brown and gray, fine SAND and Silt, little Clay, wet.	53.5' 54' SAND Silty CLAY		
54 55	28	24/24	54-56	5-11 17-20	ND	Very stiff, brown and gray, Silty CLAY with Sandy lenses 12-18 inches and black smear at 18 inches.			
56 57	29	24/24	56-58	8-16 20-27	ND	Hard, brown and gray, Silty CLAY, wet. Changing at 57.2 feet to: Brown and gray, CLAY & SILT, trace fine to coarse Sand, wet.	57.2' 58' CLAY & SILT Silty CLAY		
58 59	30	24/24	58-60	4-8 17-22	ND	Very stiff, brown and gray, Silty CLAY, trace fine Sand, wet. Changing at 59.5 feet to: Brown and gray, CLAY & SILT, trace fine to coarse Sand, wet.	59.5' 60' CLAY & SILT Clayey SILT		
60 61	31	24/24	60-62	8-14 15-22	ND		62' Silty CLAY		
62 63	32	24/24	62-64	3-7 22-27	ND		63.6' 64.3' SAND		
64 65	33	24/24	64-66	6-44-50/6"	ND	Very stiff, Clayey SILT, little fine to coarse Sand, wet.	65' Silty CLAY 65.5' SAND	8	
66 67	34	24/6	66-68	22-50/4"	ND	Very stiff, Silty CLAY, trace fine Sand, wet. Changing at 63.6 feet to: Brown, fine to coarse SAND and Silt, little fine Gravel, wet.	Clayey SILT	9	
68 69	35	24/18	68-70	17-35-50/6"	ND	Very dense, brown, fine to medium SAND, some Silt, wet. Changing at 64.3 feet t: Brown and gray, Silty CLAY, trace fine to coarse Sand, wet. Changing at 65.0 feet to: Brown, fine to coarse SAND, little Gravel, some Silt, wet. Changing at 65.5 feet to: Brown, Clayey SILT, little fine to coarse Sand, wet.	68' SAND	10	
70 71	36	24/21	70-72	3-8 22-50/3"	ND				2-Inch PVC Well Screen
72 73	37	24/18	72-74	2-14-50/6"	ND				
74 75	38	24/18	74-76	8-29-50/6"	ND	Hard, brown, Clayey SILT, little fine to coarse Sand, wet.	75'		
76 77	39	24/15	76-78	17-30-50/3"	ND	Very dense, gray and brown, fine to coarse SAND, little Silt, trace Gravel, wet.		11	
78 79						Dense, gray and brown, fine to medium SAND, little Silt, wet.			
80 81						Dense, gray and brown, fine to medium SAND, little Silt, wet with Silty Clay 15 to 16 inches.			
82 83						Very dense, gray and brown, fine to medium SAND, little Silt, wet.			
84 85 86						Bottom of Borehole at 75 Feet			

REMARKS

8. Switched to 3.0-inch split spoon at 64.0 feet below ground surface.
9. Temporary well installed from 66.0 to 76.0 feet below ground surface. Well screen interval from 71.0 to 66.0 feet below ground surface. Purged 34.0 gallons of water.
10. Swiched to 2.0-inch split spoon at 68.0 feet below ground surface.
11. Monitoring well was installed in borehole upon completion. Well screen set from approximately 71.0 to 75.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 4/20/20

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Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-10S
Page: 1 **of** 5
File No.: 16.0062677.81
Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry Zach/Travis
Logged by: C. Melby
Date Start/Finish: 3-5-19 / 3-9-19
Boring Location:
GS Elev.: **Datum:** MI State Plane S Zone NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/12	0-2	3-1 1-4	ND	Very loose, dark brown, TOPSOIL. Changing at 0.5 feet to: Brown, fine SAND, some Silt, trace Gravel, dry.	TOPSOIL 0.5' SAND	1	PROTECTIVE CASING
2	2	24/0	2-4	3-2 2-4	NA	NO RECOVERY.	2' NO RECOVERY	2	
4	3	24/24	4-6	1-2 2-4	ND	Loose, light brown, fine to medium SAND, little Silt, moist.	4' SAND		
6	4	24/0	6-8	3-2 4-4	NA	NO RECOVERY.	6' NO RECOVERY		
8	5	24/18	8-10	2-3 3-3	ND	Loose, light brown, fine SAND, some Silt, wet.	8' SAND	3 4	
10	6	24/24	10-12	1-1 1-1	ND	Very loose, light brown, fine SAND, some Silt, wet. Changing at 11.5 feet to: Brown, fine to coarse SAND, some Silt, wet.			
12	7	24/24	12-14	3-7 4-6	ND	Medium dense, brown, fine to coarse SAND, some Silt, trace Rock fragments, wet.			
14	8	24/24	14-16	1-3 5-8	ND	Loose, brown, fine to coarse SAND, little Silt, trace Rock fragments, wet.			

REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).
2. During drilling to 4.0 feet below ground surface, sediment appeared to be Sand.
3. Groundwater was encountered at approximately 8.0 feet below ground surface.
4. Temporary well installed from 8.0 to 18.0 feet below ground surface. Well screen interval from 13.0 to 18.0 feet below ground surface. Purged 30.0 gallons of water.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV-10S

BORING_WI_6267781 WWW.WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-10S
Page: 2 **of** 5
File No.: 16.0062677.81
Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
							SAND		
16	9	24/24	16-18	7-11 13-36	ND	Medium dense, fine to coarse SAND, little Silt, wet.			
17									
18	10	24/24	18-20	4-10 9-11	ND	Medium dense, brown, fine to coarse SAND, little fine Gravel, little Silt, wet.		5	
19									
20	11	24/24	20-22	6-19 21-18	ND	Dense, brown, fine to coarse SAND, little Gravel, little Silt, wet.			
21									
22	12	24/24	22-24	6-16 15-15	ND	Dense, brown, fine to coarse SAND, little Gravel, little Silt, wet.			
23									
24	13	24/24	24-26	10-17 18-16	ND	Dense, brown, fine to coarse SAND, little Gravel, little Silt, wet.			
25									
26	14	24/24	26-28	2-6 10-9	ND	Dense, brown, fine to coarse SAND, little Gravel, little Silt, wet. Changing at 26.5 feet to: Brown, fine SAND and Silt with 17 to 18-inch brown, Silty CLAY lenses.		6	
27									
28	15	24/24	28-30	4-6 6-15	ND	Medium dense, brown, fine to coarse SAND, little Silt, wet. Changing at 28.8 feet to: Brown, Silty CLAY, little fine Sand, wet.	28.8' Silty CLAY		
29									
30	16	24/24	30-32	5-8 8-10	ND	Medium dense, brown, fine to coarse SAND, little Silt, wet. Changing at 30.5 feet to: Brown, CLAY & SILT, little fine Sand, wet.	30.5' CLAY & SILT		
31									
32	17	24/12	32-34	2-4	ND	Stiff, brown, Clayey SILT, little fine Sand,	32' Clayey SILT		

REMARKS

5. Temporary well installed from 18.0 to 28.0 feet below ground surface. Well screen interval from 23.0 to 28.0 feet below ground surface. Purged 20.0-25.0 gallons of water.
6. Temporary well installed from 26.0 to 36.0 feet below ground surface. Well screen interval from 31.0 to 36.0 feet below ground surface. Purged 20.0-25.0 gallons of water.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-10S
Page: 3 **of** 5
File No.: 16.0062677.81
Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
33				10-13		wet.	Clayey SILT		
34	18	24/24	34-36	8-9 22-40	ND	Dense, brown, fine SAND and SILT, wet.	34' SAND		Bentonite/Grout
35								7	
36	19	24/24	36-38	7-16 26-21	ND	Hard, gray, Silty CLAY, wet.	36' Silty CLAY		
37									
38	20	24/24	38-40	4-9 15-17	ND	Very stiff, brown and gray, Silty CLAY, wet.			
39									
40	21	24/24	40-42	5-10 14-15	ND	Very stiff, brown and gray, Silty CLAY, wet.			
41									
42	22	24/24	42-44	3-6 8-13	ND	Stiff, brown and gray, Silty CLAY, wet.			
43									
44	23	24/24	44-46	3-3 6-11	ND	Stiff, brown and gray, Silty CLAY, wet.			
45									
46	24	24/24	46-48	2-5 10-15	ND	Stiff, brown and gray, Silty CLAY, wet. Changing at 47.5 feet to: Stiff, brown and gray, Silty CLAY, trace fine Sand, wet.			
47									
48	25	24/24	48-50	6-7 11-16	ND	Very stiff, brown and gray, Silty CLAY, trace Fine Sand, wet.			
49									

REMARKS

7. Casing was set at 36.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-10S
Page: 4 **of** 5
File No.: 16.0062677.81
Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
	26	24/24	50-52	12-17 <1-21	ND	Hard, brown and gray, Silty CLAY, trace fine Sand, wet.	Silty CLAY		
51									
52	27	24/24	52-54	4-15 21-19	ND	Hard, brown and gray, Silty CLAY, trace fine Sand, wet. Changing at 53.5 feet to: Brown and gray, fine SAND and Silt, little Clay, wet.			
53							53.5' SAND		
54	28	24/24	54-56	5-11 17-20	ND	Very stiff, brown and gray, Silty CLAY with Sandy lenses 12-18 inches and black smear at 18 inches.	54' Silty CLAY		
55									
56	29	24/24	56-58	8-16 20-27	ND	Hard, brown and gray, Silty CLAY, wet. Changing at 57.2 feet to: Brown and gray, CLAY & SILT, trace fine to coarse Sand, wet.			
57							57.2' CLAY & SILT		
58	30	24/24	58-60	4-8 17-22	ND	Very stiff, brown and gray, Silty CLAY, trace fine Sand, wet. Changing at 59.5 feet to: Brown and gray, CLAY & SILT, trace fine to coarse Sand, wet.	58' Silty CLAY		
59							59.5' CLAY & SILT		
60	31	24/24	60-62	8-14 15-22	ND	Very stiff, Clayey SILT, little fine to coarse Sand, wet.	60' Clayey SILT		
61									
62	32	24/24	62-64	3-7 22-27	ND	Very stiff, Silty CLAY, trace fine Sand, wet. Changing at 63.6 feet to: Brown, fine to coarse SAND and Silt, little fine Gravel, wet.	62' Silty CLAY		
63							63.6' SAND		
64	33	24/24	64-66	6-44-50/6"	ND	Very dense, brown, fine to medium SAND, some Silt, wet. Changing at 64.3 feet t: Brown and gray, Silty CLAY, trace fine to coarse Sand, wet. Changing at 65.0 feet to: Brown, fine to coarse SAND, little Gravel, some Silt, wet. Changing at 65.5 feet to: Brown, Clayey SILT, little fine to coarse Sand, wet.	64.3' Silty CLAY	8	
65							65' SAND		
66	34	24/6	66-68	22-50/4"	ND	Hard, brown, Clayey SILT, little fine to coarse Sand, wet.	65.5' Clayey SILT	9	
67									

REMARKS

8. Switched to 3.0-inch split spoon at 64.0 feet below ground surface.
9. Temporary well installed from 66.0 to 76.0 feet below ground surface. Well screen interval from 71.0 to 66.0 feet below ground surface. Purged 34.0 gallons of water.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-10S
Page: 5 **of** 5
File No.: 16.0062677.81
Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
68	35	24/18	68-70	17-35-50/6"	ND	Very dense, gray and brown, fine to coarse SAND, little Silt, trace Gravel, wet.	Clayey SILT 68' SAND	10	
69									
70	36	24/21	70-72	3-8 22-50/3"	ND	Dense, gray and brown, fine to medium SAND, little Silt, wet.			Filter Sand
71									
72	37	24/18	72-74	2-14-50/6"	ND	Dense, gray and brown, fine to medium SAND, little Silt, wet with Silty Clay 15 to 16 inches.			
73									2-Inch PVC Well Screen
74	38	24/18	74-76	8-29-50/6"	ND	Very dense, gray and brown, fine to medium SAND, little Silt, wet.			
75									
76	39	24/15	76-78	17-30-50/3"	ND	Hard, gray, Silty CLAY, wet.			
77									
78						Bottom of Borehole at 78.8 Feet	78'	11	
79									
80									
81									
82									
83									
84									

REMARKS

10. Swiched to 2.0-inch split spoon at 68.0 feet below ground surface.
11. Monitoring well was installed in borehole upon completion. Well screen set from approximately 71.0 to 75.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: PMW-WV-11/MW-WV-11D
Page: 1 of 15
File No.: 16.0062677.81
Check: Leslie Nelson

Contractor: Stearns Drilling Company
Foreman: Jerry H., Travis & Zach/Gary
Logged by: John Morehouse
Date Start/Finish: 1-3-19 / 1-9-19
Boring Location: 11 Mile Rd & Algoma Ave NE, Rockford, MI
GS Elev.: No Surveyed **Datum:** NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
NM	NM	NM	NM	NM

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/20.4	0-2	1-0 1-2	ND	Black, fine to medium-grained SAND, little Silt, slightly cohesive, moist. Changing at 0.7 feet to: Dark yellowish-brown, CLAY & SILT, plastic, cohesive, moist. Changing at 1.7 feet to: NO RECOVERY.	SAND 0.7' CLAY & SILT 1.7'	1	PROTECTIVE CASING
2	2	24/24	2-4	2-3 3-5	ND	Dark yellowish-brown, CLAY & SILT, plastic, cohesive, moist. Changing at 2.7 feet to: Mottled, yellowish-brown, CLAY & SILT, little Sand, plastic, cohesive, moist. Changing at 3.5 feet to: Light brownish-gray, SILT, little Clay, moderately plastic, cohesive, moist. Changing at 3.8 feet to: Yellowish-brown, fine to medium grained SAND, little Silt. wet.	NO RECOVERY 2' CLAY & SILT 3.5' SILT 3.8'		
4	3	24/15.6	4-6	1-2 3-3	ND	Yellowish-brown, fine to medium grained SAND, little Silt. wet. Changing at 5.3 feet to: NO RECOVERY.	SAND 5.3' NO RECOVERY 6'	2	
6	4	24/24	6-8	3-2 4-5	ND	Brown, CLAY & SILT, plastic, cohesive, moist. Changing at 6.2 feet to: Yellowish-brown, fine to medium grained SAND, little Silt, wet. Changing at 6.4 feet to: Brown, CLAY & SILT, plastic, cohesive, moist. Changing at 7.5 feet to: Yellowish-brown, CLAY & SILT, plastic, cohesive, moist. Changing at 7.6 feet to: Brown, CLAY & SILT, plastic, cohesive, moist. Changing at 7.8 feet to: Yellowish-brown, fine to medium grained SAND, little Silt, wet. Changing at 7.9 feet to: Brown, CLAY & SILT, plastic, cohesive, moist.	6.2' CLAY & SILT 6.4' SAND CLAY & SILT 7.5' 7.6' SAND 7.8' CLAY & SILT 7.9' SAND CLAY & SILT		
8	5	24/16.8	8-10	2-3 3-5	ND	Brown, CLAY & SILT, plastic, cohesive, moist. Changing at 8.5 feet to: Yellowish-brown, fine to medium grained SAND, trace Silt, wet. Changing at 8.6 feet to: Brown, CLAY & SILT, plastic, cohesive, moist. Changing at 9.4 feet to: NO	8.5' 8.6' SAND CLAY & SILT 9.4' NO RECOVERY 10'		

REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).
2. Groundwater was encountered at approximately 3.8 feet below ground surface.

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BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 3/25/19

GZA
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Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: PMW-WV-11/MW-WV-11D
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Check: Leslie Nelson

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	6	24/24	10-12		ND	RECOVERY. Yellowish-brown, fine to medium grained SAND, trace Silt, wet. Changing at 10.4 feet to: Grayish-brown, CLAY & SILT, plastic, cohesive, moist. Changing at 11.5 feet to: Light brownish-gray, fine grained SAND, some Silt, little Clay, moderately plastic, cohesive, wet. Changing at 11.6 feet to: Grayish-brown, CLAY & SILT, plastic, cohesive, moist.	SAND 10.4' CLAY & SILT 11.5' 11.6' SAND CLAY & SILT		
11									
12	7	24/18	12-14	3-1 2-3	ND	Grayish-brown, CLAY & SILT, plastic, cohesive, moist. Changing at 12.2 feet to: Brown, fine to medium grained SAND, trace Silt, wet. Changing at 12.4 feet to: Grayish-brown, CLAY & SILT, plastic, cohesive, moist. Changing at 13.5 feet to: NO RECOVERY.	12.2' 12.4' SAND CLAY & SILT 13.5'		
13									
14	8	24/14.4	14-16	1-2 3-5	ND	Grayish-brown, CLAY & SILT, plastic, cohesive, moist. Changing at 15.2 feet to: NO RECOVERY.	NO RECOVERY 14' CLAY & SILT		
15							15.2' NO RECOVERY		
16	9	24/14.4	16-18	2-4-2	ND	Very dark brown, PEAT, some Silt, little Clay, plastic, cohesive, moist. Changing at 16.4 feet to: Dark yellowish-brown to yellowish-brown, fine to medium grained SAND, trace Silt, moist. Changing at 17.1 feet to: Yellowish-brown to brown, CLAY & SILT, plastic, cohesive, moist. Changing at 17.2 feet to: NO RECOVERY.	16' PEAT 16.4' SAND 17.1' 17.2' CLAY & SILT NO RECOVERY		
17									
18	10	24/13.2	18-20	1-2 3-6	ND	Yellowish-brown to brown, CLAY & SILT, plastic, cohesive, moist. Changing at 18.5 feet to: Dark brown, GRAVEL, some coarse to medium grained Sand, trace Silt, wet. Changing at 18.8 feet to: Yellowish-brown, CLAY & SILT, plastic, cohesive, moist. Changing at 19.1 feet to: NO RECOVERY.	18' CLAY & SILT 18.5' GRAVEL 18.8' CLAY & SILT 19.1' NO RECOVERY		
19									
20	11	24/18	20-22	2-2 3-5	ND	Yellowish-brown, fine grained SAND, trace Silt, wet. Changing at 20.5 feet to: Dark brown to yellowish-brown, medium to coarse grained SAND, some Gravel, trace Silt, wet; occasional very thin seams of Silty Clay, trace Gravel. Changing at 21.5 feet to: NO RECOVERY.	20' SAND 21.5'		
21									

REMARKS

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

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22	12	24/12	22-24	3-5 4-3	ND	Dark brown to yellowish-brown, medium to coarse grained SAND, some Gravel, trace Silt, moist. Changing at 23.0 feet to: NO RECOVERY.	NO RECOVERY 22' SAND		
23							23' NO RECOVERY		
24	13	24/13.2	24-26	1-0 2-3	ND	Yellowish-brown, medium grained SAND, trace Silt, wet. Changing at 24.9 feet to: Dark brown to yellowish-brown, medium to coarse grained SAND, some Gravel, trace Silt, wet. Changing at 25.1 feet to: NO RECOVERY.	24' SAND		
25							25.1' NO RECOVERY		
26	14	24/8.4	26-28	2-4 4-4	ND	Brown, fine to coarse grained SAND, little Gravel, trace Silt, wet. Changing at 26.7 feet to: NO RECOVERY.	26' SAND		
27							26.7' NO RECOVERY		
28	15	24/15.6	28-30	3-4 3-4	ND	Brown, fine to coarse grained SAND, little Gravel, trace Silt, wet. Changing at 29.3 feet to: No RECOVERY.	28' SAND		
29							29.3' NO RECOVERY		
30	16	24/15.6	30-32	2-2 6-5	ND	Brown, fine to coarse grained SAND, little Gravel, trace Silt, wet. Changing at 31.1 feet to: Brown, Silty CLAY, plastic, cohesive, moist. Changing at 31.3 feet to: NO RECOVERY.	30' SAND		
31							31.1' 31.3' CLAY NO RECOVERY		
32	17	24/16.8	32-34	28-18 13-16	ND	Brown, medium to coarse grained SAND, trace Silt, wet. Changing at 32.9 feet to: NO RECOVERY.	32' SAND		
33							32.9' NO RECOVERY		

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
34	18	24/18	34-36	3-4 7-8	ND	Dark gray, Silty CLAY, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 35.5 feet to: No RECOVERY.	NO RECOVERY 34' Silty CLAY		
35							35.5'		
36	19	24/22.8	36-38	2-4 6-8	ND	Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 37.9 feet to: NO RECOVERY.	NO RECOVERY 36' CLAY & SILT		
37							37.9'		
38	20	24/24	38-40	2-7 6-5	ND	Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist.	38' NO RECOVERY CLAY & SILT		
39									
40	21	24/21.6	40-42	4-5 7-10	ND	Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 41.8 feet to: No RECOVERY.			
41							41.8'		
42	22	24/22.8	42-44	3-6 8-10	ND	Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 43.9 feet to: NO RECOVERY.	42' NO RECOVERY CLAY & SILT		
43									
44	23	24/24	44-46	3-5 7-10	ND	Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist.	43.9' 44' NO RECOVERY CLAY & SILT		

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							CLAY & SILT		
46	24	24/21.6	46-48	2-4 5-9	ND	Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 47.8 feet to: NO RECOVERY.			
47							47.8'		
48	25	24/21.6	48-50	8-14 11-15	ND	Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 49.4 feet to: Brown, SILT & CLAY, some Sand, little Gravel, plastic, cohesive, moist. Changing at 49.6 feet to: Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 49.8 feet to: NO RECOVERY.	48' NO RECOVERY CLAY & SILT		
49							49.4' 49.6' SILT & CLAY 49.8' CLAY & SILT		
50	26	24/14.4	50-52	2-2 6-9	ND	Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 51.2 feet to: NO RECOVERY.	50' NO RECOVERY CLAY & SILT		
51							51.2' NO RECOVERY		
52	27	24/21.6	52-54	2-7 11-14	ND	Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 53.8 feet to: NO RECOVERY.	52' CLAY & SILT		
53							53.8'		
54	28	24/18	54-56	4-21-22	ND	Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 55.4 feet to: Brown, fine to medium grained SAND, little Silt, moist to wet. Changing at 55.5 feet to: NO RECOVERY.	54' NO RECOVERY CLAY & SILT		
55							55.4' 55.5' SAND NO RECOVERY		
56	29	24/21.6	56-58	3-9 13-20	ND	Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 57.4 feet to: Dark	56' CLAY & SILT		

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57						grayish-brown, fine to medium grained SAND, little Silt, little Clay, slightly plastic, cohesive, moist. Changing at 57.8 feet to: NO RECOVERY.	CLAY & SILT 57.4' SAND 57.8'		
58	30	24/20.4	58-60	4-10 13-16	ND	Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 59.7 feet to: NO RECOVERY.	58' NO RECOVERY CLAY & SILT		
59							59.7'		
60	31	24/14.4	60-62	3-10 24-15	ND	Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 61.2 feet to: NO RECOVERY.	NO 60' RECOVERY CLAY & SILT		
61							61.2' NO RECOVERY		
62	32	24/21.6	62-64	25-8-10	ND	Dark grayish-brown, CLAY & SILT, some Sand, trace Gravel, moderately plastic, cohesive, moist. Changing at 63.8 feet to: NO RECOVERY.	62' SILT & CLAY		
63							63.8'		
64	33	24/22.8	64-66	6-10 15-26	ND	Dark grayish-brown, Silty CLAY, plastic, cohesive, moist. Changing at 65.3 feet to: Dark grayish-brown, medium grained SAND, trace Silt, wet. Changing at 65.9 feet to: NO RECOVERY.	64' NO RECOVERY Silty CLAY		
65							65.3' SAND		
66	34	24/20.4	66-68	27-28 21-30	ND	Dark grayish-brown, fine to medium grained SAND, trace Silt, wet. Changing at 66.1 feet to: Dark grayish-brown, SILT, little fine grained Sand, non-plastic, cohesive, wet. Changing at 66.4 feet to: Dark grayish-brown, SILT & CLAY, some Sand, trace Gravel, moderately plastic, cohesive, moist. Changing at 66.7 feet to: Dark grayish-brown, fine to medium grained SAND, trace Silt, wet. Changing at 67.4 feet to: Dark grayish-brown, SILT, little Clay,	65.9' 66' NO RECOVERY 66.1' SAND SILT 66.4' SILT & CLAY 66.7' SAND 67.4' SILT 67.7' NO 68' RECOVERY 68.2' SAND		
67									
68	35	24/21.6	68-70	15-20 25-50	ND				

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69						plastic, cohesive, moist to wet. Changing at 67.7 feet to: NO RECOVERY. Dark grayish-brown, fine to medium grained SAND, trace Silt. wet. Changing at 68.2 feet to: Dark grayish-brown, SILT & CLAY, some Sand, trace Gravel, moderately plastic, cohesive, moist. Changing at 69.4 feet to: Dark grayish-brown, CLAY & SILT, little Sand, trace Gravel, moderately plastic, cohesive, moist. Changing at 69.6 feet to: Varved, dark grayish-brown, SILT, with alternating layers of Silty Clay, plastic, cohesive, moist. Changing at 69.8 feet to: NO RECOVERY.	SILT & CLAY 69.4' CLAY & SILT 69.6' SILT 69.8' NO RECOVERY 70'		
70	36	24/22.8	70-72	33-48-50/3"	ND		SAND		
71						Brown, fine to medium grained SAND, trace Silt, wet. Changing at 71.4 feet to: Grayish-brown, SILT, trace Clay, trace fine grained Sand, moderately plastic, cohesive, moist to wet. Changing at 71.7 feet to: Brown, fine to medium grained SAND, trace Silt, wet. Changing at 71.9 feet to: NO RECOVERY. Dark grayish-brown, Silty CLAY, plastic, cohesive, moist. Changing at 72.2 feet to: NO RECOVERY.	71.4' SILT 71.7' SAND 71.9' NO RECOVERY 72' Silty CLAY 72.2' NO RECOVERY		
72	37	24/2.4	72-74	55/3"	ND				
73									
74	38	24/2.4	74-76	57/2"	ND	Dark grayish-brown, SILT & CLAY, some Sand, plastic, cohesive, moist. Changing at 74.2 feet to: NO RECOVERY.	74' SILT & CLAY 74.2' NO RECOVERY		
75									
76	39	24/22.8	76-78	10-22 26-24	ND	Grayish-brown to dark grayish-brown, CLAY & SILT, little Gravel, little Sand, plastic, cohesive, moist. Changing at 77.1 feet to: Varved grayish-brown to dark grayish-brown, SILT, some fine grained Sand, trace Clay, with fine grained SAND, slightly plastic, cohesive, moist. Changing at 77.4 feet o: Dark gray, Silty CLAY, plastic, cohesive, moist. Changing at 77.9 feet to: NO RECOVERY.	76' CLAY & SILT 77.1' SILT 77.4' Silty CLAY 77.9'		
77									
78	40	24/18	78-80	7-11 14-30	ND	Dark gray, Silty CLAY, plastic, cohesive, bedded, moist. Changing at 78.4 feet to: Brown, fine to medium grained SAND, little Silt, moist. Changing 78.8 feet to: Dark gray, Silty CLAY, plastic, cohesive, bedded, moist. Changing at 79.5 feet to: NO RECOVERY.	78' NO RECOVERY 78.4' Silty CLAY SAND 78.8' Silty CLAY 79.5' NO RECOVERY 80'		Bentonite Grout
79									

REMARKS

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	41	24/21.6	80-82	12-25 33-40	ND	Dark gray, Silty CLAY, plastic, cohesive, bedded, moist. Changing at 80.4 feet to: Brown, fine to medium grained SAND, little Silt, wet. Changing at 80.5 feet to: Dark gray, Silty CLAY, plastic, cohesive, bedded, moist. Changing at 80.8 feet to: Brown, fine to medium grained SAND, little Silt, wet. Changing at 81.0 feet to: Dark gray, Silty CLAY, plastic, cohesive, bedded, moist. Changing at 81.4 feet to: Brown, fine to medium grained SAND, little Silt, wet. Changing at 81.6 feet to: Dark gray, Silty CLAY, plastic, cohesive, bedded, moist. Changing at 81.8 feet to: NO RECOVERY. Brown, fine to medium grained SAND, trace Silt, wet. Changing at 83.2 feet to: NO RECOVERY.	Silty CLAY 80.4' 80.5' SAND 80.8' Silty CLAY 81' SAND Silty CLAY 81.4' 81.6' SAND 81.8' Silty CLAY 82' NO RECOVERY SAND 83.2' NO RECOVERY		
81									
82	42	24/14.4	82-84	0-0 2-6	ND				
83									
84	43	24/19.2	84-86	8-16-50/4"	ND	Brown, fine to medium SAND, trace Silt, wet. Changing at 85.4 feet to: Brown, GRAVEL, some coarse Sand, trace Silt, wet. Changing at 85.8 feet to: NO RECOVERY.	84' SAND 85.4' GRAVEL 85.8'		
85									
86	44	24/21.6	86-88	49-28 39-50	ND	Brown, fractured COBBLE. Changing at 86.5 feet to: Brown, fine to medium SAND, some Silt, slightly cohesive, moist to wet. Changing at 87.4 feet to: Brown, Silty CLAY, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 87.6 feet to: NO RECOVERY.	86' NO RECOVERY Fractured COBBLE 86.5' SAND 87.4' 87.6' Silty CLAY		
87									
88	45	24/8.4	88-90	19-39-50/3"	ND	Dark grayish-brown, SILT & CLAY, some Sand, trace Gravel, plastic, cohesive, moist. Changing at 88.7 feet to: NO RECOVERY.	88' NO RECOVERY SILT & CLAY 88.7' NO RECOVERY		
89									
90	46	24/1.2	90-92	56/4"	ND	Dark grayish-brown, SILT & CLAY, some Sand, trace Gravel, plastic, cohesive, moist. Changing at 90.1 feet to: NO RECOVERY.	90' 90.1' SILT & CLAY NO RECOVERY		
91									

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92	47	24/18	92-94	20-50-24	ND	Dark grayish-brown, SILT & CLAY, some Sand, trace Gravel, plastic, cohesive, moist. Changing at 92.7 feet to: Dark brown, GRAVEL, some fine to coarse grained Sand, wet. Changing at 92.9 feet to: Dark grayish-brown, SILT & CLAY, some Sand, trace Gravel, plastic, cohesive, moist. Changing at 93.5 feet to: NO RECOVERY.	92' SILT & CLAY; 92.7' 92.9' GRAVEL; SILT & CLAY; 93.5' NO RECOVERY		
94	48	24/20.4	94-96	14-24 39-44	ND	Dark grayish-brown, SILT & CLAY, some Sand, trace Gravel, plastic, cohesive, moist. Changing at 95.7 feet to: NO RECOVERY.	94' SILT & CLAY; 95.7' NO RECOVERY		
96	49	24/24	96-98	9-27 31-33	ND	Dark grayish-brown to dark gray, SILT & CLAY, some Sand, trace Gravel, moderately plastic, cohesive, moist; very thin Sand, seam at 98.9 feet.	96' SILT & CLAY		
98	50	24/20.4	98-100	8-28-47	ND	Dark grayish-brown to dark gray, SILT & CLAY, some Sand, trace Gravel, moderately plastic, cohesive, moist; very thin Sand, seam at 98.9 feet. Changing at 99.7 feet to: NO RECOVERY.	99.7' NO RECOVERY		
100	51	24/24	100-102	8-22 29-36	ND	Dark grayish-brown to dark gray, SILT & CLAY, some Sand, trace Gravel, moderately plastic, cohesive, moist.	100' SILT & CLAY		
102	52	24/20.4	102-104	13-31 46-50/5"	ND	Dark grayish-brown to dark gray, SILT & CLAY, some Sand, trace Gravel, moderately plastic, cohesive, moist. Changing at 103.3 feet to: Brown, fine to medium grained SAND, trace Silt, wet. Changing at 103.7 feet to: NO RECOVERY.	103.3'		

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 3/25/19

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: PMW-WV-11/MW-WV-11D
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File No.: 16.0062677.81
Check: Leslie Nelson

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							SAND		
							103.7'		
104	53	24/6	104-106	50/5.5"	ND	Dark gray, GRAVEL, some fine to coarse grained SAND, trace Silt, wet. Changing at 104.5 feet to: NO RECOVERY.	NO RECOVERY 104' GRAVEL		
							104.5'		
105							NO RECOVERY		
							106'		
106	54	24/13.2	106-108	1-2 6-15	ND	Dark grayish-brown, GRAVEL, some fine to coarse grained Sand, trace Silt, wet. Changing at 107.1 feet to: NO RECOVERY.	GRAVEL		
							107.1'		
107							NO RECOVERY		
							108'		
108	55	24/6	108-110	2-2 6-9	ND	Dark grayish-brown, GRAVEL, some fine to coarse grained Sand, trace Silt, wet. Changing at 108.5 feet to: NO RECOVERY.	GRAVEL		
							108.5'		
109							NO RECOVERY		
							110'		
110	56	24/15.6	110-112	14-15	ND	Dark grayish-brown, GRAVEL, some fine to coarse grained Sand, trace Silt, wet. Changing at 111.3 feet to: NO RECOVERY.	GRAVEL		
							111.3'		
111							NO RECOVERY		
							112'		
112	57	24	112-114			No sampling attempts.	NO SAMPLING ATTEMPTS		
113									
114	58	24	114-116			No sampling attempts.			

REMARKS

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Boring No.: PMW-WV-11/MW-WV-11D

BORING_WELL 6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 3/25/19

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: PMW-WV-11/MW-WV-11D
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File No.: 16.0062677.81
Check: Leslie Nelson

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
							NO SAMPLING ATTEMPTS		
116	59	24	116-118			No sampling attempts.			
117									
118	60	24	118-120			No sampling attempts.			
119									
120	61	24	120-122			No sampling attempts.			
121									
122	62	24	122-124			No sampling attempts.			
123									
124	63	24	124-126			No sampling attempts.			
125									
126	64	24	126-128			No sampling attempts.			

REMARKS

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Check: Leslie Nelson

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
127							NO SAMPLING ATTEMPTS		
128	65	24	128-130			No sampling attempts.			
129									
130	66	24	130-132			No sampling attempts.			
131									
132	67	24	132-134			No sampling attempts.			
133									
134	68	24	134-136			No sampling attempts.			
135									
136	69	24	136-138			No sampling attempts.			
137									
138	70	24	138-140			No sampling attempts.			

REMARKS

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File No.: 16.0062677.81
Check: Leslie Nelson

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
							NO SAMPLING ATTEMPTS		
139									
140	71	24	140-142			No sampling attempts.			
141									
142	72	24	142-144			No sampling attempts.			
143									
144	73	24	144-146			No sampling attempts.			
145									
146	74	24	146-148			No sampling attempts.			
147									
148	75	24	148-150			No sampling attempts.			
149									

REMARKS

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BORING_WELL 6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 3/25/19

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Check: Leslie Nelson

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	76	24	150-152			No sampling attempts.	NO SAMPLING ATTEMPTS		
151									
152	77	24	152-154			No sampling attempts.			
153									
154	78	24	154-156			No sampling attempts.			
155									
156	79	24	156-158			No sampling attempts.			
157									
158	80	24	158-160			No sampling attempts.			
159									Filter Sand
160	81	24	160-162			No sampling attempts.			
161									2-Inch PVC Well Screen

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check: Leslie Nelson

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
162	82	24	162-164			No sampling attempts.	NO SAMPLING ATTEMPTS		
163									
164	83	24/9.6	164-166	25-50/3	ND	Dark grayish-brown, SILT, trace fine grained SAND, non-plastic, cohesive, moist.	164' SILT		
165									
166						Bottom of Borehole at 166.0 Feet	166'	3	
167									
168									
169									
170									
171									
172									
173									

REMARKS

3. Monitoring well was installed in borehole upon completion. Well screen set from 158.9 to 163.7 feet below ground surface.

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV11S
Page: 1 **of** 1
File No.: 16.0062677.81
Check: Leslie Nelson

Contractor: Stearns Drilling Company
Foreman: Jerry H., Travis & Zach/Gary
Logged by: John Morehouse
Date Start/Finish: 1-3-19 / 1-3-19
Boring Location:
GS Elev.: **Datum:** NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

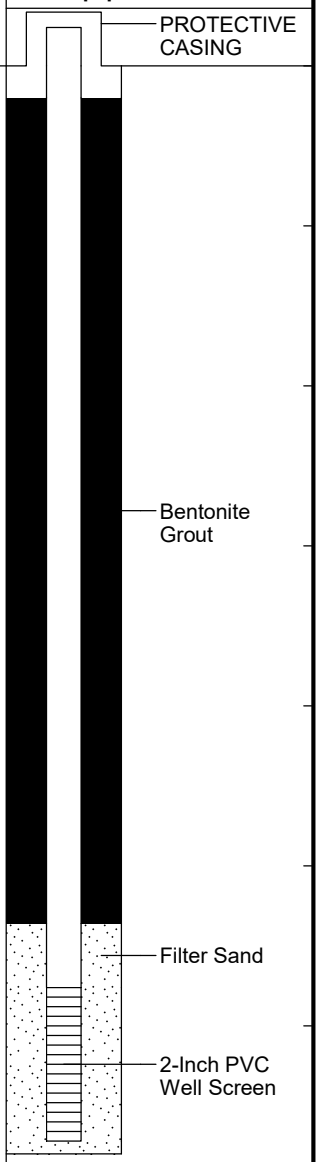
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–34						See boring log PMW-WV-11/MW-WV-11D for soil descriptions.		
34–35						Bottom of Borehole at 34.0 Feet		1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 28.8 to 33.6 feet below ground surface.

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BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 3/25/19

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Algoma Twp, Kent County, Michigan

Boring No.: MW-WV12D
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File No.: 16.0062677.81
Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry H.
Logged by: John Morehouse
Date Start/Finish: 10-26-18 / 11-29-18
Boring Location:
GS Elev.: **Datum:** MI State Plane S Zone NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24	0-2	3-3 3-3	0.0 ppm	Dark brown, poorly sorted, fine to medium-grained SAND, some Silt, trace Clay, trace Gravel, non to slightly plastic, slightly cohesive, moist. Changing at 1.6 feet to: NO RECOVERY.	SAND	1	PROTECTIVE CASING
2	2	24	2-4	2-2 1-1	0.0 ppm	Dark brown, poorly sorted, fine to medium-grained SAND, some Silt, trace Clay, trace Gravel, non to slightly plastic, slightly cohesive, moist. Changing at 2.3 feet to: Dark yellowish-brown, poorly sorted, SILT, little Clay, trace Gravel, moderately plastic, cohesive, moist. Changing at 2.6 feet to: Dark yellowish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plstic, cohesive, moist. Changing at 2.8 feet to: NO RECOVERY.	1.6' NO RECOVERY 2' SAND 2.3' SILT 2.6' CLAY & SILT 2.8' NO RECOVERY		
3									
4	3	24	4-6	0-0 1-2	0.0 ppm	Dark yellowish-brown, poorly sorted, Silty CLAY, trce Gravel, plastic, cohesive, moist. Changing at 5.6 feet to: NO RECOVERY.	4' Silty CLAY		
5							5.6' NO RECOVERY		
6	4	24	6-8	0-1 5-6	0.0 ppm	Dark yellowish-brown, poorly sorted, Silty CLAY, trace Gravel, plastic, cohesive, moist. Changing at 7.6 feet to: Yellowish-brown, poorly sorted, fine to medium-grained SAND, little Silt, little Clay, trace Gravel, slightly plastic, slightly cohesive, moist. Changing 7.8 feet to: NO RECOVERY.	6' Silty CLAY 7.6' SAND		
7							7.8' NO RECOVERY		
8	5	24	8-10	4-7 9-8	0.0 ppm	Yellowish-brown, poorly sorted, fine to medium-grained SAND, little Silt, little Clay, trace Gravel, slightly plastic, slightly cohesive, moist. Changing at 8.6 feet to: Yellowish-brown, poorly sorted, fine to medium-grained SAND, little Silt, little Clay, trace Gravel, slightly plastic, slightly cohesive, moist. Changing at 9.5 feet to: NO RECOVERY.	8' NO RECOVERY SAND 9.5' NO RECOVERY		
9									
10	6	24	10-12	5-8 8-10	0.0 ppm	Yellowish-brown, poorly sorted, fine to medium-grained SAND, little Silt, little Clay, trace Gravel, slightly plastic, slightly cohesive, moist. Changing at 11.5 feet to: NO RECOVERY.	10' SAND 11.5' NO RECOVERY		
11									
12							12'		

REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).

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BORING_WI 6267781 WWW.WOLVEN.AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV12D
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File No.: 16.0062677.81
Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
	7	24	12-14	2-7 13-24	0.0 ppm 0.0 ppm	Yellowish-brown, poorly sorted, fine to medium-grained SAND, little Silt, little Clay, trace Gravel, slightly plastic, slightly cohesive, moist. Changing at 13.0 feet to: Yellowish-brown, poorly sorted, fine to coarse-grained SAND, some Gravel, little Silt, slightly cohesive, moist. Changing at 13.9 feet to: NO RECOVERY.	SAND		
13									
14	8	24	14-16	14-11 10-14	0.0 ppm	Yellowish-brown, poorly sorted, fine to coarse-grained SAND, some Gravel, little Silt, slightly cohesive, moist. Changing at 14.5 feet to: Yellowish-brown, poorly sorted, fine to medium-grained SAND, little Silt, little Clay, trace Gravel, slightly plastic, slightly cohesive, moist. Changing at 15.7 feet to: NO RECOVERY.	13.9' 14' NO RECOVERY SAND		
15									
16	9	24	16-18	6-8 9-13	0.0 ppm	Dark gray, poorly sorted, Silty CLAY, plastic, cohesive, moist. Changing at 17.8 feet to: NO RECOVERY.	15.7' 16' NO RECOVERY Silty CLAY		
17									
18	10	24	18-20	6-10 11-16	0.0 ppm	Brown, moderately well sorted, fine to medium-grained SAND, little Silt, moist to wet. Changing at 18.3 feet to: Yellowish-brown, poorly sorted, fine to medium-grained SAND, little Silt, little Clay, trace Gravel, slightly plastic, slightly cohesive, moist with occasional fine Sand partings. Changing at 18.8 feet to: Brown, moderately well sorted, fine to medium-grained SAND, little Silt, moist to wet. Changing at 18.9 feet to: Yellowish-brown, poorly sorted, fine to medium-grained SAND, little Silt, little Clay, trace Gravel, slightly plastic, slightly cohesive, moist with occasional fine Sand partings. Changing at 19.8 feet to: NO RECOVERY.	17.8' 18' NO RECOVERY SAND	2	
19									
20	11	24	20-22	2-6 10-16	0.0 ppm		19.8' 20' NO RECOVERY. SAND		
21									
22	12	24	22-24	6-8 12-10	0.0 ppm	Brown, moderately well sorted, fine to medium-grained SAND, little Silt, moist to wet. Changing at 20.4 feet to: Yellowish-brown, poorly sorted, fine to medium-grained SAND, little Silt, little Clay, trace Gravel, slightly plastic, slightly cohesive, moist with occasional fine Sand, partings. Changing at 20.8 feet to: Brown, moderately well sorted, fine to medium-grained SAND, little Silt, moist to wet. Changing at 20.9 feet to: Yellowish-brown, poorly sorted, fine to medium-grained SAND, little Silt, little Clay, trace Gravel, slightly plastic, slightly cohesive, moist with occasional fine Sand partings. Changing at 21.4 feet to: Brown,	21.8' 22' NO RECOVERY Silty CLAY		
23									
24	13	24	24-26	4-8 12-15	0.0 ppm		23.7' 24' NO RECOVERY Silty CLAY		
25									

REMARKS

2. Groundwater was encountered at approximately 18.0 feet below ground surface.

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BORING_WI 6267781 WWW.WOLVEN.AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV12D
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Check: Kate McDonald

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	14	24	26-28	6-13 15-16	0.0 ppm	moderately well sorted, fine to medium-grained SAND, little Silt, moist to wet. Changing at 21.5 feet to: Yellowish-brown, poorly sorted, fine to medium-grained SAND, little Silt, little Clay, trace Gravel, slightly plastic, slightly cohesive, moist with occasional fine Sand partings. Changing at 21.8 feet to: NO RECOVERY.	Silty CLAY 27' 27.2' SAND Silty CLAY 27.8'		
28	15	24	28-30	5-7 10-14	0.0 ppm	Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 23.7 feet to: NO RECOVERY.	28' NO RECOVERY Silty CLAY		
29						Dark grayish-brown, well sorted, Silty CLAY, trace Gravel, plastic, cohesive, moist with fine Sand partings at 24.7 feet. Changing at 25.4 feet to: Dark grayish-brown, poorly sorted, Silty CLAY, trace Gravel, plastic, cohesive, moist with fine Sand partings at 25.4 feet and 25.7 feet.			
30	16	24	30-32	5-7 11-16	0.0 ppm	Dark grayish-brown, poorly sorted, Silty CLAY, trace Gravel, plastic, cohesive, moist with fine Sand partings at 26.7 feet. Changing at 27.0 feet to: Brown, very well sorted, fine-grained SAND, trace Silt, moist. Changing at 27.2 feet to: Dark			
31							31.9'		
32	17	24	32-34	4-9 11-17	0.0 ppm	grayish-brown, poorly sorted, Silty CLAY, trace Gravel, plastic, cohesive, moist with fine Sand partings at 27.4 feet. Changing at 27.8 feet to: NO RECOVERY.	32' NO RECOVERY Silty CLAY		
33						Dark gray, well sorted, Silty CLAY, plastic, cohesive, moist.			
34	18	24	34-36	5-11 13-13	0.0 ppm	Dark gray, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 31.9 feet to: NO RECOVERY.			
35						Dark gray, well sorted, Silty CLAY, plastic, cohesive, moist.			
36	19	24	36-38	3-7 12-12	0.0 ppm	Dark gray, well sorted, Silty CLAY, plastic, cohesive, moist.			
37									
38	20	24	38-40	3-8 11-13	0.0 ppm	Dark gray, well sorted, Silty CLAY, plastic, cohesive, moist.	38' CLAY & SILT		
39									

REMARKS

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Check: Kate McDonald

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
41	21	24	40-42	3-7 89-10	0.0 ppm	Dark gray, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 41.2 feet to: Dark gray, poorly sorted, SILT & CLAY, some Sand, trace Gravel, moderately plastic, cohesive, moist. Changing at 41.4 feet to: Dark gray, well sorted, Silty CLAY, plastic, cohesive, moist with occasional fine Sand partings.	CLAY & SILT 41.2' 41.4' SILT & CLAY Silty CLAY		
42	22	24	42-44	3-8 10-13	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, trace Gravel, plastic, cohesive, moist. Changing at 43.6 feet to: Dark gray, well sorted, Silty CLAY, plastic, coesive, moist. Changing at 43.9 feet to: Dark grayish-brown, poorly sorted, CLAY & SILT, trace Gravel, plastic, cohesive, moist.	42' CLAY & SILT 43.6' 43.9' Silty CLAY		
44	23	24	44-46	2-8 12-12	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, trace Gravel, plastic, cohesive, moist. Changing at 44.9 feet to: Dark grayish-brown, poorly sorted, SILT & CLAY, little Sand, trace Gravel, slightly plastic, cohesive, moist. Changing at 45.8 feet to: NO RECOVERY.	CLAY & SILT 44.9' SILT & CLAY 45.8'		
46	24	24	46-48	4-6 11-16	0.0 ppm	Dark grayish-brown, poorly sorted, SILT & CLAY, little Sand, trace Gravel, slightly plastic, cohesive, moist. Changing at 46.2 feet to: Dark gray, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 47.8 feet to: NO RECOVERY.	46' NO 46.2' RECOVERY SILT & CLAY Silty CLAY 47.8'		
48	25	24	48-50	3-7 14-23	0.0 ppm	Dark gray, well sorted, Silty CLAY, plastic, cohesive, moist with fine Sand parting at 48.6 feet. Changing at 49.8 feet to: Brown, well sorted, fine to medium -grained SAND, trace Silt, moist to wetl. Changing at 49.9 feet to: NO RECOVERY.	48' NO RECOVERY Silty CLAY 49.8'		
50	26	24	50-52	2-9 14-22	0.0 ppm	Grayish-brown to brown, poorly sorted, fine to coarse-grained SAND, trace Gravel, trace Silt, wet. Changing at 50.7 feet to: Dark gray, very well sorted, fine-grained SAND, some Silt, wet. Changing at 51.0 feet to: Dark yellowish-brown, moderately sorted, fine-grained SAND, some Silt, trace Clay, slightly plastic, cohesive, wet. Changing at 51.3 feet to: Yellowish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 51.5 feet to: NO RECOVERY.	49.9' SAND 50' NO RECOVERY SAND 51.5'		
52	27	24	52-54	10-15 17-27	0.0 ppm	Yellowish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 52.8 feet to: Dark grayish-brown, very well sorted, SILT, trace	NO 52' RECOVERY SAND 52.8' SILT 53.7' 54' NO		

REMARKS

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Boring No.: MW-WV12D

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV12D
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File No.: 16.0062677.81
Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
	28	24	54-56	13-17 17-32	0.0 ppm	Clay, slightly plastic, cohesive, moist. Changing at 53.7 feet to: NO RECOVERY. Dark grayish-brown, poorly sorted, SILT & CLAY, little Sand, trace Gravel, moderately plastic, cohesive, moist. Changing at 55.2 feet to: Dark grayish-brown to grayish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 55.4 feet to: Varved dark grayish-brown, very well sorted, Silty CLAY & SILT, plastic, cohesive, moist. Changing at 55.9 feet to: Dark gray, poorly sorted, CLAY & SILT, trace Gravel, plastic, cohesive, moist. Dark grayish-brown to brown, well sorted, SILT with very thin Clay varves, plastic (Clay), cohesive, moist to wet. Changing at 57.7 feet to: NO RECOVERY. Dark grayish-brown, moderately sorted, CLAY & SILT, trace fine-grained Sand, plastic, cohesive, moist. Changing at 59.0 feet to: Dark gray to dark grayish-brown, moderately well sorted, fine to medium SAND, little Silt, moist to wet. Changing at 59.3 feet to: Dark grayish-brown, moderately sorted, CLAY & SILT, trace fine-grained Sand, plastic, cohesive, moist. Changing at 59.6 feet to: NO RECOVERY. Varved dark grayish-brown, well sorted, Silty CLAY and fine SAND, plastic, cohesive, moist to wet. Changing at 61.1 feet to: Dark grayish-brown, moderately well sorted, Silty CLAY, trace Gravel, plastic, cohesive, moist with occasional fine Sand partings. Changing at 61.7 feet to: NO RECOVERY. Varved dark grayish-brown, well sorted, Silty CLAY and fine-grained SAND, plastic, cohesive, moist to wet with fine Sand partings from 62.0 to 63.0 feet. Changing at 63.0 feet to: Dark grayish-brown, poorly sorted, CLAY & SILT, trace Gravel, trace Sand, plastic, cohesive, moist. Changing at 63.6 feet to: NO RECOVERY. Dark grayish-brown, poorly sorted, CLAY & SILT, trace Gravel, trace Sand, plastic, cohesive, moist. Changing at 64.6 feet to: Dark grayish-brown, well sorted, fine to medium SAND, trace Silt, wet. Changing at 64.7 feet to: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 65.1 feet to: Dark grayish-brown, moderately well sorted, fine to medium-grained SAND, little Clay, little Silt, slightly plastic, moist to wet. Changing at 65.3 feet to: Dark grayish-brown, moderately sorted, CLAY & SILT, trace Gravel, trace Sand, plastic, cohesive, moist. Changing at 65.6 feet to: NO RECOVERY.	RECOVERY SILT & CLAY 55.2' 55.4' SAND CLAY & SILT 56' SILT 57.7' 58' NO RECOVREY CLAY & SILT 59' 59.3' SAND 59.6' CLAY & SILT 60' NO RECOVERY Silty CLAY and SAND 61.1' Silty CLAY 61.7' 62' NO RECOVERY Silty CLAY and SAND 63' CLAY & SILT 63.6' 64' NO RECOVERY CLAY & SILT 64.6' 64.7' SAND 65.1' Silty CLAY 65.3' SAND 65.6' CLAY & SILT 66' NO RECOVERY Silty CLAY and SAND 67.9'		
	29	24	56-58	3-13 16-20	0.0 ppm				
	30	24	58-60	3-13 21-47	0.0 ppm				
	31	24	60-62	3-10 15-37	0.0 ppm				
	32	24	62-64	5-10 12-44	0.0 ppm				
	33	24	64-66	6-12 16-34	0.0 ppm				
	34	24	66-68	7-17 22-45	0.0 ppm				

REMARKS

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	35	24	68-70	3-4 12-25	0.0 ppm	Varved dark grayish-brown, well sorted, Silty CLAY and fine-grained SAND, plastic, cohesive, moist. Changing at 67.9 feet to: Brown, moderately well sorted, fine to coarse-grained SAND, little Silt, grace Gravel, moist to wet.	68' SAND 68.5' Silty CLAY SAND		
69							69' 69.2' Silty CLAY		
						Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 68.5 feet to: Brown, well sorted, fine to medium-grained SAND, trace Silt, moist to wet. Changing at 69.0 feet to: Varved dark grayish-brown, well sorted, Silty CLAY and fine-grained SAND, plastic, cohesive, moist. Changing at 69.1 feet to: Varved dark grayish-brown, well sorted, Silty CLAY and SILT, plastic, cohesive, moist. Changing at 69.2 feet to: NO RECOVERY.	NO RECOVERY		
70	36	24	70-72	6-13-50/6"	0.0 ppm		70' CLAY & SILT		
71							71' Silty CLAY 71.4'		
							71.6' SAND 71.8' Silty CLAY		
72	37	24	72-74	2-7 17-40	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, trace Gravel, plastic, cohesive, moist. Grading to 71.0 feet: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 71.4 feet to: Brown, very well sorted, fine to medium-grained SAND, trace Silt, moist to wet. Changing at 71.6 feet to: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 71.8 feet to: Brown, very well sorted, fine to medium SAND, trace Silt, moist to wet.	SAND		
73							73.5'		
							NO RECOVERY		
74	38	24	74-76	1-10 33-50	0.0 ppm		74' SAND		
							74.5'		
75							NO RECOVERY		
						Brown, very well sorted, fine to medium SAND, trace Silt, moist to wet. Changing at 73.5 feet to: NO RECOVERY.			
76	39	24	76-78	1-4 16-26	0.0 ppm	Brown, very well sorted, fine to medium-grained SAND, trace Silt, moist to wet. Changing at 74.5 feet to: NO RECOVERY.	76' 76.3' SAND		
							NO RECOVERY		
77						Brown, very well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 76.3 feet to: NO RECOVERY.			
							78'		
78	40	24	78-80	5-22 31-38	0.0 ppm	Brown, very well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at Changing at 79.6 feet to: NO RECOVERY.	SAND		
79							79.6'		
							NO RECOVERY		
80	41	24	80-82	1-11 14-43	0.0 ppm	Brown, very well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 81.6 feet to: NO RECOVERY.	SAND		
81							81.6'		
							NO RECOVERY		

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
83	42	24	82-84	10-26 40-50	0.0 ppm	Brown, very well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 83.3 feet to: NO RECOVERY.	SAND 83.3' NO RECOVERY 84'		
84 85	43	24	84-86	4-10 17-20	0.0 ppm	Brown, very well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 85.2 feet to: Dark grayish-brown poorly sorted, SAND, little Clay, little Silt, slightly plastic, moderately cohesive, moist. Changing at 85.2 feet to: NO RECOVERY.	SAND 85.3' NO RECOVERY 86'		
86 87	44	24	86-88	15-28 33-50/4.5"	0.0 ppm	Dark grayish-brown, poorly sorted SAND, some Silt, trace Clay, slightly plastic, moderately cohesive, moist. Changing at 87.4 feet to: NO RECOVERY.	SAND 87.4' NO RECOVERY 88'		Bentonite Grout
88 89	45	24	88-90	11-21 20-25	0.0 ppm	Dark grayish-brown, poorly sorted SAND, some Silt, trace Clay, trace Gravel, slightly plastic, moderately cohesive, moist. Changing at 88.9 feet to: Dark grayish-brown, poorly sorted, CLAY & SILT, some Sand, slightly plastic, cohesive, moist. Changing at 89.2 feet to: NO RECOVERY.	SAND 88.9' CLAY & SILT 89.2' NO RECOVERY 90'		
90 91	46	24	90-92	14-23 19-22	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, some Sand, slightly plastic, cohesive, moist. Changing at 90.6 feet to: Dark grayish-brown, well sorted, SILT, non plastic, moderately cohesive, moist to wet. Changing at 91.5 feet to: Dark grayish-brown to dark gray, poorly sorted, SILT & CLAY, trace Gravel, plastic,	CLAY & SILT 90.6' SILT 91.5' SILT & CLAY 91.9'		
92 93	47	24	92-94	9-31-50/6"	0.0 ppm	cohesive, moist. Changing at 91.9 feet to: NO RECOVERY. Dark grayish-brown to dark gray, poorly sorted, SILT & CLAY, trace Gravel, plastic, cohesive, moist. Changing at 93.1 feet to: Varved dark grayish-brown, well sorted, Silty CLAY and Silt, plastic, cohesive, moist. Changing at 93.2 feet to: NO RECOVERY.	92' NO RECOVERY SILT & CLAY 93.1' 93.2' CLAY & SILT NO RECOVERY 94'		
94 95	48	24	94-96	31-50/4.5"	0.0 ppm	Varved dark grayish-brown, well sorted, Silty CLAY and Silt, plastic, cohesive, moist. Changing at 95.3 feet to: NO RECOVERY.	CLAY & SILT 95.3' NO RECOVERY 96'		

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	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
	49	24	96-98	25-48-50/4	0.0 ppm 0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, some Sand, trace Gravel, plastic, cohesive, moist. Changing at 97.2 feet to: NO RECOVERY.	CLAY & SILT		
97							97.2' NO RECOVERY		
98	50	24	98-100	27-50/5.5"	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, some Sand, trace Gravel, plastic, cohesive, moist. Changing at 98.3 feet to: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 98.9 feet to: NO RECOVERY.	98' CLAY & SILT		
98.3							Silty CLAY		
99							98.9' NO RECOVERY		
100	51	24	100-102	8-23 37-32	0.0 ppm	Brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 100.5 feet to: Brown, very well sorted, SILT, trace Clay, slightly plastic, cohesive, varved with very thin layers of Silty CLAY, moist. Changing at 101.2 feet to: NO RECOVERY.	100' SAND		
100.5'							SILT		
101							101.2' NO RECOVERY		
102	52	24	102-104	27-28 44-45	0.0 ppm	Light grayish-brown to pale brown, very well sorted, SILt, cohesive, moist. Changing at 102.2 feet to: Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 103.2 feet to: NO RECOVERY.	102' 102.2' SILT		
							CLAY & SILT		
103							103.2' NO RECOVERY		
104	53	24	104-106	11-27-50/5	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 105.4 feet to: NO RECOVERY.	104' CLAY & SILT		
105							105.4' NO RECOVERY		
106	54	24	106-108	31-50/5.5"	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 107.4 feet to: NO RECOVERY.	106' CLAY & SILT		
107							107.4' NO RECOVERY		
108	55	24	108-110	26-50/4"	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 108.8 feet to: NO RECOVERY.	108' CLAY & SILT		
109							108.8' NO RECOVERY		
							110'		

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	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
111	56	24	110-112	11-22 37-50/5"	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 111.9 feet to: NO RECOVERY.	CLAY & SILT		
112	57	24	112-114	31-50/3.5"	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 112.7 feet to: NO RECOVERY.	111.9' 112' NO RECOVERY CLAY & SILT 112.6' 112.7' SAND NO RECOVERY		
113									
114	58	24	114-116	18-38-50	0.0 ppm	Dark grayish-brown, very well sorted, SILT, trace Clay, slightly plastic, cohesive, varved with very thin layers of Silty CLAY, moist. Changing at 114.7 feet to: Dark grayish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 114.8 feet to: Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 115.5 feet to: NO RECOVERY.	114' SILT 114.7' 114.8' SAND CLAY & SILT 115.5' NO RECOVERY		
115									
116	59	24	116-118	4-13 25-50	0.0 ppm		116' CLAY & SILT		
117						Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 116.4 feet to: Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 117.8 feet to: NO RECOVERY. Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist.			
118	60	24	118-120	5-27 34-39	0.0 ppm		117.8' 118' NO RECOVERY CLAY & SILT		
119									
120	61	24	120-122	12-20 28-45	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 121.9 feet to: NO RECOVERY.			
121									
122	62	24	122-124	17-23 46-50/3.5"	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 123.5 feet to: Dark grayish-brown, very well sorted, SILT, trace Clay, slightly plastic, cohesive, varved with very thin layers of Silty CLAY, moist. Changing at 123.8 feet to: NO RECOVERY.	121.9' 122' NO RECOVERY CLAY & SILT 123.5' 123.8' SILT 124' NO		
123									

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	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
125	63	24	124-126	8-24 44-50/4"	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 125.8 feet to: NO RECOVERY.	RECOVERY CLAY & SILT		
126	64	24	126-128	10-25 47-50/4"	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 127.8 feet to: NO RECOVERY.	125.8' 126' NO RECOVERY CLAY & SILT		
127									
128	65	24	128-130	27-34-50/5"	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 129.4 feet to: NO RECOVERY.	127.8' 128' NO RECOVERY CLAY & SILT		
129									
130	66	24	130-132	9-21 35-50/5"	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand trace Gravel, plastic, cohesive, moist. Changing at 131.9 feet to: NO RECOVERY.	129.4' NO RECOVERY 130' CLAY & SILT		
131									
132	67	24	132-134	7-9 10-17	0.0 ppm	Dark grayish-brown poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 132.8 feet to: Dark grayish-brown, very well sorted, SILT, non plastic, cohesive, moist. Changing at 133.1 feet to: Dark grayish-brown, well sorted, Silty CLAY, plastic, cohesive, moist. Changing at 133.4 feet to: Dark	131.9' 132' NO RECOVERY CLAY & SILT 132.8' SILT 133.1' Silty CLAY 133.4' SILT		
133									
134	68	24	134-136	19-33-50/4"	0.0 ppm	grayish-brown, well sorted, SILT, some fine-grained SAND, non plastic, cohesive, moist to wet. Changing at 133.8 feet to: NO RECOVERY.	133.8' 134' NO RECOVERY 134.3' CLAY & SILT SILT		
135						Dark grayish-brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist. Changing at 134.3 feet to: Dark grayish-brown, very well sorted, SILT, non plastic, cohesive, moist. Changing at	134.8' SILT & CLAY (CL)		
136	69	24	136-138	50/4.5"	0.0 ppm	134.6 feet to: Dark grayish-brown, moderately sorted, SILt, little Clay, slightly plastic, cohesive, moist. Changing at 134.8 feet to: Dark grayish-brown, very well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 135.4 feet to: NO RECOVERY.			
137						Dark grayish-brown, well sorted,			

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	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
	70	24	138-140	30-50/2"	0.0 ppm	fine-grained SAND with layers of well sorted, Silty CLAY, moist. Chaging at 136.4 feet to: NO RECOVERY.	SILT & CLAY (CL) 138.6' NO RECOVERY		
139						Dark grayish-brown, well sorted, fine-grained SAND with layers of well sorted Silty CLAY, moist. Changing at 138.4 feet to: Dark grayish-brown, poorly sorted, SILT & CLAY, little Sand, trace Gravel, slightly plastic, cohesive, moist. Changing at 138.6 feet to: NO RECOVERY.	140'		
140	71	24	140-142	2-1 4-8	0.0 ppm		SILT & CLAY 140.8' NO RECOVERY		
141						Varved dark grayish-brown, well sorted, SILT and Silty CLAY, plastic, cohesive, moist. Changing at 140.8 feet to: NO RECOVERY.	142'		
142	72	24	142-144	7-19 35-50/3.5"	0.0 ppm	Dark grayish-brown to dark brown, poorly sorted, coarse-grained SAND, some Gravel, trace Silt, moist to wet. Changing at 142.3 feet to: Dark grayish-brown to dark brown, poorly sorted, fine to coarse-grained SAND, little Gravel, trace Silt, moist to wet. Changing at 143.0 feet to: NO RECOVERY.	SAND 143' NO RECOVERY		
143							144'		
144	73	24	144-146	41-50	0.0 ppm	Brown to dark gray, poorly sorted, GRAVEL with coarse-grained SAND, little Silt, wet. Changing at 144.7 feet to: NO RECOVERY.	GRAVEL 144.7' NO RECOVERY		
145							146'		
146	74	24	146-148	18-50/5"	0.0 ppm	Brown to dark gray, poorly sorted, GRAVEL with coarse-grained SAND, little Silt, wet. Changing at 146.9 feet to: NO RECOVERY.	GRAVEL 146.9' NO RECOVERY		
147							148'		
148	75	24	148-150	38-50/5"	0.0 ppm	Brown to dark gray, poorly sorted, GRAVEL with coarse-grained SAND, little Silt, wet. Changing at 148.9 feet to: NO RECOVERY.	GRAVEL 148.9' NO RECOVERY		
149							150'		
150	76	24	150-152	50/5"	0.0 ppm	Brown to dark gray, poorly sorted, GRAVEL with coarse-grained SAND, little Silt, wet. Changing at 150.4 feet to: NO RECOVERY.	GRAVEL 150.4' NO RECOVERY		
151							152'		

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	77	24	152-154	30-50/3"	0.0 ppm	Brown to dark gray, poorly sorted, GRAVEL with coarse-grained SAND, little Silt, moderately cohesive, moist to wet. Changing at 152.4 feet to: Very dark gray, poorly sorted, GRAVEL, some Silt, little Sand, trace Clay, non to slightly plastic, cohesive, moist. Changing at 152.5 feet to: Dark yellowish-brown, moderately sorted, coarse to medium-grained SAND, some Gravel, little Silt, moist. Changing at 152.7 feet to: NO RECOVERY.	GRAVEL 152.5' 152.7' SAND NO RECOVERY		
153									
154	78	24	154-156	50/4"	0.0 ppm	Dark yellowish-brown, moderately sorted, coarse to medium-grained SAND, some Gravel, little Silt, wet. Changing at 154.2 feet to: Dark yellowish-brown, poorly sorted, fine to coarse-grained, SAND, trace Silt, trace Gravel, wet. Changing at 154.5 feet to: NO RECOVERY.	154' SAND 154.5' NO RECOVERY		
155									
156	79	24	156-158	50-50/3"	0.0 ppm	Dark brown to dark yellowish-brown, poorly sorted, fine to coarse-grained SAND, trace Silt, wet. Changing at 156.5 feet to: Dark brown, poorly sorted, GRAVEL, some medium to coarse-grained Sand, little Silt, slightly cohesive, moist to wet. Changing at 156.8 feet to: NO RECOVERY.	156' SAND 156.5' 156.8' GRAVEL NO RECOVERY		
157									
158	80	24	158-160	20-50/6"	0.0 ppm	Dark brown, poorly sorted, GRAVEL, some medium to coarse-grained SAND, little Silt, slightly cohesive, moist to wet. Changing at 159.0 feet to: NO RECOVERY.	158' GRAVEL 159' NO RECOVERY		
159									
160	81	24	160-162	32-50/3"	0.0 ppm	Dark brown, poorly sorted, GRAVEL, some medium to coarse-grained SAND, little Silt, slightly cohesive, moist to wet. Changing at 160.8 feet to: NO RECOVERY.	160' GRAVEL 160.8' NO RECOVERY		
161									
162	82	24	162-164	50-64	0.0 ppm	Dark yellowish-brown, poorly sorted, fine to coarse-grained SAND, some Silt, little Gravel, moist to wet. Changing at 162.8 feet to: NO RECOVERY.	162' SAND 162.8' NO RECOVERY		
163									
164	83	24	164-166	40-50	0.0 ppm	Dark yellowish-brown to dark brown, moderately sorted, GRAVEL, some coarse-grained Sand, trace Silt, wet. Changing at 164.4 feet to: Dark yellowish-brown, poorly sorted, fine to coarse-grained SAND, some Silt, little Gravel, moist to wet. Changing at 165.0 to NO RECOVERY.	164' GRAVEL 164.4' SAND 165' NO RECOVERY 166'		
165									

REMARKS

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BORING_WI 6267781 WWW.WOLVEN.AVENUE.GPJ WI_DNR.GDT 4/17/20

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Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV12D
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Check: Kate McDonald

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
167	84	24	166-168	47-50/4"	0.0 ppm	Dark yellowish-brown to dark brown, moderately sorted, GRAVEL, some coarse-grained Sand, trace Silt, wet. Changing at 166.1 feet to: Dark yellowish-brown, poorly sorted, fine to coarse-grained SAND, some silt, little Gravel, moist to wet. Changing at 166.7 feet to: Yellowish-brown, well sorted, fine to medium-grained SAND, trace Silt, wet. Changing at 166.8 feet to: NO RECOVERY.	166.1' GRAVEL SAND 166.8' NO RECOVERY		
168	85	24	168-170	30-50/4"	0.0 ppm	Dark yellowish-brown, poorly sorted, fine to coarse-grained SAND, some Silt, little Gravel, moist to wet. Changing at 168.8 feet to: NO RECOVERY.	168' SAND 168.8' NO RECOVERY		
170	86	24	170-172	21-50/4"	0.0 ppm	Dark yellowish-brown, poorly sorted, fine to coarse-grained SAND, some Silt, little Gravel, moist to wet. Changing at 170.8 feet to: NO RECOVERY.	170' SAND 170.8' NO RECOVERY		
172	87	24	172-174	20-50/4"	0.0 ppm	Dark yellowish-brown to dark brown, poorly sorted, GRAVEL, some Silt, little fine to coarse-grained Sand, wet. Changing at 172.9 feet to: NO RECOVERY.	172' GRAVEL 172.9' NO RECOVERY		
174	88	24	174-176	45-50/4.5"	0.0 ppm	Dark yellowish-brown to dark brown, poorly sorted, GRAVEL, some Silt, little fine to coarse-grained Sand, wet. Changing at 174.9 feet to: NO RECOVERY.	174' GRAVEL 174.9' NO RECOVERY		Filter Sand
176	89	24	176-178	40-50/2"	0.0 ppm	Dark yellowish-brown to dark brown, poorly sorted, GRAVEL, some Silt, little fine to coarse-grained Sand, wet. Changing at 176.6 feet to: NO RECOVERY.	176' GRAVEL 176.6' NO RECOVERY		
178	90	24	178-180	11-12 9-12	0.0 ppm	Dark yellowish-brown to dark brown, poorly sorted, GRAVEL, some Silt, little fine to coarse-grained Sand, wet. Changing at 178.9 feet to: NO RECOVERY.	178' GRAVEL 178.9' NO RECOVERY 180'		2-Inch PVC Well Screen

REMARKS

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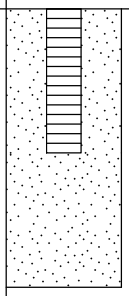
Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
181	91	24	180-182	33-50/5"	0.0 ppm	Dark yellowish-brown to dark brown, poorly sorted, GRAVEL, some Silt, little fine to coarse-grained Sand, wet. Changing at 180.8 feet to: NO RECOVERY.	GRAVEL 180.8' No RECOVERY		
182	92	24	182-184	33-18 10-27	0.0 ppm	Dark yellowish-brown to dark brown, poorly sorted, GRAVEL, some Silt, little fine to coarse-grained Sand, wet. Changing at 182.9 feet to: Dark grayish-brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 183.3 feet to: NO RECOVERY.	182' GRAVEL 182.9' CLAY & SILT 183.3' NO RECOVERY		
184	93	24	184-186	21-33-50/3	0.0 ppm	Dark grayish-brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 185.0 feet to: NO RECOVERY.	184' CLAY & SILT 185' NO RECOVERY		
186						Bottom of Borehole at 186.0 Feet	186'	3	
187									
188									
189									
190									
191									
192									
193									

REMARKS

3. Monitoring well was installed in borehole upon completion. Well screen set from 176.6 to 181.5 feet below ground surface.

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Boring No.: MW-WV-12M
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File No.: 16.0062677.81
Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry H.
Logged by: John Morehouse
Date Start/Finish: 12-5-18 / 12-5-18
Boring Location:
GS Elev.: **Datum:** MI State Plane S Zone NAD 83

	Auger/ Casing	Sampler
Type:	Direct Push	MacroCore
O.D. / I.D.:	NA	2.25"
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–49						See boring log PMW-WV-12/MW-WV-12D for soil descriptions.			PROTECTIVE CASING

REMARKS

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Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
51–108									Bentonite Grout

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
109–166									Filter Sand; 2-Inch PVC Well Screen
150						Bottom of Borehole at 150.0 Feet		1	

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 144.5 to 149.4 feet below ground surface.

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Boring No.: MW-WV-12S
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File No.: 16.0062677.81
Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry H.
Logged by: John Morehouse
Date Start/Finish: 12-6-18 / 12-5-18
Boring Location:
GS Elev.: **Datum:** MI State Plane S Zone NAD 83

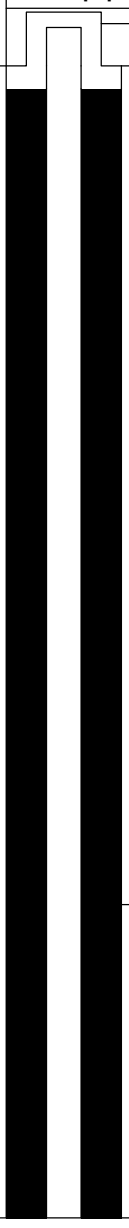
	Auger/ Casing	Sampler
Type:	Direct Push	MacroCore
O.D. / I.D.:	NA	2.25"
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks
1–49						See boring log PMW-WV-12/MW-WV-12D for soil descriptions.		

Equipment Installed



REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
51–79									
80						Bottom of Borehole at 80.0 Feet		1	

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 74.6 to 79.5 feet below ground surface.

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Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry Zach/Travis
Logged by: C. Melby
Date Start/Finish: 2-14-19 / 2-18-19
Boring Location:
GS Elev.: **Datum:** MI State Plane S Zone NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks
0	1	24/8	0-2	WOH 12"-1-1		Very soft, light brown, Clayey SILT, little Organic Matter, Moist.	Clayey SILT	1 2
2	2	24/24	2-4	2-3 4-4		Very soft, light brown, Clayey SILT, little Organic Matter, Moist. Changing at 2.5 feet to: Brown, fine to medium SAND and Silt, wet.	2.5' SAND	3
4	3	24/12	4-6	1-3 3-1		Loose, light brown, fine to medium SAND and Silt wet.		
6	4	24/12	6-8	1-1 3-3		Loose, brown, fine to medium SAND and Silt, wet.		
8	5	24/10	8-10	1-3 4-4		Loose, brown, fine to medium SAND and Silt, with tip of spoon at 9.9 feet gray, Silty CLAY, some fine to medium Sand, wet.		
10	6	24/10	10-12	1-4 5-5		Loose, brown, fine to medium SAND, trace Silt, wet.	9.9' 10' Silty CLAY SAND	4
12	7	24/16	12-14	4-5 4-4		Loose, brown, fine to coarse SAND, little Gravel, trace Silt, wet.		
14	8	24/18	14-16	1-4 5-5		Loose, brown, fine to medium SAND, trace Silt, wet.		

Equipment Installed

PROTECTIVE CASING

REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).
2. Installed temporary well from 0.0 to 10.0 feet below ground surface with a 5-foot well screen, and purged 20.0 gallons of water.
3. Groundwater was encountered at approximately 2.0 feet below ground surface.
4. Installed temporary well from 10.0 to 20.0 feet below ground surface with a 5-foot well screen, and purged 35.0 gallons of water.

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Check: Kate McDonald

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							SAND		
16	9	24/16	16-18	3-5 5-10		Medium dense, brown, fine to medium SAND, trace Silt, wet. Changing at 16.5 feet to: Brown, Clayey SILT, some fine to medium Sand, wet.	16.5' Clayey SILT		
17									
18	10	24/16	18-20	5-8 9-7		Brown, Clayey SILT, some fine to medium Sand, wet.			
19									
20	11	24/12	20-22	5-8 6-9		Medium dense, brown, fine to medium SAND, little Silt, wet.	20' SAND		
21									
22	12	24/16	22-24	1-6 3-4		Loose, brown, fine to medium SAND, little Silt, wet. Changing at 23.0 feet to: Brown, Silty CLAY, some fine Sand, wet.			
23							23' Silty CLAY		
24	13	24/21	24-26	2-6 8-10		Stiff, gray, Silty CLAY, trace fine Sand, wet.			
25								5	
26	14	24/12	26-28	0-0 2-3		Soft, brown, Silty CLAY, little fine Sand, wet.			
27									
28	15	24/24	28-30	3-5 6-7		Stiff, brown, Silty CLAY, some fine Sand, wet. Changing at 28.8 feet to: Medium dense, brown, fine to medium SAND, some Silt, wet. Changing at 29.5 feet to: Soft, Silty CLAY, trace fine Sand, wet.			Bentonite/Grout
29							28.8' SAND 29.5' Silty CLAY		
30	16	24/24	30-32	3-5 8-9		Stiff, gray, brown and red, Silty CLAY, trace fine to coarse Sand, wet.			
31									
32	17	24/24	32-34	2-4		Stiff, brown, Clayey SILT, little fine to	32' Clayey SILT		

REMARKS

5. Installed 10-inch casing to 25.0 feet below ground surface. 12.25 inch auger advanced to 25.0 feet for 10-inch casing install.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
33				6-10		medium Sand, wet. Changing at 33.8 feet to: Gray and brown, fine SAND, some Silt, wet.	Clayey SILT		
34	18	24/16	34-36	2-3 7-15		Stiff, brown, Clayey SILT, little fine Sand, wet. Changing at 35.4 feet to: Brown, fine SAND, some Silt, wet.	33.8' 34' SAND Clayey SILT		
35							35.4' SAND	6	
36	19	24/14	36-38	5-9 18-16		Medium dense, brown, fine SAND and Silt, wet.			
37									
38	20	24/24	38-40	1-3 5-10		Medium dense, brown, fine SAND and Silt, wet. Changing at 38.8 feet to: Brown and gray, Clayey SILT, trace fine Sand, wet.	38.8' Clayey SILT		
39									
40	21	24/16	40-42	2-10 22-22		Dense, gray and brown, SAND and Silt, wet.	40' SAND		
41									
42	22	24/24	42-44	6-16 20-28		Dense, gray and brown, SAND and Silt, wet.			
43									
44	23	24/18	44-46	3-6 15-15		Medium dense, gray and brown, SAND and Silt, wet.			
45								7	
46	24	24/18	46-48	8-3 6-10		Loose, tan and brown, fine to coarse SAND, little Silt, trace Gravel, wet.			
47									
48	25	24/18	48-50	3-6 9-25		Medium dense, fine to coarse SAND, little Silt, wet.			
49									

REMARKS

6. Installed temporary well from 35.0 to 45.0 feet below ground surface with a 5-foot well screen, and purged 30.0 gallons of water.
7. Installed temporary well from 45.0 to 55.0 feet below ground surface with a 5-foot well screen, and purged 30.0 gallons of water.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
51	26	24/14	50-52	5-3 16-19		Medium dense, tan and brown, fine to medium SAND, little Silt, wet.	SAND		
52	27	24/24	52-54	3-5 8-11		Medium dense, tan and brown, fine to medium SAND, little Silt, wet.			
53								8	
54	28	24/18	54-56	2-2 3-4		Loose, tan and brown, fine to medium SAND, little Silt, trace Gravel, wet.			
55									
56	29	24/24	56-58	0-2 3-4		Loose, tan and brown, fine to medium SAND, trace Silt, trace Gravel, wet.			Filter Sand
57									
58	30	24/12	58-60	2-2 5-5		Loose, tan and brown, fine to medium SAND, trace Silt, wet.			
59									
60	31	24/0	60-62	1-1 2-3		NO RECOVERY.	60' NO RECOVERY		2-Inch PVC Well Screen
61									
62	32	24/18	62-64	3-8 18-19		Medium dense, brown, fine to medium SAND, wet. Changing at 63.0 feet to: Brown, Clayey SILT, trace fine to coarse Sand, wet.	62' SAND 63' Clayey SILT		
63									
64	33	24/12	64-66	10-16 24-33		Hard, gray, Silty CLAY, trace fine Sand, wet.	64' Silty CLAY		
65									
66	34	24/15	66-68	7-16 30-50/3"		Hard, gray, Silty CLAY, trace fine Sand, wet. Changing at 67.7 feet to: Gray, Silty CLAY, some fine to coarse Sand, trace Rock fragments, wet.			
67									

REMARKS

8. Installed temporary well from 53.0 to 63.0 feet below ground surface with a 5-foot well screen, and purged 65.0 gallons of water.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
68	35	24/12	68-70	9-52-50/3"		Very dense, gray, fine to coarse SAND and Silt, trace Gravel, wet. Changing at 69.8 feet to: Gray, Silty CLAY, some fine to coarse Sand, wet.	Silty CLAY 68' SAND		
69									
70	36	24/18	70-72	13-26 39-45		Hard, Clayey SILT, some fine to coarse Sand, little Rock fragments, trace Gravel, wet.	69.8' 70' Silty CLAY Clayey SILT		
71									
72	37	24/24	72-74	11-18 21-21		Hard, Clayey SILT, some fine to coarse Sand, little Rock fragments, trace Gravel, wet.			
73									
74	38	24/24	74-76	15-22 24-37		Hard, CLAY & SILT, some fine to coarse Sand, little Rock fragments, wet.	74' CLAY & SILT		
75									
76	39	24/0	76-78	15-50/6"		NO RECOVERY.	76' NO RECOVERY	9	
77									
78	40	24/24	78-80	6-26 24-20		Hard, gray, CLAY & SILT, little fine to coarse Sand, wet.	78' CLAY & SILT		
79									
80	42	24/18	80-82	33-27 27-36		Hard, gray, Clayey SILT, little fine to coarse Sand, trace Rock fragments, wet.	80' Clayey SILT		
81									
82	43	24/8	82-84	13-50/2"		Hard, gray, SILT & CLAY, some Rock fragments, little fine to coarse Sand with large Boulder at 82.8 feet.	82' SILT & CLAY		
83									
84	44	24/24	84-86	19-29 35-45		Crushed BOULDER. Changing at 84.5 feet to: Gray, Clayey SILT, litle fine to coarse Sand, wet.	84' Crushed 84.5' BOULDER Clayey SILT		

REMARKS

9. Large rock shards.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
							Clayey SILT		
86	45	24/0	86-88	10-50/1"		NO RECOVERY.	86' NO RECOVERY	10	
87									
88	46	24/6	88-90	21-50/3"		Hard, gray, Clayey SILT, little fine to coarse Sand with 2-inch Rock fragment at bottom.	88' Clayey SILT		
89									
90	47	24/6	90-92	50/6"		Hard, gray, Clayey SILT, little fine to coarse Sand, some Rock fragments, wet.			
91									
92	48	24/18	92-94	26-48-50/6"		Hard, gray, Clayey SILT, little fine to coarse Sand, some Rock fragments, wet.			
93									
94	49	24/20	94-96	5-22 45-50/5"		Hard, gray, Clayey SILT and fine to coarse Sand, little Gravel, trace Rock fragments, wet.			
95									
96	50	24/11	96-98	20-50/5"		Hard, gray, Clayey SILT, some fine to coarse Sand, wet.			
97									
98	51	24/9	98-100	34-50/3"		Hard, gray, Clayey SILT, some fine to coarse Sand, wet with 2-inch Rock fragments from 98.5 to 98.8 feet.			
99									
100	52	24/6	100-102	15-50/0"		Hard, gray, Clayey SILT, little fine to coarse Sand, trace Rock fragments, wet.			
101						Bottom of Borehole at 101.0 Feet	101'	11	
102									

REMARKS

10. 1-inch rock fragments.
11. Monitoring well was installed in borehole upon completion. Well screen set from approximately 58.0 to 63.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV-13D

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-13M
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File No.: 16.0062677.81
Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: J. Muntoon
Logged by: S. Stephenson
Date Start/Finish: 2-22-19 / 2-22-19
Boring Location:
GS Elev.: **Datum:** MI State Plane S Zone NAD 83

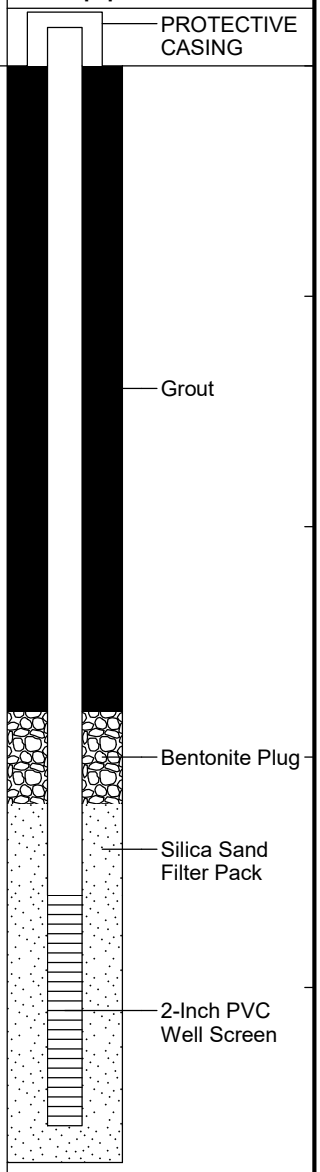
	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks
1–23						See boring log WV-MW-13/WV-MW-13D for soil descriptions.		
24						Bottom of Borehole at 23.8 Feet		1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 18.0 to 23.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV-13M

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Boring No.: MW-WV-13S
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File No.: 16.0062677.81
Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: C. Melby/ J. Markosky
Date Start/Finish: 3-26-19 / 3-26-19
Boring Location:
GS Elev.: **Datum:** MI State Plane S Zone NAD 83

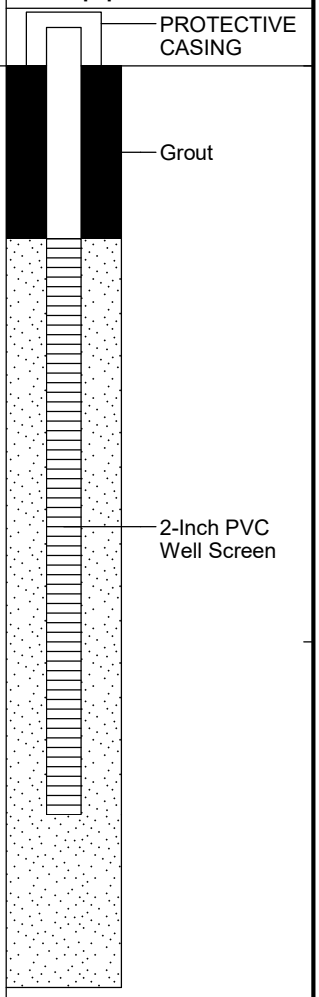
	Auger/ Casing	Sampler
Type:	Direct Push	MacroCore
O.D. / I.D.:	NA	2.25"
Hammer Wt.:	NA	NA
Hammer Fall:	NA	NA
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks
1–7						See boring log WV-MW-13/WV-MW-13D for soil descriptions.		
8						Bottom of Borehole at 8.0 Feet		1
9								

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 1.5 to 6.5 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: J. Markosky
Date Start/Finish: 4-15-19 / 4-24-19
Boring Location: See Survey
GS Elev.: See Survey **Datum:** MI State Plane S Zone NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
TBD				

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/24	0-2	1-2 1-2	0.0 ppm	Very loose, dark brown, fine to medium SAND, some Organic Matter, dry (TOPSOIL). Changing at 1.0 foot to: Brown, fine to medium SAND, little Silt, dry (TOPSOIL).	SAND	1	None
2	2	24/12	2-4	1-2 4-3	0.0 ppm	Loose, brown, fine to coarse SAND, little Silt, dry.			
4	3	24/12	4-6	2-2 2-2	0.0 ppm	Loose, brown, fine to coarse SAND, little Silt, dry.		2	
6	4	24/12	6-8	0-0 1-1	0.0 ppm	Very loose, brown, fine to coarse SAND, little Silt, moist.			
8	5	24/24	8-10	1-1 1-1	0.0 ppm	Very loose, brown, fine to coarse SAND, little Silt, moist.			
10	6	24/24	10-12	1-3 2-3	0.0 ppm	Loose, brown, fine to coarse SAND, little Silt, moist.			
12	7	24/12	12-14	4-6 8-8	0.0 ppm	Loose, brown, fine to coarse SAND, little Silt, wet.			
14	8	24/24	14-16	7-9 11-14	0.0 ppm	Medium dense, brown, fine to coarse SAND, little Silt, wet. Changing at 14.2 feet to: Brown, CLAY & SILT, trace fine Sand,	14.2' CLAY & SILT		

REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million (ppm) of isobutylene. Background was measured at 0.0 ppm.
2. Groundwater sample collected from temporary well with well screen set from approximately 4.0 to 14.0 feet below ground surface and submitted for analytical laboratory testing.

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Algoma Twp, Kent County, Michigan

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
						dry.	CLAY & SILT		
16	9	24/24	16-18	5-8 13-14	0.0 ppm	Very stiff, gray, Silty CLAY, trace fine Sand, dry.	16' Silty CLAY		
17									
18	10	24/24	18-20	8-9 14-15	0.0 ppm	Very stiff, gray, Silty CLAY, trace fine Sand, dry.			
19									
20	11	24/24	20-22	10-13 13-17	0.0 ppm	Very stiff, gray, Silty CLAY, trace fine Sand, dry.			
21									
22	12	24/20	22-24	0-0 4-12	0.0 ppm	Very stiff, gray, Silty CLAY, trace fine Sand, dry. Changing at 23.0 feet to: Brown, fine to coarse SAND, little Silt, moist.			
23							23' SAND		
24	13	24/24	24-26	7-7 12-14	0.0 ppm	Very stiff, gray, CLAY, little Silt, dry.	24' CLAY		
25									
26	14	24/24	26-28	5-9 13-17	0.0 ppm	Very stiff, gray, CLAY, little Silt, dry.		3	
27									
28	15	24/24	28-30	2-8 12-13	0.0 ppm	Very stiff, gray, CLAY, little Silt, dry.			
29									
30	16	24/24	30-32	5-7 12-17	0.0 ppm	Very stiff, gray, CLAY, little Silt, dry.			
31									
32	17	24/24	32-34	5-8	0.0 ppm	Very stiff, gray, CLAY, little Silt, dry with 1.0			

REMARKS

3. Sand bailer used at 26.0 feet below ground surface. Not enough water for installation of a temporary well.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
				10-12		inch Sand seam at 33.2 feet.	CLAY		
33									
34	18	24/24	34-36	5-9 12-13	0.0 ppm	Very stiff, gray, CLAY, little Silt, dry.			
35									
36	19	24/24	36-38	4-8 13-15	0.0 ppm	Very stiff, gray, CLAY, little Silt, dry.			
37									
38	20	24/24	38-40	5-10 13-17	0.0 ppm	Very stiff, gray, CLAY, little Silt, dry.			
39									
40	21	24/18	40-42	2-8 13-14	0.0 ppm	Very stiff, gray, CLAY, little Silt, dry.			
41									
42	22	24/24	42-44	4-10 13-18	0.0 ppm	Very stiff, gray, Silty CLAY, dry.	42' Silty CLAY		
43									
44	23	24/24	44-46	5-9 7-9	0.0 ppm	Very stiff, gray, Silty CLAY, dry with 1.0 inch Sand seam at 45.8 feet.			
45									
46	24	24/24	46-48	7-11 11-19	0.0 ppm	Very stiff, gray, Silty CLAY, dry.			
47									
48	25	24/24	48-50	2-11 31-23	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.			
49									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
51	26	24/24	50-52	4-7 8-10	0.0 ppm	Very stiff, gray, Silty CLAY, little fine Sand, dry.	Silty CLAY		
52	27	24/24	52-54	6-10 9-14	0.0 ppm	Very stiff, gray, Silty CLAY, little fine Sand, dry.			
54	28	24/24	54-56	9-17 27-41	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.		4	
56	29	24/24	56-58	5-8 11-11	0.0 ppm	Very stiff, gray, Silty CLAY, little fine to coarse Sand, dry.			
58	30	24/24	58-60	4-7 9-11	0.0 ppm	Very stiff, gray, Silty CLAY, trace fine to coarse Sand, dry.			
60	31	24/12	60-62	12-12 14-15	0.0 ppm	Very stiff, gray, Silty CLAY, little fine to medium Sand, dry.			
62	32	24/24	62-64	2-4 7-7	0.0 ppm	Stiff, gray, Silty CLAY, little fine to medium Sand, dry.			
64	33	24/20	64-66	5-6 10-12	0.0 ppm	Very stiff, gray, Silty CLAY little fine Sand, dry.			
66	34	24/24	66-68	10-13 18-23	0.0 ppm	Hard, gray, Silty CLAY little fine Sand, dry.			
67									

REMARKS

4. 3.0" split spoon used from 54.0 to 56.0 feet below ground surface.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
68	35	24/24	68-70	5-11 16-18	0.0 ppm	Very stiff, gray, Silty CLAY little fine Sand, dry.	Silty CLAY		
69									
70	36	24/24	70-72	8-16 23-26	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.			
71									
72	37	24/24	72-74	9-15 17-22	0.0 ppm	Hard, gray, CLAY & SILT, little fine to medium Sand, dry.	72' CLAY & SILT		
73									
74	38	24/24	74-76	4-8 18-23	0.0 ppm	Very stiff, gray, SILT & CLAY, little fine to medium Sand, dry.	74' SILT & CLAY		
75									
76	39	24/24	76-78	8-21 26-29	0.0 ppm	Hard, gray, CLAY & SILT, little fine to medium Sand, dry.	76' CLAY & SILT		
77									
78	40	24/24	78-80	8-13 23-32	0.0 ppm	Hard, gray, CLAY & SILT, little fine to medium Sand, dry. Changing at 79.0 feet to: Hard, dark gray, Silty CLAY, little fine Sand, dry.			
79							79' Silty CLAY	5	
80	41	24/24	80-82	7-12 20-28	0.0 ppm	Hard, dark gray, Silty CLAY, little fine Sand, dry. Changing at 81.0 feet to: Hard, gray and green, Silty CLAY, little fine Sand, dry.			
81									
82	42	24/24	82-84	10-16 25-28	0.0 ppm	Hard, brown, Silty CLAY, some fine to medium Sand, dry. Changing at 82.7 feet to: Brown to olive, Silty CLAY, little fine Sand, dry.			
83									
84	43	24/24	84-86	4-13 18-23	0.0 ppm	Hard, light gray to gray, Silty CLAY, little fine to medium Sand, dry.			

REMARKS

5. Small hydraulic leak on CME 1050. Switched to CME 95.

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							Silty CLAY		
86	44	24/24	86-88	5-4 12-14	0.0 ppm	Very stiff, gray to olive, CLAY & SILT, little fine Sand, dry.	86' CLAY & SILT		
87									
88	45	24/12	88-90	9-50/6"	0.0 ppm	Very stiff, gray to olive, CLAY & SILT, little fine Sand, dry. Changing at 89.9 feet to: Gray, fine to medium SAND, dry.			
89									
90	46	24/24	90-92	12-13 21-36	0.0 ppm	Hard, gray, Silty CLAY, little fine to medium Sand, dry.	89.9' 90' SAND Silty CLAY		
91									
92	47	24/24	92-94	5-14 20-21	0.0 ppm	Hard, gray, Silty CLAY, little fine to medium Sand, dry.			
93									
94	48	24/24	94-96	6-12 15-22	0.0 ppm	Very stiff, gray, Silty CLAY, little fine to medium Sand, dry.			
95									
96	49	24/20	96-98	5-11 15-20	0.0 ppm	Very stiff, gray, Silty CLAY, little fine to medium Sand, dry.			
97									
98	50	24/24	98-100	5-10 19-20	0.0 ppm	Very stiff, gray, Silty CLAY, little fine to medium Sand, dry.			
99									
100	51	24/24	100-102	3-7 12-18	0.0 ppm	Very stiff, gray, Silty CLAY, little fine to medium Sand, dry.			
101									
102	52	24/24	102-104	6-12	0.0 ppm	Very stiff, gray, Silty CLAY, little fine to			

REMARKS

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Boring No.: WV-MW-14D

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
103				18-16		medium Sand, dry.	Silty CLAY		
104	53	24/24	104-106	5-11 19-18	0.0 ppm	Very stiff, gray, Silty CLAY, little fine to medium Sand, dry.			
105									
106	54	24/24	106-108	6-13 20-19	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.			
107									
108	55	24/24	108-110	7-12 19-20	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.		6	
109									
110	56	24/11	110-112	42-50/5"	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry. Changing at 110.8 feet to: Gray, Silty CLAY, some fine Sand, dry.			
111									
112	57	24/12	112-114	12-50/6"	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.			
113									
114	58	24/17	114-116	12-24-50/5	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.			
115									
116	59	24/24	116-118	10-15 31-31	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.			
117									
118	60	24/24	118-120	11-9 14-25	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry. Changing at 119.9 feet to: Gray, fine to medium SAND, moist to dry.			
119							119.9'		

REMARKS

6. 3.0" split spoon used from 108.0 to 110.0 feet below ground surface.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
	61	24/24	120-122	11-16 24-30	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.	120' SAND / Silty CLAY		
121									
122	62	24/16	122-124	25-28-50/4"	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.			
123									
124	63	24/23	124-126	10-26 49-50/5"	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.			
125									
126	64	24/17	126-128	22-52-50/5"	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.			
127									
128	65	24/12	128-130	6-29-50/5"	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.			
129									
130	66	24/24	130-132	5-12 24-31	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.			
131									
132	67	24/23	132-134	15-24 40-50/5'	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.			
133									
134	68	24/12	134-136	20-38	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry.			
135									
136	69	24/12	136-138	22-50/5"	0.0 ppm	Hard, gray, Silty CLAY, little fine to coarse Sand, dry. Changing at 136.5 feet to: Brown to gray, fine SAND, little Silt, moist.	136.5' SAND		
137									

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
							SAND		
138	70	24/11	138-140	20-50/5"	0.0 ppm	Very dense, gray, fine to coarse SAND, little Silt, wet.		7	
139									
140	71	24/18	140-142	45-44-50/6	0.0 ppm	Very dense, gray, fine to coarse SAND, little Silt, wet.			
141									
142	72	24/18	142-144	11-23 40-50/4"	0.0 ppm	Very dense, gray, fine to coarse SAND, little Silt, wet.			
143									
144	73	24/16	144-146	12-35-50/4	0.0 ppm	Very dense, gray, fine to coarse SAND, little Silt, wet. Changing at 144.5 feet to: Very dense, gray, medium to coarse SAND, little Silt, wet.			
145									
146	74	24/24	146-148		0.0 ppm	Brown, fine to coarse SAND, some Gravel, little Silt, wet.			
147									
148	75	24/1	148-150	50/1"	0.0 ppm	Very dense, gray, fine to coarse SAND, little Silt, wet.			
149									
150						Bottom of Borehole at 150.0 Feet	150'	8	
151									
152									
153									
154									

REMARKS

7. Groundwater was encountered at approximately 138.0 feet below ground surface.
8. See WV-MW-14M for well installation details.

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Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: J. Markosky
Date Start/Finish: 4-29-19 / 5-1-19
Boring Location: See Survey
GS Elev.: See Survey **Datum:** MI State Plane S Zone NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–54						See MW-WV-14D boring log for soil descriptions.			PROTECTIVE CASING

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

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Algoma Twp, Kent County, Michigan

Boring No.: WV-MW-14M
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File No.: 16.0062677.81
Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
56–118									Bentonite Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Algoma Twp, Kent County, Michigan

Boring No.: WV-MW-14M
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File No.: 16.0062677.81
Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
120–182						Bottom of Borehole at 145.0 Feet		1	Filter Sand; Top of Well Screen; 2-Inch PVC Well Screen; Bottom of Well Screen

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 140.0 to 145.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: WV-MW-14S
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File No.: 16.0062677.81
Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: J. Markosky
Date Start/Finish: 4-28-19 / 4-29-19
Boring Location: See Survey
GS Elev.: See Survey **Datum:** MI State Plane S Zone NAD 83

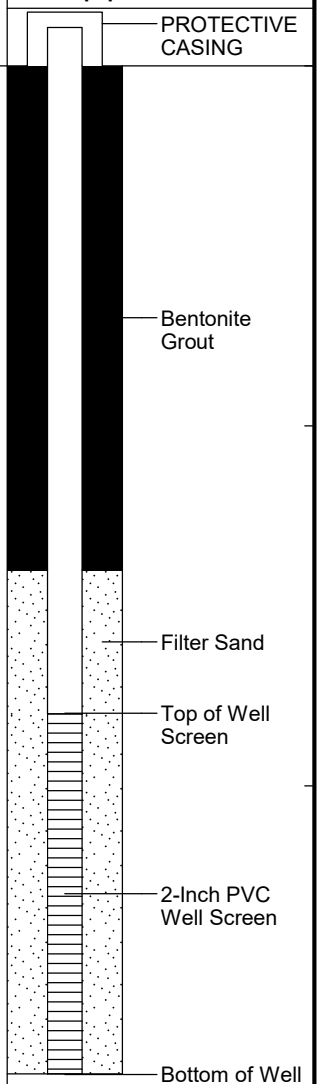
	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks
1–15						See MW-WV-14D boring log for soil descriptions.		
14						Bottom of Borehole at 14.0 Feet		1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 9.0 to 14.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolverine World Wide
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Algoma Twp, Kent County, Michigan

Boring No.: WV-MW-15A
Page: 1 **of** 1
File No.: 16.0062677.81
Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 8-28-19 / 8-30-19
Boring Location: North Side of Property
GS Elev.: NM **Datum:** MI State Plane S Zone NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

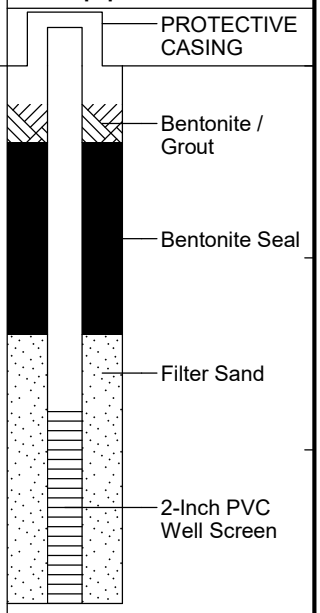
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
NM	NM	NM	NM	NM

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–13						See MW-WV-15D boring log for soil descriptions.		
14						Bottom of Borehole at 14.0 Feet		1
15–29								

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 9.0 to 14.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: WV-MW-15B
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File No.: 16.0062677.81
Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 8-28-19 / 8-30-19
Boring Location: North Side of Property
GS Elev.: NM **Datum:** MI State Plane S Zone NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

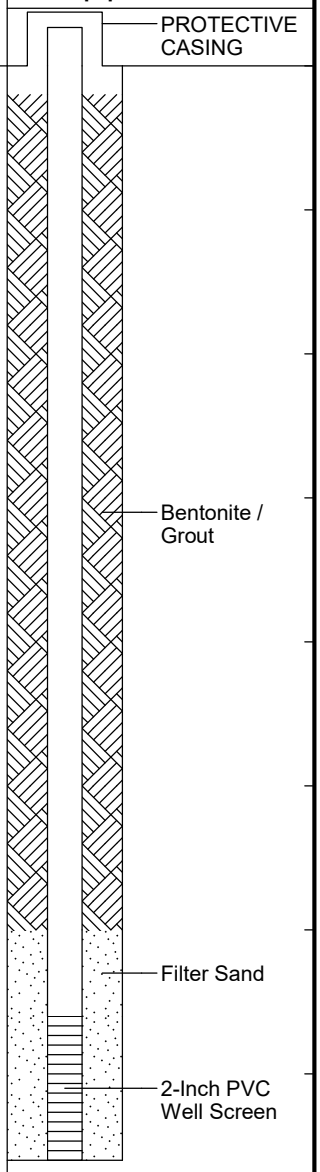
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
NM	NM	NM	NM	NM

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–37						See MW-WV-15D boring log for soil descriptions.		
38						Bottom of Borehole at 38.0 Feet		1
39								

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 33.0 to 38.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 9/27/19

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Boring No.: WV-MW-15C
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Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 8-21-19 / 8-21-19
Boring Location: North Side of Property
GS Elev.: NM **Datum:** MI State Plane S Zone NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
NM	NM	NM	NM	NM

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1						See MW-WV-15D boring log for soil descriptions.			PROTECTIVE CASING
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									Bentonite / Grout
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check: Kate McDonald

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31–49									Filter Sand; 2-Inch PVC Well Screen
50						Bottom of Borehole at 50.0 Feet		1	
51–64									

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 37.8 to 42.6 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: WV-MW-15D
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Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 8-9-19 / 8-19-19
Boring Location: North Side of Property
GS Elev.: NM **Datum:** MI State Plane S Zone NAD 83

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
NM	NM	NM	NM	NM

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/14	0-2	3-6 6-9		Very dark grayish-brown, SILT, some fine Sand, trace Gravel, moist. Changing at 0.6 feet to: Yellowish-brown, SILT, some Sand, trace Gravel, moist. Changing at 1.2 feet to: NO RECOVERY.	SILT 1.2' NO RECOVERY 2'		PROTECTIVE CASING
2	2	24/14	2-4	7-6 3-5		Yellowish-brown, SILT, some Sand, trace Gravel, moist. Changing at 2.4 feet to: Brownish-yellow, fine to medium SAND, trace Silt, moist. Changing at 2.8 feet to: Dark yellowish-brown, fine to medium SAND, trace Silt, moist. Changing at 3.2 feet to: NO RECOVERY.	SILT 2.4' SAND 3.2' NO RECOVERY 4'		
4	3	24/11	4-6	4-9 8-13		Brown, fine to coarse SAND, trace Gravel, trace Silt, wet. Changing at 4.9 feet to: NO RECOVERY.	SAND 4.9' NO RECOVERY 6'		
6	4	24/11	6-8	3-6 7-6		Brown, fine to coarse SAND, trace Gravel, trace Silt, grading to medium to coarse SAND, trace Gravel, trace Silt, wet. Changing at 6.9 feet to: NO RECOVERY.	SAND 6.9' NO RECOVERY 8'		
8	5	24/4	8-10	2-10 9-4		Brown, medium to coarse SAND, trace Gravel, trace Silt, wet. Changing at 8.3 feet to: NO RECOVERY.	8.3' SAND NO RECOVERY 10'		
10	6	24/12	10-12	2-4 3-4		Brown, medium to coarse SAND, trace Gravel, trace Silt, wet. Changing at 11.0 feet to: NO RECOVERY.	SAND 11' NO RECOVERY 12'		
12	7	24/17	12-14	3-9 8-10		Brown, medium to coarse SAND, trace Gravel, trace Silt, wet. Changing at 12.7 feet to: Dark grayish-brown, SILT & CLAY, moderately plastic, cohesive, moist. Changing at 12.8 feet to: Dark grayish-brown, Silty CLAY, plastic, cohesive, moist. Changing at 13.4 feet to: NO RECOVERY.	SAND 12.7' 12.8' SILT & CLAY 13.4' Silty CLAY NO RECOVERY 14'		
14	8	24/13	14-16	9-12 11-10		Dark grayish-brown, Silty CLAY, plastic, cohesive, moist. Changing at 15.1 feet to: NO RECOVERY.	Silty CLAY 15.1' NO RECOVERY 16'		
15									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 9/27/19

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Check: Kate McDonald

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
17	9	24/17	16-18	3-6 6-6		Dark grayish-brown, Silty CLAY, plastic, cohesive, moist, occasional very thin lenses of fine grained Sand, moist. Changing at 17.4 feet to: NO RECOVERY.	Silty CLAY 17.4' NO RECOVERY 18'		
18	10	24/18	18-20	2-5 6-9		Dark grayish-brown, Silty CLAY, plastic, cohesive, occasional very thin lenses of fine Sand, moist. Changing at 18.6 feet to: Brown, fine SAND, trace Silt, wet. Changing at 18.9 feet to: Dark grayish-brown, Silty CLAY, plastic, cohesive, moist. Changing at 19.5 feet to: NO RECOVERY.	Silty CLAY 18.6' 18.9' SAND Silty CLAY 19.5'		
20	11	24/23	20-22	4-10 12-15		Dark grayish-brown, Silty CLAY, plastic, cohesive, bedded, occasional very thin lenses of fine Sand, moist. Changing at 21.9 feet to: NO RECOVERY.	NO RECOVERY 20' Silty CLAY 21.9'		
22	12	24/19	22-24	4-9 10-13		Dark grayish-brown, Silty CLAY, plastic, cohesive, bedded, occasional very thin lenses of fine Sand, moist. Changing at 23.6 feet to: NO RECOVERY.	22' NO RECOVERY Silty CLAY 23.6'		
24	13	24/24	24-26	2-13 13-13		Dark grayish-brown, Silty CLAY, plastic, cohesive, bedded, occasional very thin lenses of fine Sand, moist. Changing at 24.5 feet to: Brown, fine SAND, trace Silt, wet. Changing at 24.9 feet to: Dark grayish-brown, Silty CLAY, plastic, cohesive, bedded, moist. Changing at 25.3 feet to: Brown, fine SAND, trace Silt, wet. Changing at 25.6 feet to: Dark grayish-brown, Silty CLAY, plastic, cohesive, bedded, moist.	NO RECOVERY 24' Silty CLAY 24.5' SAND 24.9' Silty CLAY 25.3' SAND 25.6' Silty CLAY		
26	14	24/24	26-28	1-8 11-11			26.2' SILT 27.4' Silty CLAY		
28	15	24/20	28-30	WOH		Dark grayish-brown, Silty CLAY, plastic, cohesive, bedded, moist. Changing at 26.2 feet to: Brown, SILT, little Sand, cohesive, non-plastic, moist. Changing at 27.4 feet to: Dark grayish-brown, Silty CLAY, plastic, cohesive, bedded, moist.	28' SAND / SILT / Silty CLAY	1	
30	16	24/24	30-32	1-2 3-3		Brown, fine SAND, Silt and Silty Clay, moist to wet. Changing at 29.7 feet to: NO RECOVERY.	29.7' 30' NO RECOVERY SAND 30.8'		
32	17	24/18	32-34	2-6 5-5		Grayish-brown to brown, fine SAND, some Silt, wet. Changing at 30.8 feet to: Grayish-brown to brown, SAND, Silt and Silty Clay, moist to wet. Changing at 30.9 feet to: Grayish-brown to brown, fine SAND, some Silt, wet. Brown to grayish-brown, fine SAND, little Silt, wet. Changing at 32.4 feet to: Dark grayish-brown, Silty CLAY, plastic, cohesive, moist. Changing at 32.8 feet to: Brown to grayish-brown, fine SAND, little Silt, wet.	30.9' SAND / SILT / Silty CLAY SAND 32.4' 32.8' Silty CLAY SAND		
34	18	24/14	34-36	1-2 4-4		Brown to grayish-brown, fine SAND, little	34.2' 34.3' Silty CLAY		

REMARKS

1. Groundwater was encountered at approximately 28.0 feet below ground surface.

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BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 9/27/19

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Algoma Twp, Kent County, Michigan

Boring No.: WV-MW-15D
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Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
35						Silt, wet. Changing at 34.2 feet to: Dark grayish-brown, Silty CLAY, plastic, cohesive, moist. Changing at 34.3 feet to: Brown to grayish-brown, fine SAND, little Silt, wet.	SAND SAND		
36	19	24/22	36-38	4-10 13-11		Brown to grayish-brown, fine SAND, little Silt, wet. Changing at 36.1 feet to: Dark grayish-brown, fine SAND, litle Silt, wet. Changing at 36.3 feet to: Brown to grayish-brown, fine SAND, little Silt, wet.	36.1' 36.3' Silty CLAY SAND		
37							36.8' 37' SILT SAND		
38	20	24/8	38-40	2-5 10-12		Changing at 36.8 feet to: Brown, SILT, cohesive, non-plastic, moist. Changing at 37.0 feet to: Brown to grayish-brown, fine SAND, little Silt, wet. Changing at 37.5 feet to: Brown, SILT, cohesive, non-plastic, moist. Changing at 37.6 feet to: Brown to grayish-brown, fine SAND, little Silt, wet.	37.5' 37.6' SILT SAND		
39							38.7' NO RECOVERY		
40	21	24/22	40-42	1-2 6-9		Brown, fine to coarse SAND, trace Gravel, trace Silt, wet. Changing at 38.7 feet to: NO RECOVERY.	40' SAND		
41						Brown, fine to coarse SAND, trace Gravel, trace Silt, wet. Changing at 41.8 feet to: NO RECOVERY.	41.8'		
42	22	24/19	42-44	1-5 7-9		Brown, fine to coarse SAND, trace Gravel, trace Silt, wet. Changing at 40.5 feet to: Dark grayish-brown, Silty CLAY, plastic, cohesive, moist. Changing at 40.6 feet to: Brown, GRAVEL, little Sand, trace Silt, wet. Changing at 40.9 feet to: Dark grayish-brown, Silty CLAY, plastic, cohesive, moist. Changing at 41.0 feet to: Brown, fine to coarse SAND, trace Gravel, trace Silt, wet. Changing at 41.6 feet to: NO RECOVERY.	42' NO RECOVERY 42.5' SAND 42.6' Silty CLAY 42.9' GRAVEL 43' Silty CLAY 43.6' SAND		
43									
44	23	24/22	44-46	4-6 9-12			44' NO RECOVERY 44.6' SAND		
45						Brown, fine to medium SAND, trace Silt, wet. Changing at 44.6 feet to: Dark grayish-brown, Silty CLAY, plastic, cohesive, moist. Changing at 44.7 feet to: Brown, fine to coarse SAND, little Gravel, trace Silt, wet. Changing at 45.4 feet to: Brown, SILT, trace fine Sand, wet. Changing at 45.5 feet to: Brown, SILt, moderately cohesive, moist to wet. Changing at 45.8 feet to: NO RECOVERY. Brown, GRAVEL, little Sand, trace Silt, wet. Changing at 47.3 feet to: Dark grayish-brown, Sandy CLAY, moderately cohesive, slightly plastic, moist. Changing at 47.5 feet to: Dark grayish-brown, Silty CLAY, plastic, cohesive, moist. Changing at 47.6 feet to: Dark brown, Silty CLAY, trace Gravel, plastic, cohesive, moist. Dark brown, Silty CLAY, trace Gravel, plastic, cohesive, moist. NO SAMPLE COLLECTED.	44.7' Silty CLAY SAND 45.4' SILT 45.8'		
46	24	24/24	46-48	6-14 24-31			46' NO RECOVERY GRAVEL		
47							47.3'		
48	25	24/24	48-50	14-30 30-30			47.5' Sandy CLAY Silty CLAY		
49									
50		60					50' NO SAMPLE COLLECTED		
51									
52									
53									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 9/27/19

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Check: Kate McDonald

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
54							NO SAMPLE COLLECTED		
55	26	12/12	55-56	7-9		Dark grayish-brown, Silty CLAY, plastic, cohesive, bedded, moist.	55' Silty CLAY		
56	27	24/24	56-58	7-18 20-29		Dark grayish-brown, Silty CLAY, plastic, cohesive, bedded, moist. Changing at 57.6 feet to: Dark grayish-brown, Silty CLAY, trace Gravel, plastic, cohesive, some bedding, moist.			
57									
58	28	24/24	58-60	40-39 22-22		Dark grayish-brown, Silty CLAY, trace Gravel, plastic, cohesive, some bedding, moist.			
59									
60	29	24/24	60-62	19-21 30-44		Dark grayish-brown, Silty CLAY, trace Gravel, plastic, cohesive, moist.			
61									
62	30	24/24	62-64	3-11 17-23		Dark grayish-brown, Silty CLAY, trace Gravel, plastic, cohesive, moist.			
63									
64	31	24/24	64-66	12-29 32-50		Dark grayish-brown, Silty CLAY, trace Gravel, plastic, cohesive, moist.			
65									Bentonite / Grout
66	32	24/24	66-68	12-20 26-40		Dark grayish-brown, Silty CLAY, trace Gravel, plastic, cohesive, moist.			
67									
68	33	24/5	68-70	17-50		Dark grayish-brown, Silty CLAY, trace Gravel, plastic, cohesive, moist.	68.4' NO RECOVERY		
69									
70	34	24/24	70-72	9-19 31-42		Dark grayish-brown, Silty CLAY, trace Gravel, plastic, cohesive, moist.	70' Silty CLAY		
71									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 9/27/19

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: WV-MW-15D
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File No.: 16.0062677.81
Check: Kate McDonald

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	35	10/8	72-72.8	30-50/4"		Dark grayish-brown, Silty CLAY, trace Gravel, plastic, cohesive, moist. Changing at 72.7 feet to: NO RECOVERY.	Silty CLAY 72.7' NO RECOVERY 74'		
74	36	17/12	74-75.4	15-39-50/5"		Dark grayish-brown, Silty CLAY, trace Gravel, plastic, cohesive, moist. Changing at 74.3 feet to: Dark grayish-brown to brown, fine to medium SAND, little to some Silt, slightly cohesive, non-plastic, moist to wet. Changing at 74.6 feet to: Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 75.0 feet to: NO RECOVERY.	74.3' Silty CLAY SAND 75' NO RECOVERY 76'		
76	37	8/5	76-76.7	30-50/2"			76.4' SAND NO RECOVERY 78'		
78	38	10/10	78-78.8	20-50/4"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 76.4 feet to: NO RECOVERY. Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 78.8 feet to: NO RECOVERY.	SAND 78.8' NO RECOVERY 80'		
80	39	10/8	80-80.8	34-50/4"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 80.7 feet to: NO RECOVERY.	SAND 80.7' NO RECOVERY 82'		
82	40	10/8	82-82.8	15-50/4"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 82.7 feet to: NO RECOVERY.	SAND 82.7' NO RECOVERY 84'		
84	41	11/12	84-84.9	32-50/5"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 85.0 feet to: NO RECOVERY.	SAND 85' NO RECOVERY 86'		
86	42	11/11	86-86.9	31-50/5"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 86.9 feet to: NO RECOVERY.	SAND 86.9' NO RECOVERY 88'		
88	43	12/12	88-89	33-50		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 88.5 feet to: Dark grayish-brown to dark yellowish-brown, fine to medium SAND, little to some Silt, moist to wet. Changing at 89.0 feet to: NO RECOVERY.	SAND 89' NO RECOVERY 90'		
90	44	11/12	90-90.9	38-50/4.5"		Dark grayish-brown, fine SAND, some Silt,	SAND		

REMARKS

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BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 9/27/19

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: WV-MW-15D
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File No.: 16.0062677.81
Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
91						little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 91.0 feet to: NO RECOVERY.	91' SAND NO RECOVERY		
92	45	12/12	92-93	27-50		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 93.0 feet to: NO RECOVERY.	92' SAND		
93							93' NO RECOVERY		
94	46	12/12	94-95	27-50		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 95.0 feet to: NO RECOVERY.	94' SAND		
95							95' NO RECOVERY		
96	47	17/18	96-97.4	29-47-50/5"		Dark grayish-brown, Silty CLAY, plastic, cohesive, moist. Changing at 97.5 feet to: NO RECOVERY.	96' Silty CLAY		
97							97.5' NO RECOVERY		
98	48	18/18	98-99.5	23-43-50		Brown, fine to medium SAND, little Silt, trace Gravel, moist to wet. Changing at 98.4 feet to: Dark grayish-brown, Silty CLAY, plastic, cohesive, moist.	98' 98.4' SAND Silty CLAY		
99									
100	49	8/7	100-100.7	48-50/2"		Dark grayish-brown, fine to medium SAND, little Silt, trace Gravel, slightly cohesive, moist to wet. Changing at 100.4 feet to: Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 100.9 feet to: NO RECOVERY.	100' SAND		
101							100.9' NO RECOVERY		
102	50	10/7	102-102.8	37-50/3.5"		Grayish-brown to brown, fine to medium SAND, little Silt, trace Gravel, slightly cohesive, moist to wet. Changing at 102.6 feet to: NO RECOVERY.	102' SAND		
103							102.6' NO RECOVERY		
104	51	10/8	104-104.8	37-50/4"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 104.7 feet to: NO RECOVERY.	104' SAND		
105							104.7' NO RECOVERY		
106	52	9/8	106-106.8	41-50/3"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 106.9 feet to: NO RECOVERY.	106' SAND		
107							106.9' NO RECOVERY		
108	53	11/8	108-108.9	44-50/4.5"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 108.9 feet to: NO RECOVERY.	108' SAND		
109							108.9'		

REMARKS

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BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 9/27/19

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: WV-MW-15D
Page: 7 **of** 8
File No.: 16.0062677.81
Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
110	54	11/14	110-110.9	38-50/5"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 111.3 to 112.0 feet to: NO RECOVERY.	NO RECOVERY 110' SAND 111.3'		
112	55	11/12	112-112.9	31-50/5"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 113.0 feet to: NO RECOVERY.	NO RECOVERY 112' SAND 113'		
114	56	17/17	114-115.4	11-36-50/5"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 115.4 feet to: NO RECOVERY.	NO RECOVERY 114' SAND 115.4'		
116	57	12/8	116-117	48-50/5.5"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 116.9 feet to: NO RECOVERY.	NO RECOVERY 116' SAND 116.9'		
118	58	18/18	118-119.5	26-49-50		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 119.5 feet to: NO RECOVERY.	NO RECOVERY 118' SAND 119.5'		
120	59	21/22	120-121.8	23-37 40-50/3"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist.	NO RECOVERY 120' SAND		
122	60	5/0	122-122.4	50/5"		NO RECOVERY.	122' NO RECOVERY		
124	61	11/10	124-124.9	33-50/5"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 124.8 feet to: NO RECOVERY.	124' SAND 124.8' NO RECOVERY		
126	62	10/9	126-126.8	48-50/4"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 126.9 feet to: NO RECOVERY.	126' SAND 126.9' NO RECOVERY 128'		

REMARKS

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BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 9/27/19

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: WV-MW-15D
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Check: Kate McDonald

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
129	63	10/9	128-128.8	40-50/4"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 128.9 feet to: NO RECOVERY.	SAND 128.9' NO RECOVERY		
130	64	11/11	130-130.9	33-50/5"		Dark grayish-brown, fine SAND, some Silt, little Clay, trace Gravel, non to slightly plastic, cohesive, moist. Changing at 131.2 feet to: NO RECOVERY.	130' SAND 131.2' NO RECOVERY		
132	65	9/9	132-132.8	46-50/3"		Brown, fine to medium SAND, little Silt, moist to wet. Changing at 132.6 feet to: Dusky red to dark yellowish-brown to gray, fine to medium SAND, little Silt moist to wet (weathered Sandstone). Changing at 135.4 feet to: NO RECOVERY.	132' SAND 133.4' NO RECOVERY		Filter Sand
134	66	2/2	134-134.2	50/2"		Brown, fine to coarse SAND, little Gravel, trace Silt, wet (weathered Sandstone). Changing at 134.2 feet to: NO RECOVERY.	134' 134.2' SAND NO RECOVERY		
136	67	3/4	136-136.3	50/3"		Dark gray, weathered SHALE, moist.	136' SHALE		2-Inch PVC Well Screen
138						Bottom of Borehole at 138.0 Feet	138'	2	

REMARKS

2. Monitoring well was installed in borehole upon completion. Well screen set from 134.9 to 137.6 feet below ground surface.

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BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 9/27/19

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-16D
Page: 1 **of** 6
File No.: 16.0062677.81
Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: S. Stephenson
Date Start/Finish: 3-21-19 / 3-22-19
Boring Location: See Survey
GS Elev.: See Survey **Datum:** MI State Plane S Zone NAD 83

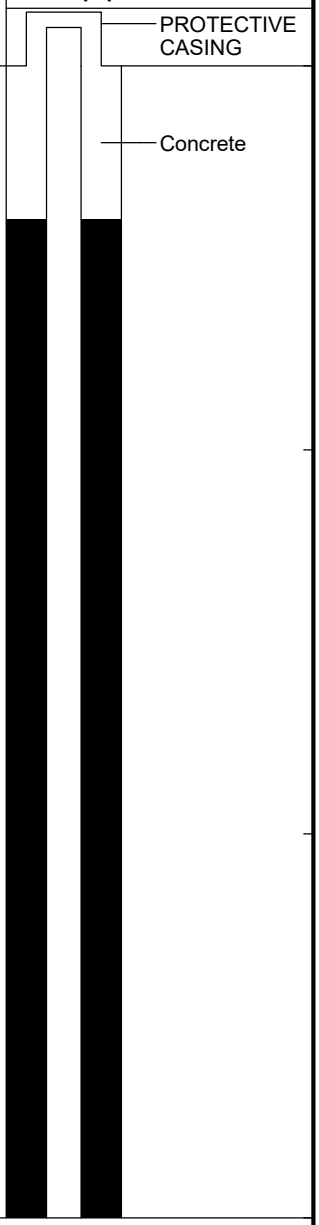
	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
NM				

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks
	1	300	0-25		ND	Blind drill. See MW-WV-16S for soil descriptions from 0.0 to 25.0 feet.	BLIND DRILL	1

Equipment Installed



REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).

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Boring No.: MW-WV-16D

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-16D
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Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
							BLIND DRILL		
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26	2	24/24	26-28	3-9 14-23	ND	Very stiff, brown, CLAY & SILT, little Sand, trace Rock fragments.	26' CLAY & SILT	2	
27									
28	3	24/24	28-30	6-7 8-16	ND	Very stiff, brown, CLAY & SILT, little Sand, trace Rock fragments. Silt lenses from approximately 28.4 to 28.7 feet below ground surface.			
29									
30	4	24/24	30-32	5-8 14-19	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
31									
32	5	24/24	32-34	5-9	ND	Very stiff, brown, CLAY & SILT, trace Sand,			

REMARKS

2. Second borehole drilling at MW-WV-16D.

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BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-16D
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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
33				29-33		wet.	CLAY & SILT		
34	6	24/24	34-36	9-8 14-17	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
35									
36	7	24/24	36-38	11-7 12-17	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
37									
38	8	24/24	38-40	5-10 19-24	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
39									
40	9	24/24	40-42	4-12 15-26	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
41									
42	10	24/24	42-44	5-9 12-14	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
43									
44	11	24/24	44-46	6-10 15-21	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
45									Bentonite Grout
46	12	24/24	46-48	4-9 19-24	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet. Changing at 47.5 feet to: Brown and gray, fine SAND, some Silt, wet.			
47							47.5' SAND		
48	13	24/24	48-50	3-7 6-8	ND	Stiff, brown, CLAY & SILT, trace Sand, wet. Changing at 48.5 feet to: Brown, fine SAND, some Silt, wet. Changing at 49.0 feet to: Brown, Clayey SILT, trace Sand, wet.	48' CLAY & SILT 48.5' SAND 49' Clayey SILT		
49									

REMARKS

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BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-16D
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Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
51	14	24/24	50-52	3-9 9-16	ND	Brown, Clayey SILT, some Sand, wet. Changing at 51.7 feet to: Brown, CLAY & SILT, trace Sand, wet.	Clayey SILT 51.5' CLAY & SILT		
52	15	24/24	52-54	3-8 14-23	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
53									
54	16	24/24	54-56	5-10 16-19	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
55									
56	17	24/24	56-58	2-7 13-19	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
57									
58	18	24/24	58-60	3-10 15-21	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
59									
60	19	24/24	60-62	3-8 17-25	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
61									
62	20	24/24	62-64	2-11 15-22	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
63									
64	21	24/24	64-66	4-10 14-19	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
65									
66	22	24	66-68	4-11 16-21	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet.			
67									

REMARKS

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Boring No.: MW-WV-16D

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Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
68	23	24/24	68-70	4-11 19-23	ND	Very stiff, brown, CLAY & SILT, trace Sand, wet. Changing at 69.0 feet to: Brown, Silty CLAY, trace Sand, wet.	CLAY & SILT		
69							69' Silty CLAY		
70	24	24/24	70-72	3-14 23-27	ND	Brown, Silty CLAY, trace Sand, wet. Changing at 71.0 feet to: Brown, CLAY & SILT, wet.			
71							71' CLAY & SILT		
72	25	24/24	72-74	4-10 17-26	ND	Very stiff, brown, Silty CLAY, trace Sand, wet. Changing at 73.0 feet to: Dark brown and dark gray, Silty CLAY, trace Sand, wet.	72' Silty CLAY		
73									
74	26	24/18	74-76	10-19 33-39	ND	Hard, black and gray with slight bue and green tinge, Silty CLAY, trace Sand, wet. Changing at 75.8 feet to: Green, CLAY & SILT, some Sand, wet.			
75							75.8'		
76	27	24/12	76-78	1-6 15-25	ND	Very stiff, black and gray, Silty CLAY, wet. changing at 77.5 feet to: Pale green and gray, CLAY & SILT, little to trace Sand, wet.	76' CLAY & SILT Silty CLAY		
77							77.5' CLAY & SILT		
78	28	24/18	78-80	10-20 26-38	ND	Pale green and gray, CLAY & SILT, little to trace Sand, wet.			
79									
80	29	24/24	80-82	11-24 35-39	ND	Pale green and gray, CLAY & SILT, little to trace Sand, wet.			
81									
82	30	24/24	82-84	7-16 24-38	ND	Pale green and gray, CLAY & SILT, little to trace Sand, wet.			
83									
84	31	24/12	84-86	12-50/6"	ND	Pale green and gray, CLAY & SILT, little to trace Sand, wet. Pulverized rock at 85.9 feet below ground surface.			

REMARKS

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Boring No.: MW-WV-16D

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

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Check: Kate McDonald

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
86	32	24/18	86-88	2-5 6-9	ND	Gray, CLAY & SILT, little Sand, wet. Changing at 86.2 feet to: Brown and gray, fine SAND and SILT, wet.	CLAY & SILT 86.2' SAND and SILT	3	
88	33	24/18	88-90	6-24-50/6"	ND	Very dense, brown and gray, fine SAND, some Silt, wet.	88' SAND		
90	34	24/8	90-92	37-50/2"	ND	Very dense, brown and gray, fine SAND, some Silt, wet.			Filter Sand
92	35	24/10	92-94	24-50/4"	ND	Very dense, brown and gray, fine SAND, some Silt, wet.			
94	36	24/6	94-96	50/6"	ND	Very dense, brown and gray, fine SAND, some Silt, wet.			2-Inch PVC Well Screen
96	37	24/18	96-98	18-31-50/6"	ND	Brown and gray, Clayey SILT, little fine to coarse Sand, dry.	96' Clayey SILT 98'		
98						Bottom of Borehole at 98.0 Feet		4	
99									
100									
101									
102									

REMARKS

3. Groundwater sample was collected from temporary well with a well screen from approximately 91.0 to 96.0 feet.
4. Monitoring well was installed in borehole upon completion. Well screen set from 91.0 to 96.0 feet below ground surface.

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Boring No.: MW-WV-16D

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-16S
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File No.: 16.0062677.81
Check: Kate McDonald

Contractor: Stearns Drilling Company
Foreman: J. Muntoon
Logged by: Sheryl Stephenson
Date Start/Finish: 3-19-19 / 3-20-19
Boring Location: See Survey
GS Elev.: See Survey **Datum:** MI State Plane S Zone NAD 83

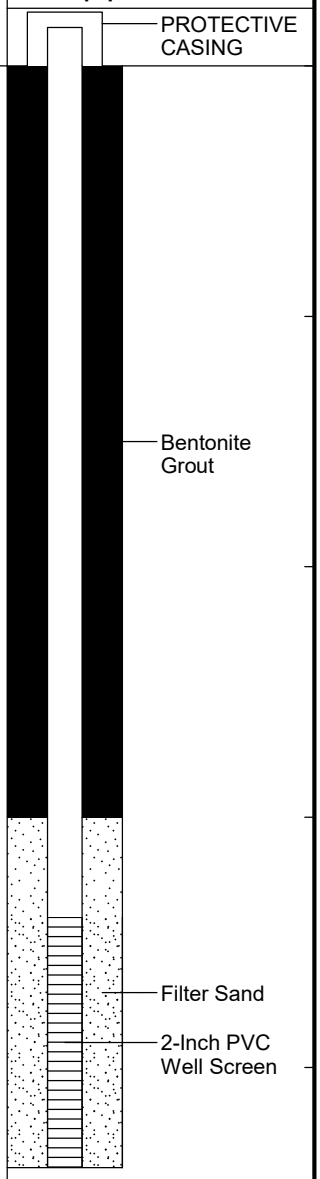
	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
Other:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/6	0-2	1-1 1-1	ND	Very loose, brown, TOPSOIL.	TOPSOIL	
2							2'	
3	2	24/18	2-4	2-3 4-4	ND	Loose, light brown, fine SAND, little Silt, moist.	SAND	
4								
5	3	24/18	4-6	3-5 5-4	ND	Medium dense, light brown and gray, fine SAND, little Silt, trace fine Gravel, moist.		
6								
7	4	24/18	6-8	4-7 5-5	ND	Medium dense, light brown, fine to coarse SAND, little Gravel, little Silt, wet. Changing at 7.5 feet to: Orange and brown, fine SAND, little Silt, wet.		1
8								
9	5	24/12	8-10	2-4 6-5	ND	Medium dense, brown, fine SAND, some Silt, trace fine Gravel, wet.		2
10								
11	6	24/24	10-12	1-6 6-5	ND	Medium dense, brown, fine SAND, some Silt, wet. Changing at 11.0 feet to: Brown, fine to coarse SAND, some Silt, little fine Gravel, wet.		
12							12'	
13	7	24/18	12-14	9-11 12-17	ND	Very stiff, gray, Clayey SILT, some fine to coarse Sand, wet.	Clayey SILT	
14							14'	
15	8	24/18	14-16	6-12 12-13	ND	Medium dense, gray, fine to medium SAND, some Silt, trace fine Gravel, wet. Changing at 15.0 feet to: Gray, Clayey SILT, little fine to coarse Sand, dry.	SAND 15' Clayey SILT	3
16							16'	
17	9	24/18	16-18	5-11 9-13	ND	Medium dense, gray, SAND and SILT, trace fine Gravel, moist.	SAND and SILT	
18							18'	
19	10	24/8	18-20	7-16 14-13	ND	Dense, brown, fine to medium SAND, some Silt, wet.	SAND	
20								
21	11	24/12	20-22	1-7 8-12	ND	Medium dense, fine to medium SAND, some Silt, wet. Changing at 21.0 feet to: Brown, Clayey SILT, some Sand, trace fine Gravel, moist.	21' Clayey SILT	
22							22'	
	12	24/0	22-24	9-13 15-15		NO RECOVERY.	NO RECOVERY	4

Equipment Installed



REMARKS

1. Groundwater was encountered at approximately 6.0 feet below ground surface.
2. Temporary well installed from 4.0 to 14.0 feet below ground surface. Well screen interval from 9.0 to 14.0 feet below ground surface. Purged 25.0 gallons of water.
3. Casing set at 15.0 feet below ground surface.
4. 2.0-inch of Sand and Silt with large Gabbro fragment and cohesive nature.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV-16S

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV-16S
Page: 2 **of** 2
File No.: 16.0062677.81
Check: Kate McDonald

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	% REC	% RQD				
24	13	24/18	24-26	5-5 9-10	ND	Medium dense, brown, Clayey SILT, some Sand, trace fine Gravel, wet. Changing at 23.0 feet to: Brown, CLAY & SILT, trace Gravel, moist.	NO RECOVERY 24' Clayey SILT 25' CLAY & SILT 26'		
26						Bottom of Borehole at 26.0 Feet		5	
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REMARKS

5. Monitoring well was installed in borehole upon completion. Well screen set from 17.0 to 22.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV-16S

BORING_WI 6267781 WWW WOLVEN AVENUE.GPJ WI_DNR.GDT 4/17/20

APPENDIX B – STANDARD OPERATING PROCEDURES

PURPOSE

The purpose of the Standard Operating Procedure (SOP) is to obtain pore water samples for analysis for PFAS that are representative of environmental conditions at the location sampled.

PREPARATION

If a sample cannot be obtained safely, the sample should not be collected at all and the circumstances shall be documented in the sampler's field notes. This procedure requires a minimum of two sample personnel for safety concerns.

Sampling locations shall be permanently located using a global positioning system (GPS) unit for future reference. The expected accuracy of the GPS unit shall be determined in advance and specified in the Sampling and Analysis Plan (SAP).

When collecting surface water, pore water, and sediment samples in the same location, sampling should occur in that order: surface water samples first, then pore water samples, and finally sediment samples.

EQUIPMENT AND MATERIALS

The following equipment is typically used in collecting pore water samples:

- Appropriate health and safety gear as indicated in an approved site-specific Health & Safety Plan.
- Site-Specific SAP which includes a map and other project-specific information including field data from last sampling event, if available.
- Waders.
- Boat.
- Sample containers, preserved as necessary, cooler, and double-bagged ice.
- Field worksheets, sample labels, and chain of custody forms.
- Pencil/pen and calculator.
- Camera to take digital pictures.
- The manufacturer’s instruction manuals for all equipment.
- Ruler or staff gauge for measuring water depth.
- GPS unit or similar device.
- Decontamination supplies/equipment; including laboratory-grade PFAS-free water.
- Paper towels.
- Henry sampler (Push Point).
- Flange for Henry sampler to reduce likelihood of surface water intrusion.
- Shop-fabricated sampler for use in locations that are too deep or where sediment depths prevent the use of the Henry sampler. See attachment for a drawing and picture describing the shop-fabricated sampler.
- A multiparameter meter (e.g., YSI PRO or other approved meter as specified in the site-specific QAPP) and flow through cell for measuring pH, specific conductivity in µS/cm, dissolved oxygen, oxidation-reduction potential (ORP), and temperature (°C).
- A probe guard for the multiparameter meter to take in-situ parameter surface water readings.
- A Turbidity Meter (e.g., Hach 2100P or 2100Q or other approved meter as specified in the site-specific QAPP).
- Appropriate calibration solutions for the multi-parameter and turbidity meters, if water quality parameters are collected.

- Peristaltic pump and tubing
- Toolbox to include general items such as large and small wrenches, pipe wrenches, pliers, screw drivers, 25-foot measuring tape, sharp knife (locking blade), and duct tape, at a minimum.

PROCEDURE

In general, all instrumentation necessary for field monitoring and health and safety purposes shall be maintained, tested, and inspected according to the manufacturer's instructions. The manufacturer's instruction manuals for field equipment shall be kept on-site with the equipment.

All instruments will be successfully calibrated once by the sampling team prior to the sampling event according to SOP A15: *Calibration of Field Instruments*.

Instruments will be calibrated at the beginning of each sampling day at the site and will be checked (in the run mode) in the morning and again at the end of the day. Instrument calibration will be performed additional times during the sampling day if instrument readings appear to be significantly different than previously observed.

Digital photographs are usually taken at each sampling location, upstream and downstream from the same position so that consistency can be maintained between sampling rounds.

If not previously done, use a GPS unit to permanently mark the sample location for future reference (See SOP A11: *Global Positioning System*).

If the stream/creek/water body must be waded to collect pore water samples, the water should not exceed three feet in depth. If the water exceeds three feet, samples will be collected by boat.

Using a stream staff/gage or similar measuring device, measure the depth of water from the bottom of the streambed/lakebed to the surface of the water, in feet, directly downstream of each sampling location and record on the *Pore Water Worksheet*. Some sites may have a permanently installed staff gage at one location to monitor water levels instead of, or in addition to, collecting measurements at each separate location.

Pore water samples to be collected from the same water body should be collected sequentially from downstream to upstream sample locations. Sample locations will be approached from the downstream side to minimize bottom sediment disturbance, and the sampler should stand down stream of the sampling device . Water samples collected from a boat shall be collected from the bow or upstream side of the boat, away from the motor, with extreme care taken to avoid contamination of the sample.

At each sample location either a Henry sampler or the shop-fabricated sampler will be driven through a flange in the stream bottom. The purpose of the flange is to reduce surface water intrusion during sampling. The flange is carefully placed on top of the sediment. The sampler is inserted through the flange to the desired depth. The flange should fit snuggly around the body of the sampler to prevent surface water from contaminating the pore water sample. Samplers will estimate the thickness of organic sediment on the bottom of the river based on resistance. The sampler inlet will be positioned 6-12 inches below the base of the loose sediment.

Samplers will use a peristaltic pump to remove fines from the sampler to facilitate flow. During purging, samplers will monitor and record indicator field parameters (turbidity, temperature, pH, specific conductance) at 3 minute or greater intervals. All measurements, except turbidity will be taken using a flow through cell. The pore water will be sampled using low-flow sampling methods as described below once the field readings from the pore water have stabilized and the pore water readings are distinguishable from the river readings. The following criteria shall be used to determine if pore water is ready for sampling (in order of preference):

1. There is a >10% difference between the river and pore water field parameter readings; OR
2. There is a >10% difference between the river and pore water readings for two out of the 3 readings; OR

3. The sample has cleared (no visible fines, turbidity at least 10% lower than river reading) and the sampler has been purged for at least 15 minutes.

When field parameters are stabilized in accordance with the criteria above, samples may be collected directly into the sample containers. Collect duplicates and other quality control samples as required in the SAP.

Once sampling containers are filled with the appropriate amount, they are capped and cleaned to remove any potential residue. Place samples in re-sealable plastic bags and store the samples in accordance with appropriate protocols. If samples require cooling, the samples shall be placed in a cooler of **double-bagged** ice.

QUALITY ASSURANCE SAMPLES

Collect appropriate quality assurance samples as specified in the site-specific SAP. At a minimum, at least one duplicate, one MS/MSD, and one field blank (for PFAS) should be collected per 20 samples. Duplicate samples are collected by filling a separate container for each analysis immediately following the actual field sample collection and should be in the same priority order as indicated in the SAP. Duplicate samples are typically not intended to be blind duplicate samples.

Equipment blanks should be collected on non-disposable equipment to ensure that the equipment is clean and the decontamination procedure is adequate (e.g., syringes, glass or stainless steel containers, etc.).

If using an in-line filter for dissolved metals, collect an equipment blank prior to sampling by running deionized water through the filter and collecting a sample for dissolved metals to ensure the integrity of the filter.

DECONTAMINATION

Decontaminate equipment according to GZA SOP A10: *Decontamination Procedure*. Disposable sampling equipment shall be discarded after completing the sampling task and not reused.

RECORDS AND DOCUMENTATION

In general, all data and sampling information will be documented as recorded as specified in the SAP. Specific reporting of these sampling events may include, but is not limited to, the following information:

1. Samples collected.
2. Date and time of sample collection.
3. Water depths at the sampling locations.
4. Any water quality parameter readings taken.
5. General physical description of the samples and sampling locations.
6. Digital photographs of sampling locations including one or more of the larger surrounding area, along with any notes on the photographs.

SPECIAL NOTES

None.

APPLICABLE STANDARDS AND REFERENCES

U.S. Environmental Protection Agency, region 4, Science and Ecosystem support Division, *Standard Operating Procedure SESDPROC-513-R3*, December 14, 2016.

ATTACHMENT

Pore Water Worksheet

Attachment A – Pore Water Sampling Worksheet

Date: **Location ID:**

Weather Conditions: **Sampler's Name:**

Water Depth (ft): **Sampler Screen Interval (ft) (below water surface)**

Sediment Thickness (ft) (est):

Start time **Sample Time**

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water

PURPOSE

The purpose of the Standard Operating Procedure (SOP) is to install piezometers in a manner in which they can be used for measurement of groundwater to surface water flow.

EQUIPMENT AND MATERIALS

- Hand auger
- Stainless steel well screen
- Galvanized threaded piping
- Dielectric Pipe Couplings
- Pipe wrenches
- Well/fence post driver
- Vented well cap
- Bentonite seal and concrete pad for piezometers installed on the riverbank.
- GPS unit or similar device
- Camera to take digital pictures
- Appropriate health and safety PPE and an approved site-specific Health and Safety Plan

INSTALLATION PROCEDURES

1. Using a pipe wrench, assemble the well screen and galvanized piping

2. Hand Auger as needed, then hand drive piezometer casing so that the top of screen is approximately 3 feet below the river bottom. The top of the piezometer should be above the estimated flood level based on observations of vegetation and deposition

3. Make a note of the general material (gravel vs sediment) on a GZA boring log. Calculate the depth of the screen beneath the floor of the river.

4. Piezometer completion shall include a 1-foot bentonite seal and concrete pad for those installed on the riverbank. If in-stream piezometers are installed, the bentonite seal and concrete pad shall not be installed.

5. Use a GPS to permanently mark the piezometer location

MEASUREMENT PROCEDURES

Water level measurements shall be collected following the procedures outlined in *SOP A14, Water Level Measurement* and recorded on the form included in SOP A14. Groundwater analytical samples may be collected from piezometers following the procedures outlined in *SOP A29, Piezometer Sampling*. If they will be used for groundwater sample collection, piezometers should be developed in accordance with *SOP A13, Well Development* and allowed to stabilize for 1 week prior to sampling.

RECORDS AND DOCUMENTATION

The details of the installation shall be recorded on the GZA boring log. If needed, additional information can be attached as a separate sheet.

PURPOSE

The purpose of the Standard Operating Procedure (SOP) is to obtain piezometer samples for analysis for PFAS that are representative of environmental conditions at the location sampled.

PREPARATION

If a sample cannot be obtained safely, the sample should not be collected at all and the circumstances shall be documented in the sampler's field notes. This procedure requires a minimum of two sample personnel for safety concerns.

Sampling locations shall be permanently located using a global positioning system (GPS) unit for future reference. The expected accuracy of the GPS unit shall be determined in advance and specified in the Sampling and Analysis Plan (SAP).

EQUIPMENT AND MATERIALS

The following equipment is typically used in collecting pore water samples:

- Appropriate health and safety gear as indicated in an approved site-specific Health & Safety Plan.
- Site-Specific SAP which includes a map and other project-specific information including field data from last sampling event, if available.
- Sample containers, preserved as necessary, cooler, and double-bagged ice.
- Field worksheets, sample labels, and chain of custody forms.
- Pencil/pen and calculator.
- Camera to take digital pictures.
- The manufacturer’s instruction manuals for all equipment.
- Ruler or staff gauge for measuring water depth.
- GPS unit or similar device.
- Decontamination supplies/equipment; including laboratory-grade PFAS-free water.
- Paper towels.
- A multiparameter meter (e.g., YSI PRO or other approved meter as specified in the site-specific QAPP) and flow through cell for measuring pH, specific conductivity in µS/cm, dissolved oxygen, oxidation-reduction potential (ORP), and temperature (°C).
- A Turbidity Meter (e.g., Hach 2100P or 2100Q or other approved meter as specified in the site-specific QAPP).
- Appropriate calibration solutions for the multi-parameter and turbidity meters, if water quality parameters are collected.
- Peristaltic pump and tubing
- Toolbox to include general items such as large and small wrenches, pipe wrenches, pliers, screw drivers, 25-foot measuring tape, sharp knife (locking blade), and duct tape, at a minimum.

PROCEDURE

In general, all instrumentation necessary for field monitoring and health and safety purposes shall be maintained, tested, and inspected according to the manufacturer's instructions. The manufacturer’s instruction manuals for field equipment shall be kept on-site with the equipment.

All instruments will be successfully calibrated once by the sampling team prior to the sampling event according to SOP A15: *Calibration of Field Instruments*.

Instruments will be calibrated at the beginning of each sampling day at the site and will be checked (in the run mode) in the morning and again at the end of the day. Instrument calibration will be performed additional times during the sampling day if instrument readings appear to be significantly different than previously observed.

Digital photographs are usually taken at each sampling location, upstream and downstream from the same position so that consistency can be maintained between sampling rounds.

If not previously done, use a GPS unit to permanently mark the sample location for future reference (See SOP A11: *Global Positioning System*).

PURGING AND SAMPLING PROCEDURE

Purging and sampling piezometers in order of increasing chemical concentrations (known or anticipated) is preferred. See the QAPP for additional information.

1. Initial Water Level

   Measure and record the depth to water (to 0.01 ft.) before any disturbance to the piezometer. Care should be taken to minimize suspension of any particulates attached to the sides. The initial water level is recorded on the worksheet.

2. Install sampling tubing.

   Lower tubing slowly into the piezometer so that the intake is located at the center of the saturated screened interval at a depth that will remain under water at all times. The lowest historical midpoint of the saturated screen length is often used as the location of the intake. If possible keep the pump or tubing intake at least two feet above the bottom of the piezometer, to minimize mobilization of particulates present in the bottom of the piezometer. The tubing shall be secured to the piezometer casing (or PVC stick-up) to minimize movement.

3. Measure Water Level

   Measure and record the water level again with the equipment in the piezometer before starting the pump.

4. Purging

   From the time the pump starts purging and until the time the samples are collected, the purged water is discharged into a graduated bucket to determine the total volume of groundwater purged. This information is recorded on the worksheet.

   Start the pump at its lowest speed setting and slowly increase the speed until discharge occurs. Check the water level. Check equipment for water leaks and if present, fix or replace the affected equipment. Try to match the final pumping rate used during previous sampling events. Otherwise, adjust pump speed until there is little or no water level drawdown. If the minimal drawdown that can be achieved exceeds 0.3 feet, but remains stable, continue purging.

   Monitor and record the water level, draw down, and pumping rate, every 5 minutes, or as appropriate, during purging. **Readings shall not be less than 5 minutes apart.** Record any pumping rate adjustments (both time and flow rate). Adjustments are best made in the first 15 minutes of pumping in order to help minimize purging time. Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to avoid drawdown and to ensure stabilization of monitoring parameters. **Pumping rates shall not be less than 50 ml/minute.**

   If a constant water level cannot be maintained (e.g., if the recovery rate to the piezometer is less than 50 ml/minute, or the piezometer is being essentially dewatered during purging), the initial water level was above the top of the screen and the water level falls below the top of the piezometer screen, or the water level continues to drop after the initial 15 minutes at a rate that is greater than the maximum allowable drawdown in the chart below, the piezometer should be considered to have insufficient recharge for low flow sampling. The pump should be stopped and the piezometer should be sampled as soon as the water level has recovered sufficiently to collect the volume needed for all anticipated samples. A water level measurement needs to be performed and recorded, and one discharge line volume of water must be purged, before samples are collected with the pump.

1. Monitor indicator field parameters.

   During piezometer purging, monitor and record indicator field parameters (turbidity, temperature, specific conductance, pH, ORP, and DO) at a frequency of 5 minute intervals or greater (e.g., every 10 minutes until the piezometer starts to stabilize, then every 5 minutes until stabilization). **Readings shall NOT be taken less than 5 minutes apart.**

   The pump's flow rate must be able to "turn over" at least one flow-through cell volume between measurements (for a 250 ml flow-through cell with a flow rate of 50 ml/minute, the monitoring frequency would be every 5 minutes; for a 500 ml flow-through cell at the same flow rate, it would be every 10 minutes). If the cell volume cannot be replaced in the proper interval, (e.g., 5 minute for a 250 ml flow through cell) then the time between measurements must be increased accordingly.

   All measurements, except turbidity, must be obtained using a flow-through cell. Samples for turbidity measurements must be obtained before the water enters the flow-through cell. Rinse the turbidity vial with DI water before collecting the first sample. Rinse the vial with DI water between readings to eliminate any sediment that may have collected on the bottom.

   See SOP A16 for additional details on field parameter readings for low-flow sampling.

   NOTE: There is a 2-hour time limit for each piezometer unless specified differently in the site-specific SAP.

   The piezometer is considered ready for sample collection once the water level and the indicator parameters have stabilized and the purge volume requirement has been met, or two hours of purge time has elapsed.

   Stabilization is considered to be achieved when three consecutive readings at 5-minute intervals are within the following limits:

   - **Water Level (ft): No change in water level for three consecutive readings.**
   - **Temperature (˚C)** +/- 1º C
     Values are typically rounded to the nearest whole number (e.g., 10.4 is rounded to 10, whereas 10.5 is rounded to 11).
   - **Specific Conductivity (**µS/cm) +/-**3%**
     Values are typically rounded to the nearest whole number.
   - **DO** +/-**10% for values greater than 0.5 mg/l**,
     Values are typically rounded to the nearest tenth place number.
     Values between 0.5 and 1.0 are typically considered stable within +/- 0.1 mg/L.
     Values less than zero point five (0.5) are typically reported as <0.5.
     If three consecutive DO values are less than 0.5 mg/l, consider the values stabilized.
   - **pH +/- 0.1 unit**
     Values are typically rounded to the nearest tenth place number.
   - **ORP +/- 10 millivolts**
     Values are typically rounded to the nearest whole number.
   - **Turbidity** +/-**10% for values greater than 5 NTU**
     Values are typically rounded to the nearest whole number.
     Values between 5 and 10 are typically considered stable within +/- 1 NTU.
     Values less than five (5) are typically reported as <5.
     If three consecutive turbidity values are less than 5 NTU, consider the values stabilized.

2. Purge Volume Requirement

   If the drawdown is less than 0.3 feet, purging is considered complete and sampling may begin when all the above indicator field parameters have stabilized.

If the drawdown has exceeded 0.3 feet and stabilizes, calculate the volume of water between the initial water level and the stabilized water level. The Final Purge Volume (FPV) must be greater than the stabilized drawdown volume plus the pump's tubing volume. This combined volume of water needs to be purged from the piezometer after the water level has stabilized before samples are collected. Document all purge volume calculations on the field worksheet.

FPV = (Total Tubing Length x Tubing Capacity) + (Total Drawdown x Piezometer Capacity)

NOTE: Include the length of tubing that is outside the piezometer to the Total Tubing Length.

Tubing Capacity Values

Tubing Diameter (inches)	¼ - inch (0.25) OD **(0.17 in ID)***	3/8 - inch (0.375) OD **(0.25 in ID)***	1/2 - inch (0.50) OD **(0.375 in ID)***	5/8 - inch (0.625) OD **(0.50 in ID)***
Volume (gal/foot)	0.0012	0.0026	0.0057	0.0102

Piezometer Capacity Values

PVC/Inner Casing ID* (inches)	1.25	1.5	1.75	2	2.25	3	3.5	4	6
Volume (gal/ft)	0.06	0.09	0.12	0.16	0.21	0.63	0.5	0.65	1.47

* Calculations are based on the inside diameter (ID).

Once the purge volume requirement has been met and the water level and the indicator parameters have stabilized, the piezometer is considered ready for sample collection.

3. Sample Collection

Samples for laboratory analyses must be collected before the flow cell and the 3-way stopcock. This will be done by disconnecting the flow cell and the 3-way stopcock so that the samples are collected directly from the pump tubing.

Make sure that all sample containers are properly labeled. Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence. Sample containers should be wiped dry and placed in re-sealable plastic bags.

During purging and sampling, the centrifugal/peristaltic pump tubing must remain filled with water to avoid aeration of the groundwater. It is recommended that 1/4-inch (inside diameter) tubing be used to help insure that the sample tubing remains water filled. If the pump tubing is not completely filled to the sampling point, use the following procedure to collect samples: collect non-VOC/dissolved gases samples first, then increase flow rate slightly until the water completely fills the tubing, collect the VOC/dissolved gases samples, and record new drawdown depth and flow rate.

Use pre-preserved sample containers or add preservative, as required by analytical methods, to the samples immediately after they are collected. Check the analytical methods (e.g., EPA SW-846, 40 CFR 136, water supply, etc.) and the lab for additional information on preservation.

Field duplicate and matrix spike/matrix spike duplicate (MS/MSD) samples should be collected by filling a separate container for each analysis immediately following the actual field sample collection (e.g., original, duplicate, MS/MSD)

Samples requiring cooling will be placed into a cooler **in double-bagged ice** for delivery to the laboratory.

7. Post Sampling Activities

Record the total purged volume (graduated bucket).

Remove the pump and tubing from the piezometer, unless dedicated. Dedicated pump and tubing should be secured to the inside of the piezometer. Non-dedicated tubing should be discarded.

If not previously measured, measure and record the depth of the piezometer (to 0.1 ft.) as required in the SAP. More information on measuring piezometer depths is located under Preliminary Procedures.

Secure the piezometer with the locking cap.

Decontaminate any non-dedicated equipment according to the Decontamination SOP in the SAP.

QUALITY ASSURANCE SAMPLES

Collect appropriate quality assurance samples as specified in the site-specific SAP. At a minimum, at least one duplicate, one MS/MSD, and one field blank (for PFAS) should be collected per 20 samples. Duplicate samples are collected by filling a separate container for each analysis immediately following the actual field sample collection and should be in the same priority order as indicated in the SAP. Duplicate samples are typically not intended to be blind duplicate samples.

Equipment blanks should be collected on non-disposable equipment to ensure that the equipment is clean and the decontamination procedure is adequate (e.g., syringes, glass or stainless steel containers, etc.).

DECONTAMINATION

Decontaminate equipment according to GZA SOP A10: *Decontamination Procedure*. Disposable sampling equipment shall be discarded after completing the sampling task and not reused.

RECORDS AND DOCUMENTATION

In general, all data and sampling information will be documented as recorded as specified in the SAP. Specific reporting of these sampling events may include, but is not limited to, the following information:

1. Samples collected.
2. Date and time of sample collection.
3. Water depths at the sampling locations.
4. Any water quality parameter readings taken.
5. General physical description of the samples and sampling locations.
6. Digital photographs of sampling locations including one or more of the larger surrounding area, along with any notes on the photographs.

SPECIAL NOTES

None.

APPLICABLE STANDARDS AND REFERENCES

U.S. Environmental Protection Agency, region 4, Science and Ecosystem support Division, *Standard Operating Procedure SESDPROC-513-R3*, December 14, 2016.

ATTACHMENT

Piezometer Sampling Worksheet

Attachment A – Piezometer Sampling Worksheet

Date: **Location ID:**

Weather Conditions: **Sampler's Name:**

Water Depth (ft): **Piezometer Screen Interval (ft) (below water surface)**

Sediment Thickness (ft) (est):

Start time **Sample Time**

Time	Water Level (ft)	Drawdown (ft)	Purge Rate (ml/min)	Temp (°C)	Specific Conductance (us/cm)	pH (SU)	DO (mg/L)	ORP (mV)	Turbidity (NTU)

Time	Water Level (ft)	Drawdown (ft)	Purge Rate (ml/min)	Temp (°C)	Specific Conductance (us/cm)	pH (SU)	DO (mg/L)	ORP (mV)	Turbidity (NTU)

GZA GeoEnvironmental, Inc.

APPENDIX B

REVISION TO GROUNDWATER-SURFACE WATER INTERFACE INVESTIGATION SUMMARY AND WORK PLAN

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GROUNDWATER-SURFACE WATER INTERFACE INVESTIGATION SUMMARY AND WORK PLAN

North Kent Study Area

April 26, 2021; Revised December 03, 2021
File No. 16.0062961.51

PREPARED FOR:
Wolverine World Wide, Inc.
Rockford, Michigan

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BGT	Below Groundwater Table
CD	Consent Decree
CSM	Conceptual Site Model
DoD	United States Department of Defense
EDD	Electronic Data Deliverable
EGLE	Michigan Department of Environment, Great Lakes and Energy
FCV	Final Chronic Values
GIS	Geographic Information Systems
GSI	Groundwater-Surface Water Interface
HNDV	Human Health Non-Drinking Water Values
HSP	House Street Property
ID	Identification
MDEQ	Michigan Department of Environmental Quality
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NE	Northeast
ng/L	Nanogram per Liter
NKSA	North Kent Study Area
ORP	Oxidation-Reduction Potential
PDF	Portable Document Format
PFAS	Per- and Polyfluoroalkyl Substances
PFBS	Perfluorobutane Sulfonic Acid
PFHxA	Perfluorohexanoic Acid
PFHxS	Perfluorohexane Sulfonic Acid
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PVC	Polyvinyl Chloride
QAPP	Quality Assurance Project Plan [*Former Wolverine Tannery, House Street Disposal Area, and Wolven/Jewell Area, Per- and Polyfluoroalkyl Substances Investigation Program*]
QA/QC	Quality Assurance/Quality Control
QSM	Quality Systems Manual
R&W/GZA	Rose & Westra, a Division of GZA GeoEnvironmental, Inc.
RAP	Response Activity Plan
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedures
USGS	United States Geological Survey
VAP	Vertical Aquifer Profiling
Wolverine	Wolverine World Wide, Inc.
WP	Work Plan
WV	Wildlife Values

1.0 INTRODUCTION

On behalf of Wolverine, R&W/GZA prepared this revised Investigation Summary and WP for the GSI RAP in the NKSA. The GSI RAP was prepared pursuant to Sections 7.4, 7.10 (a) and Appendix S of CD No. 1:18-cv-00039-JTN-SJB, effective February 19, 2020. Specifically, this Investigation Summary and WP is established in Section 7.10(b) of the CD and the approved GSI RAP dated September 23, 2020. This revised Investigation Summary and WP is submitted in response to EGLE's Notice of Approval with Conditions of the Groundwater-Surface Water Interface Investigation Summary and Work Plan dated October 7, 2021.

The objective of the GSI RAP was to investigate potential environmental risks related to surface water quality resulting from the GSI pathway in the Rogue River. The GSI investigations are specific to regulated PFAS in groundwater, originating from the HSP and the Wolven/Jewell area. As established in Paragraph 7.10(a) and Appendix S of the CD, Wolverine will study the potential for groundwater contamination to discharge to surface water at the following three areas: "(i) southeast of the House Street plume(s); (ii) from the Wolven/Jewell plume(s) and the House Street plume(s) to the northwest; and (iii) from the Wolven/Jewell plume(s) toward the Rogue River to the northeast and southeast."

As set forth in the approved GSI RAP, the three broader areas in the CD were further refined based on conceptual understanding of groundwater flow and potential surface water discharge areas in the HSP and Wolven/Jewell study areas at the following six locations:

1. Downgradient of the HSP to the southeast;
2. Downgradient of the HSP to the south,
3. Wolven northwest;
4. Downgradient of the HSP to the northwest;
5. Wolven northeast; and
6. North Childsdale.

2.0 CONCEPTUAL SITE MODEL

Based on interpretation of regional geology and hydrogeology, residential water well sampling data in the NKSA, and groundwater investigations performed associated with the HSP and Wolven/Jewell areas, a CSM was provided in the 2020 GSI RAP (R&W/GZA, 2020). Data collected during the implementation of GSI RAP activities supports the CSM. An updated interpretation of groundwater flow has been included based upon GSI investigation to date.

2.1. GROUNDWATER FLOW

Based on the last monitoring well network gauging and sampling event (November 2019 data set), groundwater elevation contours were interpolated from the static water level data. See **Figure 1** for the groundwater elevation contours in the shallow zone and **Figure 2** for the deep zone. Groundwater contours in Cross-sections A-A' (downgradient of the HSP), B-B' (Wolven Northwest) and C-C' (Area 19) were interpreted and plotted in **Figures 3A**, **3B** and **3C**. Groundwater flowlines to the approximate centerline of the Rogue River were interpreted. Considering groundwater flow on the other side of the Rogue River also discharges to the Rogue River and the

flow pattern on either side of the river is generally symmetrical, the groundwater flowline to the Rogue River centerline approximately represents the lower envelope of the vertical groundwater flow discharge zone. The interpreted groundwater table, also a groundwater flowline, represents the upper envelope of the vertical groundwater flow discharge zone.

3.0 GSI RAP OBJECTIVES

The purpose of the GSI RAP investigation was to further evaluate PFAS at the GSI. The data collected under the GSI RAP and summarized in this Investigation Summary include samples collected in the vicinity of identified potential surface water discharge areas for the PFAS-containing groundwater in the HSP and Wolven/Jewell study areas.

The investigation of GSI is necessarily iterative. To fulfil the obligation under the CD to study the potential for groundwater contamination from the HSP to discharge to surface water, additional investigation is needed as set forth in this WP. In particular, in evaluating the potential risks to the Rogue River, this GSI WP builds on the work done to date and is intended to continue in the understanding of the following areas:

- Groundwater elevation at the GSI,
- Gradient and flux at the GSI, and,
- PFAS compound concentrations in the groundwater discharging to the Rogue River.

The following sections provide an investigation summary of activities completed to satisfy the project objectives required by Paragraph 7.10(a) and Appendix S of the CD as well as the GSI RAP. Furthermore, as established in Section 7.10(b) of the CD, **Section 11** of this report provides location recommendations for permanent GSI monitoring wells and sets forth the monitoring program.

4.0 INVESTIGATION METHODOLOGY

4.1. PIEZOMETER INSTALLATION

In accordance with general procedures outlined in the GSI RAP, stainless steel, 1.25-inch temporary piezometers were hand-driven via fence post driver into the groundwater on the riverbank. The 4-foot stainless steel screens were threaded to galvanized riser pipe as they were driven below grade. The top of the well screen was driven to an approximate depth of 3 feet below the bottom of the river sediment, where possible.

The top of the piezometer was installed above the estimated flood elevation based on observations of vegetation and deposition in each of the locations. An approximate 6- to 12-inch bentonite seal was placed within the borehole over the screen. A 2-inch thick concrete pad was constructed at the surface of the piezometer to prevent infiltration and subsidence of the piezometer casings. An elevational survey collected by a Licensed Professional Surveyor[1] was conducted upon completion of the piezometer installations. Survey data as well as construction information including screen depths and approximate distance to surface water are provided on **Table 1.** A general construction schematic of installed piezometers is depicted in **Appendix A.**

[1] Survey completed by State of Michigan licensed professional surveyor, Exxel Engineering Inc., on November 6, 2020.

The following GSI piezometers were installed in each study area:

- **HSP Study Area** (Nine locations)
  - Southeast downgradient of the HSP along the Rogue River
    i. HS-GSI-1 through HS-GSI-5
  - Downgradient of the HSP near the Grand River
    i. HS-GSI-6 through HS-GSI-8
  - Northwest of the HSP
    i. HS-GSI-9
- **Wolven/Jewell Study Area** (Five locations)
  - Downgradient of Wolven Northeast plume within the Rogue River
    i. Area19-GSI-1 through Area19-GSI-3
  - Downgradient of the northwest portion of the Wolven/Jewell plume along the Rogue River
    i. WVNW-GSI-1 and WVNW-GSI-2
- **Wolven/Childsdale Study Area** (Two locations)
  - North Childsdale area, downgradient of the Wolven study area
    i. WV/CH-GSI-1 and WV/CH-GSI-2

5.0 GROUNDWATER AND SURFACE WATER GAUGING

Prior to pore-water sampling, water levels were collected from the newly installed piezometers and network of staff gauges. As established in the GSI RAP, a minimum of two weeks of piezometer and staff-gauge measurements were made to establish groundwater flows to the surface water. An additional week of groundwater gauging levels were completed based upon weather conditions and schedule prior to pore-water sampling; data was collected three times/week for three weeks. Nine groundwater gauging events were completed starting November 9 through November 27, 2020.

Existing staff gauges of the Rogue River were utilized for water level comparison and groundwater flow evaluation in the following locations in the Rogue River:

- Rockford Dam Seawall;
- East Bridge Street Bridge;
- Rogue River Road Bridge; and
- Jericho Avenue Bridge

The water levels measured from these locations were used in combination with USGS gauging station, USGS04118500, to evaluate surface water levels in the Rogue River.

Additional staff gauge locations (11 Mile Bridge, Algoma Avenue Bridge, and 12 Mile Bridge) were added to pair with piezometer locations where existing staff gauges were not present. The gauging measurements were

determined to demonstrate general groundwater flow toward the Rogue River. Groundwater and surface water gauging data and associated elevations are provided on **Table 2**.

GSI piezometers and staff gauge locations are provided on **Figure 4.** The locations in each study area are further detailed on **Figures 4A** through **4C**.

6.0 PORE-WATER SAMPLING

Pore-water sampling was conducted in accordance with procedures outlined in SOP A27/GSI RAP. A Henry Tube Sampler (i.e., stainless-steel probe) with 1.5-inch slotted screen was pushed into the sediment at discrete depths within the river bottom. A shallow-sample interval (minimum of 12 inches below the river bottom) and a deep-sample interval (minimum 6 inches below the shallow interval) were attempted at each pore-water sample location. Once the Henry Tube was pushed to depth for the shallow-sample interval, a vacuum gauge device (manometer) was connected to the Henry Tube and a peristaltic pump was used to draw water from the pore space. A second length of tubing was connected to the opposite side of the manometer in which river water was drawn into the tubing. A system of valves were closed to compare the pressure of pore-water to that of the river water. A higher gradient pressure within the pore-water tubing indicated that up-welling was occurring within the pore space and the pore-water was distinguishable from surface water. Upon confirmation, the manometer was removed and a multiparameter meter with a flow-through cell was connected to the Henry Tube sampler.

R&W/GZA collected pH, temperature, conductivity, dissolved oxygen, and ORP from the river water which was then compared to the real-time readings of pore-water. This was an additional confirmation tool indicating pore-water, not surface water, was being drawn through the sample device. Pore-water readings were considered distinguishable from the river readings when the variance was greater than 10% difference for collected parameters from the multiparameter meter, with the exception of temperature. Following the stabilization of parameters, the flow-through cell was disconnected, and pore-water was pumped directly into laboratory-provided sampling containers. The difference between pore-water and surface water geochemistry demonstrates the pore-water samples did not have significant surface water intrusion; refer to Tables 3A and 3B. Monitoring well geochemistry data is provided on Table 3C. **Section 7.3** further details laboratory sample analysis.

As described in the GSI RAP, pore-water samples were collected from the following locations in each study area:

- **HSP Study Area**
  - Nine pore-water sampling locations (HS-PW-1 through HS-PW-9), southeast downgradient of the HSP plume along the Rogue River
  - Two pore-water sampling locations (HS-PW-10 and HS-PW-11), northwest of the HSP
- **Wolven/Jewell Study Area**
  - Four pore-water sampling locations (WVNW-PW-1 through WVNW-PW-4) immediately downgradient of the Wolven northwest plume, along the Rogue River
  - Seven pore-water sampling locations (Area19-PW-1 through Area19-PW-7) downgradient/northeast of the Area 19 plume within the Rogue River
- **Wolven/Childsdale Study Area**
  - Six pore-water sampling locations (WV/CH-PW-1 through WV/CH-PW-6) downgradient to the southeast of the Wolven study area

Figure 5 summarizes pore-water sample locations in the NKSA.

6.1. GROUNDWATER SAMPLING

As identified in the GSI RAP, existing well clusters HS-MW-19S/D and HS-MW-29A (located hydraulically downgradient of the House Street plume) and one existing well installed by EGLE (DEQ-MW-9 well series) were sampled concurrently during the pore-water sampling event. Newly installed piezometers (Area19-GSI-1, Area19-GSI-2, and Area19-GSI-3) were also sampled during the pore-water sampling event. Piezometer sampling was conducted in general accordance with procedures outlined in SOP A29.

6.2. RE-SAMPLE EVENT

While not part of the GSI RAP, additional pore-water samples were collected to better delineate PFAS concentrations detected in HS-PW-3, located at the southeast downgradient portion of the HSP plume. A sample was advanced directly adjacent to the original HS-PW-3 location (HS-PW-3R). HS-PW-2.5 was advanced approximately 130 feet upstream of HS-PW-3. HS-PW-3.5 was advanced 480 feet downstream of HS-PW-3. The re-sample event was completed eight weeks after the initial sample location. Samples were collected following the previously identified procedures.

7.0 SAMPLING AND ANALYTICAL PROCEDURES

7.1. SAMPLING LOCATIONS

As discussed in **Sections 4.0** and **6.0**, the following GSI piezometer, monitoring well, and pore-water samples were collected:

Table 7.1.1 Sampled GSI Piezometers and Monitoring Wells

Area of Investigation	Piezometers	Wells
Southeast downgradient of the HSP plume along Rogue River	Out of scope for current investigation	HS-MW-19S/D and HS-MW-29A
Downgradient of Wolven northeast plume within the Rogue River	Area19-GSI-1 through Area19-GSI-3	One EGLE well (DEQ-MW-9 well series)

Table 7.1.2 Pore-Water Sample Locations

Area of Investigation	Sample I.D.	Pore-Water (ft)[1] Screen Depth	
		Shallow (A)[2]	Deep (B)[3]
Southeast downgradient of the HSP plume along Rogue River	HS-PW-1	2.00 - 2.13	2.50 -2.63
	HS-PW-2	1.00 - 1.13	NS
	HS-PW-2.5	0.50 - 0.63	1.00 - 1.13
	HS-PW-3	1.33 - 1.46	NS
	HS-PW-3R	0.50 - 0.63	NS
	HS-PW-3.5	0.83 - 0.96	NS
	HS-PW-4	0.75 - 0.88	NS

Area of Investigation	Sample I.D.	Pore-Water (ft)[1] Screen Depth	
		Shallow (A)[2]	Deep (B)[3]
	HS-PW-5	1.33 - 1.46	NS
	HS-PW-6	1.00 - 1.13	NS
	HS-PW-7	1.50 - 1.63	NS
	HS-PW-8	1.00 - 1.13	NS
	HS-PW-9	1.00 - 1.13	NS
Northwest of the HSP	HS-PW-10	5.00 - 5.13	NS
	HS-PW-11	4.50 - 4.63	NS
Downgradient of Wolven Northeast plume within the Rogue River	Area19-PW-1	1.00 - 1.13	NS
	Area19-PW-2	1.00 - 1.13	1.42 - 1.54
	Area19-PW-3	1.00 - 1.13	NS
	Area19-PW-4	1.00 - 1.13	1.42 - 1.54
	Area19-PW-5	1.00 - 1.13	NS
	Area19-PW-6	1.50 - 1.63	2.00 - 2.13
	Area19-PW-7	5.00 - 5.13	NS
Downgradient of the northwest portion of the Wolven/Jewell plume along the Rogue River	WVNW-PW-1	3.00 - 3.13	4.00 - 4.13
	WVNW-PW-2	2.33 - 2.46	3.33 - 3.46
	WVNW-PW-3	1.50 - 1.63	NS
	WVNW-PW-4	1.67 - 1.79	NS
North Childsdale area, downgradient of the Wolven study area	WV/CH-PW-1	0.75 - 0.88	NS
	WV/CH-PW-2	0.75 - 0.88	NS
	WV/CH-PW-3	1.00 - 1.13	NS
	WV/CH-PW-4	1.00 - 1.13	NS
	WV/CH-PW-5	0.83 - 0.96	NS
	WV/CH-PW-6	1.00 -1.13	2.00 - 2.13

[1] – Measured in feet below the ground surface of the river bottom
[2] – "A" represents the shallow interval sample collected at each location which was advanced to a minimum of 12-inches below the sediment where conditions allowed.
[3] – "B" represents the deep interval sample collected at each location which was advanced to a minimum of 6-inches below the shallow sample where conditions allowed.
NS – Not Sampled. See **Section 7.2**, Sampling Deviations

7.2. GSI RAP SAMPLING ADJUSTMENTS

The intervals at which samples were collected were based upon the results of the vacuum-gauge device and confirmation of up-welling groundwater gradient at each location. In some sample locations, the shallow intervals were at depths greater than 12 inches due to unconsolidated sediment which did not create an adequate seal between pore and river water. The Henry Tube sample device was pushed deeper into the pore space until the vacuum gauge could confirm that pore-water was being collected through the sampling device and river water was not being short circuited.

Subsurface conditions (rocky substrate, refusal, etc.) did not allow for the collection of the deep interval at every location. Refusal or inadequate groundwater gradient prevented the sampling deeper intervals at 23 pore-water sampling locations. Proposed pore-water sample locations in the study area northwest of the HSP (HS-PW-10 and HS-PW-11) were required to be moved further downstream. Impassable conditions of the Rogue River combined with limited private landowner access made the locations established in the GSI RAP inaccessible. Following discussion with and approval of EGLE, these locations were shifted to be located upstream and downstream of GSI piezometer HS-GSI-9. Pore-water and monitoring well sampling worksheets are provided in **Appendix B**. Sampler Screen Interval provided on pore-water worksheets is the measured depth from the top of the sediment surface to the top of the sampler screen. The approximate screen length of the Henry Tube Sampler (.13 ft or 1.5 inches) is included in the total Pore Water Screen Depth interval of *Table 7.1.2*, measured in feet.

7.3. ANALYTICAL METHOD AND PARAMETERS

The samples were analyzed for PFAS using DoD QSM 5.3 guidelines for PFAS by isotope dilution methodology. The analyte list included the 28 PFAS compounds specified in the CD, and reporting limits are provided in Table A.7.7 of the project-specific QAPP.

8.0 GSI AND APPLICABLE RULE 57 WATER QUALITY STANDARDS

The potential environmental exposure pathways for impacted surface water in the Rogue River and applicable Part 4 Rule 57 Water Quality Values are identified as follows:

- Human exposure via non-drinking water exposure route – Rule 57 HNDV;
- Aquatic life exposure to impacted water in the Rogue River – Rule 57 FCV; and
- Wildlife exposure to impacted water in the Rogue River – Rule 57 WV.

Parameter	Units	HNDV	FCV	WV
PFOA	ng/L	12,000	880,000	Not Applicable
PFOS	ng/L	12	140,000	Not Applicable

The human health drinking water value is not applicable to this GSI investigation. Rather, the applicable criteria are the generic GSI criteria, which are the lesser of HNDV, FCV, and WV. The GSI criteria are derived using surface-water concentrations, but for the purpose of this evaluation they will be used for the evaluation of pore-water data to aid in evaluating compliance at the surface water compliance point. This does not imply that GSI criteria are necessarily applicable to the pore-water concentrations.

Compound	Threshold Value (µg/L)	Basis for Value
PFOA	12	GSI
PFOS	0.012	GSI

9.0 SITE SAMPLING RESULTS

The following section summarizes the analytical results from groundwater and pore-water collected during the investigation activities. During pore-water sampling and the concurrent groundwater sampling event, samples were collected from a total of 46 locations. Of those 46 locations, 0 samples exceeded GSI criteria for PFOA

(12,000 ng/L). For PFOS, 32 samples were greater than the GSI criteria (12 ng/l). Likewise, for PFOS, 14 samples were less than 12 ng/l or were non-detect in laboratory analysis. The PFOS concentrations are further described by each area:

- **HSP Study Area (South/Southeast, downgradient of the HSP plume along Rogue River)**

>12 ng/L	HS-PW-2.5A, HS-PW-2.5B, HS-PW-3A, HS-PW-3B, HS-PW-3A, HS-PW-3B, HS-PW-3.5A, HS-PW-3B, HS-PW-4, HS-PW-5, and HS-PW-8
<12 ng/L	HS-PW-1A, HS-PW-1B, HS-PW-2, HS-PW-6, HS-PW-7, and HS-PW-9

- **HSP Study Area (Northwest of the HSP)**

Non-Detect	HS-PW-10, and HS-PW-11

- **Wolven/Jewell Study Area (downgradient of the Wolven Northwest plume)**

>12 ng/L	WVNW-PW-3, WVNW-PW-4
<12 ng/L	WVNW-PW-1A, WVNW-PW-1B, WVNW-PW-2A, and WVNW-PW-2B

- **Wolven/Jewell Study Area (downgradient/northeast of the Wolven plume)**

>12 ng/L	Area19-GSI-1, Area19-PW-1, Area19-PW-2A, Area19-PW-2B, Area19-PW-3, Area19-PW-4A, Area19-PW-4B, Area19-PW-5, Area19-GSI-2, Area19-PW-6A, Area19-PW-6B, Area19-PW-7, and Area19-GSI-3
<12 ng/L	None
Non-Detect	WV-DEQ-MW9-57

- **Wolven/Childsdale Study Area**

>12 ng/L	WV/CH-PW-1, WV/CH-PW-2, WV/CH-PW-3, WV/CH-PW-4, WV/CH-PW-5, and WV/CH-PW-6A
<12 ng/L	None
Non-Detect	WV/CH-PW-6B

Pore-water sample results are summarized on **Table 4.** Groundwater sample results are summarized on **Table 5**. **Figures 6A** through **6C** summarize pore-water samples results for PFOS concentrations in each study area.

10.0 DATA QUALITY ASSURANCE AND CONTROL

QC samples were collected at a rate of one per 20 samples in accordance with the project-specific QAPP and approved GSI WP which included: field blanks, field duplicates, and MS/MSDs. All QA/QC samples were collected using the methods described in the SOPs and analyzed using the same analytical methods used for the primary sample.

Selected GSI data has been validated according to performance requirements and the QA/QC limits in Table D.1.1 of Revision 2 of the QAPP. In addition, R&W/GZA consulted the general guidance in the EPA Contract Laboratory Program National Functional Guidance for Organic and Inorganic Superfund Data Review and relevant analytical methods to assess data usability. Approximately 5% of all PFAS samples collected are included for data validation. Sample delivery group WA28027 from pore-water sampling was included within the 5% PFOS samples selected for data validation. Analytical deficiencies relative to the QAPP requirements will be identified and noted as a

result of the data validation. All analytical data has been provided to EGLE via EDD. Stage 4 Data Validation Report - Groundwater Surface Water Interface Area, produced by Environmental Standards, is included in **Appendix C**.

11.0 GSI WORK PLAN

Based on the groundwater monitoring and pore-water investigation data presented above, the following provides a summary of the WP. The proposed GSI sampling locations are shown on **Figures 6A** to **6C.** Actual monitoring well locations may vary slightly from the proposed locations during installation. While the target locations for the well clusters are shown, limitations for access on private properties, site conditions, and utilities may require moving monitoring well locations. GSI monitoring locations are proposed to monitor locations of highest PFOS concentrations in each study area. GSI monitoring locations will also be used to monitor the lateral extent of PFOS concentrations greater than 12 ng/L at the upstream and downstream extent of each study area. This WP outlines the initial phase of GSI investigation to further characterize each study area, and additional phases of GSI investigation (well installation) may be performed based on these results.

11.1. GSI RECOMMENDATIONS

As indicated in **Figures 3A**, **3B** and **3C**, the depth of the vertical groundwater discharge zone becomes less as the location approaches the Rogue River shoreline and becomes greater as the location is away from the Rogue River shoreline. As shown in **Figure 3A**, the limit of the vertical discharge zone at HS-MW-29A/B/C/D cluster is approximately 15 feet below the groundwater table, and only MW-29A appears to be an appropriate monitoring well that is capable of monitoring PFOS venting to the Rogue River. Monitoring well WV-MW-7S/M is located approximately 1,000 feet away from the Rogue River in **Figure 3B**, and the limit of the vertical groundwater discharge zone is approximately 55 feet BGT. Both WV-MW-7S and WV-MW-7M are screened within the estimated groundwater discharge zone and are capable of monitoring PFOS venting to the GSI. In **Figure 3C**, monitoring well cluster WV-DEQ-MW9 is located approximately 400 feet away from the Rogue River, and the shallowest well screen WV-DEQ-MW9-57 is below the estimated groundwater discharge zone, and therefore, is not an appropriate GSI monitoring well for that location. On the other hand, PFOS data collected from the shallow monitoring wells, such as AREA19-GSI-1, AREA19-GSI-2 and AREA19-GSI-3, which are screened within the estimated vertical discharge zone, were consistent with the pore-water sampling data. In short, monitoring wells located close to the Rogue River and screened in the shallow groundwater zone will provide effective GSI monitoring. Based on the groundwater flow evaluation and the existing PFOS groundwater monitoring data, VAP in the top 50 feet of the saturated zone should be sufficient for the proposed GSI monitoring wells if the locations are less than 500 feet away from the Rogue River shoreline. Existing monitoring wells will be evaluated for possible use as GSI monitoring points. Proposed RAP monitoring well clusters will also be evaluated for possible use as GSI monitoring points as they are installed, and groundwater measurements are collected. If determined to meet GSI monitoring criteria, the alternative locations for GSI monitoring will be provided to EGLE.

The GSI monitoring wells are to be placed as close to the Rogue River as possible, within 50 to 500 feet from the Rogue River shoreline. At each location, the soil boring will be advanced to approximately 50 feet BGT and VAP sampling (SOP A25) will be performed by setting a temporary well screen and collecting groundwater samples at an interval of 10 feet in the saturated zone. The VAP intervals will be 5 to 10 feet BGT, 15 to 20 feet BGT, 25 to 30 feet BGT, 35 to 40 feet BGT, and 45 to 50 feet BGT, assuming groundwater is encountered throughout the borehole depth. If fine-grained soil is present or groundwater column is discontinuous, the VAP intervals will be adjusted based on field observations.

The VAP data will be evaluated to determine the appropriate location for the placement of monitoring well screens. The wells in each study area that are located upstream and downstream of the PFOS concentrations

currently known to be over 12 ng/L are those used to delineate the lateral extent of each discharge area. If the VAP data from these locations indicates PFOS is found throughout the aquifer at detections greater than GSI criteria, a step-out boring may be completed further from the source area to better delineate the PFOS concentrations prior to the installation of the monitoring well cluster.

Upon the completion of soil boring and VAP sampling, one monitoring well will be installed within the top 10 feet of the saturated zone. If PFOS is not detected in the VAP samples, one well will be installed at the location. If PFOS is detected in the VAP samples, up to three monitoring wells will be installed at depths which will be selected based on PFOS concentrations and vertical monitoring spacing. The screen position of the deeper monitoring well will be selected based on the distance of the monitoring well to the shoreline, geology, and estimated groundwater flow path.

11.2. PROPOSED MONITORING LOCATIONS

Wolven Northwest

In the Wolven Northwest area, three GSI monitoring well locations are proposed.

- WVNW-MW-201 is positioned near the pore-water sample location WVNW-PW-3, where the highest PFOS concentration was detected in the pore-water sample in the area.

- Three locations are proposed to delineate the lateral extent of PFOS concentrations exceeding 12 ng/L in this area.
  - WVNW-MW-200 is proposed at the upstream reach of the Wolven Northwest area near WVNW-PW-2
  - WVNW-MW-202 is proposed at the downstream reach of the Wolven Northwest area near WVNW-PW-3
  - WVNW-MW-203 is proposed near the WV-MW-7S/M/D monitoring well cluster to straddle the groundwater table interface

Wolven Northeast

In Wolven Northeast, five GSI monitoring well locations are proposed to spatially cover the river reach from pore-water sample location AREA19-PW-1 to AREA19-PW-5, where PFOS was detected.

- Area19-MW-222 is positioned next to AREA19-PW-5, where the highest PFOS concentration in the pore-water samples was detected.

- The other four locations (Area19-MW-7 (Area 19 RAP well), Area19-MW-221, 223, and 224) are proposed near AREA19-GSI-1, between AREA19-PW-2 and AREA19-PW-3, near AREA19-PW-6, and south of AREA19-GSI-3 to delineate the PFOS extent upstream and downstream of this study area.

Wolven/Childsdale

In the Wolven/Childsdale study area, three GSI monitoring well locations are proposed.

- WV/CH-MW-241 is positioned next to WV/CH-PW-3 and downstream of WV/CH-PW-2, where the highest PFOS concentration in the pore-water samples was detected in this area.

- Two locations are proposed to delineate the lateral extent of PFOS concentrations exceeding 12 ng/L in this area.
  - WV/CH-MW-240 is proposed at the upstream reach of the Wolven/Childsdale area near WV/CH-PW-1
  - WV/CH-MW-242 is proposed at the downstream reach of the Wolven/Childsdale area near WV/CH-PW-5

HSP South/Southeast

In the HSP area to the southeast, six GSI monitoring well locations are proposed, including one existing monitoring well.

- In the HSP area to the southeast, three GSI monitoring well locations (HS-MW-260, 261, and 262) are proposed centered around HS-PW-3, where the highest PFOS concentration was detected in this area.

- HS-MW-266 is proposed near the northeast end of the Department of Natural Resource fishponds, hydraulically upgradient of proposed HS-MW-261.

- Two locations are proposed to delineate the lateral extent of PFOS concentrations upstream and downstream of HW-PW-3.
  - HS-MW-260 is proposed at the upstream reach of the HSP area near HS-PW-2.5
  - HS-MW-262 is proposed at the downstream reach of the HSP area near HS-PW-4

- Existing groundwater monitoring well HS-MW-29A is located near pore-water sample location HS-PW-3 and will be included as a GSI monitoring well.

- Three locations are proposed for downstream monitoring of the HSP plume:
  - HS-MW-263 is proposed near HS-PW-5
  - HS-MW-264 is proposed near HS-PW-8
  - HS-MW-265 is proposed near the Grand River to monitor potential PFOS migration to the south of the HSP plume.

Proposed GSI monitoring locations are provided on **Figures 6A** through **6C**.

Upon completion of the GSI monitoring well installation, the GSI monitoring wells and the existing groundwater monitoring wells in the HSP and Wolven/Jewell study areas will be sampled and analyzed for PFAS Compounds under the CD. The results of VAP sampling and groundwater sampling results will be evaluated to further determine if additional GSI monitoring wells are necessary. If no additional GSI monitoring wells are needed, the well network will be considered substantially complete. The first round of sampling completed at construction will be considered quarter one and three additional sampling events will take place in that year. If additional wells are needed, the four quarters of monitoring will not commence until the network is deemed substantially complete.

12.0 INVESTIGATION METHODOLOGY

Relevant tasks completed under this WP will be completed in accordance with the most recent revision of the QAPP prepared for Wolverine by R&W/GZA as well as methodologies outlined in the approved GSI WP.

The proposed well cluster locations will be drilled using either hollow-stem auger or rotosonic methods in accordance with SOPs A03 through A06 of the QAPP. When possible, the initial boring at each location will be drilled 50 feet into the groundwater table or upon refusal. The borehole-terminal depth will also be evaluated based on the depths of adjacent water wells and the presence of confining strata.

As the original borings are drilled at each location, VAP samples will be collected for PFAS analysis from water-bearing and permeable formation(s) at an interval of 10 feet. VAP will be completed in accordance with *SOP A25, Vertical Aquifer Profiling* included in the QAPP. The turn-around time for laboratory samples will be approximately three to four weeks.

Well installation depths are not predetermined. Based on the combination of profiling data, encountered geology, and corresponding piezometer and river elevations, R&W/GZA will determine the depth(s) of wells installed at each nest location. The monitoring wells will be developed in accordance with *SOP A13, Well Development* in the QAPP. Upon completion, the wells will also be surveyed by a licensed surveyor.

13.0 SAMPLING AND ANALYTICAL PROCEDURES

This section provides a generalized SAP for the GSI monitoring well sampling. Specific information regarding sampling procedures and analytical methods is provided in the site-specific QAPP and approved GSI WP.

Once the GSI well network is substantially complete (as identified in **Section 11**), all newly installed wells will be sampled quarterly for one year.

13.1. SAMPLING LOCATIONS

As discussed in **Section 11.1**, the following GSI monitoring and sampling locations are proposed:

Table 13.1.1 Proposed GSI Sampling Locations

Area of Investigation	GSI Monitoring Wells
Wolven Northwest • Downgradient of the northwest portion of the Wolven/Jewell plume along the Rogue River	• WVNW-MW-200 • WVNW-MW-201 • WVNW-MW-202 • WVNW-MW-203
Wolven Northeast • Downgradient of Wolven Northeast plume within the Rogue River	• Area19-MW-7 (Area 19 RAP well) • Area19-MW-221 • Area19-MW-222 • Area19-MW-223 • Area19-MW-224
North Childsdale Area • Downgradient of the Wolven study area	• WV/CH-MW-240 • WV/CH-MW-241 • WV/CH-MW-242

Downgradient of the HSP to the southeast • Southeast downgradient of the HSP primary plume along Rogue River	• HS-MW-260 • HS-MW-29A (existing well) • HS-MW-261 • HS-MW-262 • HS-MW-263 • HS-MW-264 • HS-MW-266
Downgradient of the HSP to the south • Downgradient of the HSP near Grand River	• HS-MW-265

13.2. SAMPLE COLLECTION AND LABELING

Samples will be collected for PFAS analysis following the methods summarized in **Section 13.0** and detailed in the sampling SOPs for Groundwater Monitoring Wells (*SOP A16; Low Flow Sampling*). Detailed field and laboratory requirements are provided in the site-specific QAPP.

Sample identification will consist of nomenclatures that include the unique location identification (see reference table above). If applicable, sample identification for each sample will be repeated for each sampling event with consistent spelling.

To prevent misidentification of samples, legible labels will be affixed to each sample container. The labels will be sufficiently durable to remain legible even when wet. At a minimum, the labels will contain the following information:

- Location ID;
- Name or initials of collector; and
- Date and time of collection.

13.3. SAMPLE SHIPPING

Sample bottles will be placed into the cooler and packed with double-bagged wet ice immediately following collection. Packing material will be used as necessary. A temperature blank will be placed in the cooler prior to shipment. The cooler shall be addressed to the appropriate laboratory and dispatched as soon as practical to ensure timely arrival.

13.4. ANALYTICAL METHOD AND PARAMETERS

PFAS will be analyzed using DoD QSM 5.3 guidelines for PFAS by isotope dilution methodology. The analyte list will include the 28 PFAS compounds specified in the CD, and reporting limits are provided in Table A.7.7 of the project-specific QAPP.

14.0 DATA QUALITY ASSURANCE AND CONTROL

The following field QC samples will be collected at a rate of one per 20 samples in accordance with the project-specific QAPP: Field blanks, field duplicates, and MS/MSDs. Field QC sample collection methodologies are outlined in the approved GSI RAP.

15.0 INVESTIGATION DERIVED WASTE

Soil cuttings will be containerized and transported to the HSP for staging/storage until off-site treatment/disposal or other approved handling can be arranged. The monitoring well development and purge water will be managed as follows:

- For locations where PFAS concentrations are known to be below Part 201 GRCC, the water can be discharged to the ground surface in accordance with EGLE interoffice communication regarding purge-water disposal from well sampling and development (EGLE, 1999).

- For locations where PFAS concentrations are unknown or known to exceed Part 201 GRCC, the water will be disposed of appropriately in accordance with the EGLE interoffice communication regarding purge water disposal from well sampling and development (EGLE, 1999), and not discharged to the ground surface.

16.0 ANTICIPATED SCHEDULE

The schedule for GSI monitoring well installation will depend greatly on R&W/GZA's ability to obtain access to the desired location or proximate alternate. The following table outlines R&W/GZA's current estimates of the steps and approximate timeframes for the tasks in this WP (upon EGLE approval).

Task	Estimated Timeframe per Location
Access	1 to 3 months
Initial Drilling	2 to 3 weeks
VAP analysis	3 weeks
Monitoring Wells Installation	1 to 2 weeks
Development Wait Time	2 weeks
First Groundwater Sampling	1 week
First Laboratory Analysis	3 weeks

The table includes a completion timeframe estimate of each task per location. Based upon the 19 proposed locations in this WP, R&W/GZA estimates this WP will require a total of 17 months to complete drilling, VAP analysis, and installation of the proposed monitoring wells. Access is likely to be granted piecemeal and will therefore create overlap in the schedule of tasks. If access issues do arise, the protocol laid out in **Section 9.0** of the CD will be implemented. Additional phases of well installation may be necessary to ensure that the well network is substantially complete. Quarterly sampling of the well network will begin following substantial completion of the network. Following the full year of quarterly sampling of the well network (i.e., receipt of final EDD), Wolverine will submit, within 180 days, a Completion Report per Section 7.12(a)(viii) of the CD.

17.0 REFERENCES

Michigan Department of Environmental Quality. 1999. *Interoffice Communication, Operation Memo Gen-10, Re: Purge Water Disposal from Well Sampling and Development.* https://www.michigan.gov/documents/deq/deq-whm-hwp-Op-Memo-Gen-10-Rev1_235127_7.pdf

R&W/GZA. 2018. *Conceptual Site Model Update and Status Report, Former House Street Disposal Area, Wolverine World Wide, Inc., Rockford, Michigan*.

R&W/GZA. 2018. *Quality Assurance Project Plan, Former Wolverine Tannery and House Street Disposal Area, Revision 2.* Submitted to EPA August 29, 2018 with errata pages submitted October 31, 2018 and April 15, 2019.

R&W/GZA. 2019. *Implementation of 2018 Work Plan - Summary Report, Former Wolverine World Wide Tannery Facility*. Submitted to USEPA January 11, 2019.

R&W/GZA. 2020. *Groundwater-Surface Water Interface (GSI) Response Activity Plan, North Kent Study Area*. Submitted to Michigan Department of Environment, Great Lakes, and Energy (EGLE) September 23, 2020.

TABLES

TABLE 1
GSI Piezometer Summary
GSI Investigation
Algoma and Plainfield Townships, Kent County, Michigan

Piezometer I.D.	Date Installed	Piezometer Easting (ft.)	Piezometer Northing (ft.)	Top of Casing (ft. amsl)	Grade Elevation (ft. amsl)	Top of Screen (ft. bg.)	Total Boring Depth (ft. bg.)	Distance to River (ft.)
WVNW-GS1-1	10/29/2020	12790197.62	598854.06	716.38	711.68	2.20	6.20	4.00
WVNW-GS1-2	10/29/2020	12788280.45	597285.30	719.58	715.49	6.00	10.00	6.00
HS-GS1-1	10/27/2020	12796409.12	580037.74	635.84	631.76	3.00	7.00	3.00
HS-GS1-2	10/27/2020	12794382.15	578575.97	629.76	625.68	2.90	6.90	2.00
HS-GS1-3	10/27/2020	12794540.64	575395.34	622.55	619.47	2.80	6.80	5.00
HS-GS1-4	10/26/2020	12796056.76	572277.56	612.64	610.72	1.30	5.30	6.50
HS-GS1-5	10/26/2020	12796142.39	572339.83	615.42	612.54	4.50	8.50	6.00
HS-GS1-6	10/26/2020	12795200.75	569770.43	611.34	608.72	4.25	8.25	8.00
HS-GS1-7	10/26/2020	12793161.54	570470.86	611.68	608.68	5.00	9.00	12.80
HS-GS1-8	10/26/2020	12791378.50	571769.65	612.03	610.15	7.40	11.40	12.00
HS-GS1-9	10/29/2020	12783447.92	594138.68	722.50	717.75	5.00	9.00	13.00
AREA19-GS1-1	10/29/2020	12803671.73	602250.59	703.04	698.71	3.70	7.70	4.00
AREA19-GS1-2	10/29/2020	12805441.24	598178.39	695.90	692.09	4.00	8.00	4.00
AREA19-GS1-3	10/29/2020	12805120.16	595643.55	695.34	691.50	4.20	8.20	6.70
WV/CH-GS1-1	10/27/2020	12804580.97	590400.63	679.59	675.75	1.00	5.00	3.00
WV/CH-GS1-2	10/27/2020	12803034.54	588938.87	674.84	671.95	2.10	6.10	4.00

TABLE 2

GSI Groundwater and Surface Water Gauging
GSI Investigation
Algoma and Plainfield Townships, Kent County, Michigan

Station ID	Reference Elevation (ft, M.S.L.)	Date	Depth to Water (ft)	Water Elevation (ft, M.S.L.)
Rogue River				
HS-GSI-9	722.5	11/09/20	5.73	716.77
		11/11/20	5.41	717.09
		11/13/20	5.32	717.18
		11/16/20	5.15	717.35
		11/18/20	4.86	717.64
		11/20/20	5.24	717.26
		11/23/20	5.50	717.00
		11/25/20	5.40	717.10
		11/27/20	4.77	717.73
SG-11 Mile Bridge	725.85	11/09/20	12.80	713.05
		11/11/20	12.57	713.28
		11/13/20	12.45	713.40
		11/16/20	12.25	713.60
		11/18/20	12.02	713.83
		11/20/20	12.35	713.50
		11/23/20	12.64	713.21
		11/25/20	12.55	713.30
		11/27/20	11.95	713.90
WV/NW-GSI-2	719.58	11/09/20	7.03	712.55
		11/11/20	6.78	712.80
		11/13/20	6.64	712.94
		11/16/20	6.39	713.19
		11/18/20	6.26	713.32
		11/20/20	6.55	713.03
		11/23/20	6.83	712.75
		11/25/20	6.72	712.86
		11/27/20	6.22	713.36
WV/NW-GSI-1	716.38	11/09/20	5.61	710.77
		11/11/20	5.48	710.90
		11/13/20	5.46	710.92
		11/16/20	5.35	711.03
		11/18/20	5.28	711.10
		11/20/20	5.40	710.98
		11/23/20	5.52	710.86
		11/25/20	5.42	710.96
		11/27/20	5.23	711.15
SG-Algoma Bridge	722.06	11/09/20	12.55	709.51
		11/11/20	12.30	709.76
		11/13/20	12.10	709.96
		11/16/20	12.00	710.06
		11/18/20	11.90	710.16
		11/20/20	12.16	709.90
		11/23/20	12.30	709.76
		11/25/20	12.30	709.76
		11/27/20	11.85	710.21

TABLE 2

GSI Groundwater and Surface Water Gauging
GSI Investigation
Algoma and Plainfield Townships, Kent County, Michigan

Station ID	Reference Elevation (ft, M.S.L.)	Date	Depth to Water (ft)	Water Elevation (ft, M.S.L.)
Rogue River				
SG-12 Mile Bridge	718.41	11/09/20	12.56	705.85
		11/11/20	12.13	706.28
		11/13/20	12.15	706.26
		11/16/20	12.20	706.21
		11/18/20	11.78	706.63
		11/20/20	12.00	706.41
		11/23/20	12.20	706.21
		11/25/20	12.10	706.31
		11/27/20	11.72	706.69
Area-19-GSI-1	703.04	11/09/20	5.50	697.54
		11/11/20	5.37	697.67
		11/13/20	5.39	697.65
		11/16/20	5.26	697.78
		11/18/20	5.24	697.80
		11/20/20	5.33	697.71
		11/23/20	5.44	697.60
		11/25/20	5.40	697.64
		11/27/20	5.21	697.83
Area-19-GSI-2	695.90	11/09/20	4.87	691.03
		11/11/20	4.66	691.24
		11/13/20	4.69	691.21
		11/16/20	4.48	691.42
		11/18/20	4.50	691.40
		11/20/20	4.60	691.30
		11/23/20	4.79	691.11
		11/25/20	4.70	691.20
		11/27/20	4.46	691.44
Area-19-GSI-3	695.34	11/09/20	4.69	690.65
		11/11/20	4.52	690.82
		11/13/20	4.57	690.77
		11/16/20	4.47	690.87
		11/18/20	4.54	690.80
		11/20/20	4.58	690.76
		11/23/20	4.67	690.67
		11/25/20	4.51	690.83
		11/27/20	4.50	690.84
Rum Creek SG	695.11	11/09/20	3.93	691.18
		11/11/20	3.88	691.23
		11/13/20	3.88	691.23
		11/16/20	3.79	691.32
		11/18/20	2.90	692.21
		11/20/20	2.90	692.21
		11/23/20	N/A	N/A
		11/25/20	3.60	691.51
		11/27/20	3.80	691.31

TABLE 2

GSI Groundwater and Surface Water Gauging
GSI Investigation
Algoma and Plainfield Townships, Kent County, Michigan

Station ID	Reference Elevation (ft, M.S.L.)	Date	Depth to Water (ft)	Water Elevation (ft, M.S.L.)
Rogue River				
Dam Seawall	681.06	11/09/20	2.02	679.04
		11/11/20	1.80	679.26
		11/13/20	1.85	679.21
		11/16/20	1.67	679.39
		11/18/20	1.70	679.36
		11/20/20	1.81	679.25
		11/23/20	1.94	679.12
		11/25/20	1.85	679.21
		11/27/20	1.64	679.42
Bridge Street Bridge	694.33	11/09/20	15.60	678.73
		11/11/20	15.30	679.03
		11/13/20	15.40	678.93
		11/16/20	15.23	679.10
		11/18/20	15.27	679.06
		11/20/20	15.32	679.01
		11/23/20	15.40	678.93
		11/25/20	15.35	678.98
		11/27/20	15.15	679.18
WV/CH-GSI-1	679.59	11/09/20	4.60	674.99
		11/11/20	4.47	675.12
		11/13/20	4.55	675.04
		11/16/20	4.36	675.23
		11/18/20	4.43	675.16
		11/20/20	4.48	675.11
		11/23/20	4.54	675.05
		11/25/20	4.51	675.08
		11/27/20	4.37	675.22
Jericho Road Bridge	687.48	11/09/20	17.25	670.23
		11/11/20	17.03	670.45
		11/13/20	17.10	670.38
		11/16/20	16.90	670.58
		11/18/20	16.92	670.56
		11/20/20	17.03	670.45
		11/23/20	17.15	670.33
		11/25/20	17.05	670.43
		11/27/20	16.85	670.63
WV/CH-GSI-2	674.84	11/09/20	4.65	670.19
		11/11/20	3.48	671.36
		11/13/20	3.54	671.30
		11/16/20	3.36	671.48
		11/18/20	3.40	671.44
		11/20/20	3.51	671.33
		11/23/20	3.61	671.23
		11/25/20	3.52	671.32
		11/27/20	3.35	671.49

TABLE 2

GSI Groundwater and Surface Water Gauging
GSI Investigation
Algoma and Plainfield Townships, Kent County, Michigan

Station ID	Reference Elevation (ft, M.S.L.)	Date	Depth to Water (ft)	Water Elevation (ft, M.S.L.)
Rogue River				
HS-GSI-1	635.84	11/09/20	5.30	630.54
		11/11/20	5.12	630.72
		11/13/20	5.22	630.62
		11/16/20	5.02	630.82
		11/18/20	5.04	630.80
		11/20/20	5.13	630.71
		11/23/20	5.23	630.61
		11/25/20	5.18	630.66
		11/27/20	5.02	630.82
Packer Bridge	N/A	11/09/20	N/A	628.76
		11/11/20		629.03
		11/13/20		628.99
		11/16/20		629.23
		11/18/20		629.21
		11/20/20		629.04
		11/23/20		628.89
		11/25/20		629.03
		11/27/20		629.27
HS-GSI-2	629.76	11/09/20	4.73	625.03
		11/11/20	4.55	625.21
		11/13/20	4.60	625.16
		11/16/20	4.48	625.28
		11/18/20	4.50	625.26
		11/20/20	4.56	625.20
		11/23/20	4.64	625.12
		11/25/20	4.60	625.16
		11/27/20	4.46	625.30
HS-GSI-3	622.55	11/09/20	4.70	617.85
		11/11/20	4.56	617.99
		11/13/20	4.60	617.95
		11/16/20	4.48	618.07
		11/18/20	4.50	618.05
		11/20/20	4.59	617.96
		11/23/20	4.68	617.87
		11/25/20	4.55	618.00
		11/27/20	4.44	618.11
Rogue River Bridge	628.35	11/09/20	10.55	617.80
		11/11/20	10.40	617.95
		11/13/20	10.45	617.90
		11/16/20	10.34	618.01
		11/18/20	10.38	617.97
		11/20/20	10.43	617.92
		11/23/20	10.51	617.84
		11/25/20	10.45	617.90
		11/27/20	10.31	618.04

TABLE 2

GSI Groundwater and Surface Water Gauging
GSI Investigation
Algoma and Plainfield Townships, Kent County, Michigan

Station ID	Reference Elevation (ft, M.S.L.)	Date	Depth to Water (ft)	Water Elevation (ft, M.S.L.)
Rogue River				
HS-GSI-4	612.64	11/09/20	3.80	608.84
		11/11/20	3.66	608.98
		11/13/20	3.71	608.93
		11/16/20	3.60	609.04
		11/18/20	3.60	609.04
		11/20/20	3.68	608.96
		11/23/20	3.78	608.86
		11/25/20	3.72	608.92
		11/27/20	3.57	609.07
HS-GSI-5	615.42	11/09/20	6.50	608.92
		11/11/20	6.30	609.12
		11/13/20	6.74	608.68
		11/16/20	6.20	609.22
		11/18/20	6.20	609.22
		11/20/20	6.27	609.15
		11/23/20	6.39	609.03
		11/25/20	6.33	609.09
		11/27/20	6.17	609.25
Grand River				
HS-GSI-6	611.34	11/09/20	5.30	606.04
		11/11/20	4.94	606.40
		11/13/20	5.02	606.32
		11/16/20	4.80	606.54
		11/18/20	4.78	606.56
		11/20/20	4.78	606.56
		11/23/20	5.03	606.31
		11/25/20	4.98	606.36
		11/27/20	4.72	606.62
HS-GSI-7	611.68	11/09/20	5.80	605.88
		11/11/20	5.49	606.19
		11/13/20	5.58	606.10
		11/16/20	5.31	606.37
		11/18/20	5.31	606.37
		11/20/20	5.31	606.37
		11/23/20	5.60	606.08
		11/25/20	5.56	606.12
		11/27/20	5.29	606.39
HS-GSI-8	612.03	11/09/20	6.00	606.03
		11/11/20	5.67	606.36
		11/13/20	5.73	606.30
		11/16/20	5.43	606.60
		11/18/20	5.48	606.55
		11/20/20	5.54	606.49
		11/23/20	5.85	606.18
		11/25/20	5.65	606.38
		11/27/20	5.38	606.65

TABLE 3A
Pore-Water Geochemistry Data
GSI Investigation
Alpine and Plainfield Townships, Kent County, Michigan

Date	Location ID	Sample Time	Time of Reading	Water Level (inches)	Purge Rate (mL/min)	Tempurature (°C)		Specific Conductivity (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
						River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
11/30/2020	Area19-PW-1	10:35	10:20	12	-	4.2	-	506	-	13.13	-	256.6	-	8.57	-	4	-
			10:25	-	300	-	6	-	582	-	1.4	-	256	-	7.9	-	4
			10:30	-	300	-	6	-	582	-	1.3	-	198	-	7.8	-	2
			10:35	-	300	-	6	-	582	-	1.3	-	130	-	7.6	-	1
11/30/2021	Area19-PW-2(A)	13:55	13:35	9	-	4.2	-	548	-	27.1	-	250	-	7.9	-	3	-
			13:40	-	100	-	6	-	1289	-	4.9	-	260	-	7.5	-	30
			13:45	-	100	-	6	-	1292	-	2.6	-	186	-	7.4	-	46
			13:50	-	100	-	6	-	1289	-	2.1	-	107	-	7.3	-	29
			13:55	-	100	-	6	-	1286	-	1.7	-	43	-	7.4	-	65
11/30/2020	Area19-PW-2(B)	14:30	14:10	9	-	4.2	-	599	-	13.7	-	-70	-	7.6	-	16	-
			14:15	-	150	-	6.4	-	1242	-	1.4	-	-28	-	7.4	-	6
			14:20	-	150	-	6.5	-	1242	-	1	-	-50	-	7.2	-	8
			14:25	-	150	-	6.8	-	1236	-	1	-	-68	-	7.1	-	10
			14:30	-	150	-	6.7	-	1237	-	1.1	-	-74	-	7.1	-	7
11/30/2020	Area19-PW-3	15:35	15:15	3	-	4.4	-	600	-	13.3	-	-61	-	7.5	-	4	-
			15:20	-	150	-	6.9	-	760	-	8.2	-	-15	-	7.4	-	14
			15:25	-	150	-	6.6	-	762	-	6.1	-	-5.4	-	7.4	-	20
			15:30	-	150	-	7	-	737	-	5.5.	-	-9.4	-	7.4	-	12
			15:35	-	150	-	6.7	-	737	-	5.3	-	23.1	-	7.9	-	10
12/1/2020	Area19-PW-4(A)	10:50	10:25	9	-	3.2	-	523.9	-	19.38	-	121.9	-	9.43	-	3	-
			10:35	-	150	-	5.7	-	966	-	1.9	-	122	-	8.3	-	296
			10:40	-	150	-	5.8	-	962	-	1.2	-	107	-	8	-	114
			10:45	-	150	-	6	-	952	-	1.2	-	96	-	7.8	-	78
			10:50	-	150	-	5.7	-	941	-	1.2	-	86	-	7.7.	-	70
12/1/2020	Area19-PW-4(B)	11:35	11:15	-	-	3.2	-	524	-	11.8	-	79	-	7.9	-	17	-
			11:20	-	150	-	5.2	-	931	-	1.4	-	94	-	7.7.	-	192
			11:25	-	150	-	5.3	-	921	-	1.2	-	90	-	7.7	-	71
			11:30	-	150	-	5.3	-	906	-	1.3	-	89	-	7.7	-	56
			11:35	-	150	-	5.4	-	890	-	1.4	-	89	-	7.6	-	10
12/1/2020	Area19-PW-6(A)	15:15	14:55	-	-	3.7	-	520.2	-	12.8	-	195.2	-	8.13	-	2	-
			15:00	-	-	-	6.4	-	562	-	1.2	-	179	-	7.9	-	478
			15:05	-	-	-	6.9	-	562	-	1	-	34	-	7.8	-	40
			15:10	-	-	-	6.9	-	562	-	1	-	-27	-	7.7	-	32
			15:15	-	-	-	6.9	-	561	-	1	-	-48	-	7.6	-	17
12/1/2020	Area19-PW-6(B)	15:50	15:30	-	-	3.7	-	518.7	-	12.4	-	-11.1	-	7.96	-	8	-
			15:35	-	-	-	6.6	-	559.7	-	1.11	-	-38.6	-	7.79	-	55
			15:40	-	-	-	6.9	-	561.5	-	0.75	-	-48.9	-	7.7	-	26
			15:45	-	-	-	6.9	-	561.9	-	0.78	-	-55.4	-	7.63	-	14
			15:50	-	-	-	6.8	-	561.8	-	0.78	-		-	7.57	-	9
12/1/2020	Area19-PW-7	16:40	16:20	-	-	3.6	-	519.6	-	12.19	-	48.8	-	7.81	-	10	-
			16:25	-	-	-	8.3	-	644	-	1.24	-	82	-	7.6	-	49
			16:30	-	-	-	7.8	-	697	-	0.7	-	59	-	7.6	-	28
			16:35	-	-	-	8	-	698	-	0.7	-	40	-	7.6	-	12
			16:40	-	-	-	8	-	699	-	0.7	-	30	-	7.5	-	-
12/2/2020	WVNW-PW-4(A)	12:00	11:35	-	-	2.1	-	498	-	26.3	-	137	-	9.6	-	5	-
			11:45	-	150	-	6.2	-	684	-	5.2	-	167	-	8.4	-	266
			11:50	-	150	-	6.8	-	706	-	1.4	-	43	-	7.9	-	279
			11:55	-	150	-	6.8	-	716	-	1.3	-	-24	-	7.5	-	78
			12:00	-	150	-	6.9	-	716	-	1.2	-	-41	-	7.5	-	16
12/2/2020	WVNW-PW-3	14:40	14:20	-	-	2.6	-	623	-	1245	-	171.7	-	7.8	-	9	-
			14:25	-	150	-	7.2	-	554	-	1.4	-	171	-	7.7	-	26
			14:30	-	150	-	7.3	-	557	-	1.2	-	157	-	7.6	-	5
			14:35	-	150	-	7.4	-	557	-	1.1	-	143	-	7.6	-	1
			14:40	-	150	-	7.4	-	557	-	1.1	-	133	-	7.5	-	1
12/3/2020	HS-PW-1(A)	12:05	11:40	-	-	2.8	-	513.8	-	62.62	-	268.6	-	7.86	-	1	-
			11:50	-	-	-	4.6	-	1053	-	2.09	-	225.9	-	7.6	-	4
			11:55	-	-	-	6.1	-	1066	-	1.24	-	189	-	7.48	-	3
			12:00	-	-	-	5.8	-	1069	-	1.22	-	181.2	-	7.44	-	2
			12:05	-	-	-	5.6	-	1067	-	1.19	-	177	-	7.4	-	2

TABLE 3A
Pore-Water Geochemistry Data
GSI Investigation
Alpine and Plainfield Townships, Kent County, Michigan

Date	Location ID	Sample Time	Time of Reading	Water Level (inches)	Purge Rate (mL/min)	Tempurature (°C)		Specific Conductivity (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
						River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
12/1/2020	Area19-PW-5(A)	12:20	12:00	-	-	3.3	-	522.8	-	12.32	-	147.6	-	7.95	-	24	-
			12:05	-	150	-	6.3	-	528	-	1.3	-	144	-	7.8	-	74
			12:10	-	150	-	6.5	-	534	-	0.8	-	6.2	-	7.7	-	20
			12:15	-	150	-	6.7	-	533	-	0.7	-	-42	-	7.6	-	9
			12:20	-	150	-	6.7	-	533	-	0.8	-	-58	-	7.5	-	5
12/3/2020	HS-PW-1(B)	12:50	12:20	-	-	2.6	-	571.9	-	12.89	-	186.2	-	7.83	-	15	-
			12:35	-	-	-	5.9	-	1060	-	2.48	-	198.8	-	7.4	-	4
			12:40	-	-	-	6	-	1061	-	1.22	-	192.4	-	7.35	-	3
			12:45	-	-	-	6.1	-	1062	-	1.05	-	187.8	-	7.31	-	2
			12:50	-	-	-	5.8	-	1064	-	0.9	-	185	-	7.3	-	1
12/3/2020	HS-PW-7(A)	15:45	15:25	-	-	3.1	-	562.1	-	15.41	-	-62.5	-	7.78	-	4	-
			15:30	-	150	-	5.5	-	857	-	2.22	-	-20.7	-	7.42	-	0.5
			15:35	-	150	-	6	-	925	-	1.18	-	-57.8	-	7.32	-	3
			15:40	-	150	-	6.1	-	943	-	1.16	-	-75.5	-	7.2	-	3
			15:45	-	150	-	6.1	-	945	-	1.14	-	-78.3	-	7.18	-	2
12/4/2020	HS-PW-2(A)	14:45	14:15	-	-	2.9	-	566.5	-	16.3	-	240.3	-	7.94	-	76	-
			14:30	-	150	-	5.9	-	809	-	1.13	-	143.1	-	7.84	-	2
			14:35	-	150	-	5.7	-	818	-	1.03	-	-75.4	-	7.74	-	4
			14:40	-	150	-	5.9	-	819	-	0.94	-	-110.8	-	7.66	-	2
			14:45	-	150	-	5.9	-	820	-	0.94	-	-123	-	7.63	-	2
12/4/2020	HS-PW-3(A)	10:40	10:05	-	-	3.2	-	573.6	-	23.93	-	252.7	-	7.16	-	77.3	-
			10:25	-	-	-	7.2	-	485.1	-	1.08	-	257.6	-	6.81	-	18.1
			10:30	-	-	-	6.9	-	489.7	-	0.95	-	178.2	-	6.6	-	3.5
			10:35	-	-	-	7.1	-	489.9	-	0.94	-	120	-	6.54	-	3
			10:40	-	-	-	7.1	-	492.1	-	1.02	-	71.8	-	6.51	-	2.3
12/4/2020	HS-PW-4(A)	11:40	11:10	-	-	7.1	-	671.3	-	19.05	-	63.3	-	6.71	-	17.5	-
			11:25	-	-	-	9.3	-	-	-	1.04	-	78	-	6.91	-	4.8
			11:30	-	-	-	9.5	-	655.6	-	0.73	-	25.5	-	7.01	-	2
			11:35	-	-	-	9.6	-	655.7	-	0.67	-	-10.1	-	7.05	-	1.3
12/4/2020	HS-PW-5(A)	14:20	13:55	-	-	4.1	-	582.6	-	21.09	-	285.9	-	7.41	-	11.7	-
			14:05	-	-	-	6.5	-	950	-	1.38	-	225.4	-	7.13	-	-
			14:10	-	-	-	6.6	-	951	-	1.26	-	160.9	-	7.08	-	-
			14:15	-	-	-	6.6	-	951	-	1.14	-	-0.3	-	6.98	-	-
			14:20	-	-	-	6.6	-	953	-	1.05	-	-22.3	-	6.95	-	-
12/4/2020	HS-PW-6(A)	15:15	14:45	-	-	4.7	-	649.8	-	15.73	-	15.41	-	7.46	-	-	-
			15:00	-	-	-	6.9	-	707.8	-	1	-	13.2	-	7.38	-	-
			15:05	-	-	-	6.9	-	707.6	-	0.78	-	-23.9	-	7.38	-	-
			15:10	-	-	-	6.9	-	707.1	-	0.77	-	-49.7	-	7.36	-	-
			15:15	-	-	-	6.9	-	707.7	-	0.7	-	-66.4	-	7.34	-	-
12/7/2020	WV/CH-PW-1(A)	11:00	10:40	-	-	2.8	-	892	-	12	-	147	-	8.4	-	2.9	-
			10:45	-	-	-	4.3	-	1104	-	0.9	-	-58	-	7.4	-	3.6
			10:50	-	-	-	4.8	-	1101	-	1.1	-	-77	-	7.4	-	2.5
			10:55	-	-	-	4.7	-	1100	-	0.8	-	-90	-	7.4	-	2.8
			11:00	-	-	-	4.6	-	1102	-	0.8	-	-95	-	7.4	-	3
12/7/2020	WV/CH-PW-2(A)	11:55	11:35	-	-	2.8	-	604	-	11.82	-	113.4	-	8.45	-	3.76	-
			11:40	-	150	-	5.4	-	788	-	0.3	-	-42	-	7.4	-	1.4
			11:45	-	150	-	5.2	-	790	-	0.2	-	-60	-	7.5	-	0.2
			11:50	-	150	-	5.2	-	790	-	0.1	-	-65	-	7.4	-	0.3
			11:55	-	150	-	4.8	-	790	-	0.1	-	-69	-	7.4	-	3
12/7/2020	WV/CH-PW-3(A)	14:40	14:20	-	-	3.2	-	603	-	13	-	124	-	8.8	-	3.6	-
			14:25	-	-	-	4.9	-	711	-	6.8	-	170	-	7.6	-	8.6
			14:30	-	-	-	4.9	-	722	-	6.7	-	192	-	7.6	-	5.6
			14:35	-	-	-	4.9	-	721	-	6.7	-	213	-	7.6	-	3.9
			14:40	-	-	-	4.9	-	723	-	6.7	-	227	-	7.6	-	1.3
12/7/2020	WV/CH-PW-4(A)	15:30	15:10	-	-	3.3	-	604	-	13.6	-	213.8	-	8.73	-	2.68	-
			15:15	-	150	-	5.2	-	1015	-	0.3	-	2	-	6.9	-	2.3
			15:20	-	150	-	5.3	-	1024	-	0.1	-	-25	-	7.1	-	0.6
			15:25	-	150	-	5.4	-	1024	-	0.1	-	-32	-	7.1	-	0.4
			15:30	-	150	-	5.4	-	1025	-	0.1	-	-37	-	7.1	-	0.4

TABLE 3A
Pore-Water Geochemistry Data
GSI Investigation
Alpine and Plainfield Townships, Kent County, Michigan

Date	Location ID	Sample Time	Time of Reading	Water Level (inches)	Purge Rate (mL/min)	Tempurature (°C)		Specific Conductivity (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
						River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
12/8/2020	WV/CH-PW-5(A)	11:30	11:10	-	-	3.4	-	674	-	5.05	-	97.3	-	8.4	-	2.9	-
			11:15	-	100	-	5.3	-	786	-	1.93	-	97.5	-	7.46	-	295
			11:20	-	100	-	5.3	-	797	-	0.16	-	58.6	-	7.28	-	36.9
			11:25	-	100	-	5.3	-	799	-	0.11	-	43.4	-	7.33	-	13.4
			11:30	-	100	-	5.3	-	798	-	0.09	-	31.6	-	7.28	-	15.6
12/8/2020	WV/CH-PW-6(A)	12:30	12:00	-	-	3.3	-	674	-	12.78	-	216.7	-		-	8.9	-
			12:10	-	100	-	5.5	-	747	-	0.96	-	-46.1	8.42	7.06	-	7.97
			12:15	-	`	-	5.5	-	743	-	0.47	-	-63.4	-	7.03	-	3.58
			12:20	-	-	-	5.5	-	743.8	-	0.46	-	-665	-	7.03	-	2.07
			12:25	-	-	-	5.4	-	749	-	0.47	-	-67.5	-	7.03	-	0.99
12/8/2020	WV/CH-PW-6(B)	13:10	12:45	-	-	3.3	-	674	-	12.78	-	216.7	-	8.42	-	8.5	-
			12:50	-	-	-	6.9	-	686	-	1.2	-	-82.1	-	7.42	-	4.06
			12:55	-	-	-	7	-	685	-	1.52	-	-85.2	-	7.34	-	1.61
			13:00	-	-	-	7	-	684	-	1.67	-	-86.8	-	7.38	-	1.4
			13:05	-	-	-	7	-	686	-	1.29	-	-89.6	-	7.38	-	-
12/8/2020	HS-PW-8	15:10	14:40	-	-	3.5	-	682	-	12.66	-	25.9	-172	8.85	-	-	-
			14:45	-	-	-	5.5	-	660	-	0.35	-	-175	-	7.89	-	36.5
			14:50	-	-	-	5.6	-	660	-	0.21	-	-175	-	7.6	-	3.75
			14:55	-	-	-	5.5	-	660	-	0.21	-	-175.9	-	7.6	-	3.4
			15:00	-	-	-	5.5	-	661	-	0.22	-	-176.3	-	7.69	-	2.5
			15:05	-	-	-	5.6	-	660	-	0.24	-		-	7.66	-	1.25
12/8/2020	HS-PW-9	16:45	16:20	-	-	3.5	-	679	-	12.48	-	-12.3	-	8.8	-	2.88	-
			16:25	-	-	-	3.9	-	668	-	4.49	-	-44.9	-	7.74	-	18.1
			16:30	-	-	-	3.8	-	683	-	0.93	-	-79.9	-	7.82	-	4.03
			16:35	-	-	-	3.8	-	682	-	0.72	-	-81.7	-	7.47	-	0.8
			16:40	-	-	-	3.7	-	682	-	0.71	-	-83.6	-	7.75	-	0.63
12/9/2020	WVNW-PW-1(B)	16:55	16:30	-	-	3.7	-	654	-	11.47	-	4.2	-	6.9	-	2.79	-
			16:35	-	-	-	4.5	-	849	-	0.42	-	-31	-	7.52	-	32.2
			16:40	-	-	-	4.5	-	622	-	0.4	-	-33	-	7.49	-	17.5
			16:45	-	-	-	4.5	-	560	-	0.11	-	-38.2	-	7.52	-	9.5
			16:50	-	-	-	4.5	-	450	-	0.8	-	-39.6	-	7.47	-	12.8
12/9/2020	WVNW-PW-1(A)	16:15	15:45	-	-	3.7	-	654	-	11.47	-	4.2	-	6.9	-	2.79	-
			15:50	-	-	-	5.1	-	837	-	0.49	-	-13.6	-	7.5	-	10.8
			15:55	-	-	-	5	-	841	-	0.43	-	-24.2	-	7.47	-	5.5
			16:00	-	-	-	4.9	-	842	-	0.41	-	-28.9	-	7.56	-	19.3
			16:05	-	-	-	4.8	-	842	-	0.41	-	-27.2	-	7.54	-	13.7
12/9/2020	WVNW-PW-2(B)	15:20	14:50	-	-	3.6	-	654	-	11.18	-	-9.8	-	8.5	-	6.06	-
			15:00	-	100	-	5.5	-	631	-	0.22	-	-15.7	-	6.84	-	9.34
			15:05	-	100	-	5.6	-	631	-	0.1	-	-20.9	-	6.89	-	2.94
			15:10	-	100	-	5.6	-	631	-	0.11	-	-23	-	6.89	-	1.95
			15:15	-	100	-	5.6	-	631	-	0.09	-	-25.4	-	6.87	-	1.37
12/9/2020	WVNW-PW-2(A)	14:40	14:10	-	-	3.6	-	654	-	11.18	-	-9.8	-	8.51	-	6.06	-
			14:20	-	100	-	5.8	-	597	-	0.8	-	-29.3	-	6.93	-	6.85
			14:25	-	100	-	5.8	-	599	-	0.23	-	-21.4	-	6.89	-	3.44
			14:30	-	100	-	5.8	-	608	-	0.1	-	-25.4	-	6.88	-	2.47
			14:35	-	100	-	5.9	-	613	-	0.19	-	-28.2	-	6.88	-	2.53
12/9/2020	HS-PW-10(A)	10:05	9:30	-	-	3	-	649	-	10.58	-	58.8	-	8.48	-	2.79	-
			9:45	-	100	-	6.4	-	648	-	3.48	-	-89.3	-	7.82	-	3.15
			9:50	-	100	-	6.7	-	649	-	0.41	-	-97.4	-	7.82	-	0.71
			9:55	-	100	-	6.8	-	649	-	0.2	-	-101.2	-	7.72	-	0.66
			10:00	-	100	-	6.7	-	649	-	0.11	-	-105.3	-	7.97	-	0.26
12/9/2020	HS-PW-11(A)	11:35	10:40	-	-	3.1	-	657	-	10.8	-	82.4	-	8.48	-	5.17	-
			11:15	-	100	-	5.6	-	624	-	0.51	-	-101	-	7.84	-	13.1
			11:20	-	100	-	5.7	-	623	-	0.18	-	-108	-	7.79	-	7.24
			11:25	-	100	-	5.7	-	624	-	0.11	-	-112	-	7.82	-	5.25
			11:30	-	100	-	5.6	-	625	-	0.08	-	-114.8	-	7.85	-	-

TABLE 3B
Re-Sample Pore-Water Geochemistry Data
Alpine and Plainfield Townships, Kent County, Michigan

Date	Location ID	Sample Time	Reading Time	Water Level	Purge Rate (mL/min)	Tempurature (°C)		Specific Conductivity (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
						River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1/26/2021	HS-PW-2.5(A)	11:30	11:10	-	-	0	-	623	-	12.8	-	481	-	8.5	-	6.8	-
			11:15	-	-	-	5.6	-	466	-	1.69	-	240	-	7.3	-	3.2
			11:18	-	-	-	5.5	-	466	-	0.57	-	232	-	7.3	-	2.1
			11:25	-	-	-	5.5	-	465	-	0.45	-	225	-	7.2	-	-
			11:30	-	-	-	5.7	-	463	-	0.09	-	221	-	7.2	-	-
1/26/2021	HS-PW-2.5(B)	12:15	11:55	-	-	0	-	623	-	12.8	-	481	-	8.5	-	6.8	-
			12:00	-	-	-	7	-	454	-	1.7	-	398	-	7.4	-	8
			12:05	-	-	-	T	-	464	-	0.4	-	385	-	7.4	-	3
			12:10	-	-	-	6.9	-	465	-	0.2	-	380	-	7.4	-	3
			12:15	-	-	-	6.9	-	466	-	0.1	-	378	-	7.4	-	3
1/26/2021	HS-PW-3(A)	14:30	14:10	-	-	0.1	-	619	-	13.3	-	455	-	8.7	-	5.3	-
			14:15	-	-	-	5	-	528	-	0.88	-	204	-	7.3	-	11
			14:20	-	-	-	5	-	528	-	0.22	-	201	-	7.2	-	5.1
			14:25	-	-	-	5	-	530	-	0.13	-	198	-	7.2	-	5.7
			14:30	-	-	-	5	-	531	-	0.12	-	197	-	7.2	-	3
1/26/2021	HS-PW-3.5(A)	15:40	15:10	-	-	0.2	-	612	-	15	-	337	-	8.5	-	4.2	-
			15:20	-	-	-	5	-	720	-	3.4	-	228	-	7.5	-	5
			15:25	-	-	-	5.9	-	780	-	0.13	-	258	-	7.5	-	2.5
			15:30	-	-	-	5.2	-	784	-	0.1	-	271	-	7.5	-	-
			15:35	-	-	-	5	-	784	-	0.1	-	279	-	7.5	-	10.6
			15:40	-	-	-	5.2	-	781	-	0	-	285	-	7.5	-	12.7

TABLE 3C
Monitoring Well Geochemistry Data
Alpine and Plainfield Townships, Kent County, Michigan

Date	Location ID	Sample Time	Reading Time	Water Level	Drawdown	Pump Speed	Purge Rate (mL/min)	Tempurature (°C)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Turbidity (NTU)
12/8/2020	Area19-GSI-1	10:45	9:55	5.43	0	180	300	3.47	218	6.5	60	7.7	123
			10:05	5.43	0	180	300	8.86	376	6.1	66	7	38.5
			10:15	5.43	0	180	300	8.89	373	6	71	6.9	19.4
			10:20	5.43	0	180	300	8.9	372	6	73	6.9	9.2
			10:25	5.43	0	180	300	8.95	372	6	80	6.9	5.75
			10:30	5.43	0	180	300	8.96	372	6	83	6.9	3.76
			10:35	5.43	0	180	300	8.89	372	6	84	6.9	3
			10:40	5.43	0	180	300	8.98	371	6	85	6.9	2.7
12/8/2020	Area19-GSI-2	13:45	13:05	5.1	0.25	180	300	8	441	0.6	-107	7.1	61
			13:15	5.12	0.27	170	290	8.4	433	0.3	-112	7.1	20
			13:25	5.12	0.27	170	290	8.5	432	0.4	-113	7.1	11.7
			13:30	5.12	0.27	170	290	8.6	432	0.3	-102	7.1	7
			13:35	5.14	0.29	170	290	8.6	432	0.2	-98	7	5
			13:38	5.14	0.29	170	290	8.6	432	0.3	-97	7	<5
			13:41	5.14	0.29	170	290	8.6	432	0.2	-96	7	<5
12/8/2020	Area19-GSI-3	14:45	14:15	4.93	0.26	175	200	7.5	182	1	-282	9.1	61.1
			14:35	4.9	(+)0.03	175	200	8.6	300	1.9	-294	8.6	14
			14:35	4.9	0	175	200	8.6	350	1.6	-162	7.8	<5
			14:40	4.9	0	175	200	8.6	356	1.6	-171	7.6	<5
			14:43	4.9	0	175	200	8.6	359	1.6	-166	7.5	<5
12/9/2020	HS-MW-29A	10:20	9:30	6.25	0.03	200	350	9.7	814	0.2	-85	7.3	59
			9:40	6.25	0	200	350	9.7	836	0.2	-67	7	42
			9:45	6.25	0	200	350	9.7	845	0.3	-59	7	32
			9:48	6.25	0	200	350	9.7	852	0.2	-62	7	23
			9:52	6.25	0	200	350	9.7	850	0.2	-65	7	18
			10:00	6.25	0	200	350	9.8	855	0.2	-70	7	12
			10:05	6.25	0	200	350	9.8	857	0.2	-72	7	8
			10:08	6.25	0	200	350	9.8	854	0.2	-69	7	6
			10:11	6.25	0	200	350	9.8	863	0.2	-75	7	6
			10:14	6.25	0	200	350	9.8	863	0.14	-77	7	<5

TABLE 4
SUMMARY OF GROUNDWATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, Michigan

Area	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast
Location		AREA19-GSI-1	AREA19-GSI-2	AREA19-GSI-3	WV-DEQ-MW9-57	HS-MW-19S	HS-MW-19D	HS-MW-29A	HS-MW-29A
Sample Name		AREA19-GSI-1	AREA19-GSI-2	AREA19-GSI-3	DEQ-MW-9-57	HS-MW-19S	HS-MW-19D	HS-MW-29A	HS-MW-29A-DUP
Screen Interval (feet below the ground surface)		3.7-7.7	4-8	4.2-8.2	51.85-56.85	58.4-61.4	85.9-95.9	3.5-13.5	3.5-13.5
Laboratory Sample ID		VL11070-002	VL11070-003	VL11070-004	VL11070-007	VL11070-008	VL11070-009	VL11070-005	VL11070-006
Sample Date		12/08/2020	12/08/2020	12/08/2020	12/09/2020	12/09/2020	12/09/2020	12/09/2020	12/09/2020
Parameter (µg/L)									
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0071	<0.0073	<0.0074	<0.0069	<0.007	<0.0067	<0.0072	<0.0072
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0071	<0.0073	<0.0074	<0.0069	<0.007	<0.0067	<0.0072	<0.0072
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0071	<0.0073	<0.0074	<0.0069	<0.007	<0.0067	<0.0072	<0.0072
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0071	<0.0073	<0.0074	<0.0069	<0.007	<0.0067	<0.0072	<0.0072
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0071	<0.0073	<0.0074	<0.0069	<0.007	<0.0067	<0.0072	<0.0072
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0071	<0.0073	<0.0074	<0.0069	<0.007	<0.0067	<0.0072	<0.0072
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0071	<0.0073	<0.0074	<0.0069	<0.007	<0.0067	<0.0072	<0.0072
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0071	<0.0073	<0.0074	<0.0069	<0.007	<0.0067	<0.0072	<0.0072
Perfluorobutane sulfonic acid (PFBS)	NA	0.012	0.021	0.017	0.0067	<0.0035	<0.0034	0.012	0.012
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0036
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0035	0.0079	0.0046	<0.0035	<0.0035	<0.0034	0.0066	0.0058
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0036
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0036
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0035	0.0044	<0.0037	<0.0035	<0.0035	<0.0034	0.0036	0.0036
Perfluorohexane sulfonic acid (PFHxS)	NA	0.0076	0.018	0.013	0.0053	<0.0035	<0.0034	0.02	0.023
Perfluorobutanoic acid (PFBA)	NCL	<0.0035	0.012	0.0052	<0.0035	<0.0035	<0.0034	0.01	0.01
Perfluorodecanoic acid (PFDA)	NCL	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0036
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0036
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0035	0.0075	0.0074	<0.0035	<0.0035	<0.0034	0.0056	0.0053
Perfluorohexanoic acid (PFHxA)	NA	<0.0035	0.011	0.0074	<0.0035	<0.0035	<0.0034	0.017	0.017
Perfluorononanoic acid (PFNA)	NA	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0036
Perfluorooctanoic acid (PFOA)	12	0.016	0.084	0.058	0.0091	<0.0035	<0.0034	0.03	0.029
Perfluorooctane sulfonic acid (PFOS)	0.012	***0.017***	***0.17***	***0.13***	<0.0035	<0.0035	<0.0034	***0.28***	***0.29***
PFOA + PFOS (Calculated)	NCL	0.033	0.25	0.19	0.0091	ND	ND	0.31	0.32
Perfluoropentanoic acid (PFPeA)	NCL	<0.0035	0.0054	0.0039	<0.0035	<0.0035	<0.0034	0.0099	0.011
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0036
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0036
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0035	<0.0036	<0.0037	<0.0035	<0.0035	<0.0034	<0.0036	<0.0036
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0071	<0.0073	<0.0074	<0.0069	<0.007	<0.0067	<0.0072	<0.0072
Total PFAS (Calculated)	NCL	0.053	0.34	0.25	0.021	ND	ND	0.39	0.41

TABLE 4 NOTES
GSI Investigation
Algoma and Plainfield Townships, Kent County, Michigan

NOTES:

1. Concentration and criteria units are micrograms per Liter (µg/L) or parts per billion (ppb). Calculated criteria and concentrations are rounded to two significant digits. "ND" indicates the parameters used in the calculation were not detected.
2. Michigan Part 201 Groundwater Cleanup Criteria are based on "Table 1, Groundwater: Residential and Nonresidential Part 201 Generic Cleanup Criteria and Screening Levels/Part 213 Tier I Risk Based Screening Levels," Michigan Administrative Code, Cleanup Criteria Requirements for Response Activity, Rules 299.44 and 299.49, effective December 30, 2013; last updated December 20, 2020.
   Abbreviations Include:
   "NCL" indicates no criterion listed in EGLE Table 1.
   "NA" indicates not available.
3. Bold, italic number with thick line border or italic parameter name indicates that parameter was detected above the Michigan Part 201 Groundwater Cleanup Criteria listed.
4. Abbreviations include:
   "< RL" indicates the parameter was analyzed for but not detected above the method detection limit; RL = Reporting Limit.
   "DUP" indicates a duplicate sample.
   "-" indicates the parameter was not analyzed.
5. Screen interval presented is the top of the screen to the bottom of the screen in feet below ground surface.

TABLE 5
SUMMARY OF PORE WATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, Michigan

Area	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northwest	Wolven Northeast	Wolven Northeast
Location		WVNW-PW-1	WVNW-PW-1	WVNW-PW-2	WVNW-PW-2	WVNW-PW-3	WVNW-PW-4	WVNW-PW-4	AREA19-PW-1	AREA19-PW-2
Sample Name		WVNW-PW-1(A)	WVNW-PW-1(B)	WVNW-PW-2(A)	WVNW-PW-2(B)	WVNW-PW-3(A)	WVNW-PW-4(A)	WVNW-PW-4(A)-DUP	Area19-PW-1(A)	Area19-PW-2(A)
Sample Depth (feet below the ground surface of the river bottom)		3 - 3.13	4 - 4.13	2.33 - 2.46	3.33 - 3.46	1.5 - 1.63	1.67 - 1.79	1.67 - 1.79	1 - 1.13	1 - 1.13
Laboratory Sample ID		VL11053-012	VL11053-014	VL11053-010	VL11053-011	VL06012-013	VL06012-011	VL06012-012	VL06012-001	VL06012-002
Sample Date		12/09/2020	12/09/2020	12/09/2020	12/09/2020	12/02/2020	12/02/2020	12/02/2020	11/30/2020	11/30/2020
Parameter (µg/L)										
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0073	<0.011
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0073	<0.011
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0073	<0.011
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0073	<0.011
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0073	<0.011
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0073	<0.011
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0073	<0.011
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0073	<0.011
Perfluorobutane sulfonic acid (PFBS)	NA	0.0038	0.0045	0.0046	<0.0037	0.0051	0.01	0.011	0.013	0.016
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0037	<0.0054
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	0.0054	0.0069	0.0061	0.0093	<0.0054
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0037	<0.0054
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0037	<0.0054
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	0.0053	0.0042	<0.0037	<0.0054
Perfluorohexane sulfonic acid (PFHxS)	NA	<0.0038	<0.0038	<0.0039	<0.0037	0.0092	0.019	0.019	0.017	0.011
Perfluorobutanoic acid (PFBA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	0.0063	0.0057	0.012	0.011
Perfluorodecanoic acid (PFDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0037	<0.0054
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0037	<0.0054
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	0.0088	0.0092	0.015	<0.0054
Perfluorohexanoic acid (PFHxA)	NA	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	0.0068	0.0076	0.013	0.0069
Perfluorononanoic acid (PFNA)	NA	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0037	<0.0054
Perfluorooctanoic acid (PFOA)	12	0.0055	0.0073	0.012	0.0075	0.028	0.066	0.065	0.11	0.03
Perfluorooctane sulfonic acid (PFOS)	0.012	0.007	0.0097	0.01	0.011	***0.26***	***0.1***	***0.094***	***0.13***	***0.03***
PFOA + PFOS (Calculated)	NCL	0.013	0.017	0.022	0.019	0.29	0.17	0.16	0.24	0.06
Perfluoropentanoic acid (PFPeA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	0.004	<0.0036	0.0055	<0.0054
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0037	<0.0054
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0037	<0.0054
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0037	<0.0041	<0.0036	<0.0036	<0.0037	<0.0054
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0076	<0.0076	<0.0078	<0.0075	<0.0082	<0.0072	<0.0073	<0.0073	<0.011
Total PFAS (Calculated)	NCL	0.016	0.022	0.027	0.019	0.31	0.23	0.22	0.32	0.1

TABLE 5
SUMMARY OF PORE WATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, Michigan

Area	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven Northeast	Wolven-North Childsdale
Location		AREA19-PW-2	AREA19-PW-3	AREA19-PW-4	AREA19-PW-4	AREA19-PW-5	AREA19-PW-6	AREA19-PW-6	AREA19-PW-7	WV/CH-PW-1
Sample Name		Area19-PW-2(B)	Area19-PW-3(A)	Area19-PW-4(A)	Area19-PW-4(B)	Area19-PW-5(A)	Area19-PW-6(A)	Area19-PW-6(B)	Area19-PW-7(A)	WV/CH-PW-1(A)
Sample Depth (feet below the ground surface of the river bottom)		1.42 - 1.54	1 - 1.13	1 - 1.13	1.42 - 1.54	1 - 1.13	1.5 - 1.63	2 - 2.13	5 - 5.13	0.75 - 0.88
Laboratory Sample ID		VL06012-003	VL06012-004	VL06012-005	VL06012-006	VL06012-007	VL06012-008	VL06012-009	VL06012-010	VL11053-001
Sample Date		11/30/2020	11/30/2020	12/01/2020	12/01/2020	12/01/2020	12/01/2020	12/01/2020	12/01/2020	12/07/2020
Parameter (µg/L)										
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0077	<0.0075	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0078
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0077	<0.0075	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0078
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0077	<0.0075	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0078
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0077	<0.0075	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0078
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0077	<0.0075	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0078
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0077	<0.0075	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0078
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0077	<0.0075	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0078
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0077	<0.0075	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0078
Perfluorobutane sulfonic acid (PFBS)	NA	0.012	0.015	0.015	0.013	0.022	0.017	0.016	0.022	0.031
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0038	<0.0037	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0039
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0038	0.0041	0.0053	0.0054	0.013	0.0083	0.0086	0.0052	<0.0039
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0038	<0.0037	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0039
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0038	<0.0037	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0039
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0038	<0.0037	<0.0037	<0.0037	0.0043	0.0038	<0.0037	0.0049	0.014
Perfluorohexane sulfonic acid (PFHxS)	NA	0.0083	0.011	0.016	0.013	0.022	0.014	0.014	0.021	0.018
Perfluorobutanoic acid (PFBA)	NCL	0.0075	0.0039	<0.0037	<0.0037	0.0083	0.0053	0.0051	0.0071	<0.0039
Perfluorodecanoic acid (PFDA)	NCL	<0.0038	<0.0037	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0039
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0038	<0.0037	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0039
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0038	0.004	<0.0037	<0.0037	0.0076	0.01	0.0093	0.013	0.0086
Perfluorohexanoic acid (PFHxA)	NA	0.0053	<0.0037	<0.0037	<0.0037	0.009	0.0084	0.0087	0.011	0.0068
Perfluorononanoic acid (PFNA)	NA	<0.0038	<0.0037	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0039
Perfluorooctanoic acid (PFOA)	12	0.019	0.033	0.031	0.029	0.095	0.08	0.081	0.084	0.044
Perfluorooctane sulfonic acid (PFOS)	0.012	***0.024***	***0.089***	***0.067***	***0.064***	***0.23***	***0.06***	***0.064***	***0.02***	***0.016***
PFOA + PFOS (Calculated)	NCL	0.043	0.12	0.098	0.093	0.33	0.14	0.15	0.1	0.06
Perfluoropentanoic acid (PFPeA)	NCL	<0.0038	<0.0037	<0.0037	<0.0037	0.0041	<0.0037	<0.0037	0.0051	<0.0039
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0038	<0.0037	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0039
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0038	<0.0037	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0039
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0038	<0.0037	<0.0037	<0.0037	<0.0038	<0.0037	<0.0037	<0.0037	<0.0039
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0077	<0.0075	<0.0074	<0.0074	<0.0075	<0.0074	<0.0074	<0.0075	<0.0078
Total PFAS (Calculated)	NCL	0.076	0.16	0.13	0.12	0.42	0.21	0.21	0.19	0.14

TABLE 5
SUMMARY OF PORE WATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, Michigan

Area	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	Wolven-North Childsdale	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast
Location		WV/CH-PW-2	WV/CH-PW-3	WV/CH-PW-4	WV/CH-PW-5	WV/CH-PW-6	WV/CH-PW-6	HS-PW-1	HS-PW-1	HS-PW-2
Sample Name		WV/CH-PW-2(A)	WV/CH-PW-3(A)	WV/CH-PW-4(A)	WV/CH-PW-5(A)	WV/CH-PW-6(A)	WV/CH-PW-6(B)	HS-PW-1(A)	HS-PW-1(B)	HS-PW-2(A)
Sample Depth (feet below the ground surface of the river bottom)		0.75 - 0.88	1 - 1.13	1 - 1.13	0.83 - 0.96	1 - 1.13	2 - 2.13	2 - 2.13	2.5 - 2.63	1 - 1.13
Laboratory Sample ID		VL11053-002	VL11053-003	VL11053-004	VL11053-005	VL11053-006	VL11053-007	VL06031-001	VL06031-002	VL06031-003
Sample Date		12/07/2020	12/07/2020	12/07/2020	12/08/2020	12/08/2020	12/08/2020	12/03/2020	12/03/2020	12/03/2020
Parameter (µg/L)										
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076	<0.0077	<0.0076	<0.0073	<0.0077
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076	<0.0077	<0.0076	<0.0073	<0.0077
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076	<0.0077	<0.0076	<0.0073	<0.0077
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076	<0.0077	<0.0076	<0.0073	<0.0077
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076	<0.0077	<0.0076	<0.0073	<0.0077
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076	<0.0077	<0.0076	<0.0073	<0.0077
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076	<0.0077	<0.0076	<0.0073	<0.0077
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076	<0.0077	<0.0076	<0.0073	<0.0077
Perfluorobutane sulfonic acid (PFBS)	NA	0.011	0.0045	0.015	0.017	0.0098	0.0095	0.0087	0.0083	<0.0038
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Perfluoroheptane sulfonic acid (PFHpS)	NCL	0.0054	<0.0038	<0.0039	<0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0038	<0.0038	0.0041	0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Perfluorohexane sulfonic acid (PFHxS)	NA	0.011	<0.0038	0.012	0.012	0.0087	0.0099	<0.0038	<0.0036	<0.0038
Perfluorobutanoic acid (PFBA)	NCL	<0.0038	<0.0038	0.0059	<0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Perfluorodecanoic acid (PFDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Perfluorohexanoic acid (PFHxA)	NA	0.0041	<0.0038	<0.0039	<0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Perfluorononanoic acid (PFNA)	NA	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Perfluorooctanoic acid (PFOA)	12	0.043	0.01	0.024	0.019	0.01	0.008	<0.0038	<0.0036	0.0046
Perfluorooctane sulfonic acid (PFOS)	0.012	***0.079***	***0.032***	***0.02***	***0.032***	***0.015***	<0.0038	<0.0038	<0.0036	0.0052
PFOA + PFOS (Calculated)	NCL	0.12	0.042	0.044	0.051	0.025	0.008	ND	ND	0.0098
Perfluoropentanoic acid (PFPeA)	NCL	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0038	<0.0038	<0.0039	<0.0038	<0.0038	<0.0038	<0.0038	<0.0036	<0.0038
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0077	<0.0077	<0.0078	<0.0076	<0.0076	<0.0077	<0.0076	<0.0073	<0.0077
Total PFAS (Calculated)	NCL	0.15	0.047	0.081	0.084	0.044	0.027	0.0087	0.0083	0.0098

TABLE 5
SUMMARY OF PORE WATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, Michigan

Area	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast
Location		HS-PW-2.5	HS-PW-2.5	HS-PW-3	HS-PW-3R	HS-PW-3R	HS-PW-3.5	HS-PW-4	HS-PW-5	HS-PW-6
Sample Name		HS-PW-2.5 (A)	HS-PW-2.5 (B)	HS-PW-3(A)	HS-PW-3 (A)	HS-PW-3 (A) DUP	HS-PW-3.5 (A)	HS-PW-4(A)	HS-PW-5(A)	HS-PW-6(A)
Sample Depth (feet below the ground surface of the river bottom)		0.5 - 0.63	1 - 1.13	1.33 - 1.46	0.5 - 0.63	0.5 - 0.63	0.83 - 0.96	0.75 - 0.88	1.33 - 1.46	1 - 1.13
Laboratory Sample ID		WA28027-001	WA28027-002	VL06031-006	WA28027-003	WA28027-004	WA28027-005	VL06031-007	VL06031-008	VL06031-009
Sample Date		01/26/2021	01/26/2021	12/04/2020	01/26/2021	01/26/2021	01/26/2021	12/04/2020	12/04/2020	12/04/2020
Parameter (µg/L)										
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076
Perfluorobutane sulfonic acid (PFBS)	NA	<0.018	0.0075	0.011	<0.019	<0.017	0.032	0.05	<0.0039	<0.0038
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.018	0.0074	0.023	0.019	0.018	<0.0036	<0.0037	<0.0039	<0.0038
Perfluorononane sulfonic acid (PFNS)	NCL	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038
Perfluorooctane sulfonamide (FOSA)	NCL	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.018	0.0056	0.0068	<0.019	<0.017	0.017	0.035	<0.0039	<0.0038
Perfluorohexane sulfonic acid (PFHxS)	NA	0.025	0.02	0.042	0.028	0.026	0.019	0.056	<0.0039	<0.0038
Perfluorobutanoic acid (PFBA)	NCL	0.021	0.0091	0.022	0.021	0.02	0.0095	0.015	<0.0039	<0.0038
Perfluorodecanoic acid (PFDA)	NCL	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038
Perfluorododecanoic acid (PFDoDA)	NCL	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038
Perfluoroheptanoic acid (PFHpA)	NCL	<0.018	0.0056	0.016	<0.019	<0.017	0.0072	0.022	<0.0039	<0.0038
Perfluorohexanoic acid (PFHxA)	NA	0.033	0.015	0.045	0.041	0.038	0.012	0.027	<0.0039	<0.0038
Perfluorononanoic acid (PFNA)	NA	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038
Perfluorooctanoic acid (PFOA)	12	0.054	0.025	0.074	0.077	0.071	0.021	0.074	0.0079	0.007
Perfluorooctane sulfonic acid (PFOS)	0.012	***0.82 J***	***0.56 J***	***1.1***	***0.90 J***	***0.90 J***	***0.092 J***	***0.013***	***0.03***	0.0046
PFOA + PFOS (Calculated)	NCL	0.87	0.59	1.2	0.98	0.97	0.11	0.087	0.038	0.012
Perfluoropentanoic acid (PFPeA)	NCL	0.027	0.011	0.027	0.023	0.022	0.006	0.015	<0.0039	<0.0038
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.018	<0.0035	<0.0039	<0.019	<0.017	<0.0036	<0.0037	<0.0039	<0.0038
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.035	<0.0071	<0.0078	<0.037	<0.035	<0.0072	<0.0075	<0.0079	<0.0076
Total PFAS (Calculated)	NCL	0.98	0.67	1.4	1.1	1.1	0.22	0.31	0.038	0.012

TABLE 5
SUMMARY OF PORE WATER SAMPLE ANALYSIS - PFAS
GSI Investigation
Algoma and Plainfield Townships, Kent County, Michigan

Area	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface[2]	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast	House Street Property South/Southeast
Location		HS-PW-7	HS-PW-8	HS-PW-9	HS-PW-10	HS-PW-11
Sample Name		HS-PW-7(A)	HS-PW-8(A)	HS-PW-9(A)	HS-PW-10(A)	HS-PW-11(A)
Sample Depth (feet below the ground surface of the river bottom)		1.5 - 1.63	1 - 1.13	1 - 1.13	5 - 5.13	4.5 - 4.63
Laboratory Sample ID		VL06031-004	VL11053-008	VL11070-001	VL11070-010	VL11053-009
Sample Date		12/03/2020	12/08/2020	12/08/2020	12/09/2020	12/09/2020
Parameter (µg/L)						
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	NCL	<0.0075	<0.0072	<0.0072	<0.0073	<0.0075
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)	NCL	<0.0075	<0.0072	<0.0072	<0.0073	<0.0075
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NCL	<0.0075	<0.0072	<0.0072	<0.0073	<0.0075
1H,1H,2H,2H-perfluorohexane sulfonate (4:2FTS)	NCL	<0.0075	<0.0072	<0.0072	<0.0073	<0.0075
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	<0.0075	<0.0072	<0.0072	<0.0073	<0.0075
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	<0.0075	<0.0072	<0.0072	<0.0073	<0.0075
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	0.078	0.044	<0.0072	<0.0073	<0.0075
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	<0.0075	<0.0072	<0.0072	<0.0073	<0.0075
Perfluorobutane sulfonic acid (PFBS)	NA	0.0095	<0.0036	<0.0036	<0.0036	<0.0038
Perfluorodecane sulfonic acid (PFDS)	NCL	<0.0037	<0.0036	<0.0036	<0.0036	<0.0038
Perfluoroheptane sulfonic acid (PFHpS)	NCL	<0.0037	<0.0036	<0.0036	<0.0036	<0.0038
Perfluorononane sulfonic acid (PFNS)	NCL	<0.0037	<0.0036	<0.0036	<0.0036	<0.0038
Perfluorooctane sulfonamide (FOSA)	NCL	<0.0037	<0.0036	<0.0036	<0.0036	<0.0038
Perfluoropentane sulfonic acid (PFPeS)	NCL	<0.0037	<0.0036	<0.0036	<0.0036	<0.0038
Perfluorohexane sulfonic acid (PFHxS)	NA	0.0058	<0.0036	<0.0036	<0.0036	<0.0038
Perfluorobutanoic acid (PFBA)	NCL	0.0047	<0.0036	<0.0036	<0.0036	<0.0038
Perfluorodecanoic acid (PFDA)	NCL	<0.0037	<0.0036	<0.0036	<0.0036	<0.0038
Perfluorododecanoic acid (PFDoDA)	NCL	<0.0037	<0.0036	<0.0036	<0.0036	<0.0038
Perfluoroheptanoic acid (PFHpA)	NCL	<0.0037	<0.0036	<0.0036	<0.0036	<0.0038
Perfluorohexanoic acid (PFHxA)	NA	<0.0037	<0.0036	<0.0036	<0.0036	<0.0038
Perfluorononanoic acid (PFNA)	NA	<0.0037	<0.0036	<0.0036	<0.0036	<0.0038
Perfluorooctanoic acid (PFOA)	12	0.0038	0.007	<0.0036	<0.0036	<0.0038
Perfluorooctane sulfonic acid (PFOS)	0.012	0.0089	***0.026***	0.0082	<0.0036	<0.0038
PFOA + PFOS (Calculated)	NCL	0.013	0.033	0.0082	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	<0.0037	<0.0036	<0.0036	<0.0036	<0.0038
Perfluorotetradecanoic acid (PFTeDA)	NCL	<0.0037	<0.0036	<0.0036	<0.0036	<0.0038
Perfluorotridecanoic acid (PFTrDA)	NCL	<0.0037	<0.0036	<0.0036	<0.0036	<0.0038
Perfluoroundecanoic acid (PFUnDA)	NCL	<0.0037	<0.0036	<0.0036	<0.0036	<0.0038
Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX)	NA	<0.0075	<0.0072	<0.0072	<0.0073	<0.0075
Total PFAS (Calculated)	NCL	0.11	0.077	0.0082	ND	ND

TABLE 5 NOTES

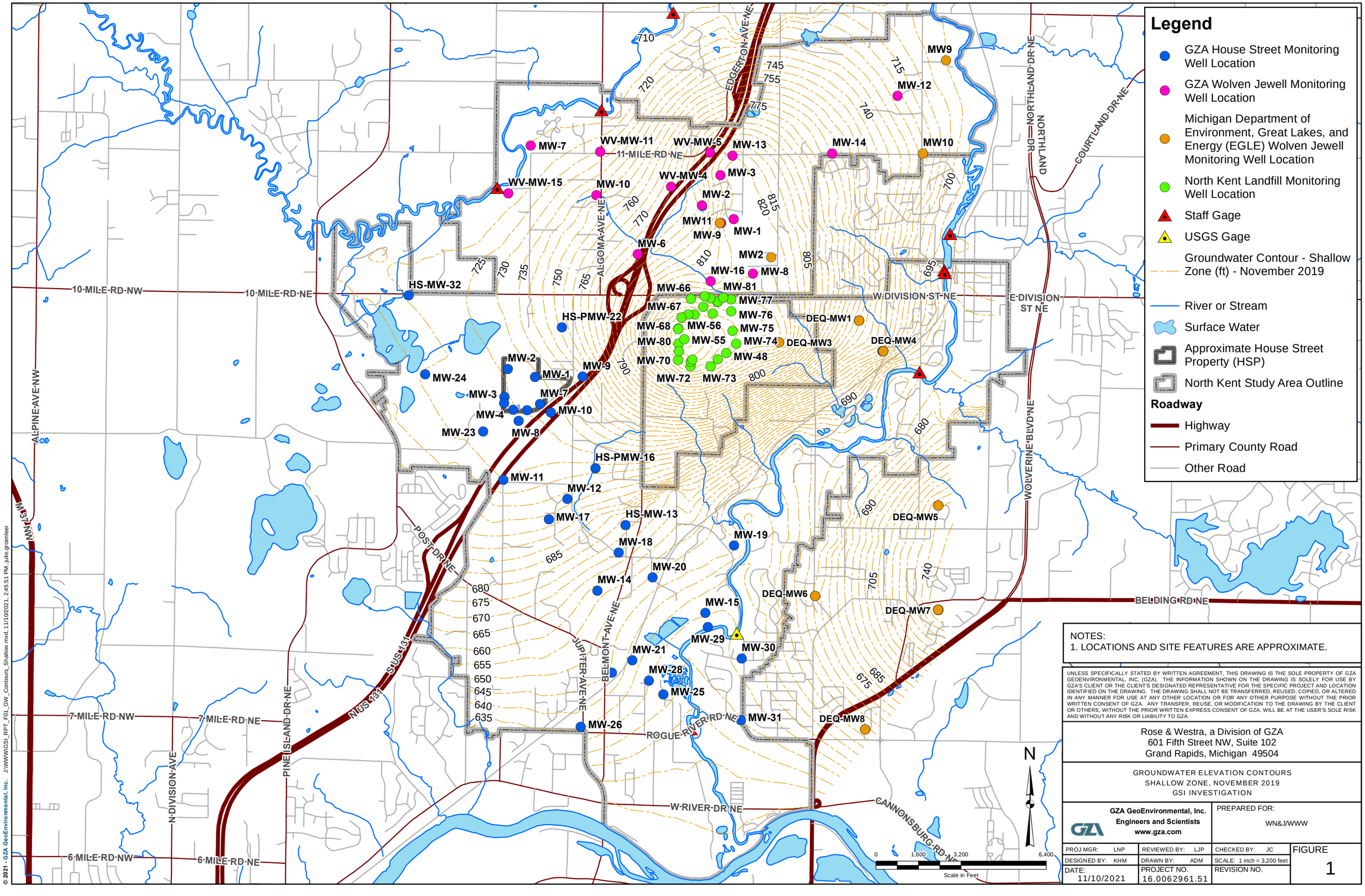
GSI Investigation

Algoma and Plainfield Townships, Kent County, Michigan

NOTES:

1. Concentration and criteria units are micrograms per Liter (µg/L) or parts per billion (ppb). Calculated criteria and concentrations are rounded to two significant digits. "ND" indicates the parameters used in the calculation were not detected.
2. Michigan Part 201 Groundwater Cleanup Criteria are based on "Table 1, Groundwater: Residential and Nonresidential Part 201 Generic Cleanup Criteria and Screening Levels/Part 213 Tier I Risk Based Screening Levels," Michigan Administrative Code, Cleanup Criteria Requirements for Response Activity, Rules 299.44 and 299.49, effective December 30, 2013; last updated December 21, 2020.
   Abbreviations Include:
   "NCL" indicates no criterion listed in EGLE Table 1.
   "NA" indicates not available.
3. Bold, italic number with thick line border or italic parameter name indicates that parameter was detected above the Michigan Part 201 Groundwater Cleanup Criteria listed.
4. Sample results from lab delivery group WA28027 were validated by Environmental Standards, Inc. as part of the five percent validation requirement in the consent decree.
5. Abbreviations include:
   "< RL" indicates the parameter was analyzed for but not detected above the method detection limit; RL = Reporting Limit.
   "DUP" indicates a duplicate sample.
   "-" indicates the parameter was not analyzed.
6. Validator qualifiers for WA28027 include:
   "J" indicates the result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
7. Screen interval presented is the top of the screen to the bottom of the screen in feet below ground surface of the river bottom.

FIGURES



NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

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GROUNDWATER ELEVATION CONTOURS
SHALLOW ZONE, NOVEMBER 2019
GSI INVESTIGATION

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Engineers and Scientists
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PREPARED FOR:
WN&J/WWW

PROJ MGR: LNP	REVIEWED BY: LJP	CHECKED BY: JC	FIGURE 1
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 3,200 feet	
DATE: 11/10/2021	PROJECT NO. 16.0062961.51	REVISION NO.	

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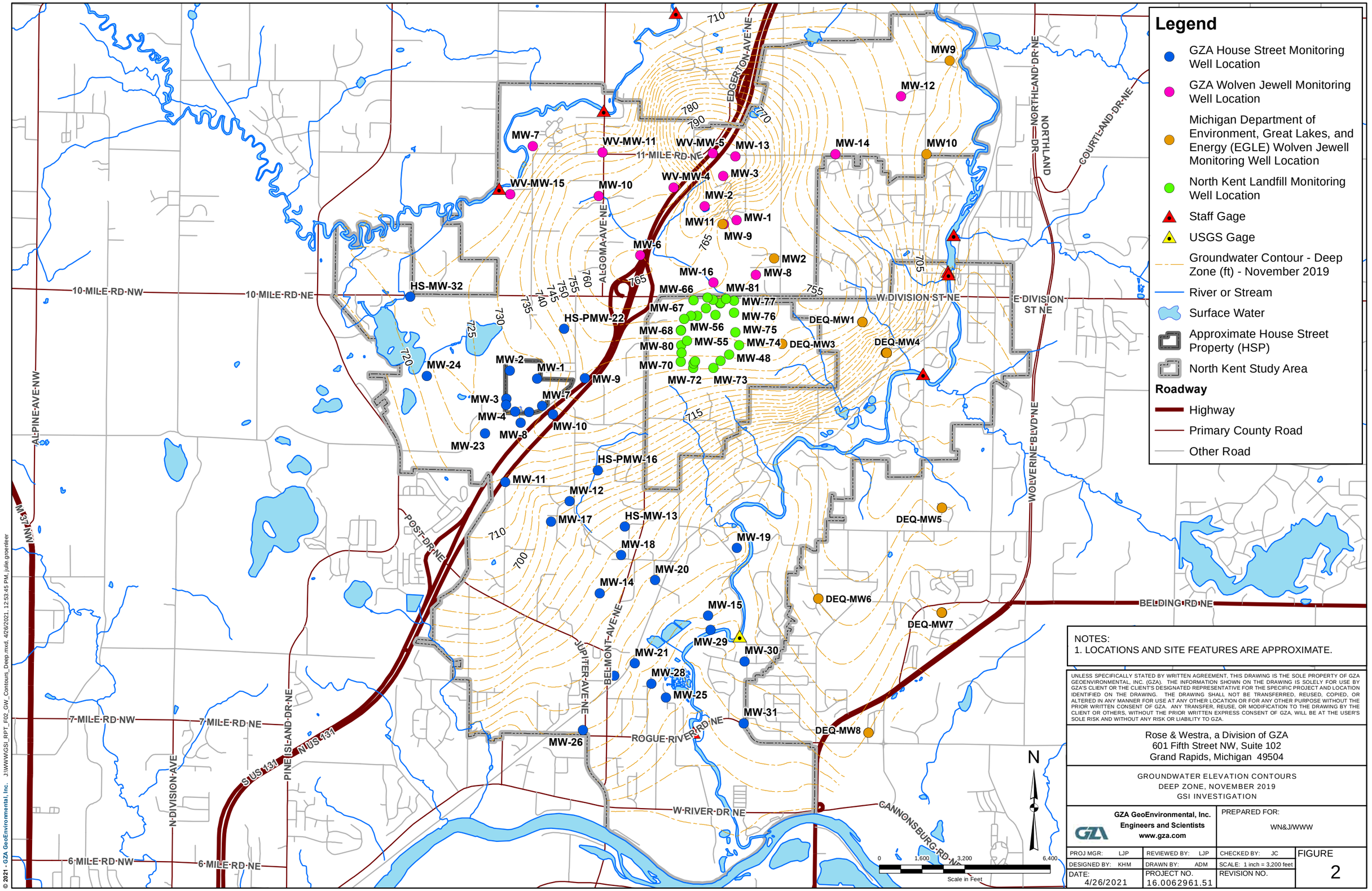

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GROUNDWATER ELEVATION CONTOURS
DEEP ZONE, NOVEMBER 2019
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR: WN&JWWW

PROJ MGR: LJP	REVIEWED BY: LJP	CHECKED BY: JC	FIGURE 2
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 3,200 feet	
DATE: 4/26/2021	PROJECT NO. 16.0062961.51	REVISION NO.	

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Legend

- GSI Pore Water Sample Location
- GSI Piezometer Location
- Residential Water Well
- Monitoring Well
- Cross Section Line
- River or Stream
- Surface Water
- Approximate House Street Property (HSP)
- North Kent Study Area Outline
- Highway
- Primary County Road
- Other Road

Approximate Total PFAS Extent (nanograms per liter [ng/L])

- < 4 ng/L
- 4 - 10 ng/L
- 11 - 70 ng/L
- 71 - 1,000 ng/L
- 1,001 - 127,000 ng/L (MAX)

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

2. ACRONYMS
- (MAX) = MAXIMUM DETECTED CONCENTRATION IN THE SAMPLES.
- ng/L = NANOGRAM PER LITER
- PFAS = PER- AND POLY-FLUOROALKYL SUBSTANCES

3. NO TOTAL PFAS CRITERIA / SCREENING LEVELS.

4. MAXIMUM CONCENTRATION FROM MONITORING AND RESIDENTIAL WELL SAMPLE RESULTS (INCLUDING THE NORTH KENT LANDFILL STUDY AREA) WERE USED TO DEVELOP CONCENTRATION ISOPLETHS.

5. CONCENTRATION ISOPLETHS WERE DEVELOPED USING NATURAL NEIGHBOR INTERPOLATION IN ARCGIS. CONCENTRATIONS WERE NOT EXTRAPOLATED OUTSIDE OF THE AREA OF KNOWN CONCENTRATIONS.

6. RESIDENTIAL WELL SAMPLES WERE ANALYZED FOR PFAS USEING EPA METHOD 537.1 WHICH REPORTS THE RESULTS FOR 14 COMPOUNDS.

7. MONITORING WELL SAMPLES WERE ANALYZED FOR PFAS USING DOD QSM BY ISOTOPE DILUTION, WHICH REPORTS THE RESULTS FOR 23 COMPOUNDS.

8. THE TOTAL PFAS PRESENTED ON THIS FIGURE ARE CALCULATED FROM THE SUM OF THE 12 PFAS COMPOUNDS THAT ARE COMMON BETWEEN EPA METHOD 537.1 AND THE ISOTOPE DILUTION, DOD QSM METHODOLOGY.

AREA19-GSI-1
AREA19-PW-1
AREA19-PW-2
AREA19-PW-3
AREA19-PW-4
AREA19-PW-5
AREA19-GSI-2
AREA19-PW-6
AREA19-PW-7
AREA19-GSI-3
WVNW-PW-1
WVNW-GSI-1
WVNW-PW-2
WVNW-GSI-2
WVNW-PW-3
WVNW-PW-4
HS-PW-10
HS-GSI-9
HS-PW-11
WV/CH-PW-1
WV/CH-PW-2
WV/CH-GSI-1
WV/CH-GSI-2
WV/CH-PW-3
WV/CH-PW-5
WV/CH-PW-6
WV/CH-PW-4
HS-PW-1
HS-PW-3.5
HS-GSI-1
HS-PW-4
HS-PW-2
HS-GSI-2
HS-PW-2.5
HS-PW-5
HS-PW-3
HS-PW-3R
HS-PW-6
HS-GSI-3
HS-PW-7
HS-PW-8
HS-PW-9
HS-GSI-5
HS-GSI-8
HS-GSI-4
HS-GSI-7
HS-GSI-6
A
A'
B
B'
C
C'
11 MILE RD NE
10 MILE RD NE
7 MILE RD NW
7 MILE RD NE
6 MILE RD NW
6 MILE RD NE
BELDING RD NE
ALGOMA AVE NE
EDGERTON AVE NE
PINE ISLAND DR NE
COURTLAND DR NE
W DIVISION ST NE
E DIVISION ST NE
WOLVERINE BLVD NE
MYERS LAKE AVE NE
N DIVISION AVE
ROSY DR NE
W RIVER DR NE
JUPITER AVE NE
NORTH LAND DR NE
CANNONSBURG RD NE
US 131
N

0 2,000 4,000 8,000
Scale in Feet

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CROSS SECTIONS
OVERVIEW
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
Engineers and Scientists
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PREPARED FOR: WN&JWWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 3
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 3,166.67 feet	
DATE: 11/15/2021	PROJECT NO. 16.0062961.51	REVISION NO.	

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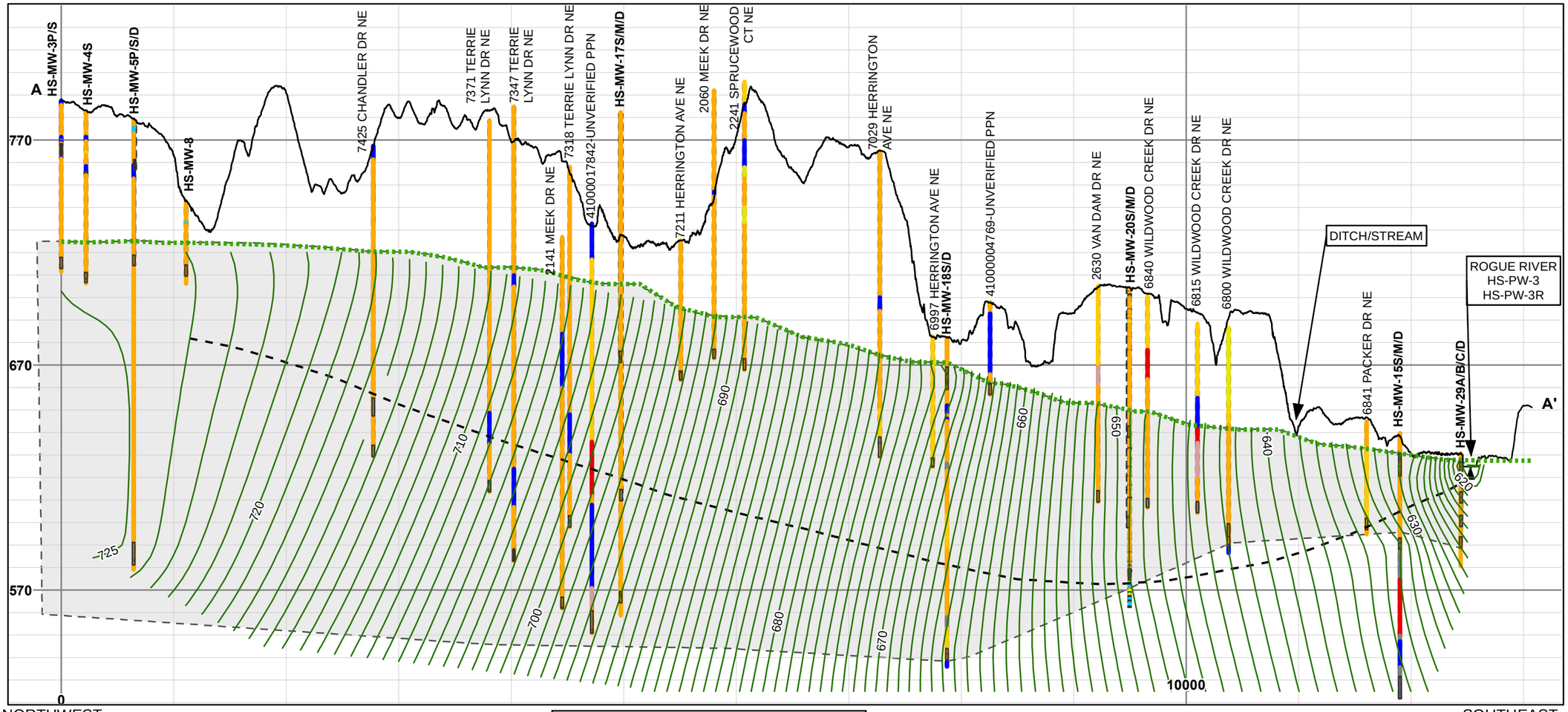

CROSS SECTION LEGEND

- GROUNDWATER CONTOUR, FT (INTERVAL = 1 FT)
- INTERPRETED GROUNDWATER FLOWLINE
- WELL SCREEN
- ESTIMATED POTENTIOMETRIC SURFACE (11/2019)
- GROUND SURFACE
- APPROXIMATE VERTICAL EXTENT OF TOTAL PFAS DETECTIONS

BOREHOLE LITHOLOGY

- GRAVEL
- SAND AND GRAVEL
- SAND
- SAND/GRAVEL W/ CLAY/SILT
- CLAY/SILT W/ SAND/GRAVEL
- SILT
- CLAY AND SILT
- CLAY
- NOT AVAILABLE

OVERVIEW MAP LEGEND

- PORE WATER SAMPLE LOCATION
- GSI PIEZOMETER LOCATION
- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
- SURFACE WATER
- APPROXIMATE HOUSE STREET PROPERTY (HSP)
- NORTH KENT LANDFILL

APPROXIMATE TOTAL PFAS EXTENT (NANOGRAMS PER LITER [NG/L])

- < 4 ng/L
- 4 - 10 ng/L
- 11 - 70 ng/L
- 71 - 1,000 ng/L
- 1,001 - 127,000 ng/L (MAX)

NOTES:

1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE. VERTICAL EXTENT OF TOTAL PFAS DETECTIONS IS APPROXIMATE.

2. GROUND SURFACE ELEVATIONS ARE BASED ON DIGITAL RASTER FILES OF BARE EARTH DIGITAL ELEVATION MODELS (DEMS), GENERATED FROM LIDAR DATA WITH 1-METER HORIZONTAL ACCURACY AND 18.5-CENTIMETER VERTICAL ACCURACY. DIGITAL FILES OF DEMS AND LIDAR DATA WERE PROVIDED BY KENT COUNTY.

3. ESTIMATED POTENTIOMETRIC SURFACE WAS DEVELOPED BASED ON MEASUREMENTS MADE IN GROUNDWATER MONITORING WELLS IN NOVEMBER 2019. GROUNDWATER ELEVATIONS WERE NOT MEASURED FROM RESIDENTIAL WATER SUPPLY WELLS.

4. WELL SCREEN ELEVATIONS PROVIDED IN FEET ABOVE MEAN SEA LEVEL, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). RESIDENTIAL WELL SCREEN ELEVATIONS AND BOREHOLE LITHOLOGY ELEVATIONS WERE CALCULATED USING WELL INFORMATION PROVIDED BY THE STATE OF MICHIGAN'S WELLOGIC DATABASE AND GROUND SURFACE ELEVATIONS OF THE CENTER OF THE PPN GENERATED FROM LIDAR DATA PROVIDED BY KENT COUNTY. ELEVATIONS ARE ROUNDED TO THE NEAREST FOOT.

5. MAXIMUM CONCENTRATION FROM MONITORING AND RESIDENTIAL WELL SAMPLE RESULTS (INCLUDING THE NORTH KENT LANDFILL STUDY AREA) WERE USED TO DEVELOP CONCENTRATION ISOPLETHS. RESIDENTIAL WELL SAMPLES WERE ANALYZED FOR PFAS USEING EPA METHOD 537.1 WHICH REPORTS THE RESULTS FOR 14 COMPOUNDS. 12 PFAS COMPOUNDS IN COMMON ON BOTH LISTS WERE USED.

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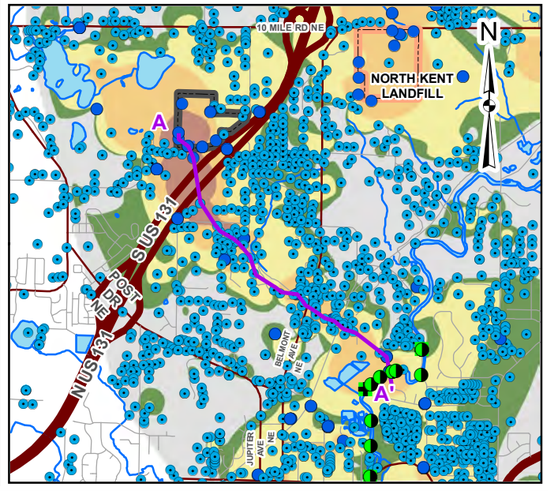
OVERVIEW MAP



0 2,750 5,500 11,000

SCALE IN FEET

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HOUSE STREET AREA
GEOLOGICAL CROSS SECTION A-A'
GSI INVESTIGATION

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		WN&J/WWW	
PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN	FIGURE
DESIGNED BY: JC	DRAWN BY: JMG	SCALE: 1 in = 5,500 ft	3A
DATE: 11/11/2021	PROJECT NO: 16.0062961.51	REVISION NO:	

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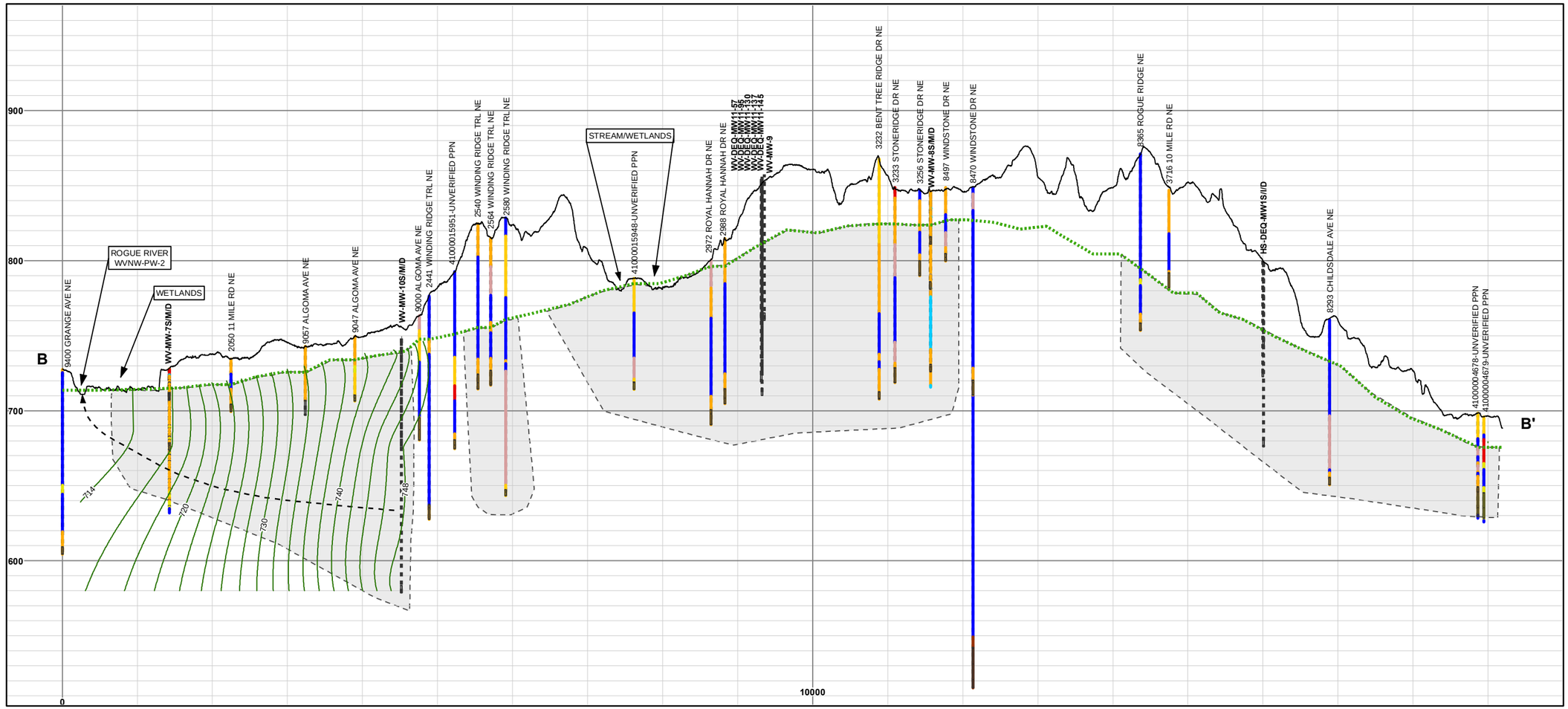

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- CLAY
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- GSI PIEZOMETER LOCATION
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3. ESTIMATED POTENTIOMETRIC SURFACE WAS DEVELOPED BASED ON MEASUREMENTS MADE IN GROUNDWATER MONITORING WELLS IN NOVEMBER 2019. GROUNDWATER ELEVATIONS WERE NOT MEASURED FROM RESIDENTIAL WATER SUPPLY WELLS.

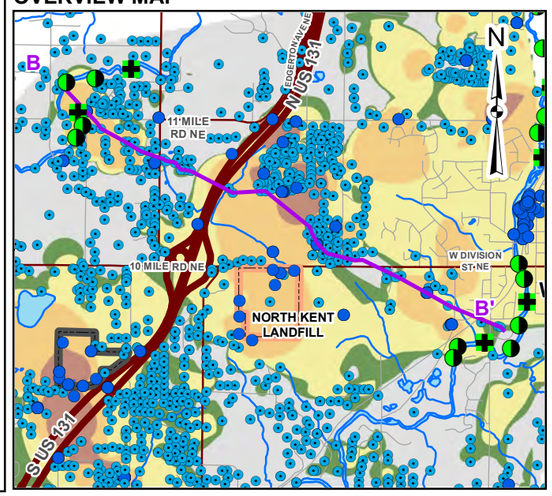
4. WELL SCREEN ELEVATIONS PROVIDED IN FEET ABOVE MEAN SEA LEVEL, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). RESIDENTIAL WELL SCREEN ELEVATIONS AND BOREHOLE LITHOLOGY ELEVATIONS WERE CALCULATED USING WELL INFORMATION PROVIDED BY THE STATE OF MICHIGAN'S WELLOGIC DATABASE AND GROUND SURFACE ELEVATIONS OF THE CENTER OF THE PPN GENERATED FROM LIDAR DATA PROVIDED BY KENT COUNTY. ELEVATIONS ARE ROUNDED TO THE NEAREST FOOT.

5. MAXIMUM CONCENTRATION FROM MONITORING AND RESIDENTIAL WELL SAMPLE RESULTS (INCLUDING THE NORTH KENT LANDFILL STUDY AREA) WERE USED TO DEVELOP CONCENTRATION ISOPLETHS.

6. RESIDENTIAL WELL SAMPLES WERE ANALYZED FOR PFAS USING EPA METHOD 537.1 WHICH REPORTS THE RESULTS FOR 14 COMPOUNDS. MONITORING WELL SAMPLES WERE ANALYZED FOR PFAS USING DOD QSM BY ISOTOPE DILUTION, WHICH REPORTS THE RESULTS FOR 23 COMPOUNDS.

7. CONCENTRATION ISOPLETHS WERE DEVELOPED USING NATURAL NEIGHBOR INTERPOLATION IN ARCGIS. CONCENTRATIONS WERE NOT EXTRAPOLATED OUTSIDE OF THE AREA OF KNOWN CONCENTRATIONS. THE TOTAL PFAS ISOPLETHS ARE CALCULATED FROM THE SUM OF THE 12 PFAS COMPOUNDS THAT ARE COMMON BETWEEN EPA METHOD 537.1 AND THE ISOTOPE DILUTION, DOD QSM METHODOLOGY.

OVERVIEW MAP



0 2,750 5,500 11,000

SCALE IN FEET

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WOLVEN NORTHWEST STUDY AREA
GEOLOGICAL CROSS SECTION B-B'
GSI INVESTIGATION

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: WN&J/WWW	
PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN	FIGURE 3B
DESIGNED BY: JC	DRAWN BY: JMG	SCALE: 1 in = 5,500 ft	
DATE: 11/12/2021	PROJECT NO: 16.0062961.51	REVISION NO:	

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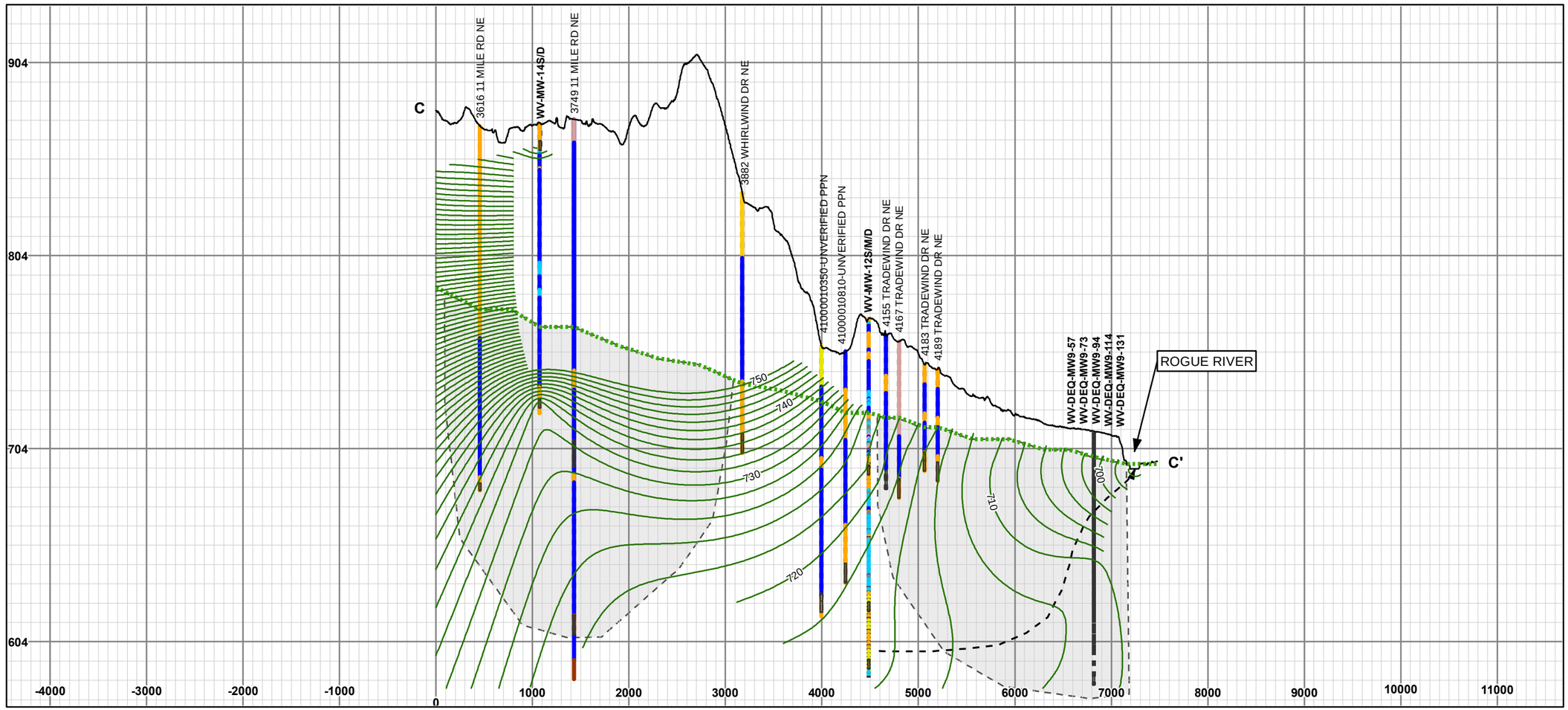

SOUTHWEST NORTHEAST

CROSS SECTION LEGEND

- GROUNDWATER CONTOUR, FT (INTERVAL = 1 FT)
- INTERPRETED GROUNDWATER FLOWLINE
- WELL SCREEN
- ESTIMATED POTENTIOMETRIC SURFACE (11/2019)
- GROUND SURFACE
- APPROXIMATE VERTICAL EXTENT OF TOTAL PFAS DETECTIONS

BOREHOLE LITHOLOGY

- GRAVEL
- SAND AND GRAVEL
- SAND
- CLAY/SILT W/ SAND/GRAVEL
- SILT
- CLAY AND SILT
- CLAY
- BEDROCK
- NOT AVAILABLE

OVERVIEW MAP LEGEND

- GSI PIEZOMETER LOCATION
- PORE WATER SAMPLE LOCATION
- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
- SURFACE WATER
- NORTH KENT LANDFILL

APPROXIMATE TOTAL PFAS EXTENT (NANOGRAMS PER LITER [NG/L])

- < 4 NG/L
- 4 - 10 NG/L
- 11 - 70 NG/L
- 71 - 1,000 NG/L
- 1,001 - 127,000 NG/L (MAX)

NOTES:

1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE. VERTICAL EXTENT OF TOTAL PFAS DETECTIONS IS APPROXIMATE.

2. GROUND SURFACE ELEVATIONS ARE BASED ON DIGITAL RASTER FILES OF BARE EARTH DIGITAL ELEVATION MODELS (DEMS), GENERATED FROM LIDAR DATA WITH 1-METER HORIZONTAL ACCURACY AND 18.5-CENTIMETER VERTICAL ACCURACY. DIGITAL FILES OF DEMS AND LIDAR DATA WERE PROVIDED BY KENT COUNTY.

3. ESTIMATED POTENTIOMETRIC SURFACE WAS DEVELOPED BASED ON MEASUREMENTS MADE IN GROUNDWATER MONITORING WELLS IN NOVEMBER 2019. GROUNDWATER ELEVATIONS WERE NOT MEASURED FROM RESIDENTIAL WATER SUPPLY WELLS.

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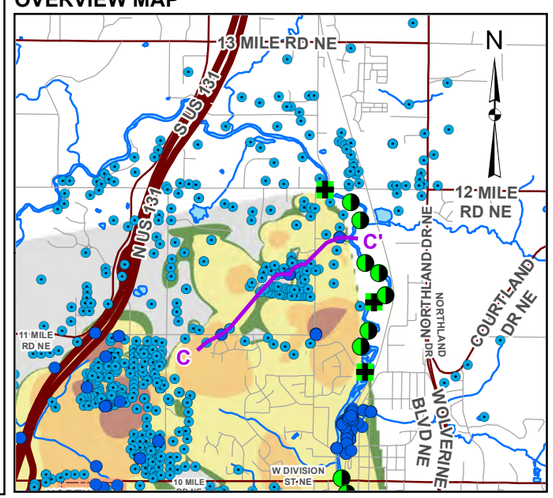
OVERVIEW MAP



0 2,750 5,500 11,000

SCALE IN FEET

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WOLVEN NORTHEAST
GEOLOGICAL CROSS SECTION C-C'
GSI INVESTIGATION

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: WN&J/WWW	
PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN	FIGURE 3C
DESIGNED BY: JC	DRAWN BY: JMG	SCALE: 1 in = 5,500 ft	
DATE: 11/12/2021	PROJECT NO: 16.0062961.51	REVISION NO:	

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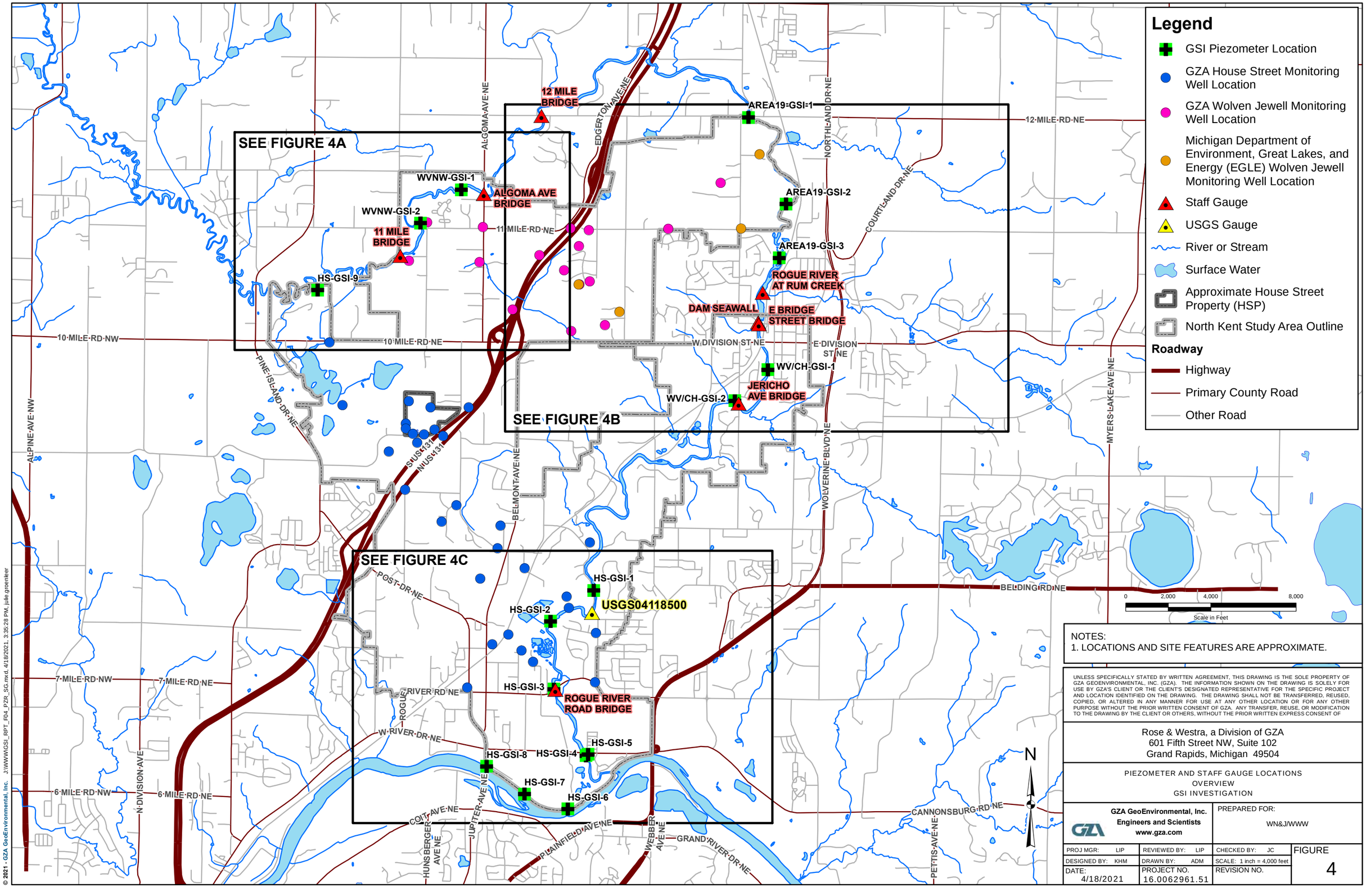

Legend

- GSI Piezometer Location
- GZA House Street Monitoring Well Location
- GZA Wolven Jewell Monitoring Well Location
- Michigan Department of Environment, Great Lakes, and Energy (EGLE) Wolven Jewell Monitoring Well Location
- Staff Gauge
- USGS Gauge
- River or Stream
- Surface Water
- Approximate House Street Property (HSP)
- North Kent Study Area Outline

Roadway

- Highway
- Primary County Road
- Other Road

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

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PIEZOMETER AND STAFF GAUGE LOCATIONS
OVERVIEW
GSI INVESTIGATION

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Engineers and Scientists
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PREPARED FOR: WN&J/WWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: JC	FIGURE 4
DESIGNED BY: KHM	DRAWN BY: ADM	SCALE: 1 inch = 4,000 feet	
DATE: 4/18/2021	PROJECT NO. 16.0062961.51	REVISION NO.	

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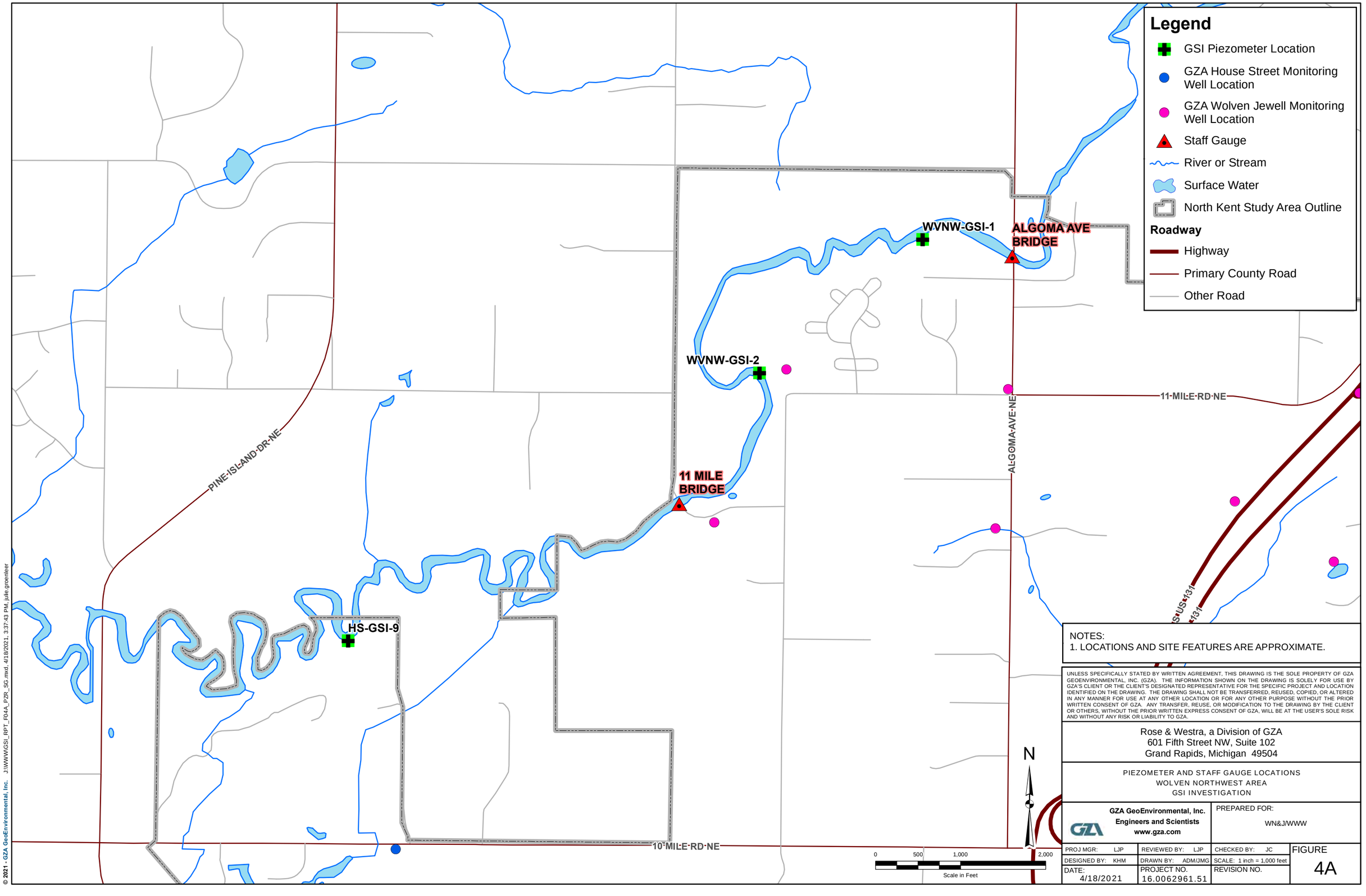

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PIEZOMETER AND STAFF GAUGE LOCATIONS
WOLVEN NORTHWEST AREA
GSI INVESTIGATION

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PREPARED FOR: WN&J/WWW

PROJ MGR: LJP	REVIEWED BY: LJP	CHECKED BY: JC	FIGURE 4A
DESIGNED BY: KHM	DRAWN BY: ADM/JMG	SCALE: 1 inch = 1,000 feet	
DATE: 4/18/2021	PROJECT NO. 16.0062961.51	REVISION NO.	

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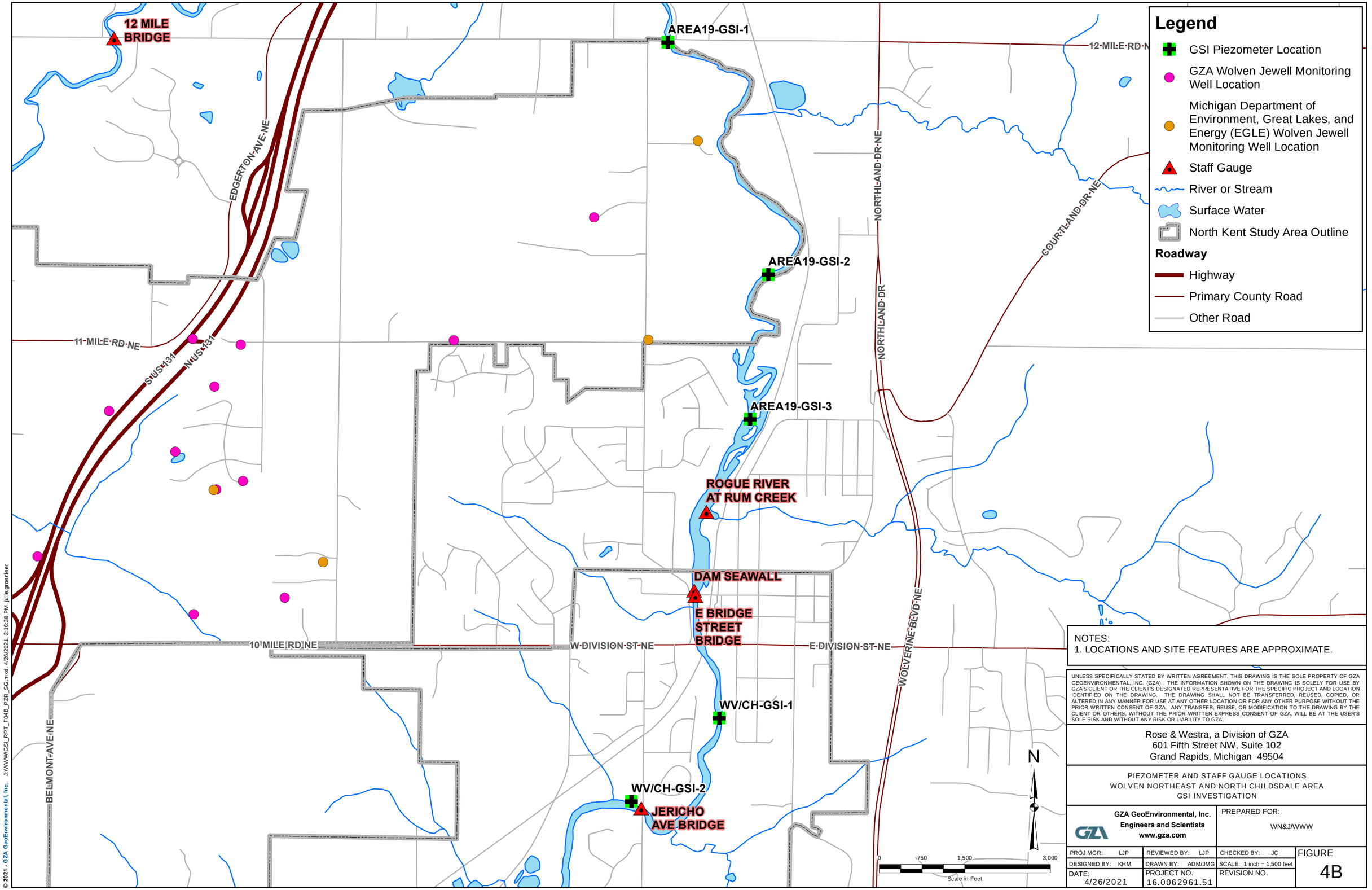

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PIEZOMETER AND STAFF GAUGE LOCATIONS
WOLVEN NORTHEAST AND NORTH CHILDSDALE AREA
GSI INVESTIGATION

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PREPARED FOR: WN&JWWW

PROJ MGR: LJP	REVIEWED BY: LJP	CHECKED BY: JC	FIGURE 4B
DESIGNED BY: KHM	DRAWN BY: ADM/JMG	SCALE: 1 inch = 1,500 feet	
DATE: 4/26/2021	PROJECT NO. 16.0062961.51	REVISION NO.	

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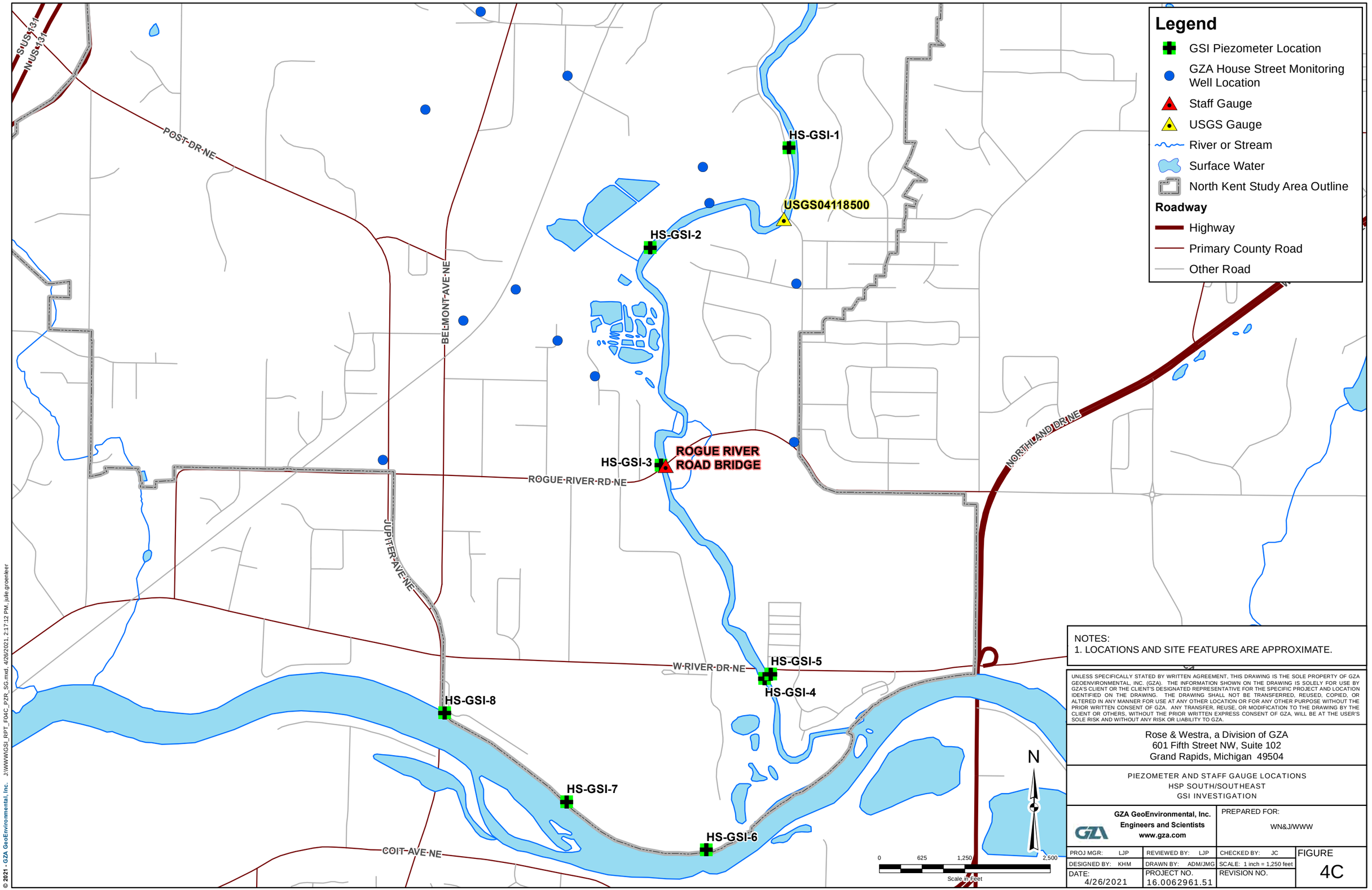

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PIEZOMETER AND STAFF GAUGE LOCATIONS
HSP SOUTH/SOUTHEAST
GSI INVESTIGATION

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PREPARED FOR: WN&J/WWW

PROJ MGR: LJP	REVIEWED BY: LJP	CHECKED BY: JC	FIGURE 4C
DESIGNED BY: KHM	DRAWN BY: ADM/JMG	SCALE: 1 inch = 1,250 feet	
DATE: 4/26/2021	PROJECT NO. 16.0062961.51	REVISION NO.	

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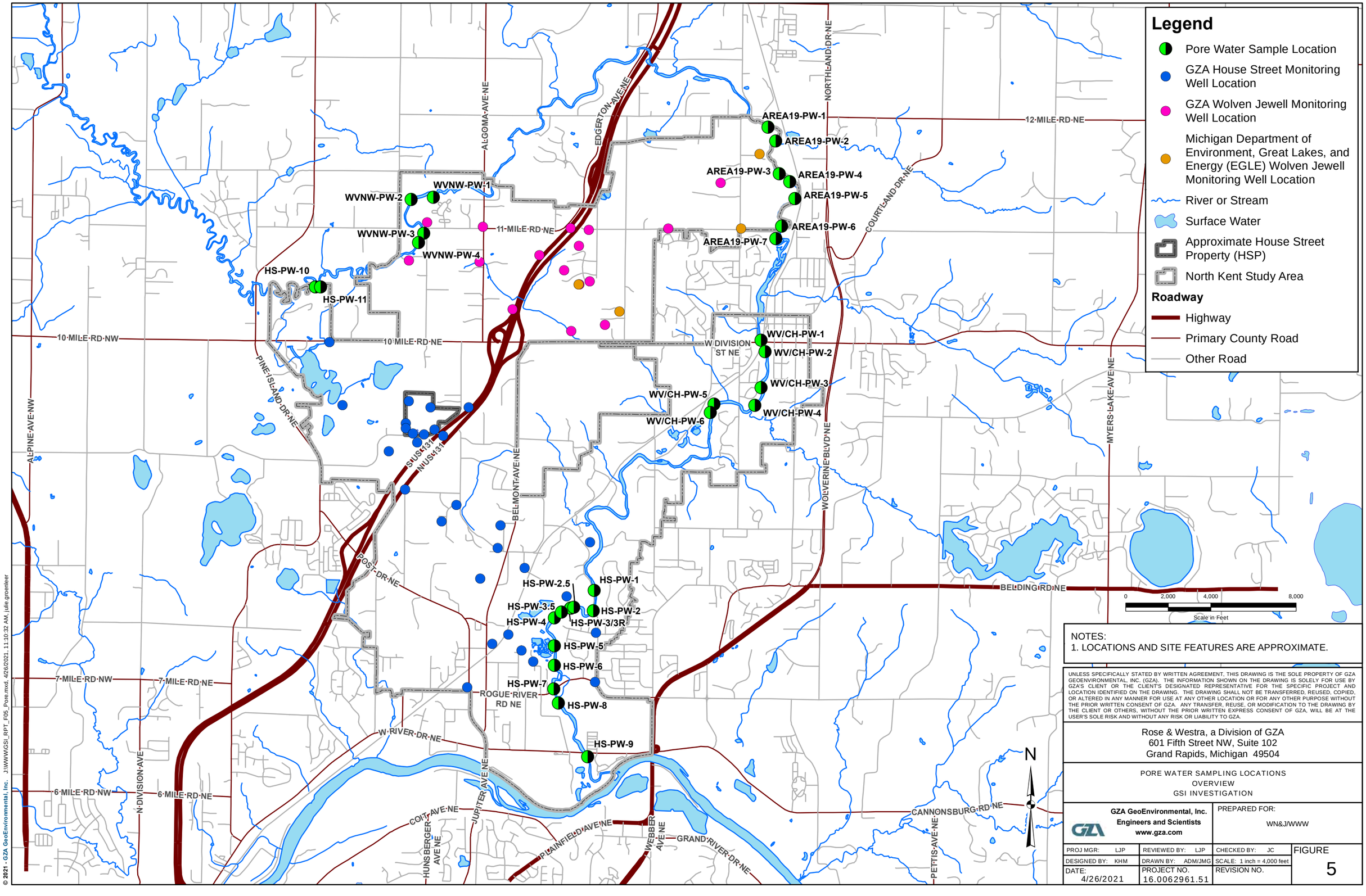

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PORE WATER SAMPLING LOCATIONS
OVERVIEW
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
Engineers and Scientists
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PREPARED FOR: WN&JWWW

PROJ MGR: LJP	REVIEWED BY: LJP	CHECKED BY: JC	FIGURE 5
DESIGNED BY: KHM	DRAWN BY: ADM/JMG	SCALE: 1 inch = 4,000 feet	
DATE: 4/26/2021	PROJECT NO. 16.0062961.51	REVISION NO.	

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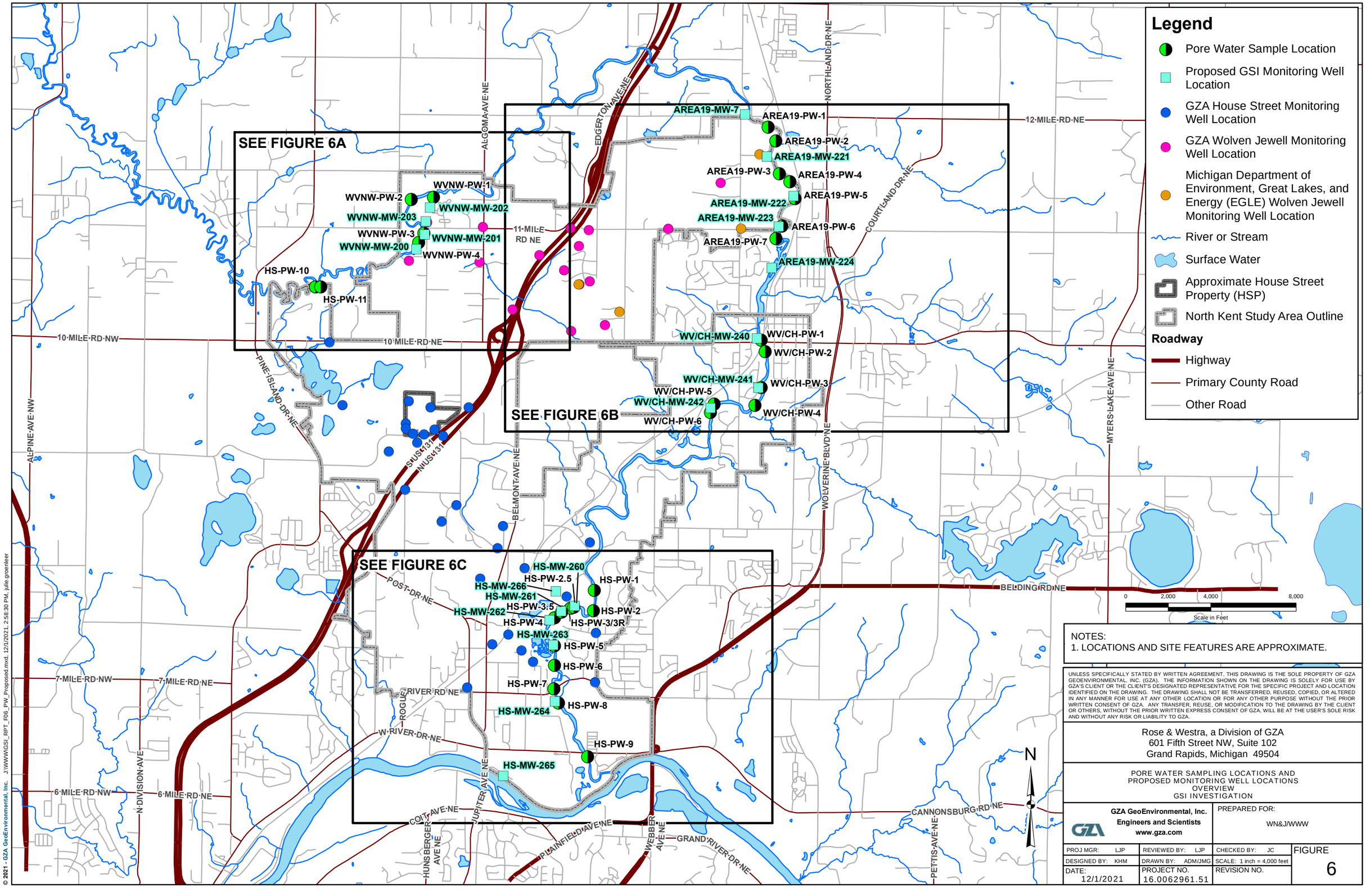

Legend

- Pore Water Sample Location
- Proposed GSI Monitoring Well Location
- GZA House Street Monitoring Well Location
- GZA Wolven Jewell Monitoring Well Location
- Michigan Department of Environment, Great Lakes, and Energy (EGLE) Wolven Jewell Monitoring Well Location
- River or Stream
- Surface Water
- Approximate House Street Property (HSP)
- North Kent Study Area Outline

Roadway

- Highway
- Primary County Road
- Other Road

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

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PORE WATER SAMPLING LOCATIONS AND PROPOSED MONITORING WELL LOCATIONS OVERVIEW
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
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PREPARED FOR: WN&JWWW

PROJ MGR: LJP	REVIEWED BY: LJP	CHECKED BY: JC	FIGURE 6
DESIGNED BY: KHM	DRAWN BY: ADM/JMG	SCALE: 1 inch = 4,000 feet	
DATE: 12/1/2021	PROJECT NO. 16.0062961.51	REVISION NO.	

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NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

2. PFOS = PERFLUOROOCTANE SULFONATE

3. NG/L = NANOGRAM PER LITER; ND = NOT DETECTED

4. MAXIMUM CONCENTRATION FROM SAMPLING INTERVAL IS SHOWN.

5. ABBREVIATIONS FOR MICHIGAN PART 201 GENERIC CLEANUP CRITERIA FOR RESIDENTIAL USES:

GSI = GROUNDWATER - SURFACE WATER INTERFACE CRITERIA.

6. ESTIMATED POTENTIOMETRIC SURFACE WAS DEVELOPED USING INTERPOLATION IN AQUAVEO GROUNDWATER MODELING SYSTEM (GMS) VERSION 10.4 BASED ON MEASUREMENTS MADE IN GROUNDWATER MONITORING WELLS IN NOVEMBER 2019. ESTIMATED POTENTIOMETRIC SURFACE IS BASED ON LIMITED WELL INSTALLATIONS, AND DATA GAPS MAY ALTER THE POTENTIOMETRIC SURFACE. POTENTIOMETRIC SURFACE WAS NOT EXTRAPOLATED OUTSIDE OF THE AREAS OF MEASURED ELEVATIONS.

7. PERFLUORO-N-OCTANOIC ACID (PFOA) CONCENTRATIONS ARE NOT SHOWN BECAUSE THERE WERE NO EXCEEDANCES OF THE PFOA GSI CRITERIA OF 12,000 NG/L.

WVNW-PW-1
3 - 3.13 FT
PFOS: 7 ng/L

WVNW-PW-1
4 - 4.13 FT
PFOS: 9.7 ng/L

WVNW-PW-2
2.33 - 2.46 FT
PFOS: 10 ng/L

WVNW-PW-2
3.33 - 3.46 FT
PFOS: 11 ng/L

WVNW-MW-202

WVNW-MW-203

WVNW-PW-3
1.5 - 1.63 FT
PFOS: 260 ng/L

WVNW-MW-201

WVNW-PW-4
1.67 - 1.79 FT
PFOS: 100 ng/L

WVNW-MW-200

HS-PW-10
5 - 5.13 FT
PFOS: ND

HS-PW-11
4.5 - 4.63 FT
PFOS: ND

PINE ISLAND DR NE

10 MILE RD NE

11 MILE RD NE

ALGOMA AVE NE

S US 131

N US 131

715 720 725 730 735 740 745 750 755 760 765 770 805

Legend

- Pore Water PFOS Sample < 12 ng/L (GSI)
- Pore Water PFOS Sample > 12 ng/L (GSI)
- Proposed GSI Monitoring Well Location
- Existing Monitoring Well Cluster WV-MW-7S/M/D
- Groundwater Potentiometric Surface - Shallow Zone (ft) - November 2019
- River or Stream
- Surface Water
- North Kent Study Area

Roadway

- Highway
- Primary County Road
- Other Road

N

0 500 1,000 2,000
Scale in Feet

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PORE WATER PFOS CONCENTRATIONS AND PROPOSED MONITORING WELL LOCATIONS
WOLVEN NORTHWEST AREA
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR: WN&J/WWW

PROJ MGR: LJP	REVIEWED BY: LJP	CHECKED BY: JC	FIGURE 6A
DESIGNED BY: KHM	DRAWN BY: ADM/JMG	SCALE: 1 inch = 1,000 feet	
DATE: 11/11/2021	PROJECT NO. 16.0062961.51	REVISION NO.	

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.

2. PFOS = PERFLUOROOCTANE SULFONATE

3. NG/L = NANOGRAM PER LITER; ND = NOT DETECTED

4. MAXIMUM CONCENTRATION FROM SAMPLING INTERVAL IS SHOWN.

5. ABBREVIATIONS FOR MICHIGAN PART 201 GENERIC CLEANUP CRITERIA FOR RESIDENTIAL USES:

GSI = GROUNDWATER - SURFACE WATER INTERFACE CRITERIA.

6. ESTIMATED POTENTIOMETRIC SURFACE WAS DEVELOPED USING INTERPOLATION IN AQUAVEO GROUNDWATER MODELING SYSTEM (GMS) VERSION 10.4 BASED ON MEASUREMENTS MADE IN GROUNDWATER MONITORING WELLS IN NOVEMBER 2019. ESTIMATED POTENTIOMETRIC SURFACE IS BASED ON LIMITED WELL INSTALLATIONS, AND DATA GAPS MAY ALTER THE POTENTIOMETRIC SURFACE. POTENTIOMETRIC SURFACE WAS NOT EXTRAPOLATED OUTSIDE OF THE AREAS OF MEASURED ELEVATIONS.

7. PERFLURO-N-OCTANOIC ACID (PFOA) CONCENTRATIONS ARE NOT SHOWN BECAUSE THERE WERE NO EXCEEDANCES OF THE PFOA GSI CRITERIA OF 12,000 NG/L.

AREA19-GSI-1
3.7 - 7.7 FT
PFOS: 17 ng/L

AREA19-MW-7

AREA19-PW-1
1 - 1.13 FT
PFOS: 130 ng/L

AREA19-PW-2
1 - 1.13 FT
PFOS: 30 ng/L

AREA19-PW-2
1.42 - 1.54 FT
PFOS: 24 ng/L

WV-DEQ-MW9-57
51.85 - 56.85 FT
PFOS: ND

MW9

AREA19-MW-221

AREA19-PW-3
1 - 1.13 FT
PFOS: 89 ng/L

AREA19-PW-4
1 - 1.13 FT
PFOS: 67 ng/L

AREA19-PW-4
1.42 - 1.54 FT
PFOS: 64 ng/L

AREA19-GSI-2
4 - 8 FT
PFOS: 170 ng/L

AREA19-MW-222

AREA19-PW-5
1 - 1.13 FT
PFOS: 230 ng/L

AREA19-PW-6
1.5 - 1.63 FT
PFOS: 60 ng/L

AREA19-MW-223

AREA19-PW-6
2 - 2.13 FT
PFOS: 64 ng/L

AREA19-PW-7
5 - 5.13 FT
PFOS: 20 ng/L

AREA19-GSI-3
4.2 - 8.2 FT
PFOS: 130 ng/L

AREA19-MW-224

WV/CH-PW-1
0.75 - 0.88 FT
PFOS: 16 ng/L

WV/CH-MW-240

WV/CH-PW-2
0.75 - 0.88 FT
PFOS: 79 ng/L

WV/CH-PW-5
0.83 - 0.96 FT
PFOS: 32 ng/L

WV/CH-PW-3
1 - 1.13 FT
PFOS: 32 ng/L

WV/CH-MW-241

WV/CH-PW-6
1 - 1.13 FT
PFOS: 15 ng/L

WV/CH-PW-4
1 - 1.13 FT
PFOS: 20 ng/L

WV/CH-PW-6
2 - 2.13 FT
PFOS: ND

WV/CH-MW-242

12-MILE-RD-NE
11-MILE-RD-NE
10-MILE-RD-NE
W-DIVISION-ST-NE
E-DIVISION-ST-NE
NORTHLAND-DR-NE
COURTLAND-DR-NE
WOLVERINE-BLVD-NE
BELMONT-AVE-NE
S-US-131
N-US-131

Legend

- Pore Water PFOS Sample < 12 ng/L (GSI)
- Pore Water PFOS Sample > 12 ng/L (GSI)
- Monitoring Well PFOS Sample < 12 ng/L (GSI)
- Piezometer PFOS Sample > 12 ng/L (GSI)
- Proposed GSI Monitoring Well Location
- Groundwater Potentiometric Surface - Shallow Zone (ft) - November 2019
- River or Stream
- Surface Water
- North Kent Study Area Outline

Roadway

- Highway
- Primary County Road
- Other Road

N

0 750 1,500 3,000
Scale in Feet

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PORE WATER, PIEZOMETER, AND MONITORING WELL
PFOS CONCENTRATIONS AND PROPOSED MONITORING WELL LOCATIONS
WOLVEN NORTHEAST AND NORTH CHILDSDALE AREA
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
WN&J/WWW

PROJ MGR: LJP	REVIEWED BY: LJP	CHECKED BY: JC	FIGURE 6B
DESIGNED BY: KHM	DRAWN BY: JMG	SCALE: 1 inch = 1,500 feet	
DATE: 12/1/2021	PROJECT NO. 16.0062961.51	REVISION NO.	

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NOTES:
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7. PERFLUORO-N-OCTANOIC ACID (PFOA) CONCENTRATIONS ARE NOT SHOWN BECAUSE THERE WERE NO EXCEEDANCES OF THE PFOA GSI CRITERIA OF 12,000 NG/L.

HS-MW-19S
58.4 - 61.4 FT
PFOS: ND

HS-MW-19D
85.9 - 95.9 FT
PFOS: ND

HS-PW-1
2 - 2.13 FT
PFOS: 0 ng/L

HS-PW-1
2.5 - 2.63 FT
PFOS: 0 ng/L

HS-PW-2.5
0.5 - 0.63 FT
PFOS: 820 ng/L

HS-PW-2.5
1 - 1.13 FT
PFOS: 560 ng/L

HS-MW-29A
3.5 - 13.5 FT
PFOS: 290 ng/L

HS-MW-266

HS-MW-260

HS-MW-261

HS-PW-4
0.75 - 0.88 FT
PFOS: 13 ng/L

HS-MW-262

HS-PW-2
1 - 1.125 FT
PFOS: 5.2 ng/L

HS-MW-263

HS-PW-3.5
0.83 - 0.96 FT
PFOS: 92 ng/L

HS-PW-3R
0.5 - 0.63 FT
PFOS: 900 ng/L

HS-PW-6
1 - 1.13 FT
PFOS: 4.6 ng/L

HS-PW-5
1.33 - 1.46 FT
PFOS: 30 ng/L

HS-PW-3
1.33 - 1.46 FT
PFOS: 1,100 ng/L

HS-PW-7
1.5 - 1.63 FT
PFOS: 8.9 ng/L

HS-MW-264

HS-PW-8
1 - 1.13 FT
PFOS: 26 ng/L

HS-PW-9
1 - 1.13 FT
PFOS: 8.2 ng/L

HS-MW-265

655
650
645
640
635
630
625
685
680
675
670
665
660
655
650
645
640

JUPITER-AVE-NE
BELMONT-AVE-NE
ROGUE-RIVER-RD-NE
W-RIVER-DR-NE
NORTHLAND-DR-NE

Legend

- Pore Water PFOS Sample < 12 ng/L (GSI)
- Pore Water PFOS Sample > 12 ng/L (GSI)
- Monitoring Well PFOS Sample < 12 ng/L (GSI)
- Monitoring Well PFOS Sample > 12 ng/L (GSI)
- Proposed GSI Monitoring Well Location
- Groundwater Potentiometric Surface - Shallow Zone (ft) - November 2019
- River or Stream
- Surface Water

Roadway

- Highway
- Primary County Road
- Other Road

N

0 625 1,250 2,500
Scale in Feet

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PORE WATER AND MONITORING WELL PFOS CONCENTRATIONS AND PROPOSED MONITORING WELL LOCATIONS
HSP SOUTH/SOUTHEAST
GSI INVESTIGATION

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR: WN&J/WWW

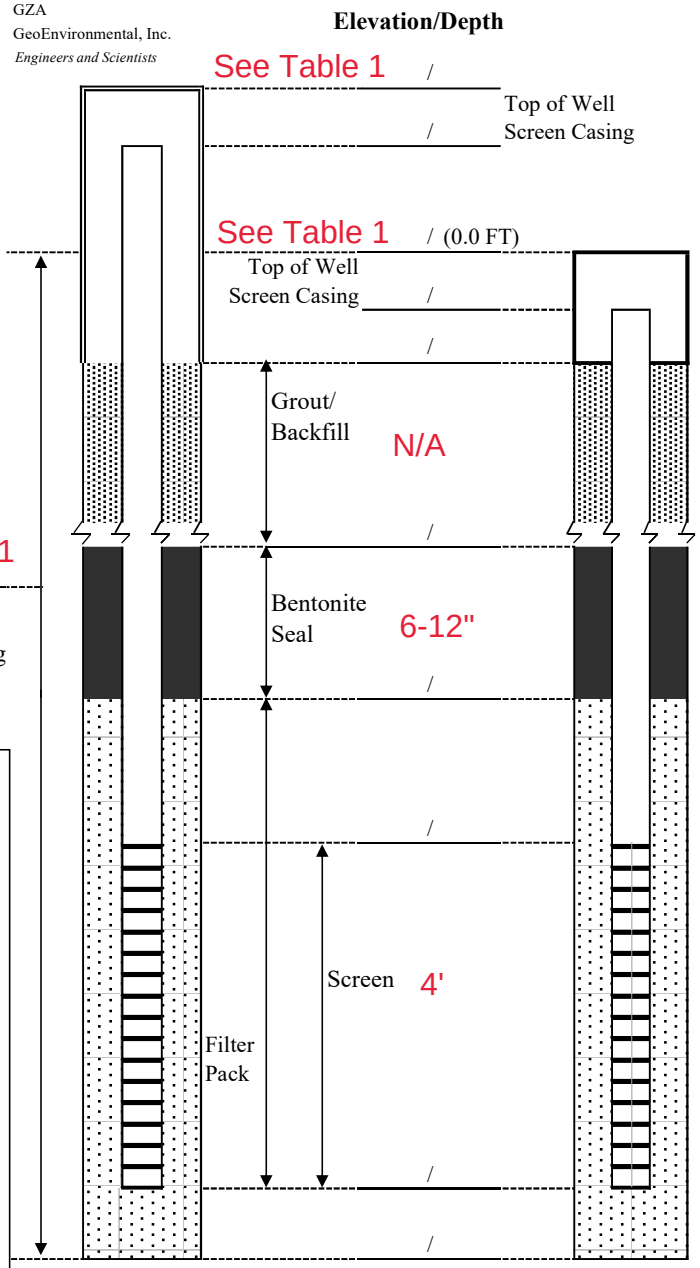
PROJ MGR: LJP	REVIEWED BY: LJP	CHECKED BY: JC	FIGURE 6C
DESIGNED BY: KHM	DRAWN BY: ADM/JMG	SCALE: 1 inch = 1,250 feet	
DATE: 11/11/2021	PROJECT NO. 16.0062961.51	REVISION NO.	

APPENDIX A

GENERAL PIEZOMETER CONSTRUCTION DETAIL

General Piezometer Construction Detail

GZA
GeoEnvironmental, Inc.
Engineers and Scientists



MONITORING WELL DETAILS

Wellscreen Dia: 1.25" Type: Steel

Slot Size: 80 gauze Well Screen Length: 4'

Well Riser Dia: 1.25" Type: Galvanized

Pipe Connections: Couplings Well Riser Length: Varies

Filter Sand Type: #1 Sand Other: _____

Protective Casing (Circle): YES / (NO)

Locked Cap (Circle): YES / (NO) Lock No: _____

DESCRIPTION OF MATERIAL BEING MONITORED

Groundwater Flow to Rogue & Grand Rivers

APPENDIX B

SAMPLING WORKSHEETS

Attachment A – Pore Water Sampling Worksheet

Date: 11/30/20

Location ID: Area 19 - PW-1

Weather Conditions: Overcast 34°

Sampler's Name: MKM

Water Depth (ft): 12"

Sampler Screen Interval ~~(ft) (below water surface)~~ 0 12"

Sediment Thickness (ft) (est): 12"

Start time 1020

Sample Time 1035

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
10:20	12"	—	—	4.2		596.0		13.13		256.1		8.57		4	
1025		—	300		6		582		1.4		256		7.9		4
1030		—	300		6		582		1.3		198		7.8		2
1035		—	300		6		582		1.3		130		7.6		1

Attachment A – Pore Water Sampling Worksheet

Date: 11/30/20

Location ID: Area19- PW-2

Weather Conditions: Overcast

Sampler's Name: MKM

Water Depth (ft): 9"

Sampler Screen Interval ~~(ft) (below water surface)~~ 12"

Sediment Thickness (ft) (est): No sediment

Start time 1335

Sample Time 1355

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1335	9"	—	—	4.2		548		27.1		250		7.9		3	
1340			150	~~6.0~~	6.0		1289		4.9		200		7.5		30
1345			150		6.0		1292		2.6		186		7.4		46
1350			150		6.0		1289		2.1		107		7.3		29
1355			150		6.0		1286		1.7		43		7.4		65

Attachment A – Pore Water Sampling Worksheet

Date: 11/30

Location ID: Area19-PW-2B

Weather Conditions: Cloudy, Low 30's

Sampler's Name: TAL/MKM

Water Depth (ft): 9"

Sampler Screen Interval ~~(ft) (below water surface)~~ 17"

Sediment Thickness (ft) (est): none

Start time 1415

Sample Time 1430

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1410	9"			4.2		599.0		13.7		-70		7.6		16	
1415			150		6.4		1212		1.4		-28		7.4		6
1420			150		6.5		1212		1.0		<50		7.2		8
1425			150		6.8		1230		1.0		-68		7.1		10
1430			150		6.7		1237		1.1		-74		7.1		7

Attachment A – Pore Water Sampling Worksheet

Date: 11/30/20 **Location ID:** Area19-PW-3

Weather Conditions: Overcast, 34° **Sampler's Name:** JAL

Water Depth (ft): 3" **Sampler Screen Interval ~~(ft) (below water surface)~~** 12"

Sediment Thickness (ft) (est): none

Start time 1520 **Sample Time** 1535

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1515	3"	—	—	4.4		600		13.3		-61	[illegible]	7.5		4	
1520			150		6.9		760		8.2		-15		7.4		14
1525			150		6.60		762		6.1		-5.4		7.4		20
1530			150		7.0		737		5.5		9.4		7.4		12
1535			150		6.7		737		5.3		23.1		7.9		10

Attachment A – Pore Water Sampling Worksheet

Date: 12/1/20

Location ID: Area 19 - PW-4(A)

Weather Conditions: Partly Sunny, 30°

Sampler's Name: TAL

Water Depth (ft): 9"

Sampler Screen Interval (~~ft) (below water surface)~~ 12"

Sediment Thickness (ft) (est): 2"

Start time 1035

Sample Time 1050

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
10:25	9"	—	—	3.2		523.9		19.38		121.9		9.43		3	
1035		—	150		5.7		946		1.9		122		8.3		296
1040		—	150		5.8		962		1.2		107		8.0		114
1045		—	150		6.0		952		1.2		96.0		7.8		78
1050		—	150		5.7		941		1.2		81.6		7.7		70

Attachment A – Pore Water Sampling Worksheet

Date: 12/1/20 Location ID: Araln-PW-4(B)

Weather Conditions: Sunny, 30° Sampler's Name: TAL

Water Depth (ft): 9" Sampler Screen Interval ~~(ft) (below water surface)~~ 17"

Sediment Thickness (ft) (est): 2"

Start time 1120 Sample Time 1135

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
11:15				3.2		534		11.8		79		7.9		17	
1120			150		5.2		931		1.4		94		7.7		192
1125			150		5.3		921		1.2		90		7.7		71
1130			150		5.3		906		1.3		89		7.7		56
1135			150		5.4		890		1.4		89		7.6		70

Attachment A – Pore Water Sampling Worksheet

Date: 12/1/20

Location ID: Trail9-PW-6(A)

Weather Conditions: Sunny, 38°

Sampler's Name: TAL

Water Depth (ft): ~~8"~~ 12"

Sampler Screen Interval (~~ft) (below water surface)~~: ~~12"~~ 18"

Sediment Thickness (ft) (est): ~~3"~~ 3"

Start time 1500

Sample Time 1515

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
14:55				3.7		520.2		12.8		195.2		8.13		2	
1500				~~5.4~~	6.4		562		1.2		179		7.9		478
1505					6.9		562		1.0		34		7.8		40
1510					6.9		562		1.0		-27		7.7		32
1515					6.9		561		1.0		-48		7.6		17

Attachment A – Pore Water Sampling Worksheet

Date: 12/1/20

Location ID: Area19-PW-6(B)

Weather Conditions: Sunny, 39°

Sampler's Name: TAL

Water Depth (ft): 12"

Sampler Screen Interval ~~(ft) (below water surface)~~ 24"

Sediment Thickness (ft) (est): 3"

Start time 1535

Sample Time 1550

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1530	–	–		3.7		518.7		12.4		-11.1		7.96		8	
1535	–	–		[illegible]	6.6		559.7	[illegible]	1.11		8.1		7.79		55
1540	–	–			6.9		561.5		.75		-38.6		7.70		26
1545	–	–			6.9		561.9		.78		-48.9		7.63		14
1550	–	–			6.8		561.8		.78		-55.4		7.57		9

Attachment A – Pore Water Sampling Worksheet

Date: 12/1/20

Location ID: Area 9- PW-7

Weather Conditions: Sunny 38°

Sampler's Name: TAL

Water Depth (ft): 2''

Sampler Screen Interval ~~(ft) (below water surface)~~ 5'

Sediment Thickness/Muck (ft) (est): 4.5'

Start time 1625

Sample Time 1640

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1620				3.6		519.6		12.19		48.8		7.81		10	
1625				~~8.3~~	8.3		644		1.24		82		7.6		49
1630					7.9		697		0.7		59		7.4		28
1635					8.0		698		0.7		40		7.6		12
1640					8.0		699		0.7		30		7.5		

Attachment A – Pore Water Sampling Worksheet

Date: 12/1/2020

Location ID: Area19-PW-5(A)

Weather Conditions: Sunny 34°

Sampler's Name: TAL

Water Depth (ft): 6"

Sampler Screen Interval ~~(ft) (below water surface)~~ 12"

Sediment Thickness (ft) (est): 4"

Start time 1205

Sample Time 1220

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
12:00				3.3		522.9		12.32		147.6		7.95		24	
1205			150		6.3		528		1.3		144		7.8		74
1210			150		6.5		534		0.8		6.2		7.7		20
1215			150		6.7		533		0.7		-42		7.6		9
1220			150		6.7		533		0.8		-58		7.5		5
~~1225~~			"												

☆ DUP taken "WVNW-PW-4(A)-DUP"

Attachment A – Pore Water Sampling Worksheet

Date: 12/2/20

Location ID: WVNW-PW-4(A)

Weather Conditions: mid 40's, sunny

Sampler's Name: JAL/MKM

Water Depth (ft): 12"

Sampler Screen Interval ~~(ft) (below water surface)~~ 0 20"

Sediment Thickness (ft) (est): 19"

Start time 1140

Sample Time 1200

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1135				2.1		498		26.3		137		9.6		5	
1145			150		6.2		604		5.2		167		8.4		2616
1150			150		6.8		706		1.4		43		7.9		279
1155			150		6.8		716		1.3		-24		7.5		78
1200			150		6.9		716		1.2		-41		7.5		16

Attachment A – Pore Water Sampling Worksheet

★ MS/MSD taken

Date: 12/2/20

Location ID: WWW-PW-3

Weather Conditions: Sunny, 45°

Sampler's Name: TAL

Water Depth (ft): 12"

Sampler Screen Interval ~~(ft) (below water surface)~~ 18"

Sediment Thickness (ft) (est): 16"

Start time 1425

Sample Time 1440

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
14:20	–	–		2.6		C23		12.95		171.7		7.8		9	
1425			150		7.2		554		1.4		171		7.7		26
1430			150		7.3		557		1.2		157		7.6		5
1435			150		7.4		557		1.1		143		7.6		7
1440			150		7.4		557		1.1		133		7.5		1

Attachment A – Pore Water Sampling Worksheet

Date: 12/3/20 **Location ID:** HS - PW-1 (A)

Weather Conditions: Cloudy & 30's **Sampler's Name:** Alexis Blackmore

Water Depth (ft): 12 in **Sampler Screen Interval (~~ft) (below water surface)~~** ~~22~~ 24

Sediment Thickness (ft) (est): 10 in

Start time 1150 **Sample Time** 1205

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1140				2.8		513.8		6.62		268.6		7.86		1	
1150			152		4.6	~~1053~~	1053		2.09		225.9	~~7.60~~	7.60		4
1155			150		6.1		1066		1.24		189.0		7.48		3
1200			150		5.8		1064		1.22		181.2		7.44		2
1205			150		5.6		1067		1.19		177		7.4		2

Attachment A – Pore Water Sampling Worksheet

Date: 12/3/20

Location ID: HS-PW-1(3)

Weather Conditions: Cloudy & 30's

Sampler's Name: Alexis Blackmore

Water Depth (ft): 12in

Sampler Screen Interval (~~ft) (below water surface~~): 30 in.

Sediment Thickness (ft) (est): 10in

Start time 1230

Sample Time 1250

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1220				2.6		571.9		12.84		186.2		7.83		15	
1230															
1235					5.9		1060		2.48		198.8		7.40		4
1240					6.0		1061		1.22		192.4		7.36		3
1245					6.1		1062		1.05		187.8		7.31		2
1250					5.8		1064		0.9		185		7.3		1

YSI turned off

Attachment A – Pore Water Sampling Worksheet

Date: 12/3/20

Location ID: HS-PW-7 (A)

Weather Conditions: Cloudy & 30s

Sampler's Name: Alexis Blackmon

Water Depth (ft): 6"

Sampler Screen Interval (~~ft) (below water surface)~~: 18"

Sediment Thickness (ft) (est): 3"

Start time 1530

Sample Time 1545

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1525				3.1		562.1		15.41		-62.5		7.78		4	
1530			150		5.5		857		2.22		-20.7		7.42		0.5
1535			↓		6.0		925		1.18		-57.8		7.37		3
1540					6.1		943		1.16		-75.5		7.20		3
1545					6.1		945		1.14		-78.3		7.18		2

Attachment A – Pore Water Sampling Worksheet

Date: 12/4/2020 **Location ID:** HS - PW-2 (A)

Weather Conditions: cloudy & 30s **Sampler's Name:** Alexis Blackmore

Water Depth (ft): 5 in **Sampler Screen Interval (~~ft) (below water surface)~~** 12 in

Sediment Thickness (ft) (est): 2 in * Pore water has strong sulfur odor

Start time 1430 **Sample Time** 1445

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1415				2.9		566.5		16.30		240.3	.	7.94		76	
1430			150		5.9		809		1.13		143.1		7.84		2
1435			150		5.7		818		1.03		-75.4		7.74		4
1440			150		5.9		819		0.94		-110.8		7.66		2
1445			150		5.9		820		0.94		-123		7.63		2

Attachment A – Pore Water Sampling Worksheet

Date: 12/4/20 **Location ID:** HS-PW-3 (A)

Weather Conditions: Cloudy & 30s **Sampler's Name:** Alexis Blackmore

Water Depth (ft): 2:n **Sampler Screen Interval (ft) (below water surface)** 16:n

Sediment Thickness (ft) (est): 2:n

Start time 1020 **Sample Time** 1040

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1005				3.2		573.6		23.93		252.7		7.16		77.3	
1025					7.2	X	485.1		1.08		257.6		6.81		18.1
1030					6.9		489.7		0.95		178.2		6.60		3.5
1035					7.1		489.9		0.94		120.0		6.54		3.0
1040					7.1		492.1		1.02		71.8		6.51		2.3

Attachment A – Pore Water Sampling Worksheet

Date: 12/4/20

Location ID: HS-PW-4 (A)

Weather Conditions: Partly sunny & 30s

Sampler's Name: Alexis Blackmore

Water Depth (ft): 12in

Sampler Screen Interval ~~(ft) (below water surface)~~ 9in.

Sediment Thickness (ft) (est): 2in

Start time 1120

Sample Time 1140

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1116				7.1		671.3		19.05		63.3		6.71		17.5	
1126					9.3				1.04		78.0		6.91		4.8
1130					9.5		655.6		0.73		25.5		7.01		2.0
1135					9.6		655.7		0.67		-10.1		7.05		1.3
1140															

Date: 12/4/20

Attachment A – Pore Water Sampling Worksheet

Location ID: HS- PW-5 (A)

Weather Conditions: Cloudy and 40s

Sampler's Name: Alexis Blackmore

Water Depth (ft): 4 in

Sampler Screen Interval (ft) ~~(below water surface)~~ 16 in

Sediment Thickness (ft) (est): 2 in

Start time 1400

Sample Time 1420

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1355				4.1		582.6		21.09		285.9		7.41		11.7	
1405					6.5		950		1.38		225.4		7.13		
1410					6.6		951		1.26		160.9		7.08		
1415					6.6		951		1.14		-0.3		6.98		
1420					6.6		953		1.05		-22.3		6.95		

*Turbidimeter Malfunctioning

Attachment A – Pore Water Sampling Worksheet

Date: 12/4/20

Location ID: HS-PW-6 (A)

Weather Conditions: Cloudy and 30s

Sampler's Name: Alexis Blackmore

Water Depth (ft): 2 in

Sampler Screen Interval ~~(ft) (below water surface)~~ 12 in

Sediment Thickness (ft) (est): 5 in

Start time 1455

Sample Time 1515

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1445				4.7		644.8		15.73	x	15.41		7.46		x	
1500					6.9		707.8		1.00		13.7		7.38		
1505					6.9		707.6		0.78		-23.9		7.38		
1510					6.9		707.1		0.77		-49.7		7.36		
1515					6.9		707.7		0.70		-66.4		7.39		

Turbidimeter malfunctioning

Attachment A – Pore Water Sampling Worksheet

Date: 12/7/20

Location ID: WV/CH-PW-1(A)

Weather Conditions: Cloudy, 29°

Sampler's Name: TAL

Water Depth (ft): 3"

Sampler Screen Interval ~~(ft) (below water surface)~~ 9"

Sediment Thickness (ft) (est): 0"

Start time 10:45

Sample Time 1100

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1040	-	-	-	2.8		892		12.0		147		8.4		2.9	
1045					4.3		1104		0.9		-58		7.4		3.6
1050					4.8		1101		1.1		-77		7.4		2.5
1055					4.7		1100		0.8		-90		7.4		2.8
1100					4.6		1102		0.8		-95		7.4		3.0

Attachment A – Pore Water Sampling Worksheet

Date: 12/7/20 **Location ID:** WV/CH-PW-2(A)

Weather Conditions: Cloudy. 31° **Sampler's Name:** TAL

Water Depth (ft): 5" **Sampler Screen Interval (ft) ~~(below water surface)~~** 9"

Sediment Thickness (ft) (est): 2"

Start time 1140 **Sample Time** 1155

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1135	–	–		2.8		604		11.82		113.4		8.45		3.76	
1140	–	–	150		5.4		788		0.3		-42		7.4		1.4
1145	–	–	150		5.2		790		0.2		-60		7.5		0.2
1150	–	–	150		5.2		790		0.1		-65		7.4		0.3
1155	–	–	150		4.8		790		0.1		-69		7.4		3.0

Attachment A – Pore Water Sampling Worksheet

Date: 12/7/20

Location ID: WV/CH -PW-3(A)

Weather Conditions: Cloudy, 30°s

Sampler's Name: TAL

Water Depth (ft): 7"

Sampler Screen Interval (ft) ~~(below water surface)~~ 12"

Sediment Thickness (ft) (est): ~~E~~ 0"

Start time 1425

Sample Time 1440

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1420				3.2		603.0		13.0		124		8.8		6~~0~~.36	
1425					4.9		711		6.8		170		7.6		8.6
1430					4.9		722		6.7		192		7.6		5.4
1435					4.9		721		6.7		213		7.6		3.9
1440					4.9		723		6.7		227		7.6		1.3

MS/MSD taken

Attachment A – Pore Water Sampling Worksheet

Date: 12/7/20

Location ID: [redacted] WW/CH-PW-4(A)

Weather Conditions: Cloudy, 35°

Sampler's Name: TAL

Water Depth (ft): 5"

Sampler Screen Interval (ft) ~~(below water surface)~~: 12"

Sediment Thickness (ft) (est): 0"

Start time 1515

Sample Time 1530

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
15:10	—	—		3.3		604		13.6		213.8		8.73		2.68	
1515	5"		150		5.2		1015		0.3		2.0		6.9		2.3
1520			150		5.3		1024		0.1		-25		7.1		0.6
1525			150		5.4		1024		0.1		-32		7.1		0.4
1530			150		5.4		1025		0.1		-37		7.1		0.4

Attachment A – Pore Water Sampling Worksheet

Date: 12/8/2020

Location ID: WV/CH-PW-5(A)

Weather Conditions: Cloudy, 33

Sampler's Name: TAL

Water Depth (ft): 6"

Sampler Screen Interval (~~ft) (below water surface~~) 10"

Sediment Thickness (ft) (est): 0"

Start time 11:15

Sample Time 11:30

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
11:10	—	—		3.4		674		5.05		97.3		8.47		2.9	
11:15			100ml		5.3		786		1.43		97.5		7.46		295
11:20			100ml		5.3		797		.16		58.6		7.28		36.9
11:25			100ml		5.3		796		.11		43.4		7.33		13.4
11:30			100ml		5.3		798		.09		31.6		7.28		15.6

Attachment A – Pore Water Sampling Worksheet

Date: 12/8/20

Location ID: WV/LH-PW 6(A)

Weather Conditions: Cloudy, 38°

Sampler's Name: TAL

Water Depth (ft): 5"

Sampler Screen Interval (ft) ~~(below water surface)~~ top 12"

Sediment Thickness (ft) (est): 4"

Start time 12:10

Sample Time 12:30

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
12:00	—	-		33		674		12.78		216.7		8.42		8.9	
12:10			100		5.5		747		.96		-46.1		7.06		7.97
12:15					5.5		743		.47		-63.4		7.03		3.58
12:20					5.5		743.7		.46		-66.5		7.03		2.07
12:25					5.4		749		.47		-67.3		7.07		.99

Attachment A – Pore Water Sampling Worksheet

Date: 12/8/20 Location ID: WV/LH-PW-6(B)

Weather Conditions: Cloudy, 34° Sampler's Name: TAL

Water Depth (ft): 5" Sampler Screen Interval (~~ft) (below water surface)~~ 24"

Sediment Thickness (ft) (est): 4"

Start time 12:50 Sample Time 13:10

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
12:45	—	—		3.3		674		12.78		216.7		8.42		8.5	
12:50			100ml		6.9		686		1.20		-82.1		7.40		4.06
12:55			100		7.0		695		1.52		-95.1		7.34		1.61
13:00			100		7.0		684		1.67		-86.4		7.33		~~1.84~~ 1.4
13:05			100		7.0		686		1.29		-89.6		7.33		

Attachment A – Pore Water Sampling Worksheet

Date: 12/8/2020

Location ID: HS-PW-8

Weather Conditions: Cloudy, 37

Sampler's Name: TAL

Water Depth (ft): 6"

Sampler Screen Interval (~~ft) (below water surface~~) 12"

Sediment Thickness (ft) (est): 4"

Start time 14:45

Sample Time 15:10

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
14:40	—	—		3.5		682		12.66		25.9		8.85			
14:45	—	—	100 ml		5.5		660		.35		-172		7.89		36.5
14:50	—	—	100 ml		5.6		660		.21		-175		7.6		3.75
14:55	—	—	100		5.5		660		.21		-175		7.6		3.4
15:00	—	—	100		5.5		661		.22		-175.9		7.64		2.5
15:05	—	—	100		5.6		660		0.24		-176.3		7.66		1.25

Attachment A – Pore Water Sampling Worksheet

Date: 12/9/20

Location ID: HS-PW-9

Weather Conditions: Cloudy, ~~33~~ 36°

Sampler's Name: TAL

Water Depth (ft): 7"

Sampler Screen Interval (~~ft) (below water surface)~~ 12"

Sediment Thickness (ft) (est): 2"

Start time 16:25

Sample Time 16:45

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
16:20	—	—		3.5		679		12.48		-13.3		8.8		2.88	
16:25	—	—	100 ml		3.9		668		4.49		-44.9		7.74		18.1
16:30	—	—	100 ml		3.8		683		.93		-79.9		7.82		4.03
16:35	—	—	100 ml		3.8		682		.72		-81.7		7.47		0.80
16:40	—	—	100 ml		3.7		682		.71		-83.6		7.75		.63

Attachment A – Pore Water Sampling Worksheet

Date: 12/9/20

Location ID: WWW-PW-1(B)

Weather Conditions: Sunny, 46°

Sampler's Name: TAL

Water Depth (ft): 5'

Sampler Screen Interval (ft) (~~below water surface~~) 4'

Sediment Thickness (ft) (est): 2.5'

Start time 16:35

Sample Time 16:55

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
16:30	–	–		3.7		654		11.47		4.2		6.9		2.79	
16:35	–	–			4.5		849		.42		-31		7.52		32.3
16:40					4.5		622		.40		-33		7.49		17.5
16:45					4.5		560		.11		-38.2		7.52		9.5
16:50					4.5		450.1		.08		-39.6		7.47		10.8

Attachment A – Pore Water Sampling Worksheet

Date: 12/9/20 Location ID: WWW-PW-1(A)

Weather Conditions: Sunny, 46° Sampler's Name: TAZ

Water Depth (ft): 3" Sampler Screen Interval (ft) ~~(below water surface)~~ 3'

Sediment Thickness (ft) (est): 25'

Start time 15:53 Sample Time 16:15

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
15:45				3.7		654		11.47		4.2		6.9		2.79	
15:55					5.1		837		0.49		-13.6		7.5		10,8
16:00					5.0		841		.43		-24.2		7.47		5.50
16:05					4.9		842		.41		-28.9		7.56		19.3
16:10					4.8		842		.41		-27.2		7.54		13.7

Attachment A – Pore Water Sampling Worksheet

Date: 12/9/20

Location ID: WWW-PW-2(B)

Weather Conditions: Sunny, 46°

Sampler's Name: TAL

Water Depth (ft): 4'1"

Sampler Screen Interval (ft) ~~(below water surface)~~ 3.3'

Sediment Thickness (ft) (est): Sediment/clay - 2'

Start time 15:00

Sample Time 15:20

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)		
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	
14:50 ~~Time~~				3.6		654		11.18		-9.7		8.51		6.06		
15:00	—	—	100 ml		5.5		631		.22		-15.7		6.94		9.34	
15:05	—	—	100 ml		5.6		631		.10		-20.9		6.89		~~9.23~~	2.94
15:10	—	—	100 ml		5.6		631		.11		-23		6.89		1.95	
15:15	—	—	100 ml		5.6		631		.09		-25.4		6.87		1.37	

Attachment A – Pore Water Sampling Worksheet

Date: 12/9/2020 Location ID: WVNW - PW - 2(A)

Weather Conditions: Sunny, 45° Sampler's Name: TAL

Water Depth (ft): 4" Sampler Screen Interval (ft) ~~(below water surface)~~ 2.3'

Sediment Thickness (ft) (est): Sediment / Clay - 2'

Start time 14:20 Sample Time 14:40

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
14:10	—	-		3.6		654		11.17		-9.8		8.51		6.06	
14:20	—	—	100 ml		5.8		597		.80		-29.3		6.93		6.85
14:25	—	-	100 ml		5.7		599		.23		-21.4		6.89		3.44
14:30	—	—	100 ml		5.8		608		.10		-25.4		6.87		2.47
14:35	—	-	100 ml		5.9		613		.19		-28.2		6.87		2.53

Attachment A – Pore Water Sampling Worksheet

Date: 12/9/20 **Location ID:** HS-PW-10(A)

Weather Conditions: Cloudy, 39 **Sampler's Name:** TAL

Water Depth (ft): ~~5~~ 8" **Sampler Screen Interval ~~(ft) (below water surface)~~** 10" + Sediment

Sediment Thickness (ft) (est): 4.5', some clay / mud

Start time 9:45 **Sample Time** 10:05

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
9:39	–	–		3.0	~~6.4~~	649	~~648~~	10.58	~~3.48~~	58.3		8.49	~~7.82~~	2.79	~~3.15~~
9:45	–	–	100 ml		6.4		648		3.48		-89.3		7.82		3.15
9:50	–	–	100ml		6.7		649		.41		-97.4		7.87		0.71
9:55	–	–	100		6.8		649		.20		-101.2		7.72		0.64
10:00					6.7		649		.11		-105.3		7.97		0.26

Attachment A – Pore Water Sampling Worksheet

Date: 12/9/2020 **Location ID:** HS-PW-11(A)

Weather Conditions: Cloudy, 40° **Sampler's Name:** TAL

Water Depth (ft): 4" **Sampler Screen Interval (ft)** ~~(below water surface)~~ 4.5' total depth

Sediment Thickness (ft) (est): 4.2'

Start time 11:15 **Sample Time** 11:35

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
10:40	—	—	-	3.1		657		10.8		82.4		8.48		5.17	
11:15	—	—	100 ml		5.6		624		.51		-101		7.84		13.1
11:20	—	—	100 ml		5.7		623		.18		-108		7.79		7.24
11:25	—	—	100 ml		5.7		624		.11		-112		7.82		5.25
11:30	—	—	100 ml		5.6		625		.08		-114.8		7.85		

Attachment A – Pore Water Sampling Worksheet

Date: 1/26/21

Location ID: HS-PW-~~3~~2.5A

Weather Conditions: snow, low 20's, cloudy

Sampler's Name: Melissa Myers

Water Depth (ft): 6"

Sampler Screen Interval (~~ft) (below water surface)~~ 6-12

Sediment Thickness (ft) (est): 6-12"

Start time 1015 (arrive & setup)

Sample Time 1130

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1110				0.0		623		12.8		481		8.5		6.8	
1115					5.4		466		1.69		240		7.3		3.2
1118					5.5		466		0.57		232		7.3		2.1
1125					5.5		465		0.15		225		7.2		N.R.
1130					5.7		463		0.09		221		7.2		

Attachment A – Pore Water Sampling Worksheet

Date: 11/26/21

Location ID: HS-PW-2.5(B)

Weather Conditions: SNOW

Sampler's Name: Mallory La Rogers

Water Depth (ft): 6"

Sampler Screen Interval ~~(ft) (below water surface)~~: 12-18"

Sediment Thickness (ft) (est): 12-18"

Start time 1155

Sample Time 1215

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1155				0.0		623		12.8		481		8.5		6.8	
1200					7.0		454		1.7		398		7.4		8.0
1205					6.9		464		0.4		385		7.4		3
1210					6.9		465		0.2		380		7.4		3
1215					6.9		466		0.1		378		7.4		3

Attachment A – Pore Water Sampling Worksheet

Date: 1/26/21 Location ID: HS-PW-3(A) & DUP

Weather Conditions: Snowy, cloudy, 28°F Sampler's Name: [illegible]

Water Depth (ft): 6" Sampler Screen Interval ~~(ft) (below water surface)~~ 6-12"

Sediment Thickness (ft) (est): 6-12"

Start time 1410 Sample Time 1430

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1410				0.1		619		13.3		455		8.7		5.3	8
1415					5.0		528		0.88		234		7.3		11
1420					5.0		528		0.22		201		7.2		5.1
1425					5.0		530		0.13		198		7.2		5.7
1430					5.0		531		0.12		197		7.2		3.0

Attachment A – Pore Water Sampling Worksheet

Date: 1/26/21

Location ID: HS-PW-3.5(A) & MS/MSD

Weather Conditions: snow, cloudy, @ 28°

Sampler's Name: Indiyamyers

Water Depth (ft): ~~1~~ 1.5'

Sampler Screen Interval (ft) (below water surface) ~~1-2~~ 10-14

Sediment Thickness (ft) (est): ~~6-12~~ 4"

FB @ 1550

Start time 1515

Sample Time 1540

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1510				0.2		617		15.0		337		8.5		4.2	
1515					3.3	NOT	>10%	difference for all parameters → moved to new spot ~ 5ft downstream							
1520					5.1		720		3.4		228		7.5		5
1525					5.9		780		0.13		258		7.5		2.5
1530					5.2		784		0.10		271		7.5		N.R
1535					5.0		784		0.10		279		7.5		10.6
1540					5.2		781		0.09		295		7.5		12.7

APPENDIX G - WELL SAMPLING WORKSHEET

For use with Peristaltic Pumps

Site Name

Page _____of_____

Date: 12/8/20 Well ID: Area 19-GSI-1

Weather Conditions: cloudy, high 40's

Sampler's Name (Print): Mariayla Myers

Purging Device & Serial # (pump type): GZA-Peri-B

Reference Measuring Point (Top of PVC/Top of Casing): Casing

Well Depth (ft, ref. to measuring point): 12

Screen Interval (ft, ref. to measuring point): 9-12 ft

Samples Collected: PFAS

Initial Water Level (ft, ref. to measuring point): 5.43

Tubing Intake (ft, ref. to measuring point): 10'

Total Purge Volume (gallons): 2.45

PVC/Inner Well Casing ID (inches): 1.25"

Tubing ID (inches): 1/4"

Indicator Parameter Stabilization: yes OR no (circle one)

Two Hour Time Limit Reached ? yes OR no (circle one)

Purging Start Time: 950 (24 hour cycle) Sample Time: 1045 (24 hour cycle) Time at Sample Completion: 1050 (24 hour cycle)

Clock Time (24 HR)	Water Level (ft)	Drawdown (ft)	Cumulative Drawdown (ft)	Pump Speed	Purge Rate (ml/min)	Temp +/- 1 ºC (ºC)	Spec. Cond. +/- 3% (µS/cm)	DO +/- 10% if > 0.5 (mg/L)	pH +/- 0.1 units	ORP +/-10 (mV)	Turbidity +/- 10% if > 5 (NTU)	Comments/Adjustments
955	5.43	0	0	180	300	8.47	278	6.5	7.7	60	123	
1005	5.43	0	0	180	300	8.86	376	6.1	7.0	66	38.5	
1015	5.43	0	0	180	300	8.89	373	6.0	6.9	71	19.4	
1020	5.43	0	0	180	300	8.90	372	6.0	6.9	73	9.2	
1025	5.43	0	0	180	300	8.95	372	6.0	6.9	80	5.75	
1030	5.43	0	0	180	300	8.96	372	6.0	6.9	83	3.76	
1035	5.43	0	0	180	300	8.89	372	6.0	6.9	84	3.0	
1040	5.43	0	0	180	300	8.98	371	6.0	6.9	85	2.7	
FPV (gallons) =	Calculations:											

Notes: 1. All depths in feet below the referenced measuring point, unless specified. 2. "NR" indicates no reading taken. 3. ID = Inside Diameter

4. When recording pH and dissolved oxygen data, only use one decimal place. When recording specific conductance, temperature, turbidity, and ORP data, record only whole numbers. When DO data is less than 0.5 mg/L, data should be recorded as "<0.5" or "less than 0.5". DO values between 0.5 and 1.0 are typically considered stable within +/- 0.1 mg/L. When turbidity data is less than 5 NTU, data should be recorded as "< 5" or "less than 5". Turbidity values between 5 and 10 are typically considered stable within +/- 1 NTU.

Sampler's Signature

5. Tubing Factors - Milliliters to purge standing water in tubing: 1/2" ID: height in ft x 38.6 = ml needed 3/8" ID: height in ft. x 21.7 = ml needed 1/4" ID: height in ft. x 9.8 = ml needed 0.17" ID: height in ft. x 4.5 = ml needed

6. Final Purge Volume (FPV) in gallons = (Total Tubing Length x Tubing Capacity) + (Total Drawdown x Well Capacity) Record N/A in box if not applicable. Note: Include the length of tubing that is outside the well to the Total Tubing Length.

APPENDIX G - WELL SAMPLING WORKSHEET

For use with Peristaltic Pumps

Site Name

Page ____ of ____

Date: 12/8/20 Well ID: ATCA19-GS1-2

Weather Conditions: Cloudy, High 30's

Sampler's Name (Print): Makayla Myers

Purging Device & Serial # (pump type): G2A-Gen-5

Reference Measuring Point (Top of PVC/Top of Casing): Casing

Well Depth (ft, ref. to measuring point): 11.8'

Screen Interval (ft, ref. to measuring point): 8-12

Samples Collected: 10 PFAS

Purging Start Time: 12:55 (24 hour cycle) Sample Time: 1345 (24 hour cycle)

Initial Water Level (ft, ref. to measuring point): 4.85

Tubing Intake (ft, ref. to measuring point): 10'

Total Purge Volume (gallons): 24gal

PVC/Inner Well Casing ID (inches): 1.25"

Tubing ID (inches): 1/4"

Indicator Parameter Stabilization: (yes) OR no (circle one)

Two Hour Time Limit Reached ? yes OR (no) (circle one)

Time at Sample Completion: 1350 (24 hour cycle)

Clock Time (24 HR)	Water Level (ft)	Drawdown (ft)	Cumulative Drawdown (ft)	Pump Speed	Purge Rate (ml/min)	Temp +/- 1 ºC (ºC)	Spec. Cond. +/- 3% (µS/cm)	DO +/- 10% if > 0.5 (mg/L)	pH +/- 0.1 units	ORP +/-10 (mV)	Turbidity +/- 10% if > 5 (NTU)	Comments/Adjustments
1305	5.10	0.25	0.25	180	300	8.0	441	0.6	7.1	-107	61	
1315	5.12	0.02	0.27	170	290	8.4	433	0.3	7.1	-112	20	
1325	5.12	0.0	0.27	170	290	8.5	432	0.4	7.1	-113	11.7	
1330	5.12	0.0	0.27	170	290	8.6	432	0.3	7.1	-102	7	
1335	5.12	0.02	0.29	170	290	8.6	432	0.2	7.0	-98	5	
1338	5.14	0.00	0.29	170	290	8.6	432	0.3	7.0	-97	<5	
1341	5.14	0.0	0.29	170	290	8.6	432	0.2	7.0	-96	<5	

FPV (gallons) = Calculations:

Notes: 1. All depths in feet below the referenced measuring point, unless specified. 2. "NR" indicates no reading taken. 3. ID = Inside Diameter

4. When recording pH and dissolved oxygen data, only use one decimal place. When recording specific conductance, temperature, turbidity, and ORP data, record only whole numbers. When DO data is less than 0.5 mg/L, data should be recorded as "<0.5" or "less than 0.5". DO values between 0.5 and 1.0 are typically considered stable within +/- 0.1 mg/L. When turbidity data is less than 5 NTU, data should be recorded as "< 5" or "less than 5". Turbidity values between 5 and 10 are typically considered stable within +/- 1 NTU.

Sampler's Signature

5. Tubing Factors - Milliliters to purge standing water in tubing: 1/2" ID: height in ft. x 38.6 = ml needed 3/8" ID: height in ft. x 21.7 = ml needed 1/4" ID: height in ft. x 9.8 = ml needed 0.17" ID: height in ft. x 4.5 = ml needed

6. Final Purge Volume (FPV) in gallons = (Total Tubing Length x Tubing Capacity) + (Total Drawdown x Well Capacity) Record N/A in box if not applicable. Note: Include the length of tubing that is outside the well to the Total Tubing Length.

APPENDIX G - WELL SAMPLING WORKSHEET

For use with Peristaltic Pumps

Site Name

Page ____ of ____

Date: 12/8/20 Well ID: Area 19-651-3

Weather Conditions: cloudy, windy, mid 30s

Sampler's Name (Print): Makayla Hughes

Purging Device & Serial # (pump type): GZA-Peri-3B

Reference Measuring Point (Top of PVC/Top of Casing): casing

Well Depth (ft, ref. to measuring point): 11.95'

Screen Interval (ft, ref. to measuring point): 9-12'

Samples Collected: PFAS

Initial Water Level (ft, ref. to measuring point): 4.67

Tubing Intake (ft, ref. to measuring point): 10'

Total Purge Volume (gallons): 24.5

PVC/Inner Well Casing ID (inches): 1.25'

Tubing ID (inches): .25'

Indicator Parameter Stabilization: **yes** OR **no** (circle one)

Two Hour Time Limit Reached ? yes OR no (circle one)

Purging Start Time: 1405 (24 hour cycle) Sample Time: 1445 (24 hour cycle) Time at Sample Completion: 1450 (24 hour cycle)

Clock Time (24 HR)	Water Level (ft)	Drawdown (ft)	Cumulative Drawdown (ft)	Pump Speed	Purge Rate (ml/min)	Temp +/- 1 ºC (ºC)	Spec. Cond. +/- 3% (µS/cm)	DO +/- 10% if > 0.5 (mg/L)	pH +/- 0.1 units	ORP +/-10 (mV)	Turbidity +/- 10% if > 5 (NTU)	Comments/Adjustments
1415	4.93	0.26	0.26	175	200	7.5	182	1.0	9.1	-282	61.1	
1425	4.90	+0.03	0.23	175	200	8.6	300	1.9	8.6	-214	14	
1435	4.90	0.0	0.23	175	200	8.6	350	1.6	7.8	-162	<5	
1440	4.90	0.0	0.23	175	200	8.6	356	1.6	7.6	-171	<5	
1443	4.9	0.0	0.23	175	200	8.6	359	1.6	7.5	~~-166~~ -166	<5	

FPV (gallons) = Calculations:

Notes: 1. All depths in feet below the referenced measuring point, unless specified. 2. "NR" indicates no reading taken 3. ID = Inside Diameter

4. When recording pH and dissolved oxygen data, only use one decimal place. When recording specific conductance, temperature, turbidity, and ORP data, record only whole numbers. When DO data is less than 0.5 mg/L, data should be recorded as "<0.5" or "less than 0.5". DO values between 0.5 and 1.0 are typically considered stable within +/- 0.1 mg/L. When turbidity data is less than 5 NTU, data should be recorded as "< 5" or "less than 5". Turbidity values between 5 and 10 are typically considered stable within +/- 1 NTU.

Sampler's Signature

5. Tubing Factors - Milliliters to purge standing water in tubing: 1/2" ID: height in ft. x 38.6 = ml needed 3/8" ID: height in ft. x 21.7 = ml needed 1/4" ID: height in ft. x 9.8 = ml needed 0.17" ID: height in ft. x 4.5 = ml needed

6. Final Purge Volume (FPV) in gallons = (Total Tubing Length x Tubing Capacity) + (Total Drawdown x Well Capacity) Record N/A in box if not applicable. Note: Include the length of tubing that is outside the well to the Total Tubing Length.

APPENDIX G - WELL SAMPLING WORKSHEET

For use with Peristaltic Pumps

Site Name

Page ____of____

Date: 12/9/20 Well ID: 45-MW-29A

Weather Conditions: cloudy, 40°

Sampler's Name (Print) Makayla Myers

Purging Device & Serial # (pump type): GZA-Peri-03

Reference Measuring Point (Top of PVC/Top of Casing): (casing)

Well Depth (ft, ref. to measuring point): 17'

Screen Interval (ft, ref. to measuring point): 3.5-13.5'

Samples Collected: PFAS

Purging Start Time: 0920 (24 hour cycle) Sample Time: 1020 (24 hour cycle)

Initial Water Level (ft, ref. to measuring point): 6.22'

Tubing Intake (ft, ref. to measuring point): 12'

Total Purge Volume (gallons): 5.5 gal

PVC/Inner Well Casing ID (inches): 2"

Tubing ID (inches): 3/8"

Indicator Parameter Stabilization: yes OR no (circle one)

Two Hour Time Limit Reached ? yes OR no (circle one)

Time at Sample Completion: 1025 (24 hour cycle)

Clock Time (24 HR)	Water Level (ft)	Drawdown (ft)	Cumulative Drawdown (ft)	Pump Speed	Purge Rate (ml/min)	Temp +/- 1 ºC (ºC)	Spec. Cond. +/- 3% (µS/cm)	DO +/- 10% if > 0.5 (mg/L)	pH +/- 0.1 units	ORP +/-10 (mV)	Turbidity +/- 10% if > 5 (NTU)	Comments/Adjustments
930	6.25	0.03	0.03	~~350~~ 200	350	9.7	814	0.2	7.3	-85	59	
940	6.25	0.0	0.03	200	350	9.7	836	0.2	7.0	-67	42	
945	6.25	0.0	0.03	200	350	9.7	845	0.3	7.0	-59	32	
948	6.25	0.0	0.03	200	350	9.7	852	0.2	7.0	-62	23	
952	6.25	0.0	0.03	200	350	9.7	850	0.2	7.0	-65	18	
1000	6.25	0.0	0.03	200	350	9.8	855	0.2	7.0	-70	12	
1005	6.25	0.0	0.03	200	350	9.8	857	0.2	7.0	-72	8	
1008	6.25	0.0	0.03	200	350	9.8	859	0.2	7.0	-69	6	
1011	6.25	0.0	0.03	200	350	9.8	863	0.2	7.0	-75	6	
1014	6.25	0.0	0.03	200	350	9.8	863	0.14	7.0	-77	5	

FPV (gallons) = Calculations:

Notes: 1. All depths in feet below the referenced measuring point, unless specified. 2. "NR" indicates no reading taken. 3. ID = Inside Diameter

4. When recording pH and dissolved oxygen data, only use one decimal place. When recording specific conductance, temperature, turbidity, and ORP data, record only whole numbers. When DO data is less than 0.5 mg/L, data should be recorded as "<0.5" or "less than 0.5". DO values between 0.5 and 1.0 are typically considered stable within +/- 0.1 mg/L. When turbidity data is less than 5 NTU, data should be recorded as "< 5" or "less than 5". Turbidity values between 5 and 10 are typically considered stable within +/- 1 NTU.

Sampler's Signature

5. Tubing Factors - Milliliters to purge standing water in tubing: 1/2" ID: height in ft. x 38.6 = ml needed 3/8" ID: height in ft. x 21.7 = ml needed 1/4" ID: height in ft. x 9.8 = ml needed 0.17" ID: height in ft. x 4.5 = ml needed

6. Final Purge Volume (FPV) in gallons = (Total Tubing Length x Tubing Capacity) + (Total Drawdown x Well Capacity) Record N/A in box if not applicable. Note: Include the length of tubing that is outside the well to the Total Tubing Length.

APPENDIX G - WELL SAMPLING WORKSHEET

For use with Peristaltic Pumps

Site Name

Page ____of____

Date : 12/9/20 Well ID : DEQ-MW-9-57

Weather Conditions : cloudy, 40s

Sampler's Name (Print) Makayla Myers

Purging Device & Serial # (pump type): GZA - PER-3

Reference Measuring Point (Top of PVC/Top of Casing): PVC

Well Depth (ft, ref. to measuring point): 56.7

Screen Interval (ft, ref. to measuring point): 52-57

Samples Collected: PFAS

Purging Start Time : 1100 (24 hour cycle) Sample Time: 1215 (24 hour cycle)

Initial Water Level (ft, ref. to measuring point): 10.85

Tubing Intake (ft, ref. to measuring point): 51.5'

Total Purge Volume (gallons): 4 gal

PVC/Inner Well Casing ID (inches): 2"

Tubing ID (inches): 3/8"

Indicator Parameter Stabilization: ~~yes~~ OR no (circle one)

Two Hour Time Limit Reached ? yes OR (no) (circle one)

Time at Sample Completion: 1220 (24 hour cycle)

Clock Time (24 HR)	Water Level (ft)	Drawdown (ft)	Cumulative Drawdown (ft)	Pump Speed	Purge Rate (ml/min)	Temp +/- 1 ºC (ºC)	Spec. Cond. +/- 3% (µS/cm)	DO +/- 10% if > 0.5 (mg/L)	pH +/- 0.1 units	ORP +/-10 (mV)	Turbidity +/- 10% if > 5 (NTU)	Comments/Adjustments
1115	10.95	0.10	0.10	200	275	10.2	842	1.4	7.5	-38	87	
1125	10.95	0.0	0.10	200	275	10.4	842	1.2	7.5	-82	44	
1140	10.95	0.0	0.10	200	275	11.1	846	1.5	7.5	-96	13	
1155	10.95	0.0	0.10	200	275	10.9	845	1.9	7.5	-109	9	
1200	10.95	0.0	0.10	200	275	10.6	843	2.1	7.5	-93	6	
1205	10.95	0.0	0.10	200	275	10.4	844	0.32	7.5	-107	5	Bubble on D.O. probe
1206	10.95	0.0	0.10	200	275	10.3	846	0.14	7.5	-113	25	
1209	10.95	0.0	0.10	200	275	10.3	850	0.19	7.5	-115	25	
1212	10.95	0.0	0.10	200	275	10.3	851	0.19	7.5	-116	45	

FPV (gallons) = Calculations:

Notes: 1. All depths in feet below the referenced measuring point, unless specified. 2. "NR" indicates no reading taken. 3. ID = Inside Diameter

4. When recording pH and dissolved oxygen data, only use one decimal place. When recording specific conductance, temperature, turbidity, and ORP data, record only whole numbers.
When DO data is less than 0.5 mg/L, data should be recorded as "<0.5" or "less than 0.5". DO values between 0.5 and 1.0 are typically considered stable within +/- 0.1 mg/L.
When turbidity data is less than 5 NTU, data should be recorded as "< 5" or "less than 5". Turbidity values between 5 and 10 are typically considered stable within +/- 1 NTU.

5. Tubing Factors - Milliliters to purge standing water in tubing: 1/2" ID: height in ft. x 38.6 = ml needed 3/8" ID: height in ft. x 21.7 = ml needed 1/4" ID: height in ft. x 9.8 = ml needed 0.17" ID: height in ft. x 4.5 = ml needed

6. Final Purge Volume (FPV) in gallons = (Total Tubing Length x Tubing Capacity) + (Total Drawdown x Well Capacity) Record N/A in box if not applicable. Note: Include the length of tubing that is outside the well to the Total Tubing Length.

Sampler's Signature

APPENDIX E - WELL SAMPLING WORKSHEET

For use with Bladder Pumps

Site Name

Page ____ of ____

Date: 12/9/20 Well ID: HS-MW-19S

Weather Conditions: partly sunny, 40's

Sampler's Name (Print): Makayla Mayers

Purging Device & Serial # (pump type): GZA-1

Reference Measuring Point (Top of PVC/Top of Casing): PVC

Well Depth (ft, ref. to measuring point): 61.4

Screen Interval (ft, ref. to measuring point): 58.4-61.4

PVC/Inner Well Casing ID (inches): 2" Tubing ID (inches): 1/4" & 3/8"

Purging Start Time: 1345 (24 hour cycle) Sample Time: 1440 (24 hour cycle)

Initial Water Level (ft., ref. to measuring point): 37.01

Pump Intake (ft., ref. to measuring point): 60.9

Head Above Pump Intake (ft., ref. measuring point): ~30

Total Purge Volume (gallons): ____

Indicator Parameter Stabilization: **yes** OR **no** (circle one)

Two Hour Time Limit Reached ? yes OR no (circle one)

Cycle Setting should be set to "1"

Samples Collected: PFAS

Time at Sample Completion: 1445 (24 hour cycle)

Clock Time (24 HR.)	Water Level (ft.)	Drawdown (ft.)	Cumulative Drawdown (ft.)	Bladder Refill Time setting	Bladder Discharge Time setting	Pressure (psi)	Purge Rate (ml/min)	Temp. +/- 1 ºC (ºC)	Spec. Cond. +/- 3% (µS/cm)	DO +/- 10% if > 0.5 (mg/L)	pH +/- 0.1 units	ORP +/-10 (mV)	Turbidity +/- 10% if > 5 (NTU)	Comments/Adjustments
1400	37.35	7.34	7.34	20	10	47	300	10.3	762	1.9	7.7	-41	128	
1415	38.10	0.75		20	10	30	150	9.9	759	1.7	7.7	-54	88	pump shutting off
1420	38.43			20	15	30	200	10.0	756	1.0	7.7	-68	83	
1425	38.50			20	15	30	~200	9.9	753	0.7	7.7	-78	67	bubble on D.O. probe
1430	38.45			25	5	60	~150	9.9	751	0.7	7.6	-90	47	
1435	38.29			25	5	50	~150	9.8	749	0.8	7.6	-93	35	
1450	38.28			25	5	50	~150	9.9	748	0.6	7.6	-99	32	
1453	38.49			25	5	50	~150	9.9	747	0.6	7.6	-103	31	
1436	38.50			25	5	50	~150	9.9	747	0.5	7.6	-105	30	
FPV (gallons) =	Calculations:													

Notes: 1. All depths in feet below the referenced measuring point, unless specified. 2. "NR" indicates no reading taken. 3. ID = Inside Diameter

4. When recording pH and dissolved oxygen data, only use one decimal place. When recording specific conductance, temperature, turbidity, and ORP data, record only whole numbers. When DO data is less than 0.5 mg/L, data should be recorded as "<0.5" or "less than 0.5". DO values between 0.5 and 1.0 are typically considered stable within +/- 0.1 mg/L. When turbidity data is less than 5 NTU, data should be recorded as "< 5" or "less than 5". Turbidity values between 5 and 10 are typically considered stable within +/- 1 NTU.

5. Tubing Factors - Milliliters to purge standing water in tubing: 1/2" ID: height in ft. x 38.6 = ml needed 3/8" ID: height in ft. x 21.7 = ml needed 1/4" ID: height in ft. x 9.8 = ml needed 0.17" ID: height in ft. x 4.5 = ml needed

6. Final Purge Volume (FPV) in gallons = (Total Tubing Length x Tubing Capacity) + (Total Drawdown x Well Capacity). Record N/A in box if not applicable. Note: Include the length of tubing that is outside the well to the Total Tubing Length.

MKM

Sampler's Signature

APPENDIX E - WELL SAMPLING WORKSHEET

For use with Bladder Pumps

Site Name

Page ____of____

Date: 12/9/20 Well ID: HS-MW-9D

Weather Conditions: partly sunny, 40's

Sampler's Name (Print): Meredyth Myers

Purging Device & Serial # (pump type): GZA-BPC-38

Reference Measuring Point (Top of PVC/Top of Casing): PVC

Well Depth (ft, ref. to measuring point): 85.9 - 95.9

Screen Interval (ft, ref. to measuring point): 95.9

PVC/Inner Well Casing ID (inches): 2" Tubing ID (inches): 1/4 & 3/8

Purging Start Time: 1570 (24 hour cycle) Sample Time: 1615 (24 hour cycle)

Initial Water Level (ft., ref. to measuring point): 32.80

Pump Intake (ft., ref. to measuring point): 88.4

Head Above Pump Intake (ft., ref. measuring point): 55.6

Total Purge Volume (gallons):

Indicator Parameter Stabilization: yes OR no (circle one)

Two Hour Time Limit Reached ? yes OR no (circle one)

Cycle Setting should be set to "1"

Samples Collected: PFAS

Time at Sample Completion: 1620 (24 hour cycle)

Clock Time (24 HR.)	Water Level (ft.)	Drawdown (ft.)	Cumulative Drawdown (ft.)	Bladder Refill Time setting	Bladder Discharge Time setting	Pressure (psi)	Purge Rate (ml/min)	Temp. +/- 1 ºC (ºC)	Spec. Cond. +/- 3% (µS/cm)	DO +/- 10% if > 0.5 (mg/L)	pH +/- 0.1 units	ORP +/-10 (mV)	Turbidity +/- 10% if > 5 (NTU)	Comments/Adjustments
1530	32.100	+0.2	+0.2	15	10	70	400	10.1	2468	0.43	7.4	-93	246	
1535	32.100	—	+0.2	15	10	70	~400	10.1	2499	0.42	7.4	-98	105	
1545	32.100	-	+0.2	15	10	70	~400	10.0	2508	0.57	7.4	-100	69	
1550	32.100	-	+0.2	15	10	70	~400	10.1	2512	0.36	7.4	-103	39.0	
1600	32.50	+0.1	+0.3	15	10	70	~400	10.1	2509	0.29	7.3	-105.3	25	
1603	32.50	0	+0.30	15	10	70	~400	10.1	2505	0.33	7.3	-106	22	
1606	32.5	—	+0.3	15	10	70	~400	10.0	2509	0.42	7.3	-106	22	
1609	32.5	-	+0.3	15	10	70	~400	9.9	2510	0.46	7.3	-106	20	
FPV (gallons) =	Calculations:													

Notes: 1. All depths in feet below the referenced measuring point, unless specified. 2. "NR" indicates no reading taken. 3. ID = Inside Diameter

4. When recording pH and dissolved oxygen data, only use one decimal place. When recording specific conductance, temperature, turbidity, and ORP data, record only whole numbers. When DO data is less than 0.5 mg/L, data should be recorded as "<0.5" or "less than 0.5". DO values between 0.5 and 1.0 are typically considered stable within +/- 0.1 mg/L. When turbidity data is less than 5 NTU, data should be recorded as "< 5" or "less than 5". Turbidity values between 5 and 10 are typically considered stable within +/- 1 NTU.

5. Tubing Factors - Milliliters to purge standing water in tubing: 1/2" ID: height in ft. x 38.6 = ml needed 3/8" ID: height in ft. x 21.7 = ml needed 1/4" ID: height in ft. x 9.8 = ml needed 0.17" ID: height in ft. x 4.5 = ml needed

6. Final Purge Volume (FPV) in gallons = (Total Tubing Length x Tubing Capacity) + (Total Drawdown x Well Capacity) Record N/A in box if not applicable. Note: Include the length of tubing that is outside the well to the Total Tubing Length.

Meredyth Myers
Sampler's Signature

APPENDIX C

LEVEL 4 DATA VALIDATION MEMORANDUM

ENVIRONMENTAL® STANDARDS

Setting the Standards for Innovative Environmental Solutions

Stage 4 Data Validation Report
Groundwater Surface Water Interface Area
Per- and Polyfluoroalkyl Substances Investigation Program
Sample Delivery Group: WA28027

Introduction

This quality assurance (QA) review is based upon an examination of the data generated from the analyses of the samples collected as part of the Per- and Polyfluoroalkyl Substances (PFAS) Investigation Program at the Wolverine World Wide, Inc.'s (Wolverine's) Groundwater Surface Water Interface Area in Rockford, Michigan, in accordance with the Quality Assurance Project Plan Former Wolverine Tannery, House Street Property, and Wolven/Jewell Area (QAPP; GZA GeoEnvironmental, Inc. [GZA], November 1, 2018; Revision June 2021). The samples were analyzed for select PFAS by Pace Analytical Services, LLC (Pace) of West Columbia, South Carolina. Data were examined to determine compliance relative to Pace's standard operating procedure (SOP) "Determination of Per- and Polyfluoroalkyl Substances (PFAS) by LC/MS/MS (Isotope Dilution) QSM 5.1 Table B-15 (EPA 537 MOD ID)" (Pace Document Number: ME00213-14) and the usability of the analytical results in accordance with the Data Validation SOP for PFAS data for samples generated by this Pace SOP.

The analytical results for the organic target analytes are presented on the validated data summary tables in Section 2 of this report. These validated data summary tables were generated from the GZA database. The "Validation Result," "Validation LOQ" (*i.e.*, the limit of quantitation [LOQ]), and "Validation Detect Flag" fields on the validated data summary tables have been updated to reflect all final data validation qualifiers and results. Validation qualifier codes have been placed in the "Validation Qualifiers" fields on the data tables to enable the data user to quickly assess the qualitative and/or quantitative reliability of a result based on the criteria evaluated during this QA review. Finally, the "Validation Reason Code" field has been populated with codes that indicate the reason for the validation qualifiers. Definitions of the validation qualifiers and reason codes are presented with the validated data summary tables in Section 2.

The data reviewer has included copies of validation forms, quality control (QC) summary forms, and other documentation needed to support the findings in this QA review in the Data Support Documentation (Section 3). The cover sheet for this section is a checklist of the QA procedures required by the protocol and examined in this data review. The Case Narrative and Chain-of-Custody (COC) Record are included in Section 4. Project Correspondence is presented in Section 5.

The nine samples that have undergone a QA review for PFAS are on Table 1.

TABLE 1 – SUMMARY OF SAMPLES REVIEWED

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-PW-2.5 (A)	WA28027-001	Aqueous	1/26/21
HS-PW-2.5 (B)	WA28027-002	Aqueous	1/26/21
HS-PW-3 (A)	WA28027-003	Aqueous	1/26/21
HS-PW-3 (A) DUP (Field Duplicate of HS-PW-3 (A))	WA28027-004	Aqueous	1/26/21
HS-PW-3.5 (A)	WA28027-005	Aqueous	1/26/21
HS-PW-3.5 (A)MS (Matrix Spike)	WA28027-005MS	Aqueous	1/26/21
HS-PW-3.5 (A)MSD (Matrix Spike Duplicate)	WA28027-005MSD	Aqueous	1/26/21
FB-1/26 (Field Blank)	WA28027-006	Aqueous	1/26/21
EB-HT (Equipment Blank)	WA28027-007	Aqueous	1/26/21

Section 1 Quality Assurance Review

The findings offered in this report for analyses that underwent a Stage 4 QA review are based upon a rigorous review of the tabulated summary forms and raw data, including the following checks and QC measures as applicable to this data set:

- Data completeness
- COC Record and sample condition upon laboratory receipt
- Sample preparation and analysis holding times
- Field and laboratory blank analysis results
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses
- Matrix spike/matrix spike duplicate (MS/MSD) analyses
- Surrogate/labeled pre-extraction internal standard recoveries
- Field duplicate precision
- Mass spectrometer tune checks
- Instrument calibration and verification
- Internal standard responses
- Quantitation and qualitative identification

Data were examined to determine compliance and usability of the analytical results relative to the QAPP and SOPs referenced above. Any findings are identified in the sections below.

Data Completeness

The Level 4 data deliverables were prepared by the laboratory and were reviewed by Environmental Standards, Inc. (Environmental Standards). The analytical data package was checked for completeness to ensure that all data requested were actually present in the data deliverables (refer to completeness forms in the Data Support Documentation [Section 3]). The data package was complete with any exceptions noted on the completeness forms.

Chain-of-Custody Record and Sample Condition upon Laboratory Receipt

All sample identifications (IDs) were consistent with the COC Record.

The sample reports were consistent with the analytical request designated on the COC Record.

The samples for PFAS analysis were received in good condition and within the acceptance criterion of ≤ 10°C.

Sample Preparation and Analysis Holding Times

All samples were extracted and analyzed within the QAPP-specified holding times.

Field and Laboratory Blank Analyses

Laboratory blank analyses were performed at the required frequencies. A summary of any positive results observed in the blanks associated with the samples is included in Section 3.

Instrument blanks were analyzed daily, at a minimum, and were evaluated to the LOQ. Qualification of data due to instrument blank contamination was not warranted.

Laboratory method blanks were evaluated to the LOQ for samples prepared within the same preparation batch. Qualification of data due to method blank contamination was not warranted.

Two aqueous field and equipment blanks (samples FB-1/26 and EB-HT) were evaluated to the LOQ for the aqueous samples included in this Sample Delivery Group (SDG). Qualification of aqueous sample data due to field and equipment blank contamination was not warranted.

Laboratory Control Sample/Laboratory Control Sample Duplicate Analyses

An LCS was included in each extraction batch as required.

All LCS percent recoveries (%Rs) were within QC acceptance limits.

In this SDG, the reported 50-150% LCS percent recovery QC acceptance limits were inconsistent with historically reported LCS percent recovery QC acceptance limits of 70-150%. The data reviewer evaluated the data to the historically reported acceptance limits.

Matrix Spike/Matrix Spike Duplicate Analyses

An MS (as well as a laboratory duplicate) was included in the extraction batch associated with samples HS-PW-2.5 (A), HS-PW-2.5 (B), HS-PW-3 (A), and HS-PW-3 (A) DUP; however, it was not evaluated, as it was performed on a sample that was not included in this data set.

An MS/MSD pair was included in the second extraction batch associated with sample HS-PW-3.5 (A). However, according to the Case Narrative, the pre-extraction internal standard (surrogate mix) was double spiked, and insufficient volume was available for a re-extraction, the data was reported as is. Theoretically, the MS/MSD results were approximately half of what they should have been, but due to possibly slight variations in spike volumes, the data reviewer did not assume an extract correction factor of 2 to be applied to the results. Based on professional judgment, the data reviewer did not use this erroneously spiked MS/MSD pair to qualify data. The data reviewer was unable to evaluate potential matrix interference within the extraction batches due to this issue.

In this SDG, the reported 50-150% MS/MSD percent recovery QC acceptance limits were inconsistent with historically reported MS/MSD percent recovery QC acceptance limits of 70-150%. The data reviewer evaluated the data to the historically reported acceptance limits.

Surrogate/Labeled Pre-extraction Internal Standard Recoveries

Surrogates were spiked prior to extraction and used as internal standards for the quantitation of target PFAS results. All surrogate (labeled pre-extraction internal standard) %Rs were within the QAPP acceptance criterion.

In this SDG, the reported 25-150% (10-150% for PFOSA) surrogate percent recovery acceptance limits were inconsistent with historically reported surrogate percent recovery acceptance limits of 50-150%. The data reviewer evaluated the data to the historically reported acceptance limits.

Field Duplicate Analyses

One field duplicate pair was collected and analyzed for PFAS with the aqueous samples in this data set (refer to Table 1). All field duplicate analyses were within QC acceptance limits (relative percent difference was < 30% when both of the results were > 5× the LOQ, or the difference was < 1× the LOQ when at least one result was ≤ 5× the LOQ).

Mass Spectrometer Tune Checks

The liquid chromatography/tandem mass spectrometry (LC/MS/MS) tune check was performed at the required frequency and met acceptance criteria.

Instrument Calibration and Verification

Instrument calibration, second-source initial calibration verification (ICV), and continuing calibration verification (CCV) analyses were performed at the required frequency and met acceptance criteria (“not-detected” results associated with high recoveries are excluded).

Pre-injection Internal Standard Responses

Pre-injection internal standards were spiked prior to injection. All pre-injection internal standard responses were within QC acceptance criteria (50-150% of the response in the associated mid-point of the initial calibration or associated CCV on days when the initial calibration was not performed).

Quantitation and Qualitative Identification

The laboratory-reported values (*e.g.*, sample results, instrument calibration results) were verified by recalculating the values using the raw instrument data provided by the laboratory. In addition, the raw data chromatograms were checked to ensure that the laboratory-reported analytes were correctly identified and quantitated. These checks were performed on a fraction of the results. Additional results were verified and/or recalculated if any issues were noted with the initial checks. Issues were not noted, with the exception of the following.

Samples HS-PW-2.5 (A), HS-PW-3 (A), and HS-PW-3 (A) DUP were reported from initial dilutions (5×) due to the high levels of PFAS present, with no undiluted analyses provided. As the laboratory raised the LOQs accordingly, qualification of the data was not warranted.

The reported positive results for the analyte in the following samples should be considered estimated. In the chromatograms for these samples, the composition of the linear and branched isomer peaks included in the response for the analyte in the sample was significantly different than the composition of the calibration standard.

Samples	Analyte	Qualifier	Validation Reason Code
HS-PW-2.5 (A), HS-PW-2.5 (B), HS-PW-3 (A), HS-PW-3 (A) DUP, and HS-PW-3.5 (A)	PFOS	J	LB

The compounds on the table below were reported by the laboratory with LOQs inconsistent with historically reported data. The data reviewer evaluated the raw data and determined that the change in LOQ was not impactful, as the compounds were “not-detected” to the historic LOQs; or were greater than the reported elevated LOQs.

Analyte(s)	Reported LOQ (ng/L)	Historically Reported LOQ (ng/L)
6:2 FTS and 8:2 FTS	8	4
PFOA	4	2

Conclusions

This QA review has identified a few aspects of the data that required qualification. The analytical data should be considered acceptable for use unless otherwise indicated in the QA review. Positive results that demonstrate a combination of low bias ("J-"), high bias ("J+"), and/or bias of unknown direction ("J") have been flagged "J" (unknown direction of bias) on the data tables as the direction of bias could not be assigned. In order to use any of the data, the data user should understand the qualifications and limitations specified in this QA review.

Report Prepared by,

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Report Reviewed by,

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Report Reviewed and Approved by,

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Date: 11/23/21

SECTION 2

ANALYTICAL RESULTS

Lab Sample ID	WA28027-001
Sample Name	HS-PW-2.5 (A)
Sample Type	N
Sample Date	1/26/2021 11:30:00 AM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-	763051-92-9	Initial	5		35	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	Initial	5		35	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	Initial	5		35	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	Initial	5		35	ng/l	U	U	N	
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	Initial	5		35	ng/l	U	U	N	
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-	756426-58-1	Initial	5		35	ng/l	U	U	N	
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	Initial	5		35	ng/l	U	U	N	
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	Initial	5		35	ng/l	U	U	N	
	N-methylperfluoro-1-octanesulfonamidoacetic acid	2355-31-9	Initial	5		35	ng/l	U	U	N	
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	Initial	5		18	ng/l	U	U	N	
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	Initial	5		18	ng/l	U	U	N	
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	Initial	5		18	ng/l	U	U	N	
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	Initial	5		18	ng/l	U	U	N	
	Perfluorobutanoic Acid (PFBA)	375-22-4	Initial	5	21	18	ng/l			Y	
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	Initial	5		18	ng/l	U	U	N	
	Perfluorodecanoic acid (PFDA)	335-76-2	Initial	5		18	ng/l	U	U	N	
	Perfluorododecanoic acid (PFDoA)	307-55-1	Initial	5		18	ng/l	U	U	N	
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	Initial	5		18	ng/l	U	U	N	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	Initial	5		18	ng/l	U	U	N	
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	Initial	5	25	18	ng/l			Y	
	Perfluorohexanoic acid (PFHxA)	307-24-4	Initial	5	33	18	ng/l			Y	
	Perfluorononanoic acid (PFNA)	375-95-1	Initial	5		18	ng/l	U	U	N	
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Initial	5	820	18	ng/l		J	Y	LB
	Perfluorooctanoic acid (PFOA)	335-67-1	Initial	5	54	18	ng/l			Y	
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	Initial	5	27	18	ng/l			Y	

Lab Sample ID	WA28027-001
Sample Name	HS-PW-2.5 (A)
Sample Type	N
Sample Date	1/26/2021 11:30:00 AM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	Initial	5		18	ng/l	U	U	N	
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	Initial	5		18	ng/l	U	U	N	
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	Initial	5		18	ng/l	U	U	N	

Lab Sample ID	WA28027-002
Sample Name	HS-PW-2.5 (B)
Sample Type	N
Sample Date	1/26/2021 12:15:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-	763051-92-9	Initial	1		7.1	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	Initial	1		7.1	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	Initial	1		7.1	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	Initial	1		7.1	ng/l	U	U	N	
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	Initial	1		7.1	ng/l	U	U	N	
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-	756426-58-1	Initial	1		7.1	ng/l	U	U	N	
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	Initial	1		7.1	ng/l	U	U	N	
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	Initial	1		7.1	ng/l	U	U	N	
	N-methylperfluoro-1-octanesulfonamidoacetic acid	2355-31-9	Initial	1		7.1	ng/l	U	U	N	
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	Initial	1		3.5	ng/l	U	U	N	
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	Initial	1		3.5	ng/l	U	U	N	
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	Initial	1	5.6	3.5	ng/l			Y	
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	Initial	1	7.5	3.5	ng/l			Y	
	Perfluorobutanoic Acid (PFBA)	375-22-4	Initial	1	9.1	3.5	ng/l			Y	
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	Initial	1		3.5	ng/l	U	U	N	
	Perfluorodecanoic acid (PFDA)	335-76-2	Initial	1		3.5	ng/l	U	U	N	
	Perfluorododecanoic acid (PFDoA)	307-55-1	Initial	1		3.5	ng/l	U	U	N	
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	Initial	1	7.4	3.5	ng/l			Y	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	Initial	1	5.6	3.5	ng/l			Y	
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	Initial	1	20	3.5	ng/l			Y	
	Perfluorohexanoic acid (PFHxA)	307-24-4	Initial	1	15	3.5	ng/l			Y	
	Perfluorononanoic acid (PFNA)	375-95-1	Initial	1		3.5	ng/l	U	U	N	
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Initial	1	560	3.5	ng/l		J	Y	LB
	Perfluorooctanoic acid (PFOA)	335-67-1	Initial	1	25	3.5	ng/l			Y	
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	Initial	1	11	3.5	ng/l			Y	

Lab Sample ID	WA28027-002
Sample Name	HS-PW-2.5 (B)
Sample Type	N
Sample Date	1/26/2021 12:15:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	Initial	1		3.5	ng/l	U	U	N	
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	Initial	1		3.5	ng/l	U	U	N	
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	Initial	1		3.5	ng/l	U	U	N	

Lab Sample ID	WA28027-003
Sample Name	HS-PW-3 (A)
Sample Type	N
Sample Date	1/26/2021 2:30:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-	763051-92-9	Initial	5		37	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	Initial	5		37	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	Initial	5		37	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	Initial	5		37	ng/l	U	U	N	
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	Initial	5		37	ng/l	U	U	N	
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-	756426-58-1	Initial	5		37	ng/l	U	U	N	
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	Initial	5		37	ng/l	U	U	N	
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	Initial	5		37	ng/l	U	U	N	
	N-methylperfluoro-1-octanesulfonamidoacetic acid	2355-31-9	Initial	5		37	ng/l	U	U	N	
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	Initial	5		19	ng/l	U	U	N	
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	Initial	5		19	ng/l	U	U	N	
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	Initial	5		19	ng/l	U	U	N	
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	Initial	5		19	ng/l	U	U	N	
	Perfluorobutanoic Acid (PFBA)	375-22-4	Initial	5	21	19	ng/l			Y	
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	Initial	5		19	ng/l	U	U	N	
	Perfluorodecanoic acid (PFDA)	335-76-2	Initial	5		19	ng/l	U	U	N	
	Perfluorododecanoic acid (PFDoA)	307-55-1	Initial	5		19	ng/l	U	U	N	
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	Initial	5	19	19	ng/l			Y	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	Initial	5		19	ng/l	U	U	N	
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	Initial	5	28	19	ng/l			Y	
	Perfluorohexanoic acid (PFHxA)	307-24-4	Initial	5	41	19	ng/l			Y	
	Perfluorononanoic acid (PFNA)	375-95-1	Initial	5		19	ng/l	U	U	N	
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Initial	5	900	19	ng/l		J	Y	LB
	Perfluorooctanoic acid (PFOA)	335-67-1	Initial	5	77	19	ng/l			Y	
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	Initial	5	23	19	ng/l			Y	

Lab Sample ID	WA28027-003
Sample Name	HS-PW-3 (A)
Sample Type	N
Sample Date	1/26/2021 2:30:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	Initial	5		19	ng/l	U	U	N	
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	Initial	5		19	ng/l	U	U	N	
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	Initial	5		19	ng/l	U	U	N	

Lab Sample ID	WA28027-004
Sample Name	HS-PW-3 (A) DUP
Sample Type	N
Sample Date	1/26/2021 2:30:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-	763051-92-9	Initial	5		35	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	Initial	5		35	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	Initial	5		35	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	Initial	5		35	ng/l	U	U	N	
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	Initial	5		35	ng/l	U	U	N	
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-	756426-58-1	Initial	5		35	ng/l	U	U	N	
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	Initial	5		35	ng/l	U	U	N	
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	Initial	5		35	ng/l	U	U	N	
	N-methylperfluoro-1-octanesulfonamidoacetic acid	2355-31-9	Initial	5		35	ng/l	U	U	N	
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	Initial	5		17	ng/l	U	U	N	
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	Initial	5		17	ng/l	U	U	N	
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	Initial	5		17	ng/l	U	U	N	
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	Initial	5		17	ng/l	U	U	N	
	Perfluorobutanoic Acid (PFBA)	375-22-4	Initial	5	20	17	ng/l			Y	
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	Initial	5		17	ng/l	U	U	N	
	Perfluorodecanoic acid (PFDA)	335-76-2	Initial	5		17	ng/l	U	U	N	
	Perfluorododecanoic acid (PFDoA)	307-55-1	Initial	5		17	ng/l	U	U	N	
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	Initial	5	18	17	ng/l			Y	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	Initial	5		17	ng/l	U	U	N	
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	Initial	5	26	17	ng/l			Y	
	Perfluorohexanoic acid (PFHxA)	307-24-4	Initial	5	38	17	ng/l			Y	
	Perfluorononanoic acid (PFNA)	375-95-1	Initial	5		17	ng/l	U	U	N	
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Initial	5	900	17	ng/l		J	Y	LB
	Perfluorooctanoic acid (PFOA)	335-67-1	Initial	5	71	17	ng/l			Y	
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	Initial	5	22	17	ng/l			Y	

Lab Sample ID	WA28027-004
Sample Name	HS-PW-3 (A) DUP
Sample Type	N
Sample Date	1/26/2021 2:30:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	Initial	5		17	ng/l	U	U	N	
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	Initial	5		17	ng/l	U	U	N	
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	Initial	5		17	ng/l	U	U	N	

Lab Sample ID	WA28027-005
Sample Name	HS-PW-3.5 (A)
Sample Type	N
Sample Date	1/26/2021 3:40:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-	763051-92-9	Initial	1		7.2	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	Initial	1		7.2	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	Initial	1		7.2	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	Initial	1		7.2	ng/l	U	U	N	
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	Initial	1		7.2	ng/l	U	U	N	
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-	756426-58-1	Initial	1		7.2	ng/l	U	U	N	
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	Initial	1		7.2	ng/l	U	U	N	
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	Initial	1		7.2	ng/l	U	U	N	
	N-methylperfluoro-1-octanesulfonamidoacetic acid	2355-31-9	Initial	1		7.2	ng/l	U	U	N	
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	Initial	1		3.6	ng/l	U	U	N	
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	Initial	1		3.6	ng/l	U	U	N	
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	Initial	1	17	3.6	ng/l			Y	
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	Initial	1	32	3.6	ng/l			Y	
	Perfluorobutanoic Acid (PFBA)	375-22-4	Initial	1	9.5	3.6	ng/l			Y	
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	Initial	1		3.6	ng/l	U	U	N	
	Perfluorodecanoic acid (PFDA)	335-76-2	Initial	1		3.6	ng/l	U	U	N	
	Perfluorododecanoic acid (PFDoA)	307-55-1	Initial	1		3.6	ng/l	U	U	N	
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	Initial	1		3.6	ng/l	U	U	N	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	Initial	1	7.2	3.6	ng/l			Y	
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	Initial	1	19	3.6	ng/l			Y	
	Perfluorohexanoic acid (PFHxA)	307-24-4	Initial	1	12	3.6	ng/l			Y	
	Perfluorononanoic acid (PFNA)	375-95-1	Initial	1		3.6	ng/l	U	U	N	
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Initial	1	92	3.6	ng/l		J	Y	LB
	Perfluorooctanoic acid (PFOA)	335-67-1	Initial	1	21	3.6	ng/l			Y	
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	Initial	1	6	3.6	ng/l			Y	

Lab Sample ID	WA28027-005
Sample Name	HS-PW-3.5 (A)
Sample Type	N
Sample Date	1/26/2021 3:40:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	Initial	1		3.6	ng/l	U	U	N	
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	Initial	1		3.6	ng/l	U	U	N	
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	Initial	1		3.6	ng/l	U	U	N	

Lab Sample ID	WA28027-006
Sample Name	FB-1/26
Sample Type	FB
Sample Date	1/26/2021 3:50:00 PM
Sample Matrix	WQ
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-	763051-92-9	Initial	1		7.4	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	Initial	1		7.4	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	Initial	1		7.4	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	Initial	1		7.4	ng/l	U	U	N	
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	Initial	1		7.4	ng/l	U	U	N	
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-	756426-58-1	Initial	1		7.4	ng/l	U	U	N	
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	Initial	1		7.4	ng/l	U	U	N	
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	Initial	1		7.4	ng/l	U	U	N	
	N-methylperfluoro-1-octanesulfonamidoacetic acid	2355-31-9	Initial	1		7.4	ng/l	U	U	N	
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	Initial	1		3.7	ng/l	U	U	N	
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	Initial	1		3.7	ng/l	U	U	N	
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	Initial	1		3.7	ng/l	U	U	N	
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	Initial	1		3.7	ng/l	U	U	N	
	Perfluorobutanoic Acid (PFBA)	375-22-4	Initial	1		3.7	ng/l	U	U	N	
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	Initial	1		3.7	ng/l	U	U	N	
	Perfluorodecanoic acid (PFDA)	335-76-2	Initial	1		3.7	ng/l	U	U	N	
	Perfluorododecanoic acid (PFDoA)	307-55-1	Initial	1		3.7	ng/l	U	U	N	
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	Initial	1		3.7	ng/l	U	U	N	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	Initial	1		3.7	ng/l	U	U	N	
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	Initial	1		3.7	ng/l	U	U	N	
	Perfluorohexanoic acid (PFHxA)	307-24-4	Initial	1		3.7	ng/l	U	U	N	
	Perfluorononanoic acid (PFNA)	375-95-1	Initial	1		3.7	ng/l	U	U	N	
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Initial	1		3.7	ng/l	U	U	N	
	Perfluorooctanoic acid (PFOA)	335-67-1	Initial	1		3.7	ng/l	U	U	N	
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	Initial	1		3.7	ng/l	U	U	N	

Lab Sample ID	WA28027-006
Sample Name	FB-1/26
Sample Type	FB
Sample Date	1/26/2021 3:50:00 PM
Sample Matrix	WQ
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	Initial	1		3.7	ng/l	U	U	N	
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	Initial	1		3.7	ng/l	U	U	N	
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	Initial	1		3.7	ng/l	U	U	N	

Lab Sample ID	WA28027-007
Sample Name	EB-HT
Sample Type	EB
Sample Date	1/26/2021 5:05:00 PM
Sample Matrix	WH
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-	763051-92-9	Initial	1		8.1	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	Initial	1		8.1	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	Initial	1		8.1	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	Initial	1		8.1	ng/l	U	U	N	
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	Initial	1		8.1	ng/l	U	U	N	
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-	756426-58-1	Initial	1		8.1	ng/l	U	U	N	
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	Initial	1		8.1	ng/l	U	U	N	
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	Initial	1		8.1	ng/l	U	U	N	
	N-methylperfluoro-1-octanesulfonamidoacetic acid	2355-31-9	Initial	1		8.1	ng/l	U	U	N	
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	Initial	1		4	ng/l	U	U	N	
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	Initial	1		4	ng/l	U	U	N	
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	Initial	1		4	ng/l	U	U	N	
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	Initial	1		4	ng/l	U	U	N	
	Perfluorobutanoic Acid (PFBA)	375-22-4	Initial	1		4	ng/l	U	U	N	
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	Initial	1		4	ng/l	U	U	N	
	Perfluorodecanoic acid (PFDA)	335-76-2	Initial	1		4	ng/l	U	U	N	
	Perfluorododecanoic acid (PFDoA)	307-55-1	Initial	1		4	ng/l	U	U	N	
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	Initial	1		4	ng/l	U	U	N	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	Initial	1		4	ng/l	U	U	N	
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	Initial	1		4	ng/l	U	U	N	
	Perfluorohexanoic acid (PFHxA)	307-24-4	Initial	1		4	ng/l	U	U	N	
	Perfluorononanoic acid (PFNA)	375-95-1	Initial	1		4	ng/l	U	U	N	
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Initial	1		4	ng/l	U	U	N	
	Perfluorooctanoic acid (PFOA)	335-67-1	Initial	1		4	ng/l	U	U	N	
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	Initial	1		4	ng/l	U	U	N	

Lab Sample ID	WA28027-007
Sample Name	EB-HT
Sample Type	EB
Sample Date	1/26/2021 5:05:00 PM
Sample Matrix	WH
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	Initial	1		4	ng/l	U	U	N	
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	Initial	1		4	ng/l	U	U	N	
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	Initial	1		4	ng/l	U	U	N	

SECTION 3

DATA SUPPORT DOCUMENTATION

ENVIRONMENTAL STANDARDS

HI-RES AND PFAS ORGANIC ANALYSIS SUPPORT DOCUMENTATION

Client Name:	WWW	EnvStd Project Manager:	Jared A
Site/Project Name:	Groundwater Surface Water Interface Area	Reviewed by:	Jared A
Job Number/Task/Subtask:	20219475.A000/00007/01	Approved by:	Meg M
Laboratory/Location:	Pace SC	Completion Date:	5/2021
SDG:	WA28027	Validation Level:	L4
Sample Collection Dates:	1/26/21		

The following table indicates criteria that were examined, the identified problems, and support documentation attachments.

	Criteria Examined in Detail **Note:** All items examined have been included in the Support Document unless otherwise noted.							Problems Identified						
	Check (√) if Yes or Footnote Letter for Comments Below													
Parameter/ Method	PFAS							PFAS						
Condition Upon Receipt	X													
Sample Preservation	X													
Holding Times	X													
Blank Analysis Results	X													
Laboratory Control Sample/Laboratory Fortified Blank/ On-going Precision and Recovery Standard	X													
Surrogates														
PFAS Pre-Extraction Internal Standards	X													
Laboratory Duplicate														
Field Duplicate	X													
Matrix Spike/Matrix Spike Duplicate	X													
Sample Preparation	X													
Mass Tuning	X													
Initial Calibration	X													
Second-Source Calibration Verification	X													
PFAS Signal Suppression Check	X													
Peak Asymmetry	X													
Continuing Calibrations	X													
Resolution Check Standards	X													
Detection Limit/Sensitivity	X													
Post-Extraction Internal Standards														
Quantitation of Results	X													
Linear/Branched Identification/Quantitation	X							X						
Qualitative Identification	X													
2,3,7,8-TCDD – 2nd column confirmation														
PFAS Ion Transition Ratio/Hi-Res Ion Ratio	X													
Hi-Res Lock Mass Monitoring														
Dioxin/Furan Chlorodiphenyl Ethers Monitoring														
Analytical Sequence	X													
Percent Solids														
Deliverable was Complete	X													
Others:														

Comments: Qualitative Identification and Quantitation of Results are not included in the Support Documentation unless a problem was identified.

WWW Data Package Deliverable Checklist
Pace SC EPA 537 MOD ID

Reviewer: JKA	Laboratory:			Project: Groundwater Surface Water Interface Area
Date of Review: 5/2021	Pace SC			SDG#: WA28027
Items	**YES**	**NO**	**N/A**	**Comments**
1. Laboratory Case Narrative	X			
2. Chain-of-Custody	X			
3. Sample Receipt Checklist	X			
4. Sample Results Summary (Form 1)	X			
A. Sample Raw Data	X			
B. Correct Reporting Limits?		X		Evaluated to historically reported LOQs
C. All analytes requested are reported?	X			
5. Surrogate (Pre-Extraction Internal Standard) Summary (Form 2)	X			
A. Correct Recovery Limits?		X		Evaluated to historically reported recovery limits
6. MS/MSD Summary (Form 3A)	X			
A. MS/MSD Raw Data	X			
B. Correct MS/MSD Recovery and RPD Limits?		X		Evaluated to historically reported recovery limits
4. LCS/LCSD Summary (Form 3B)	X			
A. LCS/LCSD Raw Data	X			
B. Correct LCS/LCSD Recovery and RPD Limits?		X		Evaluated to historically reported recovery limits
5. Blank Summary and Association (Form 4)	X			
A. Blank Raw Data	X			
6. Internal Standard Summary (Form 8)			X	Laboratory no longer provides (see Case Narrative)
A. Correct Internal Standard Limits?			X	
7. Initial Calibration Summary - Target Analytes	X			
A. Initial Calibration Summary - Surrogates	X			
B. Initial Calibration Raw Data	X			
C. Qualitative Linear/Branched PFOA Standard Raw Data	X			
8. Initial Calibration Verification Summary	X			
A. Initial Calibration Verification Raw Data	X			
9. Continuing Calibration Verification Summary	X			
A. Daily Instrument Sensitivity Check	X			
B. Continuing Calibration Verification Raw Data	X			
10. Tune Data	X			
11. Instrument Blank Raw Data	X			
12. Analytical Sequence Logs	X			
13. Extraction Logs	X			
14. Percent Solids Raw Data			X	
15. Standard Preparation Sheets	X			
16. Certificates of Analysis	X			
17. Other				

BLANK ANALYSIS RESULTS FOR ORGANIC PARAMETERS

Fraction	Matrix (Aq., S)	Blank Type (1)	Blank Sample ID	Contaminant	Concentration ng/L	Qualification limit	
						5×	10×
PFAS			all WA28027 blanks	none			

1 - MB = Method Blank; TB = Trip Blank; EB = Equipment Blank; FB = Field Blank; IB = Instrument Blank; RB = Rinse Blank

Notes: _____

** Columns G and H contains formulas

ENVIRONMENTAL STANDARDS, INC.
EVALUATION OF DUPLICATE RESULTS

Matrix: (•) Aqueous ( ) Non-aq.
Reporting Level: (•) MDL ( ) QL
Units: ng/L

PRECISION OBJECTIVES:
If Both Results ≥ 5 × Their QL, RPD ≤: 30
If Either Result < 5 × Its QL, Dif. ≤: 1.0 **× Highest QL**

Sample ID:	HS-PW-3 (A)				**Duplicate Sample ID:**	HS-PW-3 (A) DUP					
Analyte	**Sample Concentration**	**Qual**	**QL**	**MDL**	**Duplicate Concentration**	**Qual**	**QL**	**MDL**	**Difference**	**RPD**	**Flag**
PFHpS	19		19	NA	18		17	NA	1	NA	
PFHxS	28		19	NA	26		17	NA	2	NA	
PFBA	21		19	NA	20		17	NA	1	NA	
PFHxA	41		19	NA	38		17	NA	3	NA	
PFOA	77		19	NA	71		17	NA	6	NA	
PFPeA	23		19	NA	22		17	NA	1	NA	
PFOS	900		19	NA	900		17	NA	NA	0%	

NOTES:

Qual: Qualifier(s) based on evaluation(s) other than Total/ vs. Dissolved comparison, if applicable (J, U, U* or B)
RPD: Relative Percent Difference
QL: Quantitation Limit
MDL: Method Detection Limit
RL: Reporting Limit. RL = QL for QL reporting and MDL for MDL reporting
J: The analyte concentration should be considered estimated
U: The analyte was not detected in the sample at or above the RL indicated. The RL will be used for comparison purposes.
UJ: The analyte was not detected in the sample at or above the Reporting Limit Indicated. The RL is approximate.
R: The analyte was analyzed for and detected, but sample results are unreliable. The presence or absence of the analyte cannot be verified.
UR: The analyte was analyzed for and not detected, but the determination that the analyte was not present in the sample is unreliable. The presence or absence of the analyte cannot be verified.
U* The result was blank qualified. The RL will be used for comparison purposes.
NA: The MDL (for QL reporting), RPD or Difference is not applicable

Comments:

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-001
Description: HS-PW-2.5 (A)
Matrix: Aqueous
Date Sampled: 01/26/2021 1130
Date Received: 01/28/2021

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	5	02/08/2021 2027	JJG	02/04/2021 1209	81803

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		35	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		35	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		35	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		35	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		35	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		35	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		35	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		35	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		35	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		18	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	25	✓	18	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	21	✓	18	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	33		18	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	54		18	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	27		18	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		18	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	820	J LB	18	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		97	25-150
13C2_6:2FTS		90	25-150
13C2_8:2FTS		102	25-150
13C2_PFDoA		94	25-150
13C2_PFTeDA		91	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		100	25-150
13C3-HFPO-DA		101	25-150
13C4_PFBA		99	25-150
13C4_PFHpA		98	25-150
13C5_PFHxA		97	25-150
13C5_PFPeA		98	25-150
13C6_PFDA		92	25-150
13C7_PFUdA		97	25-150

all "surrogate" results evaluated 50-150 as historically reported. all acceptable

6:2 FTS, 8:2 FTS, and PFOA LOQs are twice that of historically reported LOQs. The data reviewer confirmed in the raw data that this increase of LOQ had no impact, as the samples had no positive results for the compounds, or the result of the compound was greater than the LOQ.

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-001
Description: HS-PW-2.5 (A)
Matrix: Aqueous
Date Sampled: 01/26/2021 1130
Date Received: 01/28/2021

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		103	25-150
13C8_PFOS		92	25-150
13C8_PFOSA		97	10-150
13C9_PFNA		93	25-150
d5-EtFOSAA		96	25-150
d3-MeFOSAA		100	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File:	\\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821053.d		
Injection Date:	08-Feb-2021 20:27:25	Injection Vol:	10.0 uL
Sample Type:	Client	Auto Sampler:	46
Lab Sample ID:	WA28027-001	Lab Prep. Batch:	81803
Client ID:	HS-PW-2.5 (A)	Sample Group:	WA28027
Sample Info:	WA28027-001,5	Misc. Info:	
Inst. ID:	LCMSMS02	Operator:	Stephen E. Somerville
Method Name:	LCMSMS02_PFAS-ID	Version:	2020-09-22 16:12:14
Calib Method:	PFAS-ID	Lock State:	Unlocked
Quant Method:	IsoDil	Integrator:	picker
Final Conc.:	Amt * DF * CF	Matrix/Level:	Aqueous

Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0354610

Name	Value	Units	Description
DF	5		Dilution Factor
VF	10000	ul	Final Volume
VI	282	ml	Initial Sample Volume
AlsDf	1		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.731	1.742	0	625857	24	>100:1			1100.00	937.72	99.4	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													
212.9 > 168.9	46	1.737	1.742	0/0	69617	23	31:1			119.21	21.137		
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.120	2.119	1	595561	17	>100:1			1100.00	940.18	98.4	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													
262.9 > 218.9	50	2.130	2.119	1/0	83471	17	26:1			150.07	26.608		
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.183	2.182	1	186325	20	>100:1			1100.00	973.90	95.8	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													J
298.9 > 80	44	2.183	2.182	1/0	11609	19	56:1	Target = 3.82	✓	57.595	10.212		
298.9 > 99	44	2.172	2.182		4155	19	15:1	2.79 (1.91-5.73)					
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													J
349 > 80	44	2.505	2.513	0/-1	4873	24	30:1	Target = 3.03	✓	34.244	6.0716		
349 > 99	44	2.496	2.513		1771	13	9.5:1	2.75 (1.51-4.54)					
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.442	2.441	1	103793	20	>100:1			5500.00	4664.51	96.8	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.441		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.478	2.477	1	671099	19	>100:1			1100.00	973.61	96.9	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													
313 > 269	49	2.478	2.477	1/0	114049	20	>100:1	Target = 18.18	✓	186.71	33.105		
313 > 119	49	2.478	2.477		5692	18	56:1	20.03 (9.09-27.28)					
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.583	2.590	0	1211721	21	>100:1			5500.00	5024.88	101	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.590		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.837	2.845	0	519891	20	>100:1			1100.00	987.03	97.7	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													J
363 > 319	47	2.837	2.836	1/1	39181	19	39:1	Target = 3.91		76.773	13.612		
363 > 169	47	2.837	2.836		9371	16	31:1	4.18 (1.95-5.86)					
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.855	2.863	0	135808	21	>100:1			1100.00	1025.02	99.8	
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													
399 > 80	45	2.855	2.854	1/1	19354	30	>100:1	Target = 3.01	0.11	140.15	24.849		
399 > 99	45	2.855	2.854		5650	27	38:1	3.42 (1.50-4.52)	0.05				
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.880		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													J
449 > 80	45	3.223	3.229	0/0	7505	22	19:1	Target = 3.08		63.332	11.229		
449 > 99	45	3.216	3.229		2194	14	14:1	3.42 (1.54-4.63)					
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.189	3.202	0	77330	24	>100:1			5500.00	4607.76	90.3	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.195		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.216	3.222	0	540156	24	>100:1			1100.00	1047.72	103	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.216	3.222	0/0	157384	35	60:1	Target = 3.13	0.12	303.69	53.846		M
413 > 169	53	3.209	3.222		53137	39	>100:1	2.96 (1.56-4.70)	0.14				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.592	3.599	0	112188	23	>100:1			1100.00	972.02	91.7	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													
499 > 80	54	3.592	3.599	0/0	614297	59	>100:1	Target = 3.63	0.89	4608.18	817.05		M
499 > 99	54	3.592	3.599		171660	38	>100:1	3.57 (1.81-5.45)	0.29				
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.817		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.939		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.257		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.405		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.600	3.607	0	633967	21	>100:1			1100.00	982.13	93.1	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.599		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.915	3.922	0	270964	19	>100:1			1100.00	1079.66	97.1	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.931		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.948	3.939	1	79976	19	>100:1			5500.00	4887.96	102	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.931		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		3.948	3.956	0	583644	19	>100:1			1100.00	970.46	91.7	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		3.956		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.109	4.108	1	678801	21	>100:1			5500.00	5231.71	99.8	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.108		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.258	4.267	0	539875	17				1100.00	998.97	96.6	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.267		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.258	4.257	1	580597	20	>100:1			5500.00	5320.28	96.2	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.267		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.528	4.528	1	555819	18				1100.00	1063.87	94.2	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.528		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.771		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		4.990	4.989	1	679105	21	>100:1			1100.00	924.62	90.8	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		4.989		ND								
*** 37 13C2_PFDA**													
515 > 470		3.948	3.956	0	709495	20	>100:1					106	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.478	2.477	1	748785	19	>100:1					113	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.216	3.222	0	635804	24	>100:1					115	
*** 43 13C3_PFBA**													
216 > 172		1.731	1.742	0	686550	24	>100:1					117	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.592	3.599	0	157227	20	>100:1					117	

Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

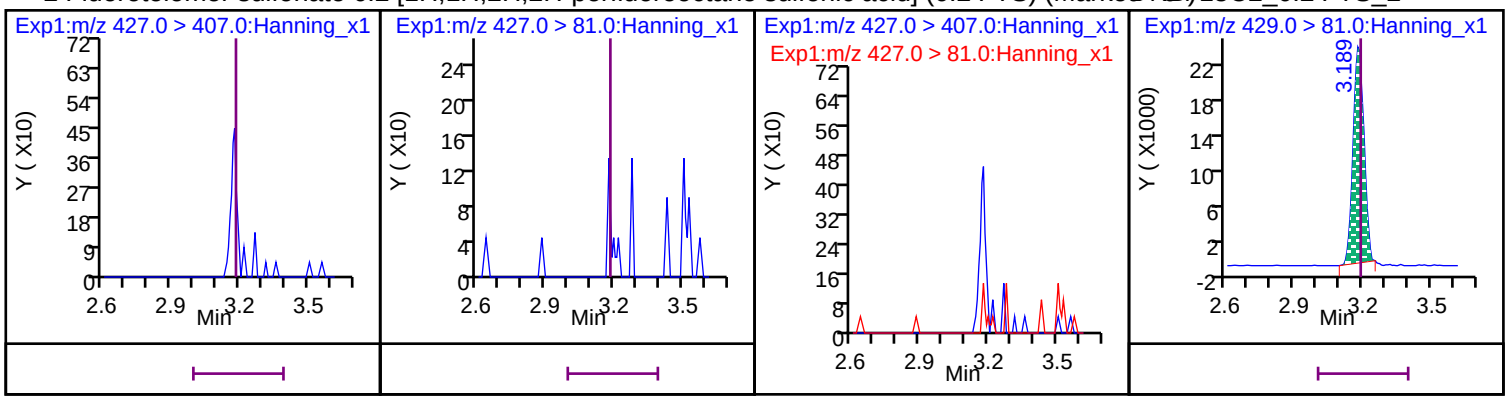
QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
M - Compound Hit/Peak Manually Integrated

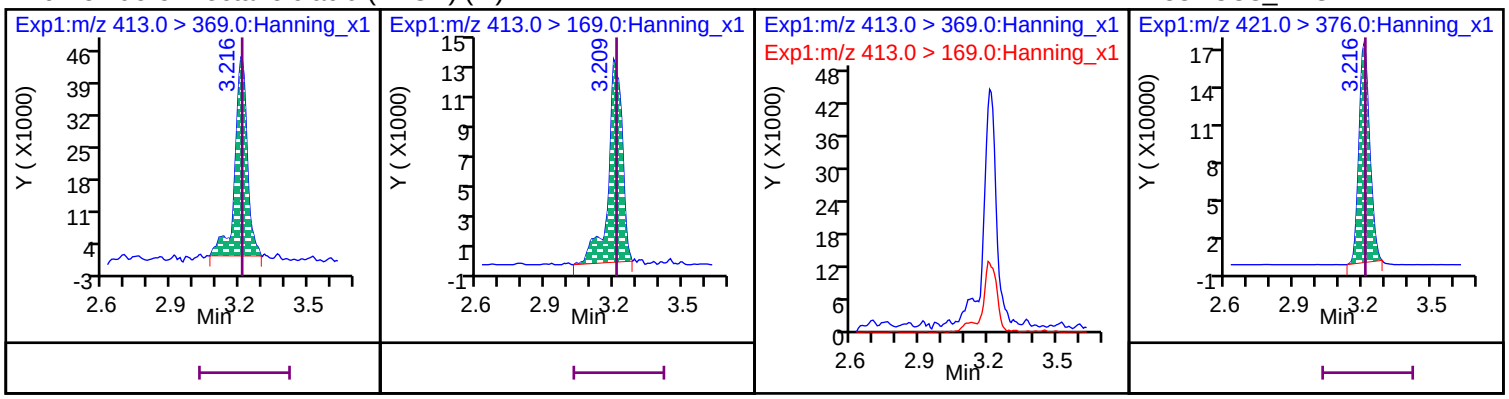
pre-injection IS summaries no longer provided (see Project Correspondence)

raw data is evaluated for project samples

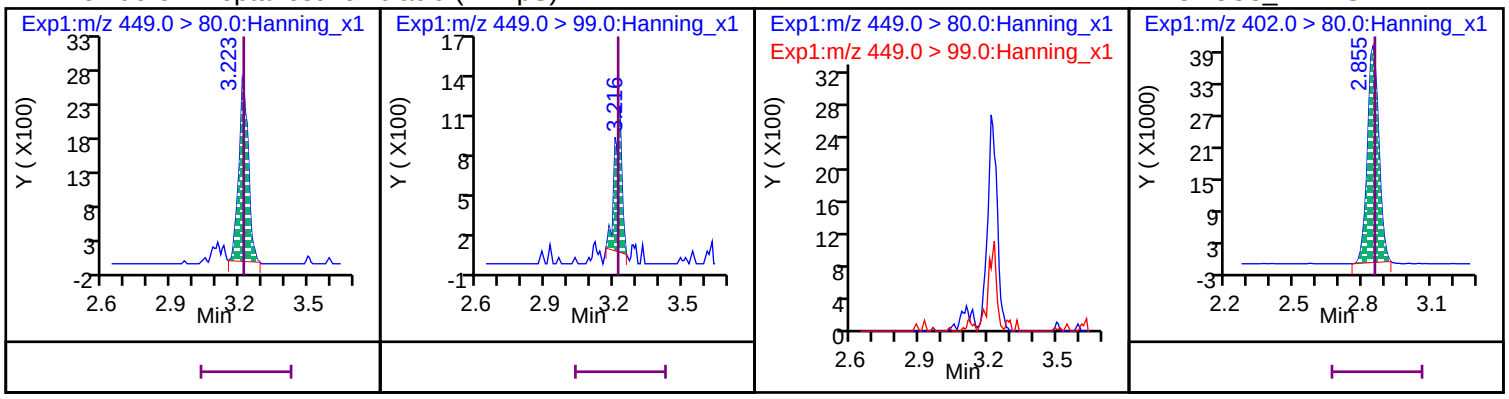
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) (Marked: M) D 64 13C2_6:2 FTS_2



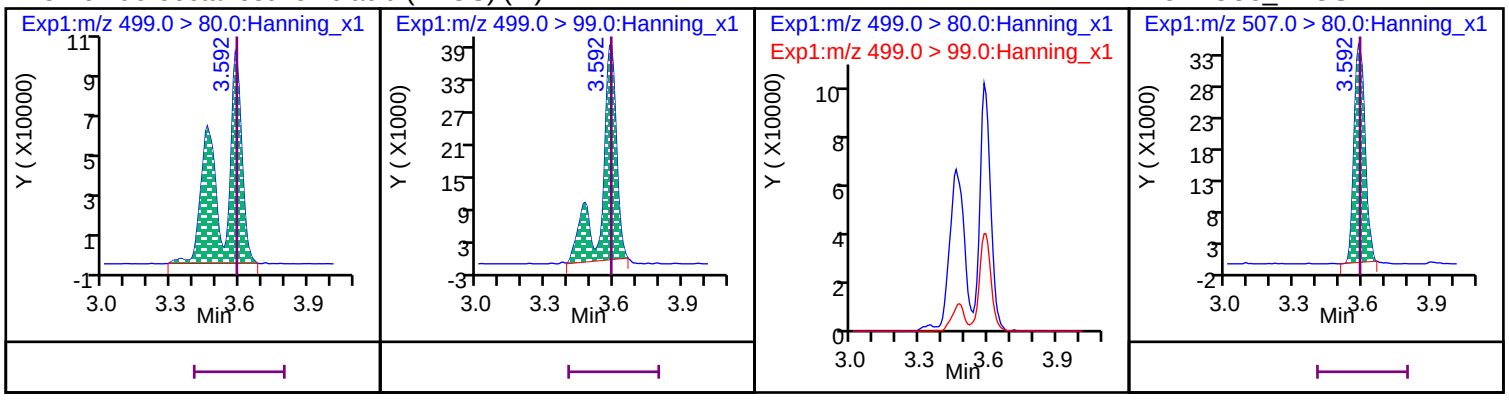
20 Perfluoro-n-octanoic acid (PFOA) (M) D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS) D 45 13C3_PFHxS



18 Perfluorooctanesulfonic acid (PFOS) (M) D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-002
Description: HS-PW-2.5 (B)
Matrix: Aqueous
Date Sampled: 01/26/2021 1215
Date Received: 01/28/2021

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	02/08/2021 2016	JJG	02/04/2021 1209	81803

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.1	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.1	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.1	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.1	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.1	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	7.5		3.5	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	7.4		3.5	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	5.6		3.5	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	20		3.5	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	9.1		3.5	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	5.6		3.5	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	15		3.5	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	25		3.5	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	11		3.5	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	560	J LB	3.5	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		107	25-150
13C2_6:2FTS		103	25-150
13C2_8:2FTS		110	25-150
13C2_PFDoA		97	25-150
13C2_PFTeDA		87	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		95	25-150
13C3-HFPO-DA		101	25-150
13C4_PFBA		96	25-150
13C4_PFHpA		105	25-150
13C5_PFHxA		101	25-150
13C5_PFPeA		105	25-150
13C6_PFDA		96	25-150
13C7_PFUdA		96	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
ND = Not detected at or above the LOQ
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
W = Reported on wet weight basis

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-002
Description: HS-PW-2.5 (B)
Matrix: Aqueous
Date Sampled: 01/26/2021 1215
Date Received: 01/28/2021

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		105	25-150
13C8_PFOS		85	25-150
13C8_PFOSA		94	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		92	25-150
d3-MeFOSAA		101	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
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Pace Environmental Services, LLC
Analyte Quantitation Report

Data File:	\\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821052.d		
Injection Date:	08-Feb-2021 20:16:48	Injection Vol:	10.0 uL
Sample Type:	Client	Auto Sampler:	45
Lab Sample ID:	WA28027-002	Lab Prep. Batch:	81803
Client ID:	HS-PW-2.5 (B)	Sample Group:	WA28027
Sample Info:	WA28027-002	Misc. Info:	
Inst. ID:	LCMSMS02	Operator:	Stephen E. Somerville
Method Name:	LCMSMS02_PFAS-ID	Version:	2020-09-22 16:12:14
Calib Method:	PFAS-ID	Lock State:	Unlocked
Quant Method:	IsoDil	Integrator:	picker
Final Conc.:	Amt * DF * CF	Matrix/Level:	Aqueous

Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0388304

Name	Value	Units	Description
DF	1		Dilution Factor
VF	10000	ul	Final Volume
VI	283	ml	Initial Sample Volume
AlsDf	0.91		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.731	1.742	0	604858	22	>100:1			1001.00	906.25	96.1	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													
212.9 > 168.9	46	1.737	1.742	0/0	145854	20	75:1			235.17	9.1318		
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.130	2.119	1	633294	16	>100:1			1001.00	999.74	105	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													
262.9 > 218.9	50	2.130	2.119	1/0	178881	13	33:1			275.22	10.687		M
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.183	2.182	1	186835	16	>100:1			1001.00	976.56	96.1	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													
298.9 > 80	44	2.183	2.182	1/0	42670	16	>100:1	Target = 3.82		192.12	7.4600		
298.9 > 99	44	2.183	2.182		11784	17	36:1	3.62 (1.91-5.73)					
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													
349 > 80	44	2.514	2.513	1/0	22516	17	>100:1	Target = 3.03		143.59	5.5758		
349 > 99	44	2.514	2.513		7936	19	30:1	2.83 (1.51-4.54)					
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.442	2.441	1	114433	17	>100:1			5005.00	5142.68	107	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.441		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.478	2.477	1	699216	18	>100:1			1001.00	1014.40	101	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													
313 > 269	49	2.478	2.477	1/0	269369	15	>100:1	Target = 18.18		385.17	14.956		M
313 > 119	49	2.478	2.477		12743	23	>100:1	21.13 (9.09-27.28)					
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.591	2.590	1	1212456	19	>100:1			5005.00	5027.93	101	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.590		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.837	2.845	0	560484	17	>100:1			1001.00	1064.09	105	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													
363 > 319	47	2.846	2.836	1/1	87267	16	66:1	Target = 3.91		144.34	5.6046		M
363 > 169	47	2.846	2.836		23305	22	>100:1	3.74 (1.95-5.86)					
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.855	2.863	0	128984	17	>100:1			1001.00	973.51	94.8	
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													
399 > 80	45	2.864	2.854	1/1	73781	24	>100:1	Target = 3.01	0.12	511.92	19.878		
399 > 99	45	2.855	2.854		23247	28	98:1	3.17 (1.50-4.52)	0.05				
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.880		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													
449 > 80	45	3.230	3.229	1/1	23539	29	22:1	Target = 3.08		190.32	7.3903		
449 > 99	45	3.237	3.229		8211	25	23:1	2.86 (1.54-4.63)					
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.196	3.202	0	88448	24	>100:1			5005.00	5270.24	103	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.195		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.223	3.222	1	550278	23	>100:1			1001.00	1067.35	105	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.223	3.222	1/0	367797	34	>100:1	Target = 3.13	0.16	633.96	24.617		
413 > 169	53	3.223	3.222		124056	35	>100:1	2.96 (1.56-4.70)	0.20				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.600	3.599	1	103997	20	>100:1			1001.00	901.05	85	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													
499 > 80	54	3.600	3.599	1/0	1941274	60	>100:1	Target = 3.63	0.69	14296	555.11		M
499 > 99	54	3.600	3.599		526293	39	>100:1	3.68 (1.81-5.45)	0.27				
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.817		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.939		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.257		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.405		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.608	3.607	1	639758	20	>100:1			1001.00	991.10	93.9	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.599		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.915	3.922	0	261798	20				1001.00	1043.14	93.8	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.931		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.948	3.939	1	86488	26	>100:1			5005.00	5285.96	110	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.931		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		3.948	3.956	0	609958	18	>100:1			1001.00	1014.21	95.9	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		3.956		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.109	4.108	1	689653	18	>100:1			5005.00	5315.35	101	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.108		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.268	4.267	1	538850	17	>100:1			1001.00	997.08	96.4	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.267		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.268	4.257	1	552777	18	>100:1			5005.00	5065.35	91.6	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.267		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.537	4.528	1	569438	17	>100:1			1001.00	1089.93	96.5	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.528		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.771		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		4.990	4.989	1	649333	22	>100:1			1001.00	884.09	86.8	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		4.989		ND								
*** 37 13C2_PFDA**													
515 > 470		3.957	3.956	1	791307	19						119	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.478	2.477	1	787851	17	>100:1					119	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.223	3.222	1	674946	24	>100:1					122	
*** 43 13C3_PFBA**													
216 > 172		1.737	1.742	0	687052	22	>100:1					117	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.600	3.599	1	150399	21	>100:1					112	

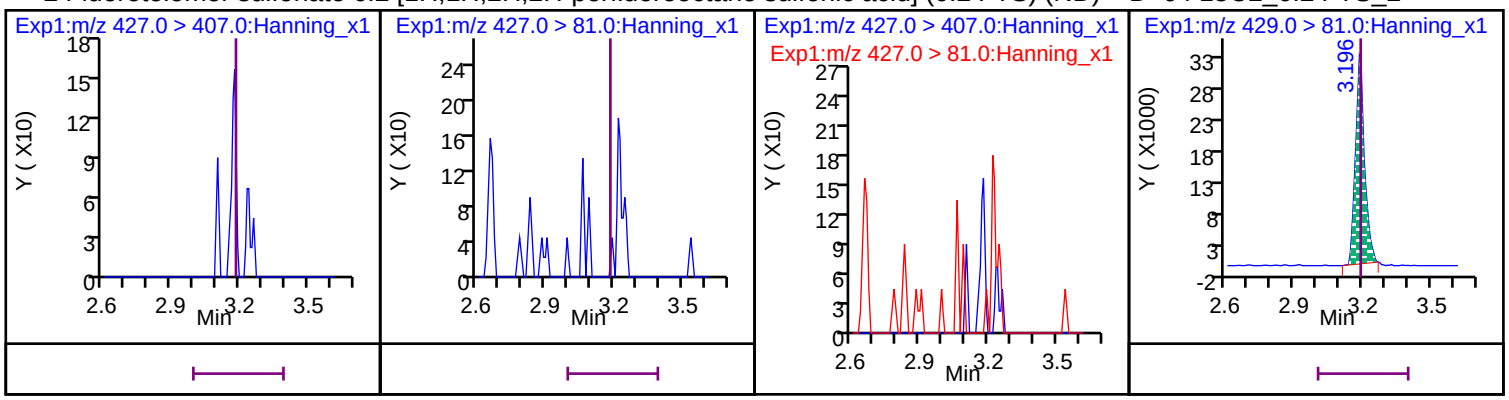
Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

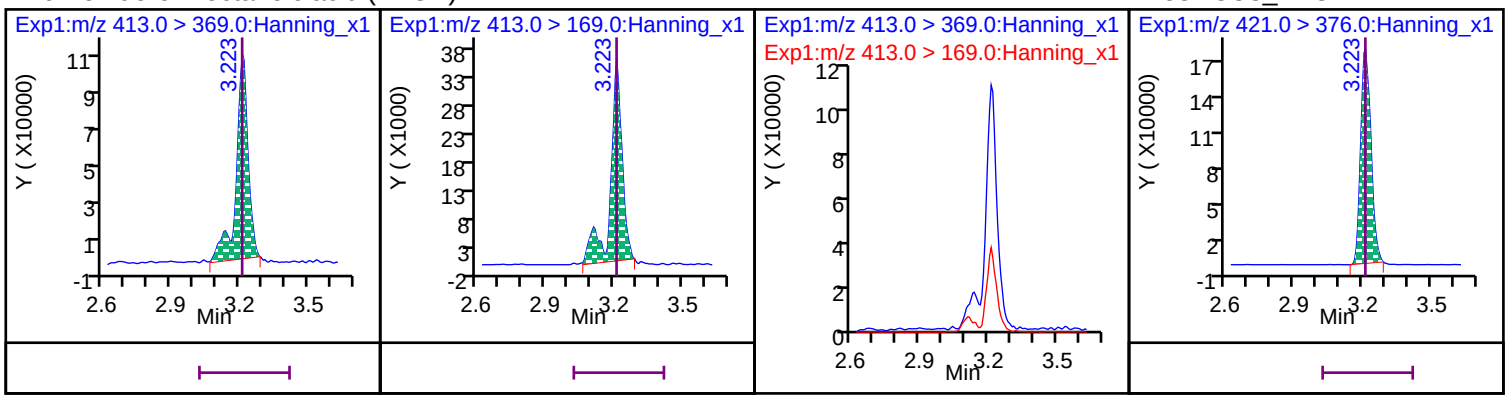
QC Flag Legend

U - Result Less Than Method Detection Limit
M - Compound Hit/Peak Manually Integrated

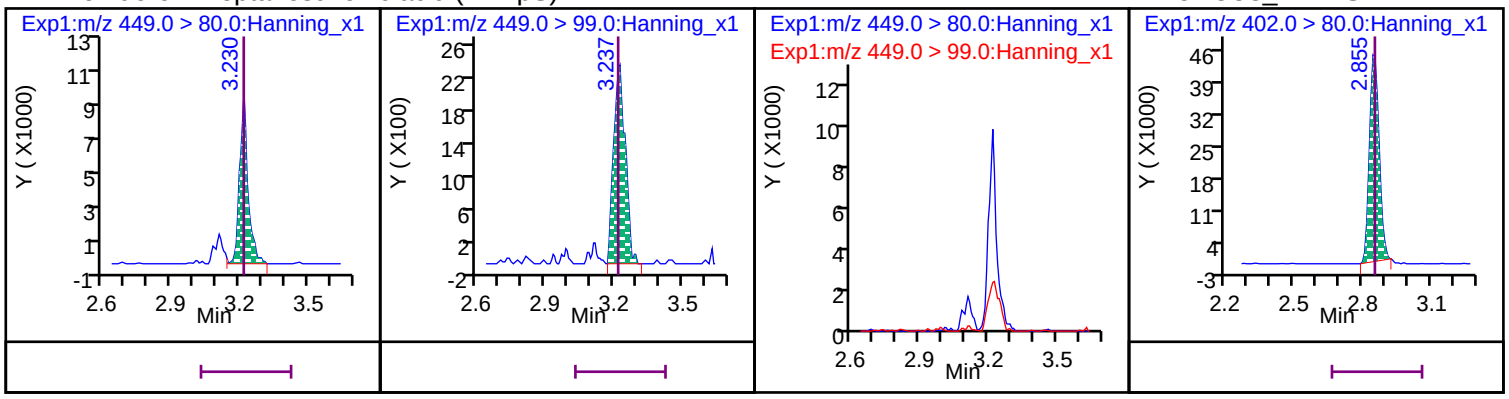
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) (ND) D 64 13C2_6:2 FTS_2



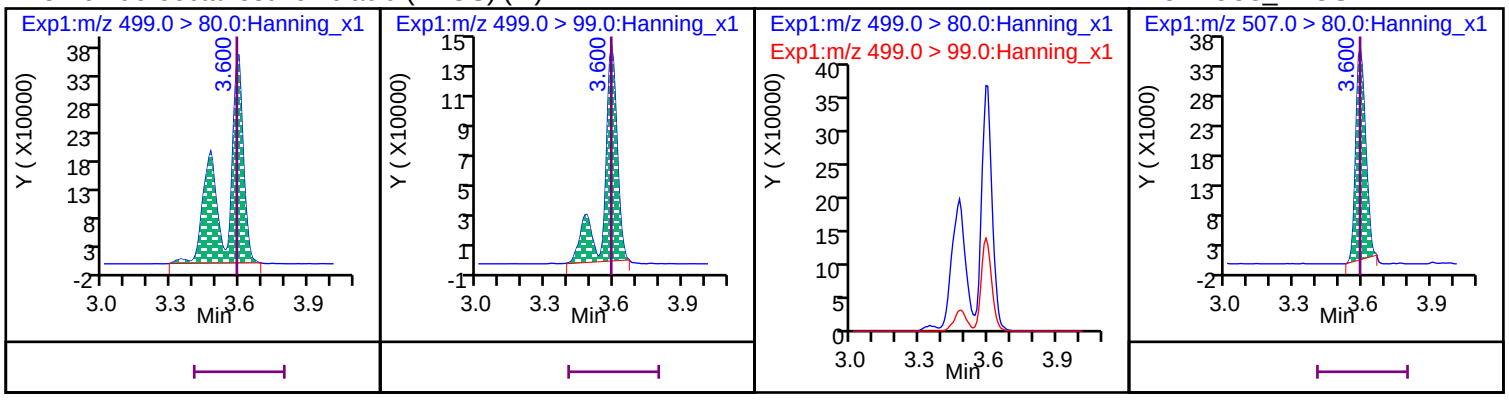
20 Perfluoro-n-octanoic acid (PFOA) D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS) D 45 13C3_PFHxS



18 Perfluorooctanesulfonic acid (PFOS) (M) D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-003
Description: HS-PW-3 (A)
Matrix: Aqueous
Date Sampled: 01/26/2021 1430
Date Received: 01/28/2021

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	5	02/08/2021 2038	JJG	02/04/2021 1209	81803

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		37	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		37	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		37	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		37	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		37	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		37	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		37	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		37	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		37	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	19		19	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		19	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	28		19	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	21		19	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	41		19	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	77		19	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	23		19	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		19	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	900	J LB	19	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		110	25-150
13C2_6:2FTS		108	25-150
13C2_8:2FTS		108	25-150
13C2_PFDoA		101	25-150
13C2_PFTeDA		97	25-150
13C3_PFBS		109	25-150
13C3_PFHxS		103	25-150
13C3-HFPO-DA		107	25-150
13C4_PFBA		108	25-150
13C4_PFHpA		106	25-150
13C5_PFHxA		103	25-150
13C5_PFPeA		112	25-150
13C6_PFDA		100	25-150
13C7_PFUdA		103	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-003
Description: HS-PW-3 (A)
Matrix: Aqueous
Date Sampled: 01/26/2021 1430
Date Received: 01/28/2021

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		109	25-150
13C8_PFOS		102	25-150
13C8_PFOSA		103	10-150
13C9_PFNA		104	25-150
d5-EtFOSAA		105	25-150
d3-MeFOSAA		110	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File:	\\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821054.d		
Injection Date:	08-Feb-2021 20:38:06	Injection Vol:	10.0 uL
Sample Type:	Client	Auto Sampler:	47
Lab Sample ID:	WA28027-003	Lab Prep. Batch:	81803
Client ID:	HS-PW-3 (A)	Sample Group:	WA28027
Sample Info:	WA28027-003,5	Misc. Info:	
Inst. ID:	LCMSMS02	Operator:	Stephen E. Somerville
Method Name:	LCMSMS02_PFAS-ID	Version:	2020-09-22 16:12:14
Calib Method:	PFAS-ID	Lock State:	Unlocked
Quant Method:	IsoDil	Integrator:	picker
Final Conc.:	Amt * DF * CF	Matrix/Level:	Aqueous

Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0370370

Name	Value	Units	Description
DF	5		Dilution Factor
VF	10000	ul	Final Volume
VI	270	ml	Initial Sample Volume
AlsDf	1		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.731	1.742	0	677291	23	>100:1			1100.00	1014.78	108	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													
212.9 > 168.9	46	1.737	1.742	0/0	70922	27	25:1			112.22	20.782		
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.120	2.119	1	680303	17	>100:1			1100.00	1073.95	112	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													
262.9 > 218.9	50	2.130	2.119	1/0	78484	14	22:1			123.52	22.875		M
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.183	2.182	1	211505	18	>100:1			1100.00	1105.51	109	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													J
298.9 > 80	44	2.183	2.182	1/0	13427	21	58:1	Target = 3.82	✓	58.684	10.867		
298.9 > 99	44	2.194	2.182		2999	18	9.2:1	4.47 (1.91-5.73)					
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													J
349 > 80	44	2.514	2.513	1/0	4610	17	33:1	Target = 3.03	✓	28.539	5.2850		
349 > 99	44	2.505	2.513		1641	22	14:1	2.80 (1.51-4.54)					
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.442	2.441	1	118054	20	>100:1			5500.00	5305.41	110	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.441		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.478	2.477	1	713634	19	>100:1			1100.00	1035.32	103	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													
313 > 269	49	2.478	2.477	1/0	144586	17	92:1	Target = 18.18	✓	222.60	41.222		M
313 > 119	49	2.469	2.477		7247	24	25:1	19.95 (9.09-27.28)					
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.591	2.590	1	1282864	22	>100:1			5500.00	5319.90	107	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.590		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.837	2.845	0	565823	21	>100:1			1100.00	1074.23	106	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													J
363 > 319	47	2.837	2.836	1/1	41208	17	60:1	Target = 3.91	✓	74.190	13.739		
363 > 169	47	2.846	2.836		13095	18	72:1	3.14 (1.95-5.86)					
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.855	2.863	0	139851	21	>100:1			1100.00	1055.53	103	
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													
399 > 80	45	2.855	2.854	1/1	21631	22	>100:1	Target = 3.01	✓	152.11	28.169		
399 > 99	45	2.855	2.854		7285	26	61:1	2.96 (1.50-4.52)					
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.880		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													
449 > 80	45	3.230	3.229	1/1	12339	23	28:1	Target = 3.08	✓	101.11	18.725		
449 > 99	45	3.223	3.229		4459	15	16:1	2.76 (1.54-4.63)					
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.196	3.202	0	92742	23	>100:1			5500.00	5526.10	108	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.195		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.216	3.222	0	566627	23	>100:1			1100.00	1099.06	109	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.216	3.222	0/0	226855	36	>100:1	Target = 3.13	✓ 0.10	417.30	77.277		M
413 > 169	53	3.216	3.222		73175	35	>100:1	3.10 (1.56-4.70)	0.17				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.592	3.599	0	124784	22	>100:1			1100.00	1081.15	102	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													
499 > 80	54	3.592	3.599	0/0	723126	57	>100:1	Target = 3.63	✓ 05	4877.00	903.15		M
499 > 99	54	3.600	3.599		195192	38	>100:1	3.70 (1.81-5.45)	0.36				
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.817		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.939		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.257		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.405		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.600	3.607	0	705862	24	>100:1			1100.00	1093.51	104	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.599		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.915	3.922	0	286844	21	>100:1			1100.00	1142.94	103	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.931		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.940	3.939	1	84824	20	>100:1			5500.00	5184.26	108	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.931		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		3.948	3.956	0	638022	20	>100:1			1100.00	1060.87	100	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		3.956		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.109	4.108	1	746072	18	>100:1			5500.00	5750.18	110	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.108		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.268	4.267	1	573353	16	>100:1			1100.00	1060.92	103	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.267		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.268	4.257	1	634293	18	>100:1			5500.00	5812.32	105	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.267		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.537	4.528	1	596598	18				1100.00	1141.92	101	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.528		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.771		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		4.990	4.989	1	723127	23	>100:1			1100.00	984.56	96.7	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		4.989		ND								
*** 37 13C2_PFDA**													
515 > 470		3.948	3.956	0	694456	20						104	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.478	2.477	1	703057	20	>100:1					106	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.216	3.222	0	594613	23	>100:1					107	
*** 43 13C3_PFBA**													
216 > 172		1.737	1.742	0	661527	23	>100:1					113	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.600	3.599	1	148662	22	>100:1					110	

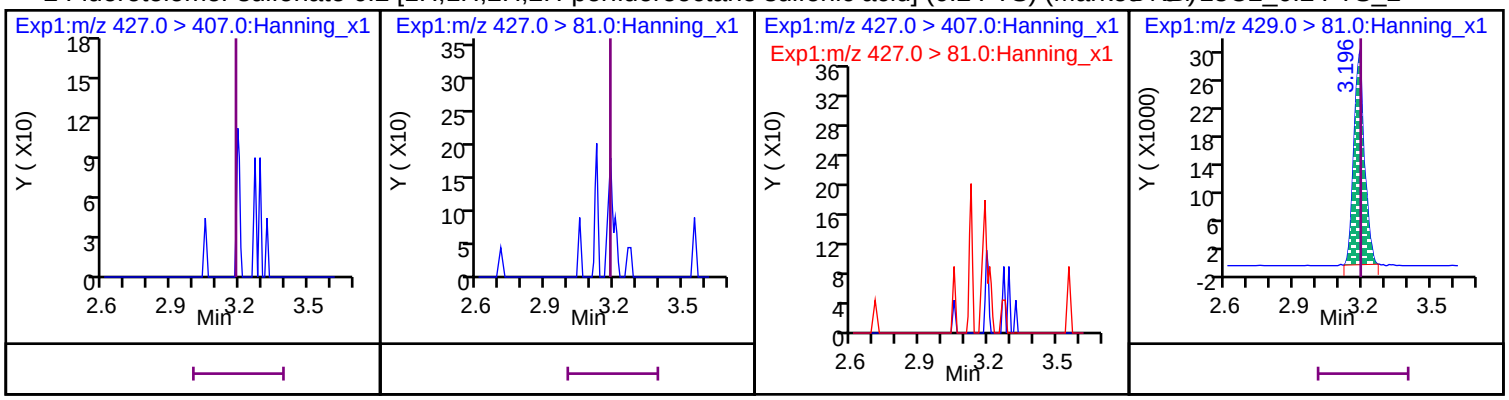
Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

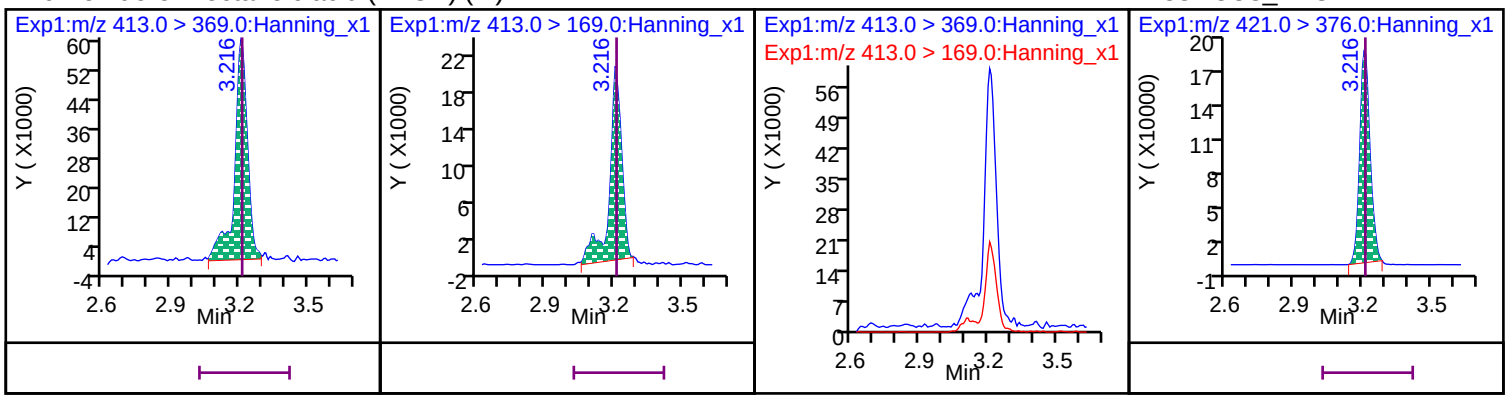
QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
M - Compound Hit/Peak Manually Integrated

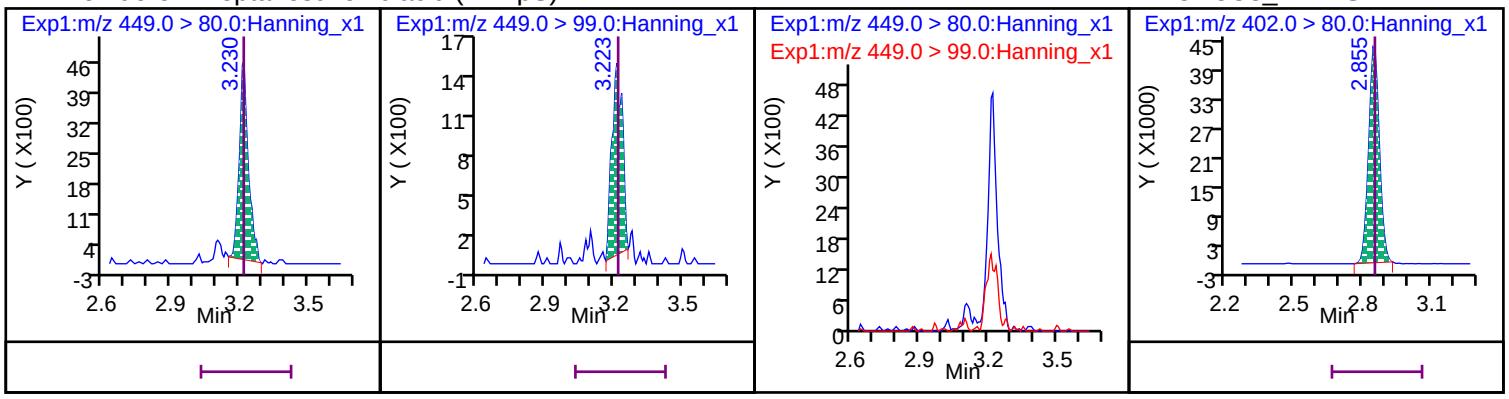
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) (Marked) D 52 13C2_6:2 FTS_2



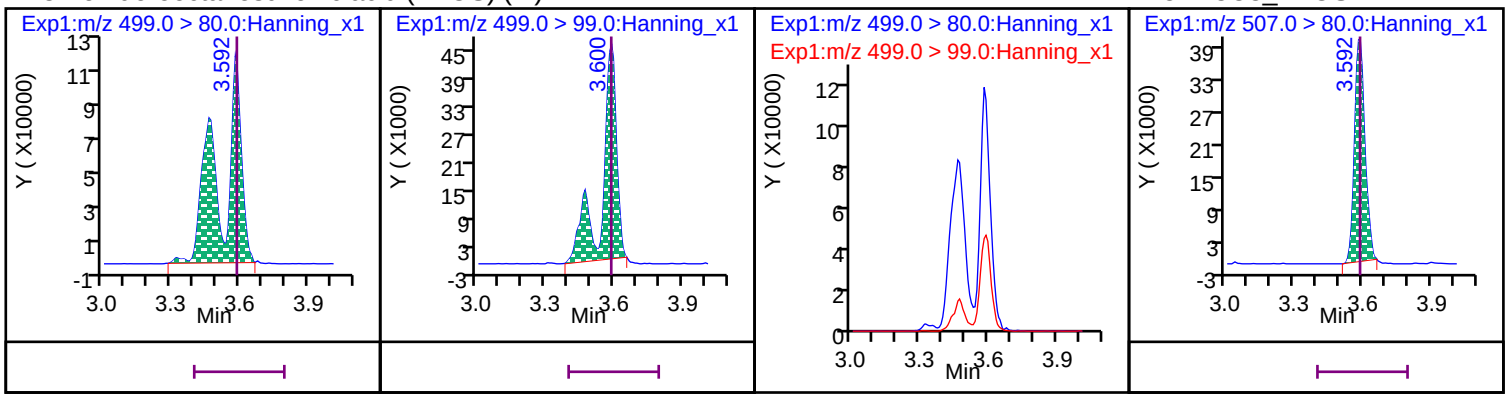
20 Perfluoro-n-octanoic acid (PFOA) (M) D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS) D 45 13C3_PFHxS



18 Perfluorooctanesulfonic acid (PFOS) (M) D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-004
Description: HS-PW-3 (A) DUP
Matrix: Aqueous
Date Sampled: 01/26/2021 1430
Date Received: 01/28/2021

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	5	02/08/2021 2048	JJG	02/04/2021 1209	81803

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		35	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		35	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		35	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		35	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		35	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		35	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		35	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		35	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		35	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	18		17	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		17	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	26		17	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	20		17	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	38		17	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	71		17	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	22		17	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		17	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	900	J LB	17	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		105	25-150
13C2_6:2FTS		92	25-150
13C2_8:2FTS		106	25-150
13C2_PFDoA		93	25-150
13C2_PFTeDA		95	25-150
13C3_PFBS		105	25-150
13C3_PFHxS		102	25-150
13C3-HFPO-DA		101	25-150
13C4_PFBA		104	25-150
13C4_PFHpA		99	25-150
13C5_PFHxA		96	25-150
13C5_PFPeA		103	25-150
13C6_PFDA		103	25-150
13C7_PFUdA		98	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
L = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-004
Description: HS-PW-3 (A) DUP
Matrix: Aqueous
Date Sampled: 01/26/2021 1430
Date Received: 01/28/2021

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		101	25-150
13C8_PFOS		95	25-150
13C8_PFOSA		97	10-150
13C9_PFNA		96	25-150
d5-EtFOSAA		91	25-150
d3-MeFOSAA		101	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

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Pace Environmental Services, LLC
Analyte Quantitation Report

Data File:	\\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821055.d		
Injection Date:	08-Feb-2021 20:48:46	Injection Vol:	10.0 uL
Sample Type:	Client	Auto Sampler:	48
Lab Sample ID:	WA28027-004	Lab Prep. Batch:	81803
Client ID:	HS-PW-3 (A) DUP	Sample Group:	WA28027
Sample Info:	WA28027-004,5	Misc. Info:	
Inst. ID:	LCMSMS02	Operator:	Stephen E. Somerville
Method Name:	LCMSMS02_PFAS-ID	Version:	2020-09-22 16:12:14
Calib Method:	PFAS-ID	Lock State:	Unlocked
Quant Method:	IsoDil	Integrator:	picker
Final Conc.:	Amt * DF * CF	Matrix/Level:	Aqueous

Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0347222

Name	Value	Units	Description
DF	5		Dilution Factor
VF	10000	ul	Final Volume
VI	288	ml	Initial Sample Volume
AlsDf	1		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.737	1.742	0	652617	23	>100:1			1100.00	977.81	104	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													
212.9 > 168.9	46	1.737	1.742	0/0	71773	24	30:1			117.86	20.462		
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.130	2.119	1	622135	17	>100:1			1100.00	982.13	103	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													
262.9 > 218.9	50	2.130	2.119	1/0	75278	14	21:1			129.56	22.492		M
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.183	2.182	1	203475	19	>100:1			1100.00	1063.54	105	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													J
298.9 > 80	44	2.183	2.182	1/0	12679	17	94:1	Target = 3.82	✓	57.602	10.000		
298.9 > 99	44	2.183	2.182		3965	18	12:1	3.19 (1.91-5.73)					
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													J
349 > 80	44	2.514	2.513	1/0	4225	13	32:1	Target = 3.03	✓	27.188	4.7201		M
349 > 99	44	2.505	2.513		1483	20	12:1	2.84 (1.51-4.54)					
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.442	2.441	1	112201	19	>100:1			5500.00	5042.37	105	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.441		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.478	2.477	1	664229	19	>100:1			1100.00	963.64	95.9	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													
313 > 269	49	2.478	2.477	1/0	133047	15	>100:1	Target = 18.18	✓	220.07	38.207		M
313 > 119	49	2.478	2.477		7280	18	55:1	18.27 (9.09-27.28)					
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.591	2.590	1	1213578	21	>100:1			5500.00	5032.58	101	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.590		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.837	2.845	0	526879	21	>100:1			1100.00	1000.29	99	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													J
363 > 319	47	2.846	2.836	1/1	37818	19	40:1	Target = 3.91	✓	73.119	12.694		
363 > 169	47	2.837	2.836		11394	21	73:1	3.31 (1.95-5.86)					
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.855	2.863	0	138245	20	>100:1			1100.00	1043.41	102	
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													
399 > 80	45	2.864	2.854	1/1	21028	23	>100:1	Target = 3.01	✓	149.59	25.970		M
399 > 99	45	2.864	2.854		6121	19	43:1	3.43 (1.50-4.52)	0.09				
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.880		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													
449 > 80	45	3.230	3.229	1/1	12656	21	21:1	Target = 3.08	✓	104.92	18.215		
449 > 99	45	3.223	3.229		3931	19	9.1:1	3.21 (1.54-4.63)					
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.196	3.202	0	79120	24	>100:1			5500.00	4714.42	92.4	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.195		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.216	3.222	0	528311	23	>100:1			1100.00	1024.74	101	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.216	3.222	0/0	207342	32	>100:1	Target = 3.13	✓ 0.12	409.06	71.018		M
413 > 169	53	3.216	3.222		72278	34	>100:1	2.86 (1.56-4.70)	0.12				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.600	3.599	1	115662	22	>100:1			1100.00	1002.11	94.6	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													
499 > 80	54	3.600	3.599	1/0	710170	58	>100:1	Target = 3.63	✓ 1.05	5167.37	897.11		M
499 > 99	54	3.600	3.599		187442	40	>100:1	3.78 (1.81-5.45)	0.40				
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.817		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.939		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.257		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.405		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.600	3.607	0	654017	23	>100:1			1100.00	1013.19	96	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.599		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.915	3.922	0	271734	19				1100.00	1082.73	97.4	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.931		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.949	3.939	1	83106	19	>100:1			5500.00	5079.26	106	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.931		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		3.957	3.956	1	654947	19	>100:1			1100.00	1089.02	103	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		3.956		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.109	4.108	1	686920	20	>100:1			5500.00	5294.28	101	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.108		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.268	4.267	1	546218	18	>100:1			1100.00	1010.71	97.7	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.267		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.268	4.257	1	545886	17	>100:1			5500.00	5002.20	90.5	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.267		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.538	4.528	1	550221	18	>100:1			1100.00	1053.15	93.3	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.528		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.771		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		4.990	4.989	1	711851	23	>100:1			1100.00	969.21	95.2	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		4.989		ND								
*** 37 13C2_PFDA**													
515 > 470		3.957	3.956	1	741192	19	>100:1					111	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.478	2.477	1	723710	21	>100:1					109	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.216	3.222	0	618574	24	>100:1					111	
*** 43 13C3_PFBA**													
216 > 172		1.737	1.742	0	676918	23	>100:1					115	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.600	3.599	1	144610	22	>100:1					107	

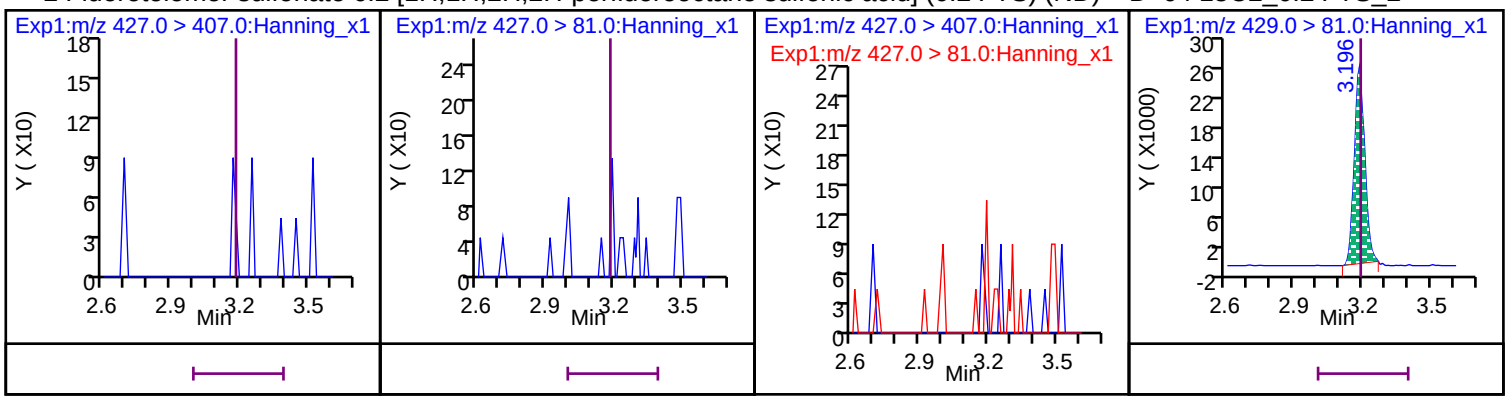
Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

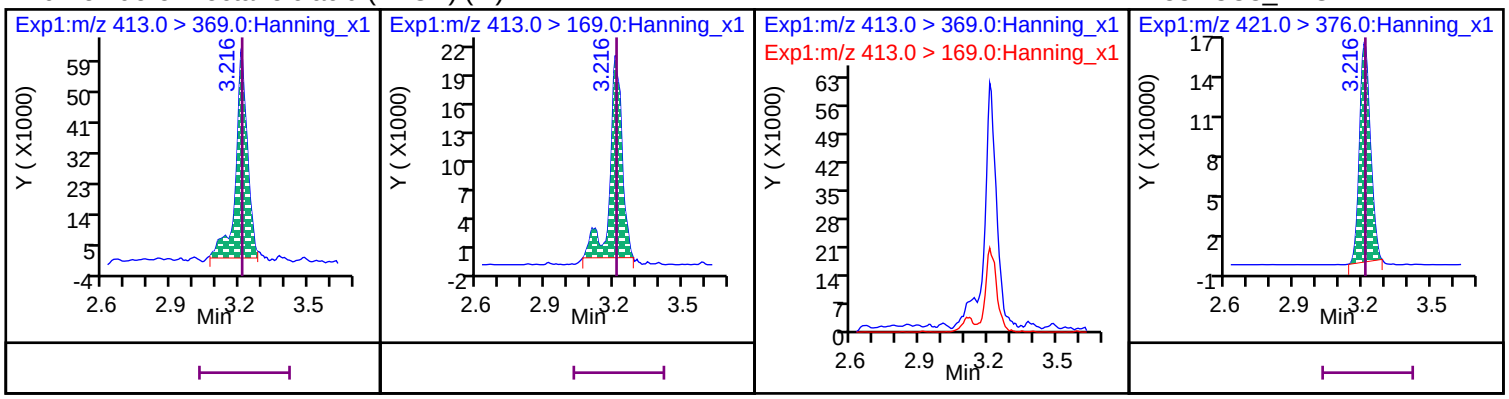
QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
M - Compound Hit/Peak Manually Integrated

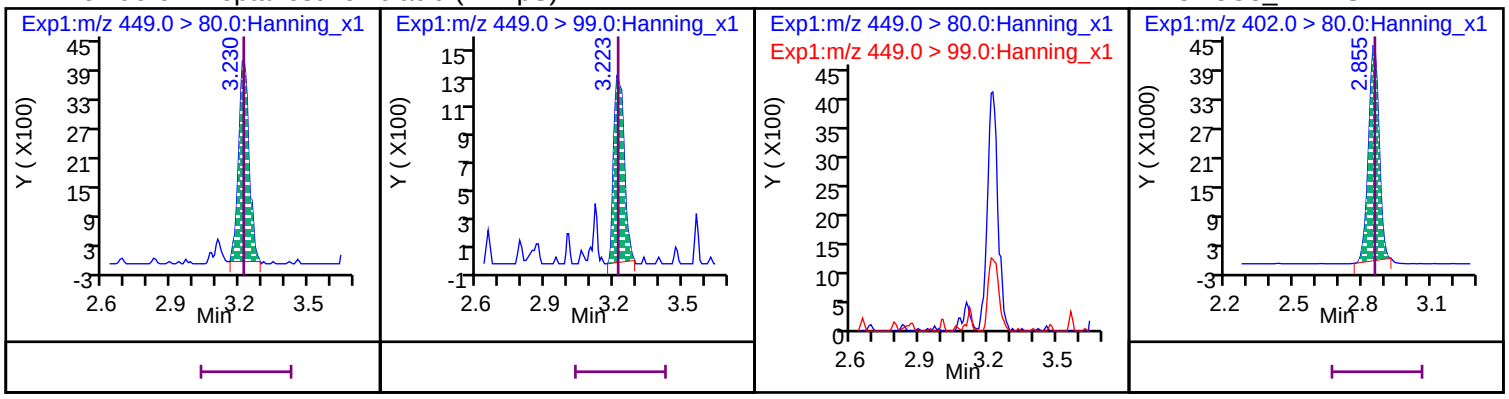
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) (ND) D 64 13C2_6:2 FTS_2



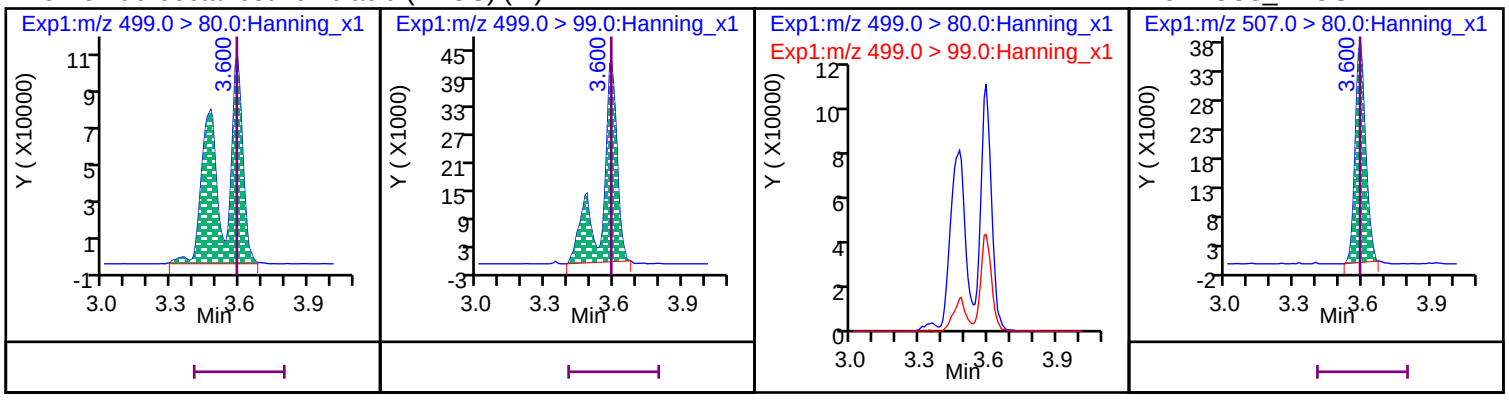
20 Perfluoro-n-octanoic acid (PFOA) (M) D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS) D 45 13C3_PFHxS



18 Perfluorooctanesulfonic acid (PFOS) (M) D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-005
Description: HS-PW-3.5 (A)
Matrix: Aqueous
Date Sampled: 01/26/2021 1540
Date Received: 01/28/2021

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	02/08/2021 1726	MMM	02/05/2021 1201	81968

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.2	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.2	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.2	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.2	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	32		3.6	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	17		3.6	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	19		3.6	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	9.5		3.6	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	7.2		3.6	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	12		3.6	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	21		3.6	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	6.0		3.6	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	92	J LB	3.6	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		97	25-150
13C2_6:2FTS		92	25-150
13C2_8:2FTS		100	25-150
13C2_PFDoA		81	25-150
13C2_PFTeDA		77	25-150
13C3_PFBS		88	25-150
13C3_PFHxS		89	25-150
13C3-HFPO-DA		97	25-150
13C4_PFBA		91	25-150
13C4_PFHpA		95	25-150
13C5_PFHxA		102	25-150
13C5_PFPeA		95	25-150
13C6_PFDA		92	25-150
13C7_PFUdA		94	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
ND = Not detected at or above the LOQ
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
W = Reported on wet weight basis

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-005
Description: HS-PW-3.5 (A)
Matrix: Aqueous
Date Sampled: 01/26/2021 1540
Date Received: 01/28/2021

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		93	25-150
13C8_PFOS		79	25-150
13C8_PFOSA		96	10-150
13C9_PFNA		95	25-150
d5-EtFOSAA		78	25-150
d3-MeFOSAA		100	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File:	\\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821047.d		
Injection Date:	08-Feb-2021 17:26:20	Injection Vol:	10.0 uL
Sample Type:	Client	Auto Sampler:	32
Lab Sample ID:	WA28027-005	Lab Prep. Batch:	81968
Client ID:	HS-PW-3.5 (A)	Sample Group:	WA28027
Sample Info:	WA28027-005	Misc. Info:	
Inst. ID:	LCMSMS01	Operator:	Matthew M. Miller
Method Name:	LCMSMS01_PFAS-ID	Version:	2020-09-23 10:00:21
Calib Method:	PFAS-ID	Lock State:	Unlocked
Quant Method:	IsoDil	Integrator:	picker
Final Conc.:	Amt * DF * CF	Matrix/Level:	Aqueous

Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0396715

Name	Value	Units	Description
DF	1		Dilution Factor
VF	10000	ul	Final Volume
VI	277	ml	Initial Sample Volume
AlsDf	0.91		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.719	1.721	0	924386	17	>100:1			1001.00	1013.98	90.8	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													
212.9 > 168.9	46	1.726	1.728	0/0	245506	17	>100:1			238.83	9.4749		
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.109	2.110	0	974730	12	>100:1			1001.00	1050.73	94.9	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													
262.9 > 218.9	50	2.109	2.110	0/0	149411	12	24:1			151.74	6.0198		M
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.172	2.162	1	307648	14	>100:1			1001.00	981.56	87.9	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													
298.9 > 80	44	2.172	2.162	1/0	298945	16	>100:1	Target = 3.46	✓	808.23	32.064		
298.9 > 99	44	2.172	2.162		81330	16	>100:1	3.67 (1.73-5.20)					
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													
349 > 80	44	2.520	2.520	0/-1	114933	14	85:1	Target = 3.26	✓	422.07	16.744		M
349 > 99	44	2.520	2.520		40573	15	>100:1	2.83 (1.63-4.89)					M
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.441	2.442	0	271040	16	>100:1			5005.00	5442.50	97.1	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.442		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.485	2.485	0	890786	15	>100:1			1001.00	1042.25	102	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													
313 > 269	49	2.493	2.477	2/2	261336	12	>100:1	Target = 17.17	✓	302.26	11.991		
313 > 119	49	2.485	2.477		14473	15	57:1	18.05 (8.58-25.76)					
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.610	2.602	1	728063	17	>100:1			5005.00	4993.36	97.1	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.602		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.874	2.865	1	805518	17	>100:1			1001.00	1034.44	94.5	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													
363 > 319	47	2.874	2.873	1/0	135380	13	>100:1	Target = 3.04	✓	181.81	7.2126		
363 > 169	47	2.874	2.873		40474	14	>100:1	3.34 (1.52-4.57)					
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.891	2.891	1	234522	17	>100:1			1001.00	1019.24	89.4	
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													
399 > 80	45	2.891	2.891	1/0	124865	27	>100:1	Target = 3.66	✓ 0.34	483.28	19.172		
399 > 99	45	2.891	2.891		36706	25	>100:1	3.40 (1.83-5.50)	0.22				
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.922		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													J
449 > 80	45	3.292	3.277	1/0	12408	20	83:1	Target = 3.56	✓	49.987	1.9831		
449 > 99	45	3.278	3.277		3362	19	13:1	3.69 (1.78-5.34)					
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.246	3.244	1	242262	20	>100:1			5005.00	6007.46	91.9	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.244		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.278	3.270	1	743918	20	>100:1			1001.00	1009.19	92.9	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.272	3.270	1/0	393695	34	62:1	Target = 2.38	✓ 0.57	525.45	20.845		
413 > 169	53	3.278	3.270		190746	34	>100:1	2.06 (1.19-3.57)	0.76				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.657	3.648	1	178436	19	>100:1			1001.00	853.78	78.8	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													
499 > 80	54	3.649	3.656	0/-1	486306	57	>100:1	Target = 4.00	✓ 0.85	2319.75	92.028		
499 > 99	54	3.657	3.656		111111	38	>100:1	4.37 (2.00-6.01)	0.30				
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.863		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.991		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.280		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.449		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.657	3.656	1	751786	19	>100:1			1001.00	1053.49	95.1	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.656		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.964	3.955	1	446786	17	>100:1			1001.00	1044.23	96.2	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.964		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.991	3.991	1	200438	17	>100:1			5005.00	6315.67	99.5	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.991		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.001	4.000	1	639261	17	>100:1			1001.00	1086.08	91.8	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.000		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.150	4.158	0	773564	19	>100:1			5005.00	4992.18	100	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.158		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.299	4.308	0	678751	17	>100:1			5005.00	4844.04	78.1	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.308		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.299	4.308	0	578867	16	>100:1			1001.00	1072.58	94	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.308		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.563	4.570	0	538739	17	>100:1			1001.00	870.70	81	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.570		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.813		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.017	5.029	0	582380	19	>100:1			1001.00	881.52	77.2	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.029		ND								
*** 37 13C2_PFDA**													
515 > 470		4.001	4.000	1	565182	16	>100:1					88.6	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.485	2.485	0	723398	15	>100:1					93.6	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.278	3.277	1	719318	21	>100:1					82.3	
*** 43 13C3_PFBA**													
216 > 172		1.726	1.721	1	764117	18	>100:1					85.5	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.657	3.656	1	211391	18	>100:1					86.3	

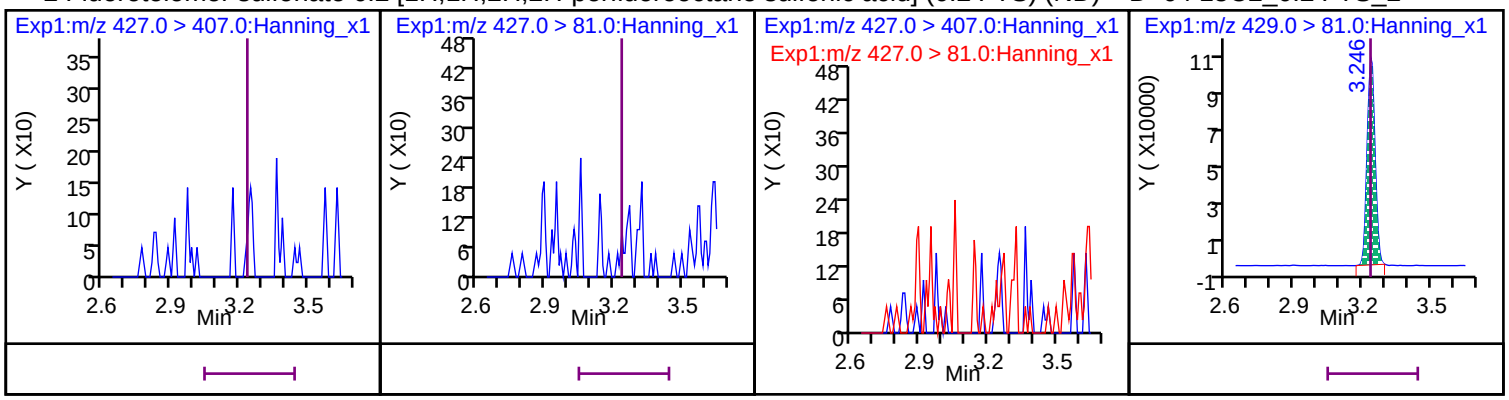
Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

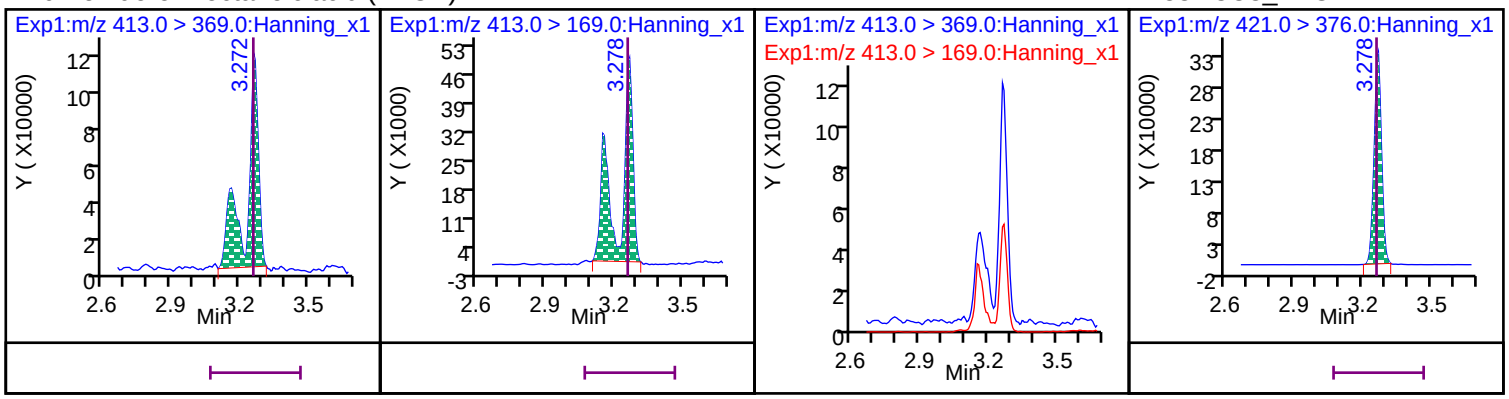
QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
M - Compound Hit/Peak Manually Integrated

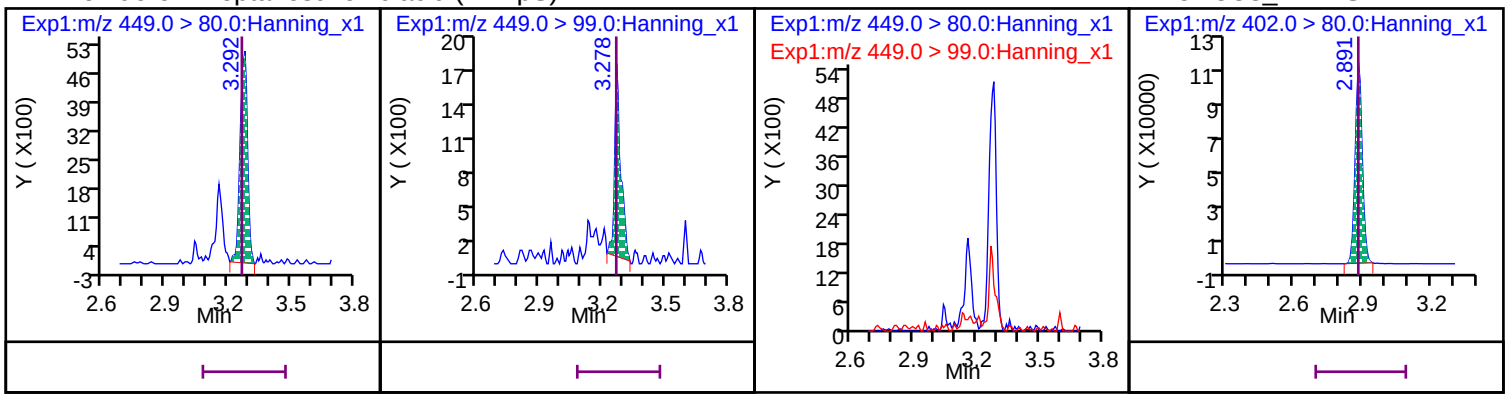
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) (ND) D 64 13C2_6:2 FTS_2



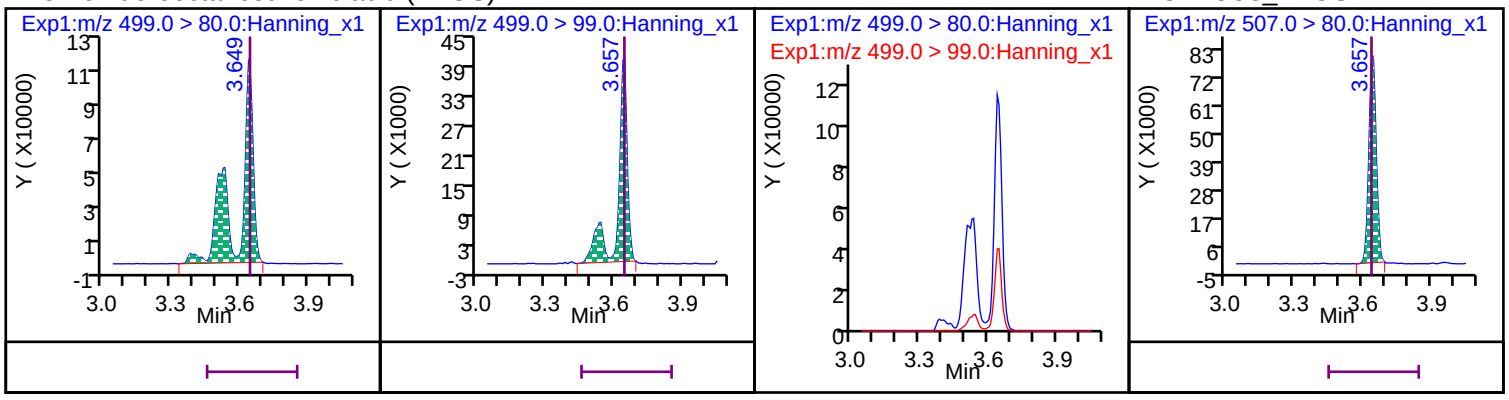
20 Perfluoro-n-octanoic acid (PFOA) D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS) D 45 13C3_PFHxS



18 Perfluorooctanesulfonic acid (PFOS) D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-006
Description: FB-1/26
Matrix: Aqueous
Date Sampled: 01/26/2021 1550
Date Received: 01/28/2021

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	02/08/2021 1758	MMM	02/05/2021 1201	81968

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.4	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.4	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		98	25-150
13C2_6:2FTS		85	25-150
13C2_8:2FTS		91	25-150
13C2_PFDoA		106	25-150
13C2_PFTeDA		85	25-150
13C3_PFBS		93	25-150
13C3_PFHxS		92	25-150
13C3-HFPO-DA		106	25-150
13C4_PFBA		93	25-150
13C4_PFHpA		98	25-150
13C5_PFHxA		103	25-150
13C5_PFPeA		97	25-150
13C6_PFDA		84	25-150
13C7_PFUdA		90	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
= Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-006
Description: FB-1/26
Matrix: Aqueous
Date Sampled: 01/26/2021 1550
Date Received: 01/28/2021

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		101	25-150
13C8_PFOS		90	25-150
13C8_PFOSA		95	10-150
13C9_PFNA		101	25-150
d5-EtFOSAA		93	25-150
d3-MeFOSAA		112	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

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Pace Environmental Services, LLC
Analyte Quantitation Report

Data File:	\\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821050.d		
Injection Date:	08-Feb-2021 17:58:02	Injection Vol:	10.0 uL
Sample Type:	Client	Auto Sampler:	35
Lab Sample ID:	WA28027-006	Lab Prep. Batch:	81968
Client ID:	FB-1/26	Sample Group:	WA28027
Sample Info:	WA28027-006	Misc. Info:	
Inst. ID:	LCMSMS01	Operator:	Matthew M. Miller
Method Name:	LCMSMS01_PFAS-ID	Version:	2020-09-23 10:00:21
Calib Method:	PFAS-ID	Lock State:	Unlocked
Quant Method:	IsoDil	Integrator:	picker
Final Conc.:	Amt * DF * CF	Matrix/Level:	Aqueous

Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0407000

Name	Value	Units	Description
DF	1		Dilution Factor
VF	10000	ul	Final Volume
VI	270	ml	Initial Sample Volume
AlsDf	0.91		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.726	1.721	1	944822	17	>100:1			1001.00	1036.40	92.8	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													Js
212.9 > 168.9	46		1.728		ND								
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.109	2.110	0	996260	13	>100:1			1001.00	1073.94	97	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													U
262.9 > 218.9	50		2.110		ND								
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.172	2.162	1	323963	15	>100:1			1001.00	1033.61	92.6	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													U
298.9 > 80	44		2.162		ND								
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													U
349 > 80	44		2.520		ND								
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.441	2.442	0	274844	17	>100:1			5005.00	5518.89	98.4	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.442		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.485	2.485	0	896678	15	>100:1			1001.00	1049.15	103	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													U
313 > 269	49		2.477		ND								
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.602	2.602	0	798471	17	>100:1			5005.00	5476.25	106	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.602		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.874	2.865	1	833860	17	>100:1			1001.00	1070.83	97.8	
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													U
363 > 319	47		2.873		ND								
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.891	2.891	1	240545	17	>100:1			1001.00	1045.41	91.7	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													U
399 > 80	45		2.891		ND								
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.922		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													U
449 > 80	45		3.277		ND								
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.245	3.244	1	223814	20	>100:1			5005.00	5550.00	84.9	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.244		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.278	3.270	1	808569	21	>100:1			1001.00	1096.90	101	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													U
413 > 369	53		3.270		ND								
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.649	3.648	1	204115	18	>100:1			1001.00	976.65	90.1	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													U
499 > 80	54		3.656		ND								
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.863		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.991		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.280		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.449		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.656	3.656	1	795522	19	>100:1			1001.00	1114.78	101	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.656		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.964	3.955	1	438851	16	>100:1			1001.00	1025.69	94.5	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.964		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.991	3.991	1	183121	16	>100:1			5005.00	5770.03	90.9	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.991		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.000	4.000	1	586092	17	>100:1			1001.00	995.75	84.2	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.000		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.150	4.158	0	866635	18	>100:1			5005.00	5592.81	112	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.158		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.299	4.308	0	805361	17	>100:1			5005.00	5747.62	92.7	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.308		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.299	4.308	0	551546	16	>100:1			1001.00	1021.96	89.6	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.308		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.563	4.570	0	703381	16	>100:1			1001.00	1136.79	106	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.570		ND								

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.813		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.016	5.029	0	641269	18	>100:1			1001.00	970.66	85	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.029		ND								
*** 37 13C2_PFDA**													
515 > 470		4.000	4.000	1	720204	17	>100:1					113	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.485	2.485	0	868677	16	>100:1					112	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.278	3.277	1	824217	22	>100:1					94.3	
*** 43 13C3_PFBA**													
216 > 172		1.726	1.721	1	942726	18	>100:1					105	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.656	3.656	1	231615	18	>100:1					94.5	

Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
s - Detector Saturated or Negative Concentration

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-007
Description: EB-HT
Matrix: Aqueous
Date Sampled: 01/26/2021 1705
Date Received: 01/28/2021

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	02/08/2021 1808	MMM	02/05/2021 1201	81968

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.1	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.1	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.1	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		8.1	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		8.1	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.1	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.1	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.1	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		94	25-150
13C2_6:2FTS		103	25-150
13C2_8:2FTS		100	25-150
13C2_PFDoA		89	25-150
13C2_PFTeDA		87	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		85	25-150
13C3-HFPO-DA		109	25-150
13C4_PFBA		98	25-150
13C4_PFHpA		106	25-150
13C5_PFHxA		110	25-150
13C5_PFPeA		98	25-150
13C6_PFDA		91	25-150
13C7_PFUdA		89	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-007
Description: EB-HT
Matrix: Aqueous
Date Sampled: 01/26/2021 1705
Date Received: 01/28/2021

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		102	25-150
13C8_PFOS		99	25-150
13C8_PFOSA		95	10-150
13C9_PFNA		108	25-150
d5-EtFOSAA		83	25-150
d3-MeFOSAA		106	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

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Pace Environmental Services, LLC
Analyte Quantitation Report

Data File:	\\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821051.d		
Injection Date:	08-Feb-2021 18:08:36	Injection Vol:	10.0 uL
Sample Type:	Client	Auto Sampler:	36
Lab Sample ID:	WA28027-007	Lab Prep. Batch:	81968
Client ID:	EB-HT	Sample Group:	WA28027
Sample Info:	WA28027-007	Misc. Info:	
Inst. ID:	LCMSMS01	Operator:	Matthew M. Miller
Method Name:	LCMSMS01_PFAS-ID	Version:	2020-09-23 10:00:21
Calib Method:	PFAS-ID	Lock State:	Unlocked
Quant Method:	IsoDil	Integrator:	picker
Final Conc.:	Amt * DF * CF	Matrix/Level:	Aqueous

Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0444899

Name	Value	Units	Description
DF	1		Dilution Factor
VF	10000	ul	Final Volume
VI	247	ml	Initial Sample Volume
AlsDf	0.91		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.719	1.721	0	996066	18	>100:1			1001.00	1092.61	97.8	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													U
212.9 > 168.9	46		1.728		ND								
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.109	2.110	0	1008728	13	>100:1			1001.00	1087.38	98.2	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													U
262.9 > 218.9	50		2.110		ND								
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.172	2.162	1	337338	17	>100:1			1001.00	1076.28	96.4	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													U
298.9 > 80	44		2.162		ND								
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													U
349 > 80	44		2.520		ND								
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.450	2.442	1	262929	17	>100:1			5005.00	5279.63	94.2	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.442		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.485	2.485	0	960530	16	>100:1			1001.00	1123.86	110	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													U
313 > 269	49		2.477		ND								
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.602	2.602	0	820263	16	>100:1			5005.00	5625.71	109	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.602		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.874	2.865	1	904478	18	>100:1			1001.00	1161.52	106	
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													U
363 > 319	47		2.873		ND								
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.891	2.891	1	223594	18	>100:1			1001.00	971.74	85.3	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													U
399 > 80	45		2.891		ND								
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.922		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													U
449 > 80	45		3.277		ND								
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.245	3.244	1	271485	21	>100:1			5005.00	6732.12	103	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.244		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.278	3.270	1	820351	21	>100:1			1001.00	1112.88	102	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													U
413 > 369	53		3.270		ND								
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.657	3.648	1	224194	20	>100:1			1001.00	1072.72	99	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													U
499 > 80	54		3.656		ND								
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.863		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.991		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.280		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.449		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.657	3.656	1	858010	18	>100:1			1001.00	1202.35	108	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.656		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.964	3.955	1	440974	18	>100:1			1001.00	1030.65	95	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.964		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.991	3.991	1	200993	16	>100:1			5005.00	6333.16	99.8	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.991		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.000	4.000	1	635685	16	>100:1			1001.00	1080.01	91.3	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.000		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.150	4.158	0	817214	18	>100:1			5005.00	5273.87	106	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.158		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.299	4.308	0	720139	18	>100:1			5005.00	5139.41	82.9	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.308		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.299	4.308	0	544460	16	>100:1			1001.00	1008.83	88.5	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.308		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.571	4.570	1	592342	17	>100:1			1001.00	957.33	89	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.570		ND								

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.813		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.017	5.029	0	659771	20	>100:1			1001.00	998.67	87.4	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.029		ND								
*** 37 13C2_PFDA**													
515 > 470		4.000	4.000	1	675641	17	>100:1					106	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.485	2.485	0	760891	16	>100:1					98.5	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.272	3.277	0	894157	21	>100:1					102	
*** 43 13C3_PFBA**													
216 > 172		1.719	1.721	0	913029	18	>100:1					102	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.657	3.656	1	254401	20	>100:1					104	

Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

QC Flag Legend

U - Result Less Than Method Detection Limit

PFAS by LC/MS/MS - MB

Sample ID: WQ81803-001
Batch: 81803
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/04/2021 1209

Parameter	Result	Q	Dil	LOQ	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	ng/L	02/05/2021 1246
11Cl-PF3OUdS	ND		1	8.0	ng/L	02/05/2021 1246
8:2 FTS	ND		1	8.0	ng/L	02/05/2021 1246
6:2 FTS	ND		1	8.0	ng/L	02/05/2021 1246
4:2 FTS	ND		1	8.0	ng/L	02/05/2021 1246
GenX	ND		1	8.0	ng/L	02/05/2021 1246
ADONA	ND		1	8.0	ng/L	02/05/2021 1246
EtFOSAA	ND		1	8.0	ng/L	02/05/2021 1246
MeFOSAA	ND		1	8.0	ng/L	02/05/2021 1246
PFBS	ND		1	4.0	ng/L	02/05/2021 1246
PFDS	ND		1	4.0	ng/L	02/05/2021 1246
PFHpS	ND		1	4.0	ng/L	02/05/2021 1246
PFNS	ND		1	4.0	ng/L	02/05/2021 1246
PFOSA	ND		1	4.0	ng/L	02/05/2021 1246
PFPeS	ND		1	4.0	ng/L	02/05/2021 1246
PFHxS	ND		1	4.0	ng/L	02/05/2021 1246
PFBA	ND		1	4.0	ng/L	02/05/2021 1246
PFDA	ND		1	4.0	ng/L	02/05/2021 1246
PFDoA	ND		1	4.0	ng/L	02/05/2021 1246
PFHpA	ND		1	4.0	ng/L	02/05/2021 1246
PFHxA	ND		1	4.0	ng/L	02/05/2021 1246
PFNA	ND		1	4.0	ng/L	02/05/2021 1246
PFOA	ND		1	4.0	ng/L	02/05/2021 1246
PFPeA	ND		1	4.0	ng/L	02/05/2021 1246
PFTeDA	ND		1	4.0	ng/L	02/05/2021 1246
PFTrDA	ND		1	4.0	ng/L	02/05/2021 1246
PFUdA	ND		1	4.0	ng/L	02/05/2021 1246
PFOS	ND	✓	1	4.0	ng/L	02/05/2021 1246

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		108	25-150
13C2_6:2FTS		105	25-150
13C2_8:2FTS		111	25-150
13C2_PFDoA		101	25-150
13C2_PFTeDA		99	25-150
13C3_PFBS		97	25-150
13C3_PFHxS		96	25-150
13C3-HFPO-DA		101	25-150
13C4_PFBA		102	25-150
13C4_PFHpA		101	25-150
13C5_PFHxA		97	25-150
13C5_PFPeA		103	25-150

✓

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
* = RSD is out of criteria
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: WQ81803-001
Batch: 81803
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/04/2021 1209

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		107	25-150
13C7_PFUdA		99	25-150
13C8_PFOA		104	25-150
13C8_PFOS		87	25-150
13C8_PFOSA		96	10-150
13C9_PFNA		104	25-150
d5-EtFOSAA		99	25-150
d3-MeFOSAA		100	25-150

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\organics\LL\LCMSMS02.i\020521-nonDOD.b\020521010.d
Injection Date: 05-Feb-2021 12:46:56 Injection Vol: 10.0 uL
Sample Type: MBlk Auto Sampler: 3
Lab Sample ID: WQ81803-001 Lab Prep. Batch: 81803
Sample Info: WQ81803-001 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Final Conc.: Amt * DF * CF Matrix/Level: Aqueous
Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0439560

Name	Value	Units	Description
DF	1		Dilution Factor
VF	10000	ul	Final Volume
VI	250	ml	Initial Sample Volume
AlsDf	0.91		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.736	1.738	0	619843	22	>100:1			1001.00	928.70	102	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													U
212.9 > 168.9	46		1.738		ND								
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.129	2.131	0	604769	16	>100:1			1001.00	954.71	103	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													U
262.9 > 218.9	50		2.131		ND								
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.182	2.184	0	178667	17	>100:1			1001.00	933.87	97.4	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													U
298.9 > 80	44		2.184		ND								
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													U
349 > 80	44		2.514		ND								
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.442	2.443	0	105361	17	>100:1			5005.00	4734.98	108	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.434		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.477	2.479	0	629302	20	>100:1			1001.00	912.97	96.7	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													U
313 > 269	49		2.479		ND								
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.590	2.583	1	1184283	20	>100:1			5005.00	4911.09	101	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.591		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.845	2.837	1	524925	18	>100:1			1001.00	996.58	101	
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													U
363 > 319	47		2.847		ND								
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.863	2.865	0	124404	19	>100:1			1001.00	938.95	95.6	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													U
399 > 80	45		2.856		ND								
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.882		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													U
449 > 80	45		3.231		ND								
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.209	3.204	1	80745	23	>100:1			5005.00	4811.25	105	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.211		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.236	3.224	1	535050	22	>100:1			1001.00	1037.81	104	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													U
413 > 369	53		3.224		ND								
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.616	3.610	1	102713	27	>100:1			1001.00	889.92	86.9	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													U
499 > 80	54		3.618		ND								
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.814		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.953		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.254		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.410		ND								
34 Perfluorododecanesulfonic acid (PFDOS) CAS: 79780-39-5													U
699 > 80	54		4.755		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.616	3.618	0	642376	22	>100:1			1001.00	995.16	104	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.618		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.932	3.927	1	245925	19	>100:1			1001.00	979.90	95.6	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.927		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.957	3.953	1	77515	20	>100:1			5005.00	4737.55	111	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.944		ND								
4 1H,1H,2H,2H-perfluorododecane sulfonic acid (10:2FTS) CAS: 120226-60-0													U
627 > 607	65		4.551		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		3.967	3.962	1	618570	17	>100:1			1001.00	1028.53	107	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		3.962		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.118	4.122	0	628349	19	>100:1			5005.00	4842.86	100	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.113		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.268	4.274	0	546526	17	>100:1			1001.00	1011.28	98.6	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.274		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.278	4.274	1	575607	18	>100:1			5005.00	5274.55	98.9	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.284		ND								

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 61 d7-MeFOSE CAS: SESI-0129													
623 > 59		4.357	4.353	1	92507	17	>100:1			1001.00	1115.32	95.9	
32 2-N-methylperfluoro-1-octanesulfonamido-ethanol (MeFOSE) CAS: 24448-09-7													U
616 > 59	61		4.363		ND								
D 57 d3-MeFOSA CAS: SESI-0109													
515 > 169		4.376	4.379	0	43891	16	>100:1			1001.00	965.96	119	
26 N-methylperfluoro-1-octanesulfonamide (MeFOSA) CAS: 31506-32-8													U
512 > 169	57		4.372		ND								
D 62 d9-EtFOSE CAS: SESI-0130													
639 > 59		4.519	4.515	1	110581	16	>100:1			1001.00	1152.43	111	
33 2-N-ethylperfluoro-1-octanesulfonamido-ethanol (EtFOSE) CAS: 1691-99-2													U
630 > 59	62		4.524		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.537	4.542	0	526214	18	>100:1			1001.00	1007.20	101	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.542		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.775		ND								
D 59 d5-EtFOSA CAS: SESI-0108													
531 > 169		4.537	4.533	1	37774	18	>100:1			1001.00	894.61	85.8	
27 N-ethylperfluoro-1-octanesulfonamide (EtFOSA) CAS: 4151-50-2													U
526 > 169	59		4.542		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		4.990	4.992	0	699924	23	>100:1			1001.00	952.97	98.8	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		4.992		ND								
D 40 13C2_PFHxDA CAS: SESI-0103													
815 > 770		5.377	5.382	0	740097	19	>100:1			1001.00	993.41	95.4	
35 Perfluoro-n-hexadecanoic acid (PFHxDA) CAS: 67905-19-5													U
813 > 769	40		5.382		ND								
36 Perfluoro-n-octadecanoic acid (PFODA) CAS: 16517-11-6													U
913 > 869	40		5.740		ND								
*** 37 13C2_PFDA**													
515 > 470		3.967	3.962	1	647080	18	>100:1					98.4	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.477	2.479	0	643874	18	>100:1					100	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.229	3.231	0	544162	21	>100:1					100	
*** 43 13C3_PFBA**													
216 > 172		1.736	1.738	0	617777	22	>100:1					106	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.608	3.610	0	125834	22	>100:1					102	

Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

QC Flag Legend

U - Result Less Than Method Detection Limit

PFAS by LC/MS/MS - MB

Sample ID: WQ81968-001
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Parameter	Result	Q	Dil	LOQ	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	ng/L	02/08/2021 1643
11Cl-PF3OUdS	ND		1	8.0	ng/L	02/08/2021 1643
8:2 FTS	ND		1	8.0	ng/L	02/08/2021 1643
6:2 FTS	ND		1	8.0	ng/L	02/08/2021 1643
4:2 FTS	ND		1	8.0	ng/L	02/08/2021 1643
GenX	ND		1	8.0	ng/L	02/08/2021 1643
ADONA	ND		1	8.0	ng/L	02/08/2021 1643
EtFOSAA	ND		1	8.0	ng/L	02/08/2021 1643
MeFOSAA	ND		1	8.0	ng/L	02/08/2021 1643
PFBS	ND		1	4.0	ng/L	02/08/2021 1643
PFDS	ND		1	4.0	ng/L	02/08/2021 1643
PFHpS	ND		1	4.0	ng/L	02/08/2021 1643
PFNS	ND		1	4.0	ng/L	02/08/2021 1643
PFOSA	ND		1	4.0	ng/L	02/08/2021 1643
PFPeS	ND		1	4.0	ng/L	02/08/2021 1643
PFHxS	ND		1	4.0	ng/L	02/08/2021 1643
PFBA	ND		1	4.0	ng/L	02/08/2021 1643
PFDA	ND		1	4.0	ng/L	02/08/2021 1643
PFDoA	ND		1	4.0	ng/L	02/08/2021 1643
PFHpA	ND		1	4.0	ng/L	02/08/2021 1643
PFHxA	ND		1	4.0	ng/L	02/08/2021 1643
PFNA	ND		1	4.0	ng/L	02/08/2021 1643
PFOA	ND		1	4.0	ng/L	02/08/2021 1643
PFPeA	ND		1	4.0	ng/L	02/08/2021 1643
PFTeDA	ND		1	4.0	ng/L	02/08/2021 1643
PFTrDA	ND		1	4.0	ng/L	02/08/2021 1643
PFUdA	ND		1	4.0	ng/L	02/08/2021 1643
PFOS	ND		1	4.0	ng/L	02/08/2021 1643

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		120	25-150
13C2_6:2FTS		109	25-150
13C2_8:2FTS		119	25-150
13C2_PFDoA		112	25-150
13C2_PFTeDA		100	25-150
13C3_PFBS		101	25-150
13C3_PFHxS		109	25-150
13C3-HFPO-DA		123	25-150
13C4_PFBA		113	25-150
13C4_PFHpA		112	25-150
13C5_PFHxA		114	25-150
13C5_PFPeA		109	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
* = RSD is out of criteria
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: WQ81968-001
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		101	25-150
13C7_PFUdA		101	25-150
13C8_PFOA		112	25-150
13C8_PFOS		102	25-150
13C8_PFOSA		103	10-150
13C9_PFNA		108	25-150
d5-EtFOSAA		98	25-150
d3-MeFOSAA		121	25-150

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821043.d
Injection Date: 08-Feb-2021 16:43:57 Injection Vol: 10.0 uL
Sample Type: MBlk Auto Sampler: 28
Lab Sample ID: WQ81968-001 Lab Prep. Batch: 81968
Sample Info: WQ81968-001 Misc. Info:
Inst. ID: LCMSMS01 Operator: Matthew M. Miller

Method Name: LCMSMS01_PFAS-ID Version: 2020-09-23 10:00:21
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Final Conc.: Amt * DF * CF Matrix/Level: Aqueous
Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0392465

Name	Value	Units	Description
DF	1		Dilution Factor
VF	10000	ul	Final Volume
VI	280	ml	Initial Sample Volume
AlsDf	0.91		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.719	1.721	0	1148765	18	>100:1			1001.00	1260.11	113	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													U
212.9 > 168.9	46		1.728		ND								
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.109	2.110	0	1121586	14	>100:1			1001.00	1209.04	109	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													U
262.9 > 218.9	50		2.110		ND								
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.161	2.162	0	354878	14	>100:1			1001.00	1132.25	101	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													U
298.9 > 80	44		2.162		ND								
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													U
349 > 80	44		2.520		ND								
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.441	2.442	0	336230	16	>100:1			5005.00	6751.52	120	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.442		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.485	2.485	0	995488	16	>100:1			1001.00	1164.76	114	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													U
313 > 269	49		2.477		ND								
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.602	2.602	0	923356	17	>100:1			5005.00	6332.76	123	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.602		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.874	2.865	1	955453	17	>100:1			1001.00	1226.98	112	
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													U
363 > 319	47		2.873		ND								
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.891	2.891	1	285457	17	>100:1			1001.00	1240.60	109	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													U
399 > 80	45		2.891		ND								
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.922		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													U
449 > 80	45		3.277		ND								
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.252	3.244	1	288378	21	>100:1			5005.00	7151.02	109	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.244		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.272	3.270	1	896778	21	>100:1			1001.00	1216.56	112	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													U
413 > 369	53		3.270		ND								
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.649	3.648	1	229957	20	>100:1			1001.00	1100.30	102	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													U
499 > 80	54		3.656		ND								
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.863		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.991		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.280		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.449		ND								
34 Perfluorododecanesulfonic acid (PFDOS) CAS: 79780-39-5													U
699 > 80	54		4.782		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.649	3.656	0	850851	20	>100:1			1001.00	1192.32	108	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.656		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.955	3.955	1	476255	17	>100:1			1001.00	1113.11	103	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.964		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.982	3.991	0	239210	21	>100:1			5005.00	7537.35	119	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.991		ND								
4 1H,1H,2H,2H-perfluorododecane sulfonic acid (10:2FTS) CAS: 120226-60-0													U
627 > 607	65		4.586		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.000	4.000	1	701826	16	>100:1			1001.00	1192.38	101	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.000		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.150	4.158	0	933884	19	>100:1			5005.00	6026.80	121	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.158		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.299	4.308	0	847429	16	>100:1			5005.00	6047.84	97.6	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.308		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.299	4.308	0	624236	15	>100:1			1001.00	1156.64	101	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.308		ND								

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 61 d7-MeFOSE CAS: SESI-0129													
623 > 59		4.381	4.372	1	160538	15	>100:1			1001.00	978.94	100	
32 2-N-methylperfluoro-1-octanesulfonamido-ethanol (MeFOSE) CAS: 24448-09-7													U
616 > 59	61		4.389		ND								
D 57 d3-MeFOSA CAS: SESI-0109													
515 > 169		4.407	4.398	1	51375	15	>100:1			1001.00	848.17	77.9	
26 N-methylperfluoro-1-octanesulfonamide (MeFOSA) CAS: 31506-32-8													U
512 > 169	57		4.398		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.571	4.570	1	741844	17	>100:1			1001.00	1198.95	112	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.570		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.813		ND								
D 62 d9-EtFOSE CAS: SESI-0130													
639 > 59		4.547	4.538	1	158672	15	>100:1			1001.00	1026.40	92	
33 2-N-ethylperfluoro-1-octanesulfonamido-ethanol (EtFOSE) CAS: 1691-99-2													U
630 > 59	62		4.554		ND								
D 59 d5-EtFOSA CAS: SESI-0108													
531 > 169		4.563	4.563	1	55515	16	>100:1			1001.00	919.36	90.7	
27 N-ethylperfluoro-1-octanesulfonamide (EtFOSA) CAS: 4151-50-2													U
526 > 169	59		4.563		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.017	5.029	0	754703	19	>100:1			1001.00	1142.36	100	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.029		ND								
D 40 13C2_PFHxDA CAS: SESI-0103													
815 > 770		5.396	5.412	0	417157	17	>100:1			1001.00	1175.75	112	
35 Perfluoro-n-hexadecanoic acid (PFHxDA) CAS: 67905-19-5													U
813 > 769	40		5.421		ND								
36 Perfluoro-n-octadecanoic acid (PFODA) CAS: 16517-11-6													U
913 > 869	40		5.785		ND								
*** 37 13C2_PFDA**													
515 > 470		4.000	4.000	1	699650	17	>100:1					110	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.485	2.485	0	839211	16	>100:1					109	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.272	3.277	0	874548	20	>100:1					100	
*** 43 13C3_PFBA**													
216 > 172		1.719	1.721	0	958922	18	>100:1					107	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.649	3.656	0	255050	20	>100:1					104	

Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

QC Flag Legend

U - Result Less Than Method Detection Limit

PFAS by LC/MS/MS - LCS

Sample ID: WQ81803-002
Batch: 81803
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/04/2021 1209

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
9Cl-PF3ONS	15	14		1	97	50-150	02/05/2021 1257
11Cl-PF3OUdS	15	14		1	95	50-150	02/05/2021 1257
8:2 FTS	15	14		1	93	50-150	02/05/2021 1257
6:2 FTS	15	16		1	109	50-150	02/05/2021 1257
4:2 FTS	15	13		1	89	50-150	02/05/2021 1257
GenX	32	32		1	100	50-150	02/05/2021 1257
ADONA	15	16		1	108	50-150	02/05/2021 1257
EtFOSAA	16	17		1	105	50-150	02/05/2021 1257
MeFOSAA	16	17		1	103	50-150	02/05/2021 1257
PFBS	14	13		1	94	50-150	02/05/2021 1257
PFDS	15	15		1	100	50-150	02/05/2021 1257
PFHpS	15	16		1	108	50-150	02/05/2021 1257
PFNS	15	16		1	103	50-150	02/05/2021 1257
PFOSA	16	16		1	98	50-150	02/05/2021 1257
PFPeS	15	15		1	101	50-150	02/05/2021 1257
PFHxS	15	15		1	103	50-150	02/05/2021 1257
PFBA	16	15		1	97	50-150	02/05/2021 1257
PFDA	16	16		1	97	50-150	02/05/2021 1257
PFDoA	16	16		1	100	50-150	02/05/2021 1257
PFHpA	16	15		1	93	50-150	02/05/2021 1257
PFHxA	16	16		1	102	50-150	02/05/2021 1257
PFNA	16	17		1	109	50-150	02/05/2021 1257
PFOA	16	16		1	101	50-150	02/05/2021 1257
PFPeA	16	15		1	95	50-150	02/05/2021 1257
PFTeDA	16	17		1	106	50-150	02/05/2021 1257
PFTrDA	16	19		1	117	50-150	02/05/2021 1257
PFUdA	16	15		1	93	50-150	02/05/2021 1257
PFOS	15	14		1	96	50-150	02/05/2021 1257

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		96	25-150
13C2_6:2FTS		99	25-150
13C2_8:2FTS		110	25-150
13C2_PFDoA		96	25-150
13C2_PFTeDA		94	25-150
13C3_PFBS		90	25-150
13C3_PFHxS		87	25-150
13C3-HFPO-DA		95	25-150
13C4_PFBA		97	25-150
13C4_PFHpA		100	25-150
13C5_PFHxA		94	25-150
13C5_PFPeA		97	25-150

LCS/MS/MSD spikes evaluated 70-150 as historically reported

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: WQ81803-002
Batch: 81803
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/04/2021 1209

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		99	25-150
13C7_PFUdA		98	25-150
13C8_PFOA		96	25-150
13C8_PFOS		87	25-150
13C8_PFOSA		94	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		88	25-150
d3-MeFOSAA		98	25-150

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: WQ81968-002
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
9Cl-PF3ONS	14	13		1	98	50-150	02/08/2021 1654
11Cl-PF3OUdS	14	13		1	95	50-150	02/08/2021 1654
8:2 FTS	14	12		1	85	50-150	02/08/2021 1654
6:2 FTS	14	14		1	99	50-150	02/08/2021 1654
4:2 FTS	14	15		1	114	50-150	02/08/2021 1654
GenX	29	31		1	107	50-150	02/08/2021 1654
ADONA	14	15		1	111	50-150	02/08/2021 1654
EtFOSAA	14	15		1	107	50-150	02/08/2021 1654
MeFOSAA	14	18		1	123	50-150	02/08/2021 1654
PFBS	13	13		1	101	50-150	02/08/2021 1654
PFDS	14	15		1	110	50-150	02/08/2021 1654
PFHpS	14	14		1	98	50-150	02/08/2021 1654
PFNS	14	14		1	101	50-150	02/08/2021 1654
PFOSA	14	15		1	101	50-150	02/08/2021 1654
PFPeS	14	14		1	100	50-150	02/08/2021 1654
PFHxS	13	12	✓	1	94	50-150	02/08/2021 1654
PFBA	14	14		1	96	50-150	02/08/2021 1654
PFDA	14	17		1	119	50-150	02/08/2021 1654
PFDoA	14	15		1	102	50-150	02/08/2021 1654
PFHpA	14	14		1	99	50-150	02/08/2021 1654
PFHxA	14	15		1	100	50-150	02/08/2021 1654
PFNA	14	15		1	102	50-150	02/08/2021 1654
PFOA	14	15	✓	1	105	50-150	02/08/2021 1654
PFPeA	14	14		1	98	50-150	02/08/2021 1654
PFTeDA	14	15		1	104	50-150	02/08/2021 1654
PFTrDA	14	15		1	102	50-150	02/08/2021 1654
PFUdA	14	15		1	102	50-150	02/08/2021 1654
PFOS	13	14		1	107	50-150	02/08/2021 1654

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		111	25-150
13C2_6:2FTS		105	25-150
13C2_8:2FTS		112	25-150
13C2_PFDoA		104	25-150
13C2_PFTeDA		98	25-150
13C3_PFBS		93	25-150
13C3_PFHxS		97	25-150
13C3-HFPO-DA		111	25-150
13C4_PFBA		105	25-150
13C4_PFHpA		109	25-150
13C5_PFHxA		120	25-150
13C5_PFPeA		110	25-150

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: WQ81968-002
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		91	25-150
13C7_PFUdA		103	25-150
13C8_PFOA		112	25-150
13C8_PFOS		92	25-150
13C8_PFOSA		105	10-150
13C9_PFNA		100	25-150
d5-EtFOSAA		98	25-150
d3-MeFOSAA		108	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
* = RSD is out of criteria
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: WA28027-005MS
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Parameter	Sample Amount (ng/L)	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
9Cl-PF3ONS	ND	13	7.2		1	55	50-150	02/08/2021 1736
11Cl-PF3OUdS	ND	13	6.6		1	50	50-150	02/08/2021 1736
8:2 FTS	ND	13	8.0		1	59	50-150	02/08/2021 1736
6:2 FTS	ND	13	8.7		1	65	50-150	02/08/2021 1736
4:2 FTS	ND	13	7.1		1	54	50-150	02/08/2021 1736
GenX	ND	28	16		1	57	50-150	02/08/2021 1736
ADONA	ND	13	7.6		1	57	50-150	02/08/2021 1736
EtFOSAA	ND	14	7.4		1	52	50-150	02/08/2021 1736
MeFOSAA	ND	14	9.0		1	64	50-150	02/08/2021 1736
PFBS	32	12	25	N	1	-56	50-150	02/08/2021 1736
PFDS	ND	14	6.6	N	1	49	50-150	02/08/2021 1736
PFHpS	ND	13	8.5		1	63	50-150	02/08/2021 1736
PFNS	ND	14	6.8		1	50	50-150	02/08/2021 1736
PFOSA	ND	14	6.7	N	1	48	50-150	02/08/2021 1736
PFPeS	17	13	17	N	1	-1.6	50-150	02/08/2021 1736
PFHxS	19	13	18	N	1	-9.3	50-150	02/08/2021 1736
PFBA	9.5	14	12	N	1	20	50-150	02/08/2021 1736
PFDA	ND	14	7.2		1	51	50-150	02/08/2021 1736
PFDoA	ND	14	8.4		1	60	50-150	02/08/2021 1736
PFHpA	7.2	14	12	N	1	34	50-150	02/08/2021 1736
PFHxA	12	14	14	N	1	11	50-150	02/08/2021 1736
PFNA	ND	14	8.2		1	58	50-150	02/08/2021 1736
PFOA	21	14	18	N	1	-22	50-150	02/08/2021 1736
PFPeA	6.0	14	11	N	1	34	50-150	02/08/2021 1736
PFTeDA	ND	14	8.0		1	57	50-150	02/08/2021 1736
PFTrDA	ND	14	8.1		1	58	50-150	02/08/2021 1736
PFUdA	ND	14	7.4		1	52	50-150	02/08/2021 1736
PFOS	92	13	59	N	1	-252	50-150	02/08/2021 1736

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	181	25-150
13C2_6:2FTS	N	159	25-150
13C2_8:2FTS	N	169	25-150
13C2_PFDoA	N	163	25-150
13C2_PFTeDA	N	156	25-150
13C3_PFBS	N	167	25-150
13C3_PFHxS	N	166	25-150
13C3-HFPO-DA	N	186	25-150
13C4_PFBA	N	175	25-150
13C4_PFHpA	N	182	25-150
13C5_PFHxA	N	212	25-150
13C5_PFPeA	N	179	25-150

"surrogate" double spiked per case narrative, results theoretically halved. not used to evaluate

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: WA28027-005MS
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA	N	174	25-150
13C7_PFUdA	N	177	25-150
13C8_PFOA	N	182	25-150
13C8_PFOS	N	157	25-150
13C8_PFOSA	N	212	10-150
13C9_PFNA	N	174	25-150
d5-EtFOSAA	N	152	25-150
d3-MeFOSAA	N	168	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
* = RSD is out of criteria
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MSD

Sample ID: WA28027-005MD
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Parameter	Sample Amount (ng/L)	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	% RPD	% Rec Limit	% RPD Limit	Analysis Date
9Cl-PF3ONS	ND	14	6.5	N	1	47	10	50-150	30	02/08/2021 1747
11Cl-PF3OUdS	ND	14	5.8	N	1	41	13	50-150	30	02/08/2021 1747
8:2 FTS	ND	14	5.7	N,+	1	40	34	50-150	30	02/08/2021 1747
6:2 FTS	ND	14	7.9		1	57	9.3	50-150	30	02/08/2021 1747
4:2 FTS	ND	14	7.8		1	57	9.7	50-150	30	02/08/2021 1747
GenX	ND	30	16		1	56	2.6	50-150	30	02/08/2021 1747
ADONA	ND	14	8.7		1	63	14	50-150	30	02/08/2021 1747
EtFOSAA	ND	15	6.8	N	1	46	7.5	50-150	30	02/08/2021 1747
MeFOSAA	ND	15	8.0		1	54	12	50-150	30	02/08/2021 1747
PFBS	32	13	25	N	1	-57	1.9	50-150	30	02/08/2021 1747
PFDS	ND	14	7.0	N	1	49	5.1	50-150	30	02/08/2021 1747
PFHpS	ND	14	9.5		1	68	12	50-150	30	02/08/2021 1747
PFNS	ND	14	7.2		1	51	5.8	50-150	30	02/08/2021 1747
PFOSA	ND	15	8.5		1	58	23	50-150	30	02/08/2021 1747
PFPeS	17	14	19	N	1	13	12	50-150	30	02/08/2021 1747
PFHxS	19	13	20	N	1	4.5	9.5	50-150	30	02/08/2021 1747
PFBA	9.5	15	13	N	1	21	2.6	50-150	30	02/08/2021 1747
PFDA	ND	15	7.3	N	1	49	1.9	50-150	30	02/08/2021 1747
PFDoA	ND	15	7.9		1	54	6.4	50-150	30	02/08/2021 1747
PFHpA	7.2	15	11	N	1	24	10	50-150	30	02/08/2021 1747
PFHxA	12	15	15	N	1	17	7.0	50-150	30	02/08/2021 1747
PFNA	ND	15	8.3		1	57	1.4	50-150	30	02/08/2021 1747
PFOA	21	15	20	N	1	-5.3	12	50-150	30	02/08/2021 1747
PFPeA	6.0	15	11	N	1	36	4.1	50-150	30	02/08/2021 1747
PFTeDA	ND	15	8.3		1	56	3.1	50-150	30	02/08/2021 1747
PFTrDA	ND	15	8.0		1	54	1.4	50-150	30	02/08/2021 1747
PFUdA	ND	15	9.1		1	61	21	50-150	30	02/08/2021 1747
PFOS	92	14	57	N	1	-259	4.4	50-150	30	02/08/2021 1747

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	209	25-150
13C2_6:2FTS	N	179	25-150
13C2_8:2FTS	N	209	25-150
13C2_PFDoA	N	172	25-150
13C2_PFTeDA	N	157	25-150
13C3_PFBS	N	159	25-150
13C3_PFHxS	N	156	25-150
13C3-HFPO-DA	N	196	25-150
13C4_PFBA	N	176	25-150
13C4_PFHpA	N	203	25-150
13C5_PFHxA	N	199	25-150
13C5_PFPeA	N	177	25-150

"surrogate" double spiked per case narrative, results theoretically halved. not used to evaluate

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MSD

Sample ID: WA28027-005MD
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA	N	170	25-150
13C7_PFUdA	N	166	25-150
13C8_PFOA	N	186	25-150
13C8_PFOS	N	162	25-150
13C8_PFOSA	N	180	10-150
13C9_PFNA	N	176	25-150
d5-EtFOSAA	N	160	25-150
d3-MeFOSAA	N	202	25-150

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

FORM 2
ISOTOPE DILUTION STANDARD RECOVERY

Lab Name: Shealy Environmental Services, Inc. Lot No.: WA28027

Project No.: 16.0062961.5

AnalyticalMethod: PFAS by ID SOP Matrix: Water

CLIENT SAMPLE ID	IDS1	IDS2	IDS3	IDS4	IDS5	IDS6	IDS7	IDS8	IDS9
HS-PW-2.5 (A)	97	90	102	94	91	96	100	101	99
HS-PW-2.5 (B)	107	103	110	97	87	96	95	101	96
HS-PW-3 (A)	110	108	108	101	97	109	103	107	108
HS-PW-3 (A) DUP	105	92	106	93	95	105	102	101	104
HS-PW-3.5 (A)	97	92	100	81	77	88	89	97	91
FB-1/26	98	85	91	106	85	93	92	106	93
EB-HT	94	103	100	89	87	96	85	109	98
WQ81803-001	108	105	111	101	99	97	96	101	102
WQ81803-002	96	99	110	96	94	90	87	95	97
WQ81968-001	120	109	119	112	100	101	109	123	113
WQ81968-002	111	105	112	104	98	93	97	111	105
HS-PW-3.5 (A)MS	181 *	159 *	169 *	163 *	156 *	167 *	166 *	186 *	175 *
HS-PW-3.5 (A)MSD	209 *	179 *	209 *	172 *	157 *	159 *	156 *	196 *	176 *

	QC LIMITS
IDS1 = 13C2_4:2FTS	25-150
IDS2 = 13C2_6:2FTS	25-150
IDS3 = 13C2_8:2FTS	25-150
IDS4 = 13C2_PFDoA	25-150
IDS5 = 13C2_PFTeDA	25-150
IDS6 = 13C3_PFBS	25-150
IDS7 = 13C3_PFHxS	25-150
IDS8 = 13C3-HFPO-DA	25-150
IDS9 = 13C4_PFBA	25-150

* Recoveries outside QC limits
D IDS Diluted Out

FORM 2
ISOTOPE DILUTION STANDARD RECOVERY

Lab Name: Shealy Environmental Services, Inc. Lot No.: WA28027

Project No.: 16.0062961.5

AnalyticalMethod: PFAS by ID SOP Matrix: Water

CLIENT SAMPLE ID	IDS10	IDS11	IDS12	IDS13	IDS14	IDS15	IDS16	IDS17	
HS-PW-2.5 (A)	98	97	98	92	97	103	92	97	
HS-PW-2.5 (B)	105	101	105	96	96	105	85	94	
HS-PW-3 (A)	106	103	112	100	103	109	102	103	
HS-PW-3 (A) DUP	99	96	103	103	98	101	95	97	
HS-PW-3.5 (A)	95	102	95	92	94	93	79	96	
FB-1/26	98	103	97	84	90	101	90	95	
EB-HT	106	110	98	91	89	102	99	95	
WQ81803-001	101	97	103	107	99	104	87	96	
WQ81803-002	100	94	97	99	98	96	87	94	
WQ81968-001	112	114	109	101	101	112	102	103	
WQ81968-002	109	120	110	91	103	112	92	105	
HS-PW-3.5 (A)MS	182 *	212 *	179 *	174 *	177 *	182 *	157 *	212 *	
HS-PW-3.5 (A)MSD	203 *	199 *	177 *	170 *	166 *	186 *	162 *	180 *	

	QC LIMITS
IDS10 = 13C4_PFHpA	25-150
IDS11 = 13C5_PFHxA	25-150
IDS12 = 13C5_PFPeA	25-150
IDS13 = 13C6_PFDA	25-150
IDS14 = 13C7_PFUdA	25-150
IDS15 = 13C8_PFOA	25-150
IDS16 = 13C8_PFOS	25-150
IDS17 = 13C8_PFOSA	10-150

* Recoveries outside QC limits
D IDS Diluted Out

FORM 2
ISOTOPE DILUTION STANDARD RECOVERY

Lab Name: Shealy Environmental Services, Inc. Lot No.: WA28027

Project No.: 16.0062961.5

AnalyticalMethod: PFAS by ID SOP Matrix: Water

CLIENT SAMPLE ID	IDS18	IDS19	IDS20						TOT OUT
HS-PW-2.5 (A)	93	96	100						0
HS-PW-2.5 (B)	94	92	101						0
HS-PW-3 (A)	104	105	110						0
HS-PW-3 (A) DUP	96	91	101						0
HS-PW-3.5 (A)	95	78	100						0
FB-1/26	101	93	112						0
EB-HT	108	83	106						0
WQ81803-001	104	99	100						0
WQ81803-002	94	88	98						0
WQ81968-001	108	98	121						0
WQ81968-002	100	98	108						0
HS-PW-3.5 (A)MS	174 *	152 *	168 *						20
HS-PW-3.5 (A)MSD	176 *	160 *	202 *						20

	QC LIMITS
IDS18 = 13C9_PFNA	25-150
IDS19 = d5-EtFOSAA	25-150
IDS20 = d3-MeFOSAA	25-150

* Recoveries outside QC limits
D IDS Diluted Out

FORM 3
MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Shealy Environmental Services, Inc. Lot No.: WA28027

Project No.: 16.0062961.5

Analytical Method: PFAS by ID SOP Matrix: Water

Client Sample ID (Matrix Spike/Matrix Spike Duplicate): HS-PW-3.5 (A)

Instrument ID: _Sciex 4500_LCMSMS1 Lab Sample ID: WA28027-005MS

Concentration Units (ug/L, mg/L, ug/kg): ng/L

ANALYTE	SPIKE ADDED	SAMPLE CONCENTRATION	MS CONCENTRATION	MS %REC	#	QC LIMITS REC.
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	13		7.2	55		50-150
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	13		6.6	50		50-150
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	13		8	59		50-150
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	13		8.7	65		50-150
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	13		7.1	54		50-150
Hexafluoropropylene oxide dimer acid (GenX)	28		16	57		50-150
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	13		7.6	57		50-150
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	14		7.4	52		50-150
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	14		9	64		50-150
Perfluoro-1-butanesulfonic acid (PFBS)	12	32	25	-56	*	50-150
Perfluoro-1-decanesulfonic acid (PFDS)	14		6.6	49	*	50-150
Perfluoro-1-heptanesulfonic acid (PFHpS)	13		8.5	63		50-150
Perfluoro-1-nonanesulfonic acid (PFNS)	14		6.8	50		50-150
Perfluoro-1-octanesulfonamide (PFOSA)	14		6.7	48	*	50-150
Perfluoro-1-pentanesulfonic acid (PFPeS)	13	17	17	-1.6	*	50-150
Perfluorohexanesulfonic acid (PFHxS)	13	19	18	-9.3	*	50-150
Perfluoro-n-butanoic acid (PFBA)	14	9.5	12	20	*	50-150
Perfluoro-n-decanoic acid (PFDA)	14		7.2	51		50-150
Perfluoro-n-dodecanoic acid (PFDoA)	14		8.4	60		50-150
Perfluoro-n-heptanoic acid (PFHpA)	14	7.2	12	34	*	50-150
Perfluoro-n-hexanoic acid (PFHxA)	14	12	14	11	*	50-150
Perfluoro-n-nonanoic acid (PFNA)	14		8.2	58		50-150
Perfluoro-n-octanoic acid (PFOA)	14	21	18	-22	*	50-150
Perfluoro-n-pentanoic acid (PFPeA)	14	6	11	34	*	50-150
Perfluoro-n-tetradecanoic acid (PFTeDA)	14		8	57		50-150
Perfluoro-n-tridecanoic acid (PFTrDA)	14		8.1	58		50-150
Perfluoro-n-undecanoic acid (PFUdA)	14		7.4	52		50-150
Perfluorooctanesulfonic acid (PFOS)	13	92	59	-252	*	50-150

"surrogate" double spiked?

* Values outside of QC Limits

FORM 3
MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Shealy Environmental Services, Inc. Lot No.: WA28027

Project No.: 16.0062961.5

Analytical Method: PFAS by ID SOP Matrix: Water

Client Sample ID (Matrix Spike/Matrix Spike Duplicate): HS-PW-3.5 (A)

Instrument ID: _Sciex 4500_LCMSMS1 Lab Sample ID: WA28027-005MS

Concentration Units (ug/L, mg/L, ug/kg): ng/L

ANALYTE	SPIKE ADDED	MSD CONCENTRATION	MSD %R	#	RPD	#	QC LIMITS RPD	QC LIMITS %R
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	14	6.5	47	*	10		0-30	50-150
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	14	5.8	41	*	13		0-30	50-150
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	14	5.7	40	*	34	*	0-30	50-150
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	14	7.9	57		9.3		0-30	50-150
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	14	7.8	57		9.7		0-30	50-150
Hexafluoropropylene oxide dimer acid (GenX)	30	16	56		2.6		0-30	50-150
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	14	8.7	63		14		0-30	50-150
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	15	6.8	46	*	7.5		0-30	50-150
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	15	8	54		12		0-30	50-150
Perfluoro-1-butanesulfonic acid (PFBS)	13	25	-57	*	1.9		0-30	50-150
Perfluoro-1-decanesulfonic acid (PFDS)	14	7	49	*	5.1		0-30	50-150
Perfluoro-1-heptanesulfonic acid (PFHpS)	14	9.5	68		12		0-30	50-150
Perfluoro-1-nonanesulfonic acid (PFNS)	14	7.2	51		5.8		0-30	50-150
Perfluoro-1-octanesulfonamide (PFOSA)	15	8.5	58		23		0-30	50-150
Perfluoro-1-pentanesulfonic acid (PFPeS)	14	19	13	*	12		0-30	50-150
Perfluorohexanesulfonic acid (PFHxS)	13	20	4.5	*	9.5		0-30	50-150
Perfluoro-n-butanoic acid (PFBA)	15	13	21	*	2.6		0-30	50-150
Perfluoro-n-decanoic acid (PFDA)	15	7.3	49	*	1.9		0-30	50-150
Perfluoro-n-dodecanoic acid (PFDoA)	15	7.9	54		6.4		0-30	50-150
Perfluoro-n-heptanoic acid (PFHpA)	15	11	24	*	10		0-30	50-150
Perfluoro-n-hexanoic acid (PFHxA)	15	15	17	*	7.0		0-30	50-150
Perfluoro-n-nonanoic acid (PFNA)	15	8.3	57		1.4		0-30	50-150
Perfluoro-n-octanoic acid (PFOA)	15	20	-5.3	*	12		0-30	50-150
Perfluoro-n-pentanoic acid (PFPeA)	15	11	36	*	4.1		0-30	50-150
Perfluoro-n-tetradecanoic acid (PFTeDA)	15	8.3	56		3.1		0-30	50-150
Perfluoro-n-tridecanoic acid (PFTrDA)	15	8	54		1.4		0-30	50-150
Perfluoro-n-undecanoic acid (PFUdA)	15	9.1	61		21		0-30	50-150
Perfluorooctanesulfonic acid (PFOS)	14	57	-259	*	4.4		0-30	50-150

"surrogate" double spiked?

* Values outside of QC Limits

FORM 3
LABORATORY CONTROL/LABORATORY CONTROL DUPLICATE SAMPLE RECOVERY

Lab Name: Shealy Environmental Services, Inc. Lot No.: WA28027

Project No.: 16.0062961.5

Analytical Method: PFAS by ID SOP Matrix: Water

Client Sample ID: WQ81803-002 Lab Sample ID: WQ81803-002

Instrument ID: Sciex_5060884 (QTRAP 4500)_LCMSMS2

Concentration Units (ug/L, mg/L, ug/kg): ng/L

ANALYTE	SPIKE ADDED	LCS CONCENTRATION	LCS %REC #	QC LIMITS REC.
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	15	14	95	50-150
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	15	14	93	50-150
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	15	16	109	50-150
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	15	13	89	50-150
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	15	16	108	50-150
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	15	14	97	50-150
Hexafluoropropylene oxide dimer acid (GenX)	32	32	100	50-150
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	16	17	105	50-150
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	16	17	103	50-150
Perfluoro-1-butanesulfonic acid (PFBS)	14	13	94	50-150
Perfluoro-1-decanesulfonic acid (PFDS)	15	15	100	50-150
Perfluoro-1-heptanesulfonic acid (PFHpS)	15	16	108	50-150
Perfluoro-1-nonanesulfonic acid (PFNS)	15	16	103	50-150
Perfluoro-1-octanesulfonamide (PFOSA)	16	16	98	50-150
Perfluoro-1-pentanesulfonic acid (PFPeS)	15	15	101	50-150
Perfluoro-n-butanoic acid (PFBA)	16	15	97	50-150
Perfluoro-n-decanoic acid (PFDA)	16	16	97	50-150
Perfluoro-n-dodecanoic acid (PFDoA)	16	16	100	50-150
Perfluoro-n-heptanoic acid (PFHpA)	16	15	93	50-150
Perfluoro-n-hexanoic acid (PFHxA)	16	16	102	50-150
Perfluoro-n-nonanoic acid (PFNA)	16	17	109	50-150
Perfluoro-n-octanoic acid (PFOA)	16	16	101	50-150
Perfluoro-n-pentanoic acid (PFPeA)	16	15	95	50-150
Perfluoro-n-tetradecanoic acid (PFTeDA)	16	17	106	50-150
Perfluoro-n-tridecanoic acid (PFTrDA)	16	19	117	50-150
Perfluoro-n-undecanoic acid (PFUdA)	16	15	93	50-150
Perfluorohexanesulfonic acid (PFHxS)	15	15	103	50-150
Perfluorooctanesulfonic acid (PFOS)	15	14	96	50-150

* Values outside of QC Limits

FORM 3
LABORATORY CONTROL/LABORATORY CONTROL DUPLICATE SAMPLE RECOVERY

Lab Name: Shealy Environmental Services, Inc. Lot No.: WA28027

Project No.: 16.0062961.5

Analytical Method: PFAS by ID SOP Matrix: Water

Client Sample ID: WQ81968-002 Lab Sample ID: WQ81968-002

Instrument ID: _Sciex 4500_LCMSMS1

Concentration Units (ug/L, mg/L, ug/kg): ng/L

ANALYTE	SPIKE ADDED	LCS CONCENTRATION	LCS %REC #	QC LIMITS REC.
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	14	13	95	50-150
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	14	12	85	50-150
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	14	14	99	50-150
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	14	15	114	50-150
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	14	15	111	50-150
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	14	13	98	50-150
Hexafluoropropylene oxide dimer acid (GenX)	29	31	107	50-150
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	14	15	107	50-150
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	14	18	123	50-150
Perfluoro-1-butanesulfonic acid (PFBS)	13	13	101	50-150
Perfluoro-1-decanesulfonic acid (PFDS)	14	15	110	50-150
Perfluoro-1-heptanesulfonic acid (PFHpS)	14	14	98	50-150
Perfluoro-1-nonanesulfonic acid (PFNS)	14	14	101	50-150
Perfluoro-1-octanesulfonamide (PFOSA)	14	15	101	50-150
Perfluoro-1-pentanesulfonic acid (PFPeS)	14	14	100	50-150
Perfluoro-n-butanoic acid (PFBA)	14	14	96	50-150
Perfluoro-n-decanoic acid (PFDA)	14	17	119	50-150
Perfluoro-n-dodecanoic acid (PFDoA)	14	15	102	50-150
Perfluoro-n-heptanoic acid (PFHpA)	14	14	99	50-150
Perfluoro-n-hexanoic acid (PFHxA)	14	15	100	50-150
Perfluoro-n-nonanoic acid (PFNA)	14	15	102	50-150
Perfluoro-n-octanoic acid (PFOA)	14	15	105	50-150
Perfluoro-n-pentanoic acid (PFPeA)	14	14	98	50-150
Perfluoro-n-tetradecanoic acid (PFTeDA)	14	15	104	50-150
Perfluoro-n-tridecanoic acid (PFTrDA)	14	15	102	50-150
Perfluoro-n-undecanoic acid (PFUdA)	14	15	102	50-150
Perfluorohexanesulfonic acid (PFHxS)	13	12	94	50-150
Perfluorooctanesulfonic acid (PFOS)	13	14	107	50-150

* Values outside of QC Limits

CLIENT SAMPLE ID

WQ81803-001

FORM 4
METHOD BLANK SUMMARY

Lab Name: Shealy Environmental Services, Inc.

Lot No.: WA28027

Project No.: 16.0062961.5

Lab Sample ID: WQ81803-001

Analytical Method: PFAS by ID SOP

Matrix: Water

Instrument ID: Sciex_5060884 (QTRAP 4500)_LCMSMS2

Lab File ID:

Extraction Type: SOP SPE

Date Extracted: 02/04/2021

LC Column: Gemini C18 ID: 2.00 (mm)

Date Analyzed: 02/05/2021

Time Analyzed: 12:46

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE/TIME ANALYZED
HS-PW-2.5 (A)	WA28027-001		20:27
HS-PW-2.5 (B)	WA28027-002		20:16
HS-PW-3 (A)	WA28027-003		20:38
HS-PW-3 (A) DUP	WA28027-004		20:48
WQ81803-002	WQ81803-002		12:57

CLIENT SAMPLE ID

WQ81968-001

FORM 4
METHOD BLANK SUMMARY

Lab Name: Shealy Environmental Services, Inc.
Lot No.: WA28027

Project No.: 16.0062961.5
Lab Sample ID: WQ81968-001

Analytical Method: PFAS by ID SOP
Matrix: Water

Instrument ID: Sciex 4500_LCMSMS1
Lab File ID:

Extraction Type: SOP SPE
Date Extracted: 02/05/2021

LC Column: Gemini C18 ID: 2.00 (mm)
Date Analyzed: 02/08/2021

Time Analyzed: 16:43

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE/TIME ANALYZED
HS-PW-3.5 (A)	WA28027-005		17:26
FB-1/26	WA28027-006		17:58
EB-HT	WA28027-007		18:08
WQ81968-002	WQ81968-002		16:54
HS-PW-3.5 (A)MS	WA28027-005MS		17:36
HS-PW-3.5 (A)MSD	WA28027-005MD		17:47

SCIEX Triple Quad™ 4500 or SCIEX Triple Quad™ 4500MD System

Planned Maintenance Procedure

GEN-IDV-08-6710-B

January 2019

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Introduction 1

Note: For regulatory and safety information for the mass spectrometer, refer to the *System User Guide*.

The planned maintenance (PM) procedure is designed to help maintain overall system performance.

The PM is not intended to take the place of an Operational Qualification (OQ) nor is it intended to verify the instrument specifications. Separate Installation Qualification (IQ) and OQ services are available. Contact a SCIEX representative.

The procedure must be performed by a trained SCIEX Field Service Employee (FSE).

The procedure has been developed for the SCIEX Triple Quad™ 4500/4500MD system with the Turbo V™ ion source. It does not apply to any other products or processes.

The procedure does not address any customer-specific analytical protocol (performance qualification) or method validation.

Note: If an issue is identified and the system requires repair, then the customer is responsible for the repair at the expense of the customer, except to the extent that the system and the required repairs are covered by a SCIEX warranty or service contract. A separate repair service call must be opened and the repair hours must not be charged against this procedure.

Planned Maintenance Tasks 2

Note: Perform all procedures using the Turbo V™ ion source, unless otherwise specified.

Pre-Planned Maintenance

Note: Guideline values are for reference only. The pre-PM test results are not required to meet or exceed these values.

Pre-PM Tasks

Task	Complete	N/A
Ask the customer about system performance since the last visit and record comments. Performance ok.	✓	—
If the customer maintains a log for the system, then review it.	○	◉
Review the work to be performed with the customer.	✓	—

Task	Complete	N/A
Inspect for front-end contamination. Refer to Inspect for Contamination.	✓	—
Check the status of the RAID 1 hard drives.	✓	—

Vacuum System Tests

<table>
<tr><th colspan="3">Task</th><th>Complete</th></tr>
<tr><td colspan="3">Record the turbo pump operational values.
<table><tr><th>Parameter</th><th>Results</th></tr><tr><td>Temperature (°C)</td><td>48</td></tr><tr><td>Current (A)</td><td>3.8</td></tr><tr><td>Voltage (V)</td><td>23</td></tr><tr><td>Power (W)</td><td>80</td></tr><tr><td>Driving frequency (Hz)</td><td>800</td></tr></table></td><td>✓</td></tr>
<tr><td rowspan="2">Inspect the vacuum gauge filament using the Analyst® Service Diagnostics (ASD) software and identify the filament position. If the mass spectrometer is using filament 2, then order a replacement vacuum gauge as a separate service call.</td><td>1</td><td>◉</td><td rowspan="2">✓</td></tr>
<tr><td>2</td><td>○</td></tr>
</table>

Pre-PM Pressure Test

Pre-PM Pressure Test is Complete	✓

Test	Guideline	Result
Vacuum chamber pressure with CAD gas off	0.4×10^{-5} torr ≤ $P_{CAD\ 0}$ ≤ 1.1×10^{-5} torr	0.5e-5
Vacuum chamber pressure with CAD gas set to Full	1.8×10^{-5} torr ≤ ($P_{CAD\ 12} - P_{CAD\ 0}$) ≤ 2.8×10^{-5} torr	1.8e-5

Pre-PM System Tests

Q1 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
175.133	≥ 8.0×10^6	2.6e7	0.6 to 0.8	0.64
500.380	≥ 8.0×10^6	2.6e7	0.6 to 0.8	0.69
906.673	≥ 2.0×10^7	4.4e7	0.6 to 0.8	0.78
1952.427	≥ 8.8×10^5	5.4e6	0.6 to 0.8	0.83

Q3 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
175.133	$\geq 8.0 \times 10^6$	3.0e7	0.6 to 0.8	0.76
500.380	$\geq 8.0 \times 10^6$	2.3e7	0.6 to 0.8	0.73
906.673	$\geq 2.0 \times 10^7$	5.3e7	0.6 to 0.8	0.80
1952.427	$\geq 8.8 \times 10^5$	1.0e7	0.6 to 0.8	1.1

Q1 Negative PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
933.636	$\geq 1.8 \times 10^7$	3.2e7	0.6 to 0.8	0.70
1863.306	$\geq 1.4 \times 10^6$	7.5e6	0.6 to 0.8	0.68

Q3 Negative PPGs Test is Complete	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
933.636	$\geq 1.8 \times 10^7$	3.8e7	0.6 to 0.8	0.75
1863.306	$\geq 2.0 \times 10^6$	5.7e6	0.6 to 0.8	0.63

Planned Maintenance Tasks

Reserpine MS/MS Test is Complete	✓

- **Test solution:** Reserpine solution 0.167 pmol/µL
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s (both MS and MS/MS)
- **Scan mode:** Product Ion (MS2)
- **Product Of:** 609.3 (or as calibrated)
- **Product Ion:** 195.1
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 609.3 and 195.1, with peak intensities, peak width, and mass shift results, complete with method file information.

Guideline	Result
Transmission efficiency $\frac{Intensity\ for\ ion\ at\ m/z\ 195.1}{Intensity\ for\ ion\ at\ m/z\ 609.3\ (or\ as\ calibrated)} \times 100 \geq 10\%$	11.6%

Planned Maintenance

Mass Spectrometer Maintenance

Task	Complete	N/A
Shut down the system and then disconnect the mains supply power cable.	✓	—
If required, replace the roughing pump oil. The recommended interval is every 3 years for long-life (ES) pumps, or every year for other pumps. **Note:** If an oil change is not required, then inspect the oil level and top up, if necessary. **CAUTION: Potential System Damage. Do not mix different types of oil. Mixing mineral oil with synthetic oil can cause pump failure.**	✓	—
If required, replace the roughing pump oil exhaust filter. The recommended interval is every 24 months.	○	◒
Clean or replace the four air filters in the base of the mass spectrometer chassis.	✓	—
(If applicable) Clean the turbo pump filter screen.	◒	○
(If applicable) Verify the operation of the SCIEX-supplied bench cooling fans.	◒	○
Inspect the mass spectrometer, components, and cabling, as required.	✓	—
Clean the curtain plate.	✓	—
Clean the orifice plate.	✓	—
Clean the QJet® ion guide and IQ0 lens.	✓	—

Planned Maintenance Tasks

Task	Complete	N/A
(If contamination is detected) Clean the Q0 region.	○	◉ —
Start up the system.	✓	—

Turbo V™ Ion Source Maintenance

Task	Complete	N/A
If necessary, replace the electrode in the TurboIonSpray® and the APCI probe.	◉	○
With the TurboIonSpray® probe installed, verify that the temperature (TEM) reaches the recommended set point of 500 °C.	✓	—
(If applicable) With the APCI probe installed, verify that the temperature (TEM) reaches the recommended set point of 400 °C.	○	◉

Post-Planned Maintenance

Task	Complete
Inspect for front-end contamination. Refer to Inspect for Contamination.	✓

Voltage Tests

Task	Complete
Inspect the RF tuning voltages at the QPS amplifier module and then, if required, tune the coil boxes.	✓
Inspect the detector voltage. Optimize, if required. Detector voltage: 1800	✓

Post-PM Pressure Test

Post-PM Pressure Test is Complete	✓

Test	Specification	Result
Vacuum chamber pressure with CAD gas off	0.4×10^{-5} torr ≤ $P_{CAD\ 0}$ ≤ 1.1×10^{-5} torr	0.7e-5
Vacuum chamber pressure with CAD gas set to Full	1.8×10^{-5} torr ≤ ($P_{CAD\ 12} - P_{CAD\ 0}$) ≤ 2.8×10^{-5} torr	2.2e-5

Post-PM System Tests

Q1 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
175.133	$\geq 8.0 \times 10^6$	2.7e7	0.6 to 0.8	0.71
500.380	$\geq 8.0 \times 10^6$	3.4e7	0.6 to 0.8	0.71
906.673	$\geq 2.0 \times 10^7$	5.0e7	0.6 to 0.8	0.74
1952.427	$\geq 8.8 \times 10^5$	5.2e6	0.6 to 0.8	0.74

Q1 Positive PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Q3 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
175.133	$\geq 8.0 \times 10^6$	3.8e7	0.6 to 0.8	0.75
500.380	$\geq 8.0 \times 10^6$	3.3e7	0.6 to 0.8	0.71
906.673	$\geq 2.0 \times 10^7$	6.3e7	0.6 to 0.8	0.77
1952.427	$\geq 8.8 \times 10^5$	1.0e7	0.6 to 0.8	0.73

Q3 Positive PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Q1 Negative PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
933.636	$\geq 1.8 \times 10^7$	3.9e7	0.6 to 0.8	0.74
1863.306	$\geq 1.4 \times 10^6$	6.8e6	0.6 to 0.8	0.71

Q1 Negative PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Q3 Negative PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
933.636	$\geq 1.8 \times 10^7$	4.4e7	0.6 to 0.8	0.76
1863.306	$\geq 2.0 \times 10^6$	5.2e6	0.6 to 0.8	0.66

Q3 Negative PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Reserpine MS/MS Test is Complete	✓

- **Test solution:** Reserpine solution 0.167 pmol/µL
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s (both MS and MS/MS)
- **Scan mode:** Product Ion (MS2)
- **Product Of:** 609.3 (or as calibrated)
- **Product Ion:** 195.1
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 609.3 and 195.1, with peak intensities, peak width, and mass shift results, complete with method file information.

Specification	Result
Transmission efficiency $\frac{Intensity\ for\ ion\ at\ m/z\ 195.1}{Intensity\ for\ ion\ at\ m/z\ 609.3\ (or\ as\ calibrated)} \times 100 \geq 10\%$	12.4%

Post-PM Tasks

Task	Complete	N/A
(Obtain customer approval first) Install any applicable Analyst®/Analyst® MD software HotFixes.	○	◉
Delete any unnecessary files.	✓	—
Back up the Analyst Data folder.	✓	—
(If applicable) Defragment the hard drive.	○	◉
(Not applicable for MD instrument families) If the customer has a Software Support Plan, then perform the Software Health Check: • (Obtain customer approval first) Install any compatible HotFixes and updates for SCIEX add-on software.	◉	○
Discuss warranty coverage for the StatusScope® remote monitoring service. Determine whether the customer already has StatusScope® remote monitoring service installed and, if not, whether it should be installed. **Note:** The StatusScope® remote monitoring service is not applicable for MD systems. **Note:** Installation of the StatusScope® remote monitoring service is available only to warranty and eligible contract customers. Refer to https://sciex.com/services/statusscope-remote-monitoring for a list of eligible contracts.	◉	○

StatusScope® Remote Monitoring Service Tasks

Task	Complete	N/A
If the StatusScope® remote monitoring service is not installed, then perform these tasks: 1. Complete the *StatusScope® User Access* form. 2. Verify the connection to the StatusScope® server. 3. Install the StatusScope® agent.	○	◉
Log on to the StatusScope® server using the FSE user name and then verify that the assets under the customer organization are connected to the StatusScope® server.	○	◉
Perform the post-PM fault test to verify that the mass spectrometer fault generated is shown in the StatusScope® remote monitoring service.	○	◉

Review

Task	Complete
Review the work performed with the customer.	✓
Record the verification data in this document and then attach all of the performance data.	✓
Review the routine maintenance schedule and the procedures with the customer.	✓
Complete this document: • Review the verification data with the customer. • Provide the customer with the completed document and the performance data. • If an electronic copy of the document is supplied to the customer, then save a copy on the Service drive.	✓

Signoff 3

Organization	Shealy Environmental		
Mass spectrometer serial number	BJ29321608	Service request number	4336406
FSE name	Lynne Russell	Date (yyyy-mm-dd)	2019-04-10
FSE signature	Lynne Russell		

Comments and Exceptions

LV 200 oil used.

Inspect for Contamination A

1. Run the **Q1 Pos PPG** method for 10 minutes, monitoring the TIC for degradation of the signal or sensitivity drops.
2. Change the polarity to negative, and then scan for one minute.
3. Change the polarity to positive, and then make sure that the **IS** parameter returns to the original value.
4. Run the method.

   If the signal sensitivity is restored temporarily but it starts to degrade again, then the charging effect is present.

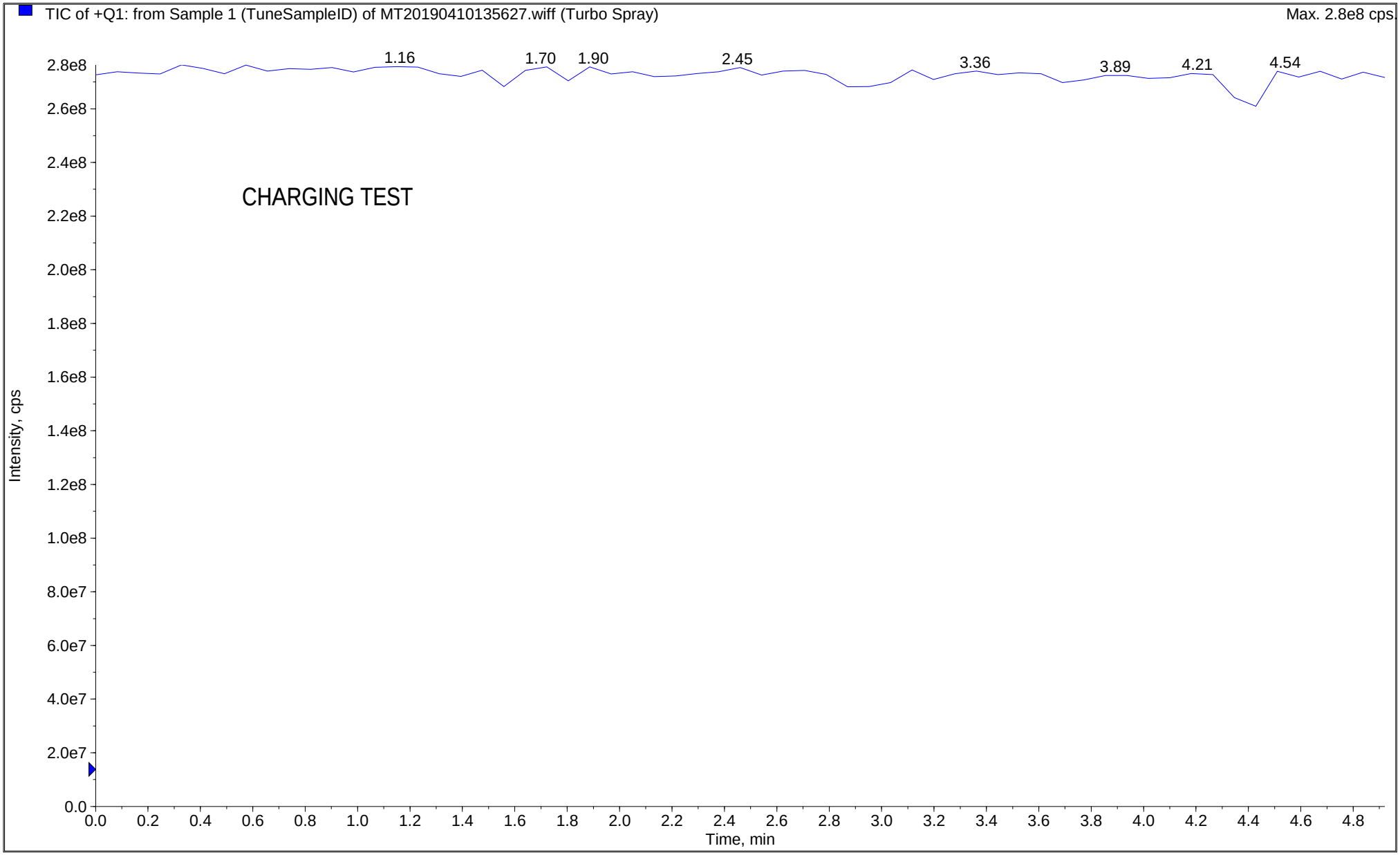
Guidelines for Identifying Components to be Cleaned

If the Q1 quadrupole is showing the charging effect and signal drop out, then clean the Q0 and the vacuum interface components (the curtain plate, orifice plate, the QJet® ion guide, and the Q0 side of the IQ0 lens) using the customer cleaning procedure, with the rod and tissues. In most cases, this will remove the contamination.

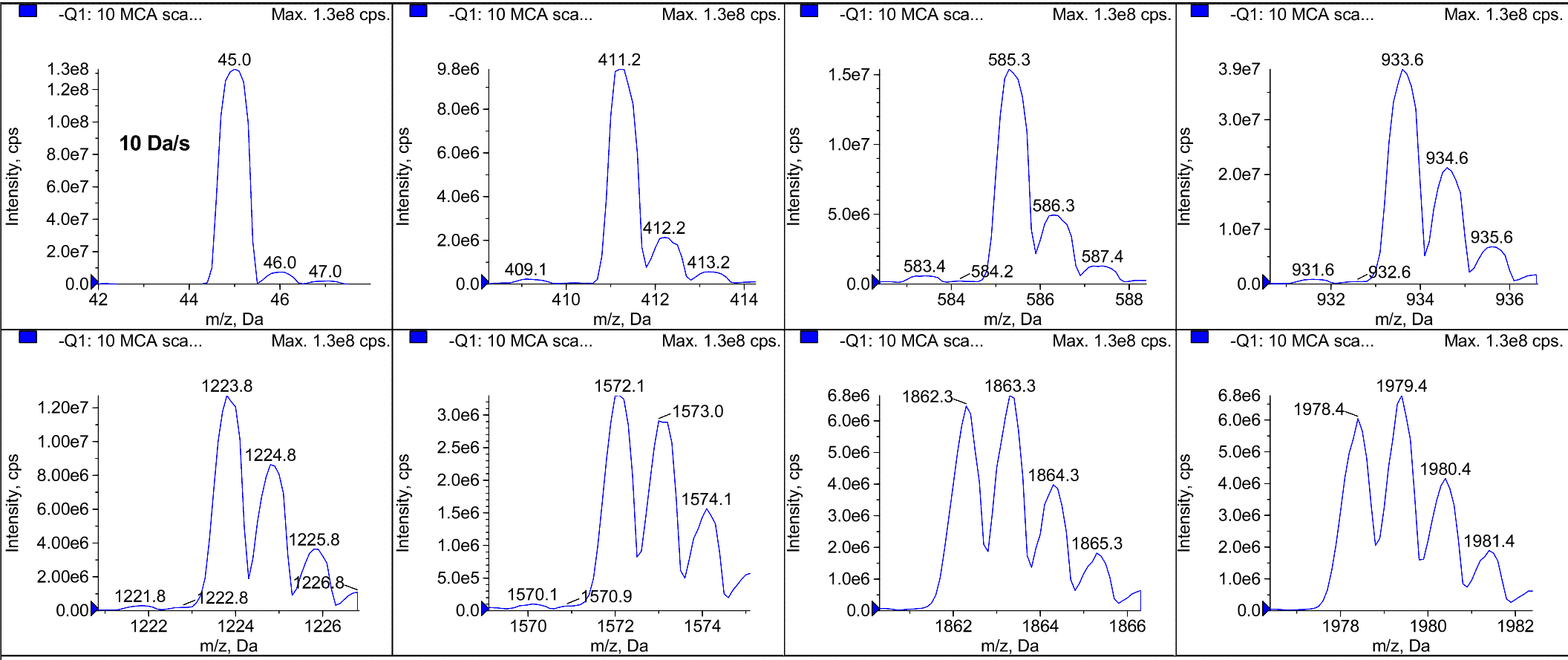
Notes:

- Do not remove the ion optics during a PM. This is considered to be a repair activity and requires a separate service call to be opened.
- Consider cleaning the Q1 quadrupole as well as other components (the stubbies and the IQ1 lens), if cleaning the front end does not eliminate the contamination.
- This guideline does not provide complete troubleshooting for all possible technical root causes of signal degradation or charging effect. Signal degradation might also result from a contaminated TurboIonSpray® probe or electrode, method parameters that are not optimized, and so on.

Printing Time: 6:20:07 PM
Printing Date: Friday, April 26, 2019
Polarity/Scan Type: Positive Q1 MS

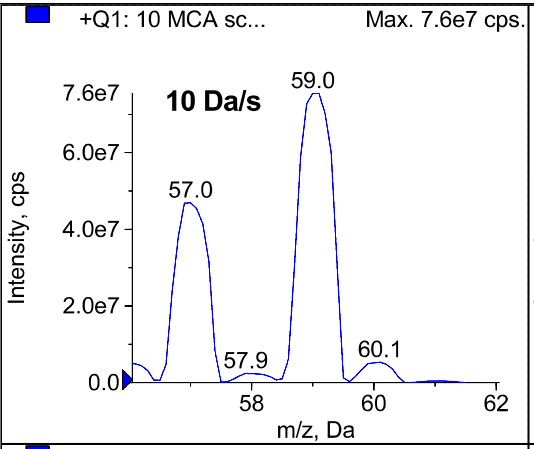


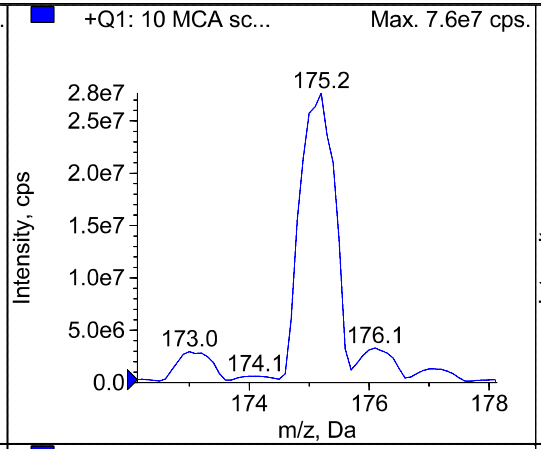
* FSE Lynne Russell
*Post-PM Results

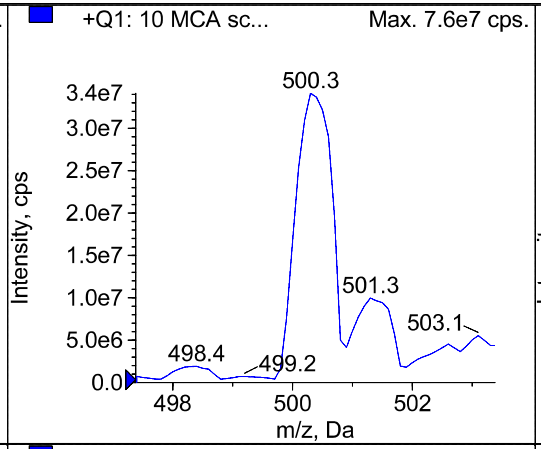


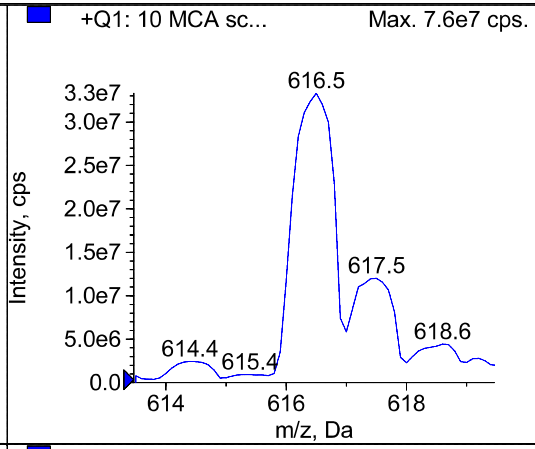
Peak List for " -Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20190410144335.wiff (Turbo Spray)"

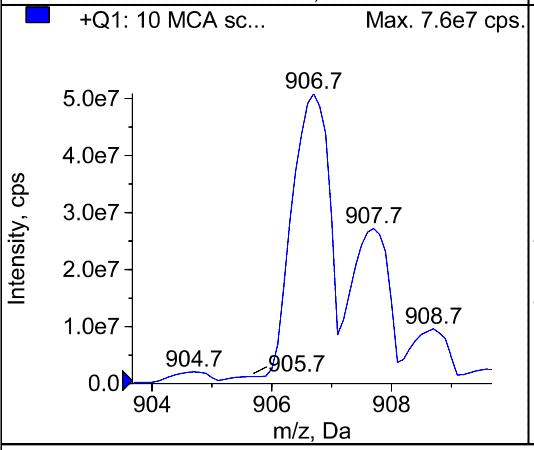
	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9960	1.3258e8	0.7208	2.0090e-3
2	411.2590	411.2654	9.8269e6	0.6969	-6.4068e-3
3	585.3850	585.3826	1.5391e7	0.7499	2.4310e-3
4	933.6360	933.6249	3.9214e7	0.7447	0.0111
5	1223.8450	1223.8422	1.2723e7	0.7009	2.8400e-3
6	1572.0970	1572.0890	3.2995e6	0.7321	8.0035e-3
7	1863.3060	1863.3026	6.7988e6	0.7113	3.3643e-3
8	1979.3890	1979.3774	6.7711e6	0.6979	0.0116

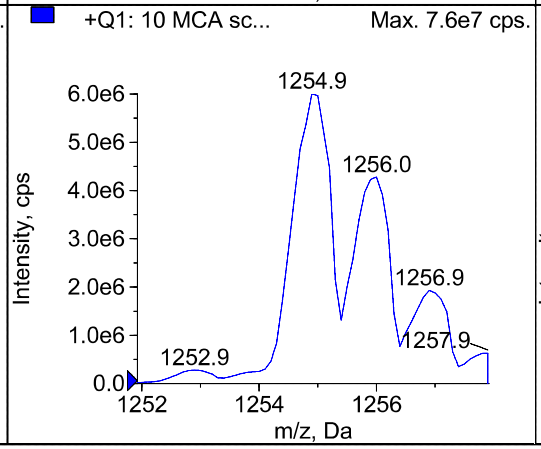


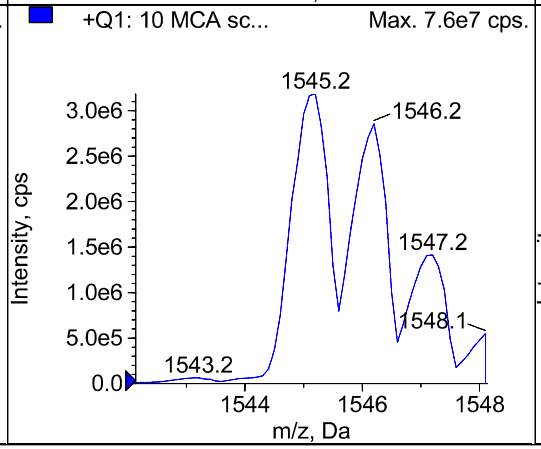


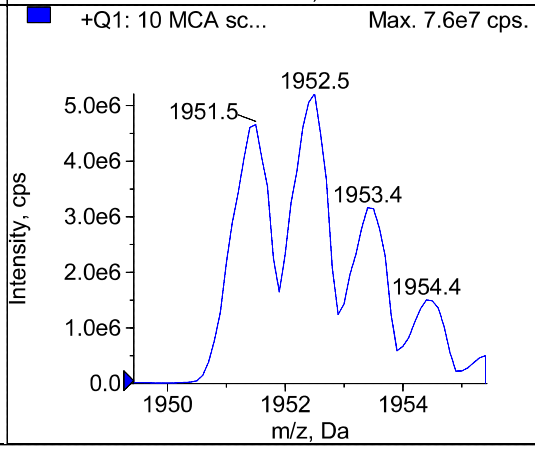






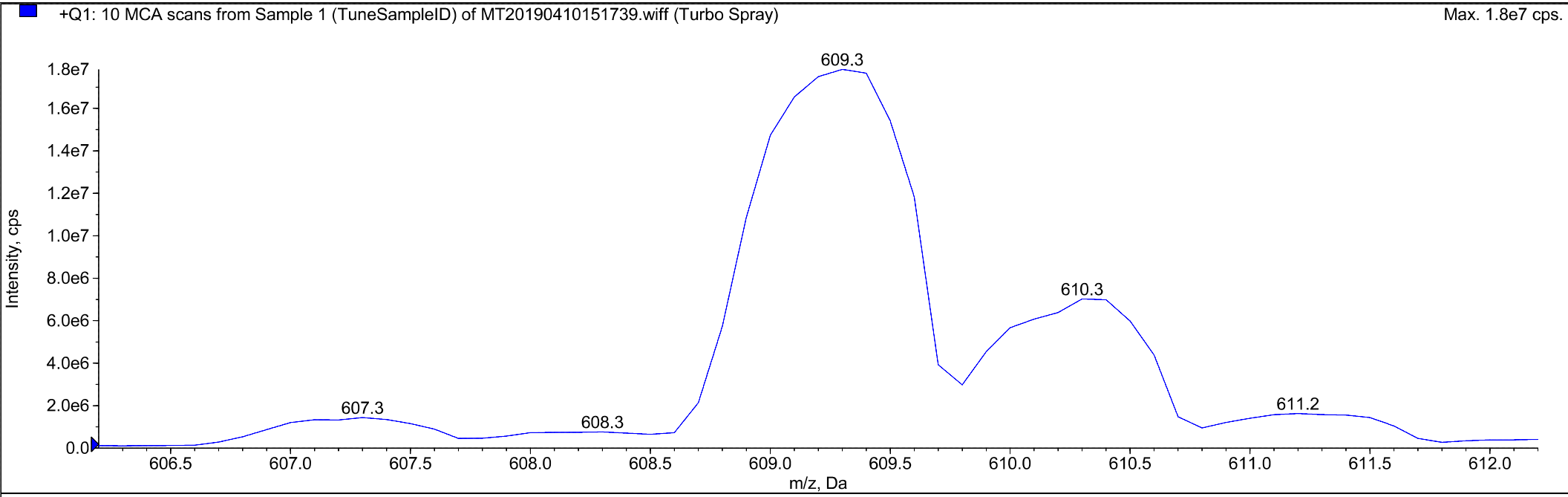






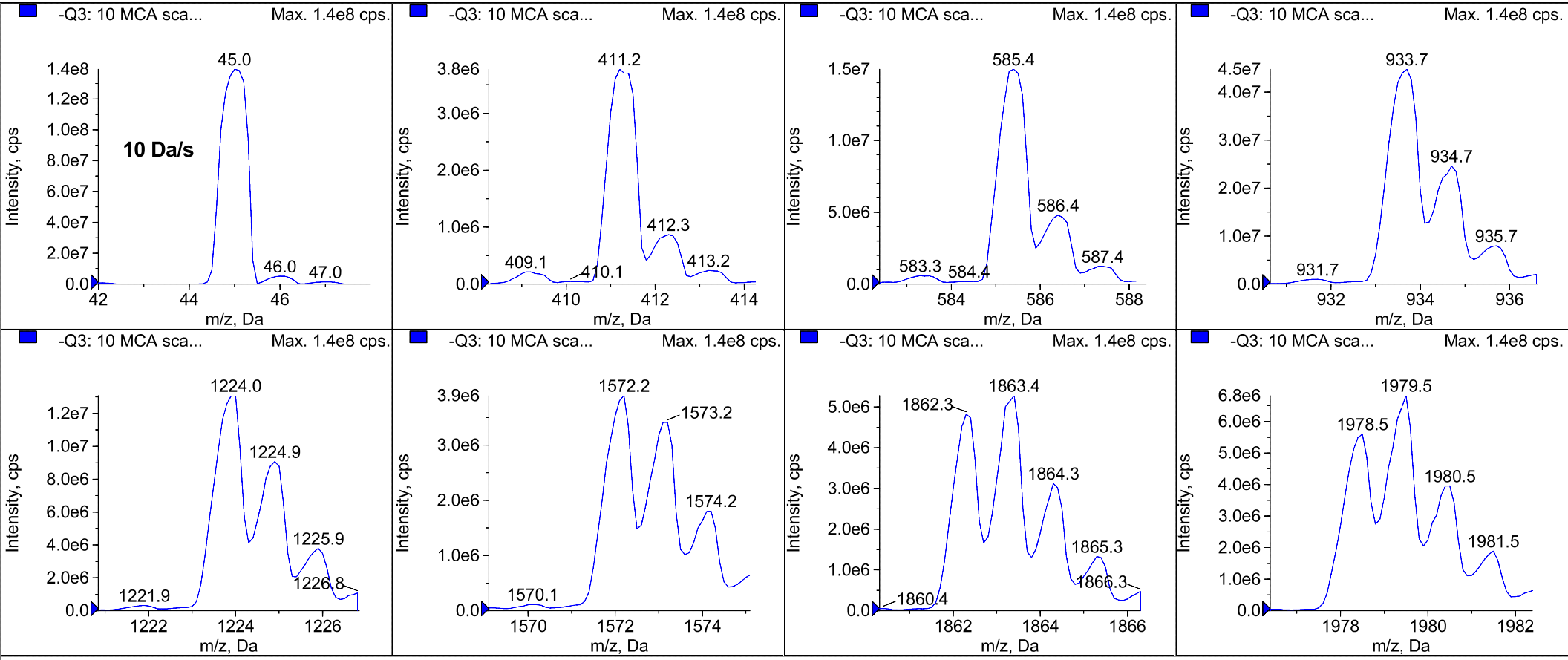
Peak List for " +Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20190410140504.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0496	7.5522e7	0.6480	3.5042e-4
2	175.1330	175.1354	2.7642e7	0.7140	-2.4039e-3
3	500.3800	500.3732	3.4129e7	0.7123	6.8383e-3
4	616.4640	616.4619	3.3315e7	0.7893	2.1491e-3
5	906.6730	906.6713	5.0848e7	0.7432	1.6744e-3
6	1254.9250	1254.9220	6.0055e6	0.7404	3.0310e-3
7	1545.1340	1545.1226	3.1869e6	0.7347	0.0114
8	1952.4270	1952.4270	5.2126e6	0.7365	-1.2862e-5



Peak List for " +Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20190410151739.wiff (Turbo Spray)"

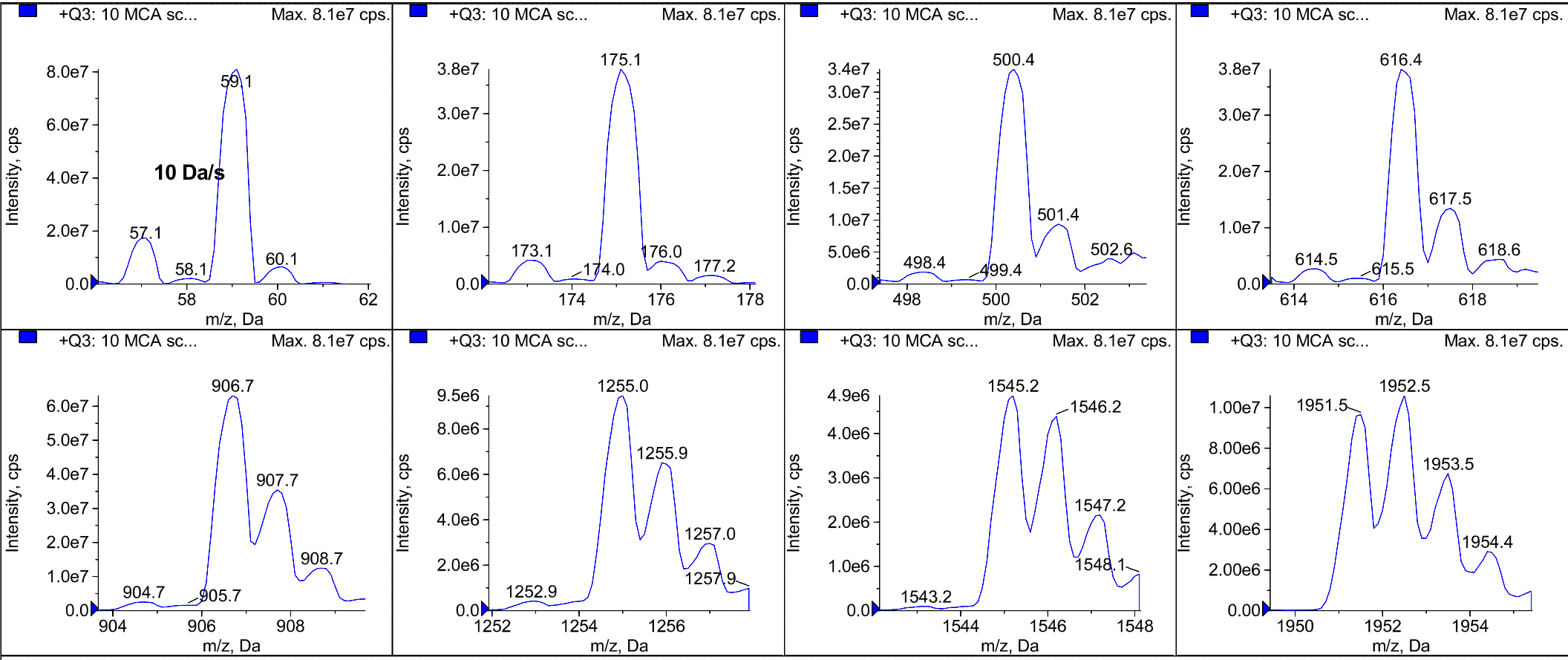
	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	174.1000	n/a	n/a	n/a	n/a
2	195.1000	n/a	n/a	n/a	n/a
3	397.2000	n/a	n/a	n/a	n/a
4	448.1000	n/a	n/a	n/a	n/a
5	609.2810	609.2637	1.7836e7	0.7749	0.0173



Peak List for " -Q3: 10 MCA scans from Sample 1 (TuneSampleID) of MT20190410145833.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9997	1.3930e8	0.6906	-1.7028e-3
2	411.2590	411.2586	3.7750e6	0.7340	4.0505e-4
3	585.3850	585.3859	1.4951e7	0.7153	-9.0261e-4
4	933.6360	933.6250	4.4765e7	0.7611	0.0110
5	1223.8450	1223.8893	1.3086e7	0.7346	-0.0443
6	1572.0970	1572.1183	3.8989e6	0.7413	-0.0213
7	1863.3060	1863.2953	5.2795e6	0.6649	0.0107
8	1979.3890	1979.3951	6.8213e6	0.7412	-6.1049e-3

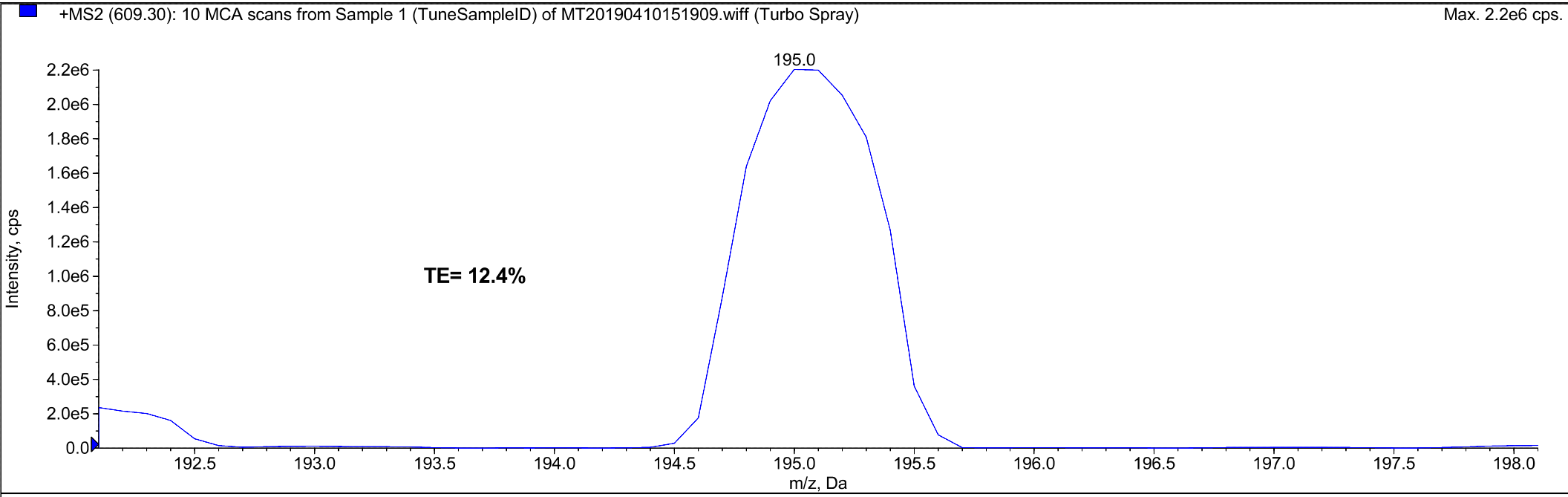
Printing Time: 2:25:26 PM
Printing Date: Wednesday, April 10, 2019
Polarity/Scan Type: Positive Q3 MS



Peak List for " +Q3: 10 MCA scans from Sample 1 (TuneSampleID) of MT20190410142310.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0492	8.1037e7	0.6529	8.1344e-4
2	175.1330	175.1312	3.7823e7	0.7504	1.7640e-3
3	500.3800	500.3815	3.3582e7	0.7095	-1.4637e-3
4	616.4640	616.4596	3.8148e7	0.6573	4.3988e-3
5	906.6730	906.6704	6.3131e7	0.7736	2.5943e-3
6	1254.9250	1254.9236	9.4704e6	0.7407	1.4113e-3
7	1545.1340	1545.1290	4.8598e6	0.7188	5.0259e-3
8	1952.4270	1952.4303	1.0596e7	0.7325	-3.3111e-3

* FSE Lynne Russell
*Post-PM Results



Peak List for " +MS2 (609.30): 10 MCA scans from Sample 1 (TuneSampleID) of MT20190410151909.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	174.1000	n/a	n/a	n/a	n/a
2	195.1000	195.0693	2.2039e6	0.6891	0.0307
3	397.2000	n/a	n/a	n/a	n/a
4	448.1000	n/a	n/a	n/a	n/a
5	609.2810	n/a	n/a	n/a	n/a

SCIEX Triple Quad™ 4500/4500MD System

Planned Maintenance Procedure

GEN-IDV-08-6710-C

August 2019

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Introduction 1

Note: For regulatory and safety information for the mass spectrometer, refer to the *System User Guide*.

The planned maintenance (PM) procedure is designed to help maintain overall system performance.

The PM is not intended to take the place of an Operational Qualification (OQ) nor is it intended to verify the instrument specifications. Separate Installation Qualification (IQ) and OQ services are available. Contact a SCIEX representative.

The procedure must be performed by a trained SCIEX Field Service Employee (FSE).

The procedure has been developed for the SCIEX Triple Quad™ 4500/4500MD system with the Turbo V™ ion source. It does not apply to any other products or processes.

The procedure does not address any customer-specific analytical protocol (performance qualification) or method validation.

Note: If an issue is identified and the system requires repair, then the customer is responsible for the repair at the expense of the customer, except to the extent that the system and the required repairs are covered by a SCIEX warranty or service contract. A separate repair service call must be opened and the repair hours must not be charged against this procedure.

Planned Maintenance Tasks 2

Note: Perform all procedures using the Turbo V™ ion source, unless otherwise specified.

Pre-Planned Maintenance

Note: Guideline values are for reference only. The pre-PM test results are not required to meet or exceed these values.

Pre-PM Tasks

Task	Complete	N/A
Ask the customer about system performance since the last visit and record comments.	✓	—
If the customer maintains a log for the system, then review it.	○	◉
Review the work to be performed with the customer.	✓	—

Task	Complete	N/A
Inspect for front-end contamination. Refer to Inspect for Contamination.	✓	—
Check the status of the RAID 1 hard drives.		—

Vacuum System Tests

Task			Complete
Record the turbo pump operational values.			
Parameter	**Results**		
Temperature (°C)	see notes		
Current (A)	see notes		
Voltage (V)	see notes		
Power (W)	see notes		
Driving frequency (Hz)	see notes		
Inspect the vacuum gauge filament using the Analyst® Service Diagnostics (ASD) software and identify the filament position. If the mass spectrometer is using filament 2, then order a replacement vacuum gauge as a separate service call.	1	◯	
	2	◯	

Pre-PM Pressure Test

Pre-PM Pressure Test is Complete	✓

Test	Guideline	Result
Vacuum chamber pressure with CAD gas off	0.4×10^{-5} torr $\leq P_{CAD\ 0} \leq 1.1 \times 10^{-5}$ torr	0.8e-5
Pressure difference (CAD_{12} minus CAD_0)	1.8×10^{-5} torr $\leq (P_{CAD\ 12} - P_{CAD\ 0}) \leq 2.8 \times 10^{-5}$ torr	2.5e-5

Pre-PM System Tests

Q1 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
175.133	$\geq 8.0 \times 10^6$	2.1e7	0.6 to 0.8	0.80
500.380	$\geq 8.0 \times 10^6$	3.0e7	0.6 to 0.8	0.99
906.673	$\geq 2.0 \times 10^7$	4.3e7	0.6 to 0.8	0.98
1 952.427	$\geq 8.8 \times 10^5$	8.2e6	0.6 to 0.8	n/a

Q3 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
175.133	$\geq 8.0 \times 10^6$	3.2e7	0.6 to 0.8	0.74
500.380	$\geq 8.0 \times 10^6$	3.3e7	0.6 to 0.8	0.80
906.673	$\geq 2.0 \times 10^7$	5.6e7	0.6 to 0.8	0.84
1 952.427	$\geq 8.8 \times 10^5$	9.8e6	0.6 to 0.8	1.1

Q1 Negative PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
933.636	$\geq 1.8 \times 10^7$	1.7e7	0.6 to 0.8	0.66
1 863.306	$\geq 1.4 \times 10^6$	1.8e6	0.6 to 0.8	0.75

Q3 Negative PPGs Test is Complete	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
933.636	$\geq 1.8 \times 10^7$	2.8e7	0.6 to 0.8	0.85
1 863.306	$\geq 2.0 \times 10^6$	3.3e6	0.6 to 0.8	0.69

Reserpine MS/MS Test is Complete	✓

- **Test solution:** Reserpine solution 0.167 pmol/µL
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s (both MS and MS/MS)
- **Scan mode:** Product Ion (MS2)
- **Product Of:** 609.3 (or as calibrated)
- **Product Ion:** 195.1
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 609.3 and 195.1, with peak intensities, peak width, and mass shift results, complete with method file information.

Guideline	Result
Transmission efficiency $\frac{Intensity\ for\ ion\ at\ m/z\ 195.1}{Intensity\ for\ ion\ at\ m/z\ 609.3\ (or\ as\ calibrated)} \times 100 \Rightarrow 10\%$	4.3%

Planned Maintenance

Mass Spectrometer Maintenance

Task	Complete	N/A
Shut down the system and then disconnect the mains supply power cable.	✓	—
Verify the expiry date on the Powervar UPS battery system, and then recommend replacement of the battery tray, if required.	○	◉
If required, replace the roughing pump oil. The recommended interval is every 3 years. **Note:** If an oil change is not required, then inspect the oil level and top up, if necessary. **CAUTION: Potential System Damage. Do not mix different types of oil. Mixing mineral oil with synthetic oil can cause pump failure.**	✓	—
If required, replace the roughing pump oil exhaust filter. The recommended interval is every 3 years.	○	◉
Clean or replace the four air filters in the base of the mass spectrometer chassis.	✓	—
(If applicable) Clean the turbo pump filter screen.	○	◉
(If applicable) Verify the operation of the SCIEX-supplied bench cooling fans.	◉	○
Inspect the mass spectrometer, components, and cabling, as required.	✓	—
Clean the curtain plate.	✓	—
Clean the orifice plate.	✓	—
Clean the QJet® ion guide and IQ0 lens.	✓	—

Task	Complete	N/A
(If contamination is detected) Clean the Q0 region.	○	◉
Start up the system.	✓	—

Turbo V™ Ion Source Maintenance

Task	Complete	N/A
If necessary, replace the electrode in the TurboIonSpray® and the APCI probe.	◉	○
With the TurboIonSpray® probe installed, verify that the temperature (TEM) reaches the recommended set point of 500 °C.	✓	—
(If applicable) With the APCI probe installed, verify that the temperature (TEM) reaches the recommended set point of 400 °C.	○	◉

Software Maintenance

Note: This task is not applicable to MD systems.

Task	Complete	N/A
(Obtain customer approval first) Install any applicable Analyst® Software HotFixes.	○	◉

Post-Planned Maintenance

Task	Complete
Inspect for front-end contamination. Refer to Inspect for Contamination.	✓

Voltage Tests

Task	Complete
Inspect the RF tuning voltages at the QPS amplifier module and then, if required, tune the coil boxes.	✓
Inspect the detector voltage. Optimize, if required. Detector voltage: 2100	

Post-PM Pressure Test

Post-PM Pressure Test is Complete	✓

Test	Specification	Result
Vacuum chamber pressure with CAD gas off	0.4×10^{-5} torr ≤ $P_{CAD\ 0}$ ≤ 1.1×10^{-5} torr	0.8e-5
Pressure difference (CAD_{12} minus CAD_0)	1.8×10^{-5} torr ≤ ($P_{CAD\ 12} - P_{CAD\ 0}$) ≤ 2.8×10^{-5} torr	3.4e-5

Post-PM System Tests

Q1 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
175.133	$\geq 8.0 \times 10^6$	2.1e7	0.6 to 0.8	0.75
500.380	$\geq 8.0 \times 10^6$	2.4e7	0.6 to 0.8	0.72
906.673	$\geq 2.0 \times 10^7$	3.6e7	0.6 to 0.8	0.72
1 952.427	$\geq 8.8 \times 10^5$	5.3e6	0.6 to 0.8	0.72

Q1 Positive PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Q3 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
175.133	$\geq 8.0 \times 10^6$	2.7e7	0.6 to 0.8	0.72
500.380	$\geq 8.0 \times 10^6$	3.0e7	0.6 to 0.8	0.76
906.673	$\geq 2.0 \times 10^7$	4.9e7	0.6 to 0.8	0.70
1 952.427	$\geq 8.8 \times 10^5$	5.4e6	0.6 to 0.8	0.74

Q3 Positive PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Q1 Negative PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
933.636	$\geq 1.8 \times 10^7$	2.2e7	0.6 to 0.8	0.76
1 863.306	$\geq 1.4 \times 10^6$	3.0e6	0.6 to 0.8	0.72

Q1 Negative PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Q3 Negative PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
933.636	$\geq 1.8 \times 10^7$	2.9e7	0.6 to 0.8	0.74
1 863.306	$\geq 2.0 \times 10^6$	4.5e6	0.6 to 0.8	0.74

Q3 Negative PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Reserpine MS/MS Test is Complete	✓

- **Test solution:** Reserpine solution 0.167 pmol/µL
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s (both MS and MS/MS)
- **Scan mode:** Product Ion (MS2)
- **Product Of:** 609.3 (or as calibrated)
- **Product Ion:** 195.1
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 609.3 and 195.1, with peak intensities, peak width, and mass shift results, complete with method file information.

Specification	Result
Transmission efficiency $\frac{Intensity\ for\ ion\ at\ m/z\ 195.1}{Intensity\ for\ ion\ at\ m/z\ 609.3\ (or\ as\ calibrated)} \times 100 \Rightarrow 10\%$	11.9%

Post-PM Tasks

Task	Complete	N/A
Delete any unnecessary files.	✓	—
Back up the Analyst Data folder.	✓	—
(If applicable) Defragment the hard drive.	○	◉
(Not applicable for MD instrument families) If the customer has a Software Support Plan, then perform the Software Health Check: • (Obtain customer approval first) Install any compatible HotFixes and updates for SCIEX add-on software.	◉	○
(Not applicable for MD instrument families) Discuss warranty coverage for the StatusScope® Remote Monitoring Service. Determine whether the customer already has StatusScope® Remote Monitoring Service installed and, if not, whether it should be installed. **Note:** Installation of the StatusScope® Remote Monitoring Service is available only to warranty and eligible contract customers. Refer to sciex.com/instrument-service-and-support/statusscope-remote-monitoring for a list of eligible contracts.	○	◉

StatusScope® Remote Monitoring Service Tasks

Note: The StatusScope® remote monitoring service is not applicable for MD systems.

Task	Complete	N/A
If the StatusScope® Remote Monitoring Service is not installed, then perform these tasks: 1. Make sure that the *StatusScope® Customer Remote Connectivity Authorization* and *Customer Remote Connectivity Registration* forms are both completed. 2. Verify the connection to the server for the StatusScope® Remote Monitoring Service. 3. Install the agent for the StatusScope® Remote Monitoring Service.	○	◉
Log on to the server for the StatusScope® Remote Monitoring Service using the FSE user name and then verify that the assets under the customer organization are connected to the server for the StatusScope® Remote Monitoring Service.	○	◉
Perform the post-PM fault test to verify that the mass spectrometer fault generated is shown in the StatusScope® Remote Monitoring Service.	○	◉

Wrap Up

Task	Complete	N/A
Review the work performed with the customer.	✓	—
Record the test results in this document and then attach all of the test data.	✓	—
Review the routine maintenance schedule and the procedures with the customer.	✓	—
Complete this document: • Review the test results with the customer. • Provide the customer with the completed document and the test data. • If an electronic copy of the document is supplied to the customer, then save a copy on the Service drive.	✓	—

Signoff 3

Organization	Shealy Environmental		
Mass spectrometer serial number	EB250231807	Service request number	4534266
FSE name	Lynne Russell	Date (yyyy-mm-dd)	2020-03-09
FSE signature			

Comments and Exceptions

Due to administrative restrictions, I was unable to use ASD to perform vacuum system test.
Oil and filter changes were not performed during this PM because they were not due. LER 09Mar2020

Inspect for Contamination A

1. Run the **Q1 Pos PPG** method for 10 minutes, monitoring the TIC for degradation of the signal or sensitivity drops.
2. Change the polarity to negative, and then scan for one minute.
3. Change the polarity to positive, and then make sure that the **IS** parameter returns to the original value.
4. Run the method.

   If the signal sensitivity is restored temporarily but it starts to degrade again, then the charging effect is present.

Guidelines for Identifying Components to be Cleaned

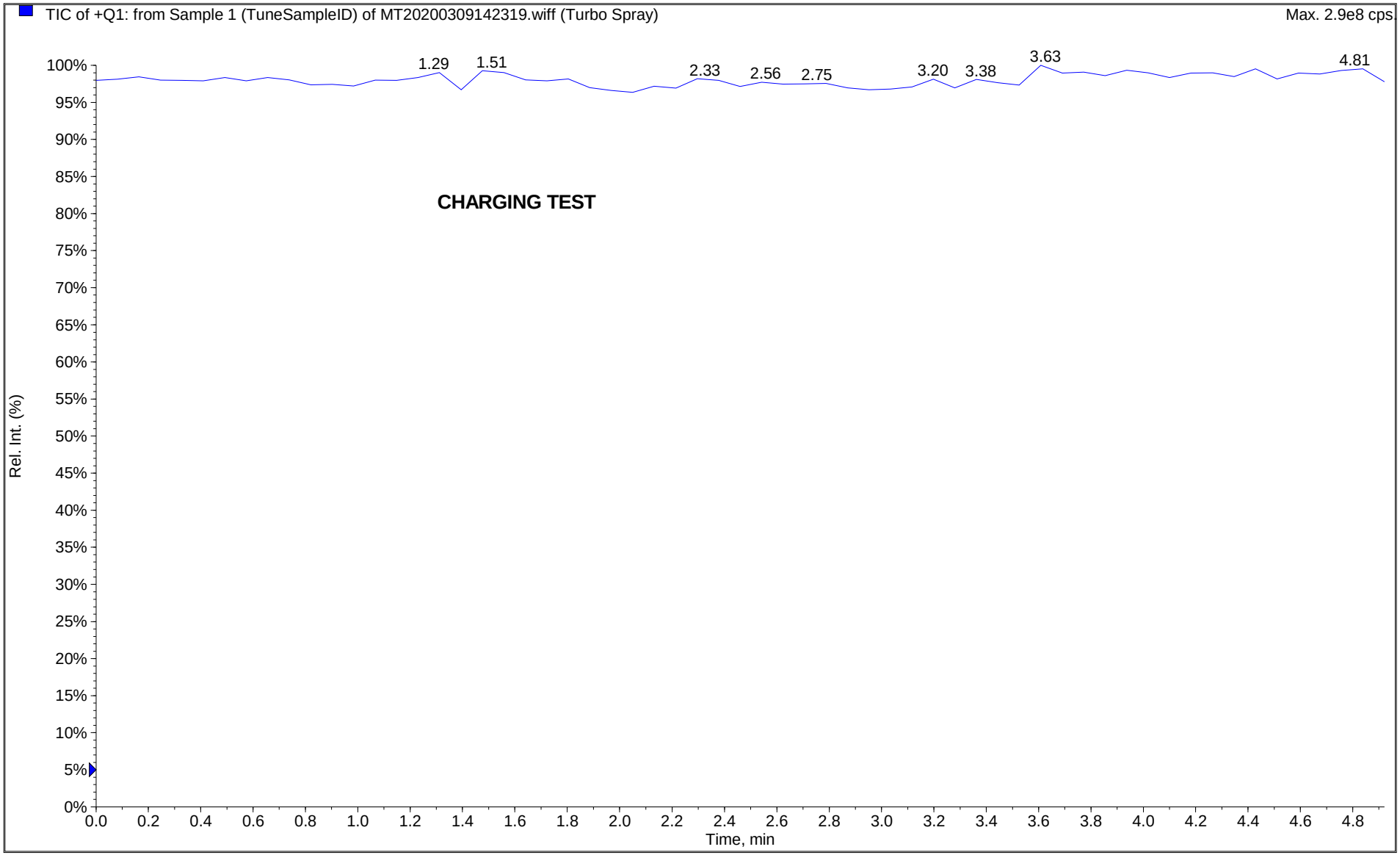
If the Q1 quadrupole is showing the charging effect and signal drop out, then clean the Q0 and the vacuum interface components (the curtain plate, orifice plate, the QJet® ion guide, and the Q0 side of the IQ0 and IQ1 lens) using the customer cleaning procedure, with the rod and tissues. In most cases, this will remove the contamination.

Notes:

- Do not remove the ion optics during a PM. This is considered to be a repair activity and requires a separate service call to be opened.
- Consider cleaning the Q1 quadrupole as well as other components (the stubbies and the IQ1 lens), if cleaning the front end does not eliminate the contamination.
- This guideline does not provide complete troubleshooting for all possible technical root causes of signal degradation or charging effect. Signal degradation might also result from a contaminated TurboIonSpray® probe or electrode, method parameters that are not optimized, and so on.

Acq. Time: 14:23
Acq. Date: Monday, March 09, 2020

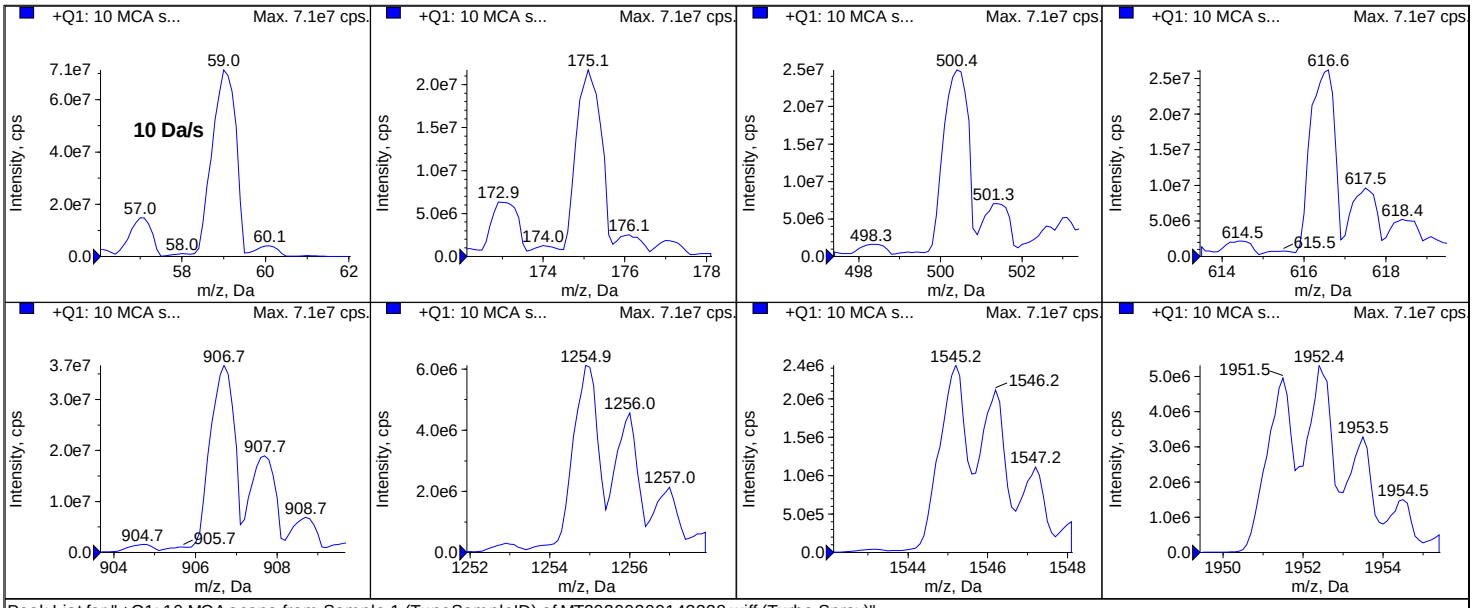
Analyst Version: 1.7.0
*SN: EB250231807



*Post-PM
*FSE: Lynne Russell

Acq. Time: 14:33
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



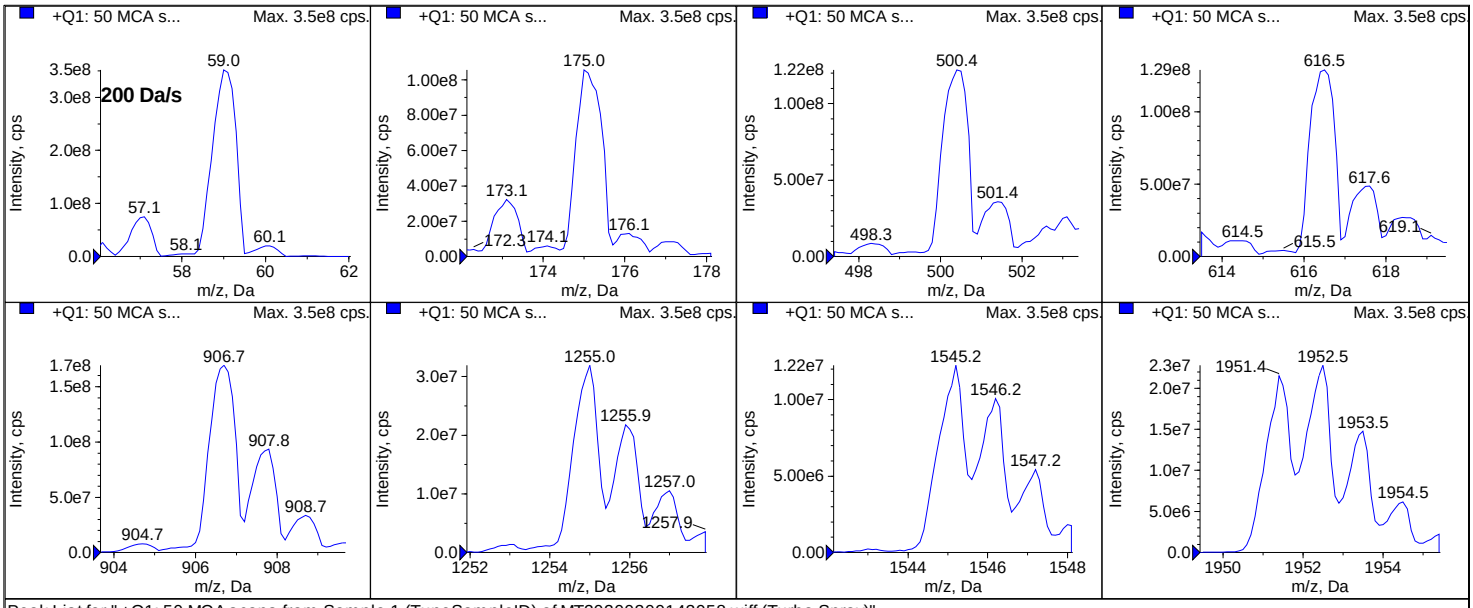
Peak List for " +Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20200309143328.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0403	7.1359e7	0.6692	9.6940e-3
2	175.1330	175.1170	2.1686e7	0.7574	0.0160
3	500.3800	500.4049	2.4873e7	0.7296	-0.0249
4	616.4640	616.4564	2.6201e7	0.7194	7.6080e-3
5	906.6730	906.6762	3.6657e7	0.7211	-3.2397e-3
6	1254.9250	1254.9156	6.1174e6	0.7141	9.4336e-3
7	1545.1340	1545.1477	2.4373e6	0.7781	-0.0137
8	1952.4270	1952.4311	5.3103e6	0.7239	-4.1026e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 14:40
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



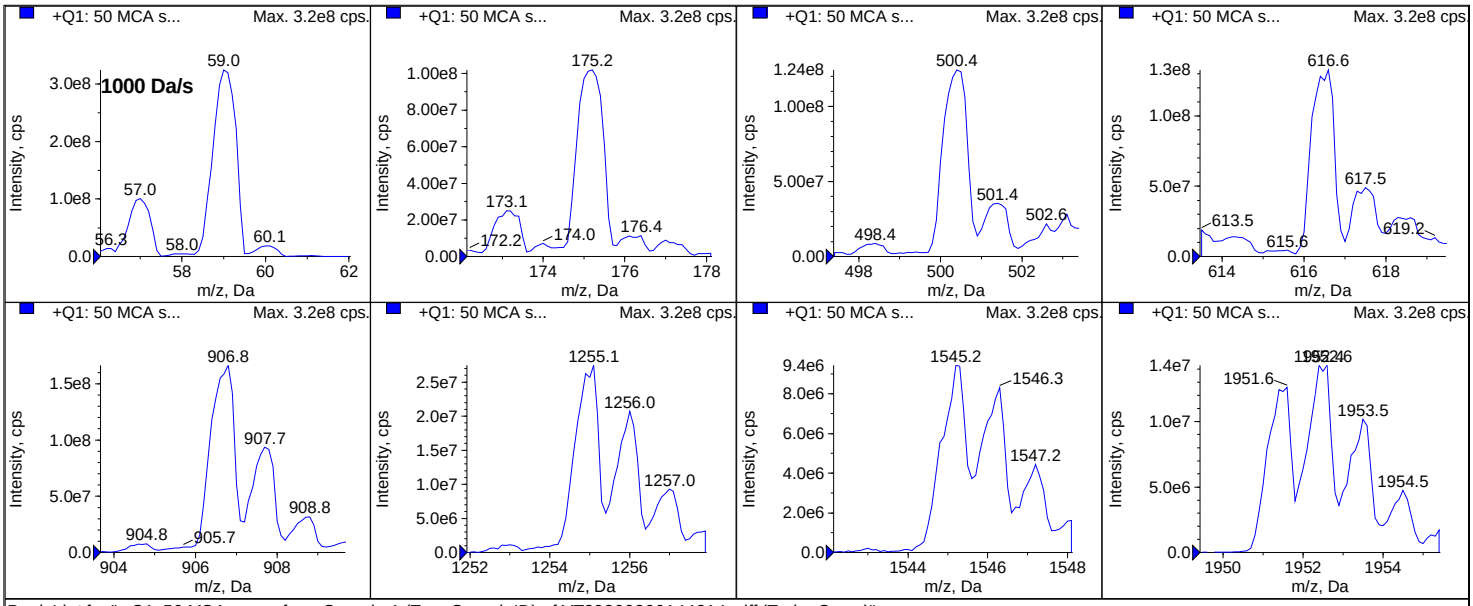
Peak List for " +Q1: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309143958.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0426	3.5185e8	0.6526	7.3620e-3
2	175.1330	175.1285	1.0569e8	0.7634	4.4530e-3
3	500.3800	500.3824	1.2207e8	0.7427	-2.3841e-3
4	616.4640	616.4559	1.2884e8	0.7249	8.1053e-3
5	906.6730	906.6721	1.6932e8	0.7323	8.6040e-4
6	1254.9250	1254.9208	3.1914e7	0.6958	4.2190e-3
7	1545.1340	1545.1217	1.2244e7	0.7698	0.0123
8	1952.4270	1952.3998	2.2800e7	0.7075	0.0272

*Post-PM
*FSE: Lynne Russell

Acq. Time: 14:42
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



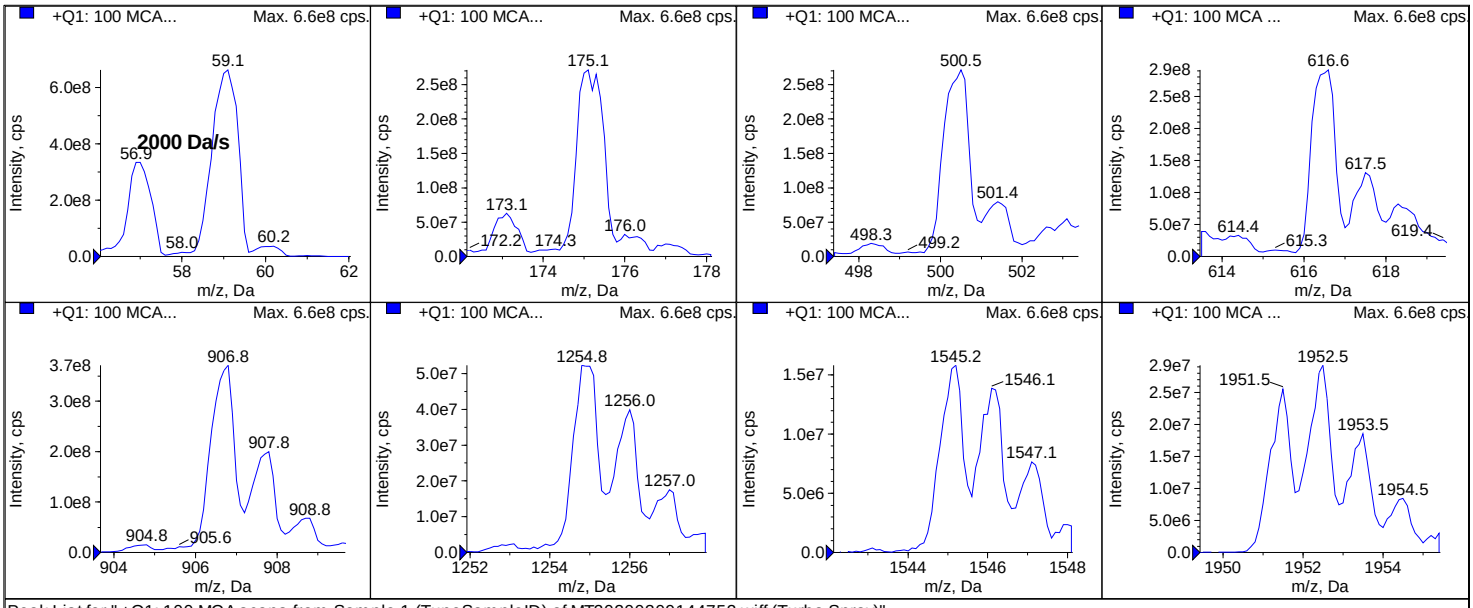
Peak List for " +Q1: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309144214.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0447	3.2454e8	0.6334	5.2631e-3
2	175.1330	175.1572	1.0197e8	0.7487	-0.0242
3	500.3800	500.3686	1.2434e8	0.6955	0.0114
4	616.4640	616.4687	1.3271e8	0.6439	-4.7115e-3
5	906.6730	906.6772	1.6629e8	0.6655	-4.1937e-3
6	1254.9250	1254.9605	2.7440e7	0.6670	-0.0355
7	1545.1340	1545.1771	9.4300e6	0.7409	-0.0431
8	1952.4270	1952.4754	1.4280e7	0.6846	-0.0484

*Post-PM
*FSE: Lynne Russell

Acq. Time: 14:47
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



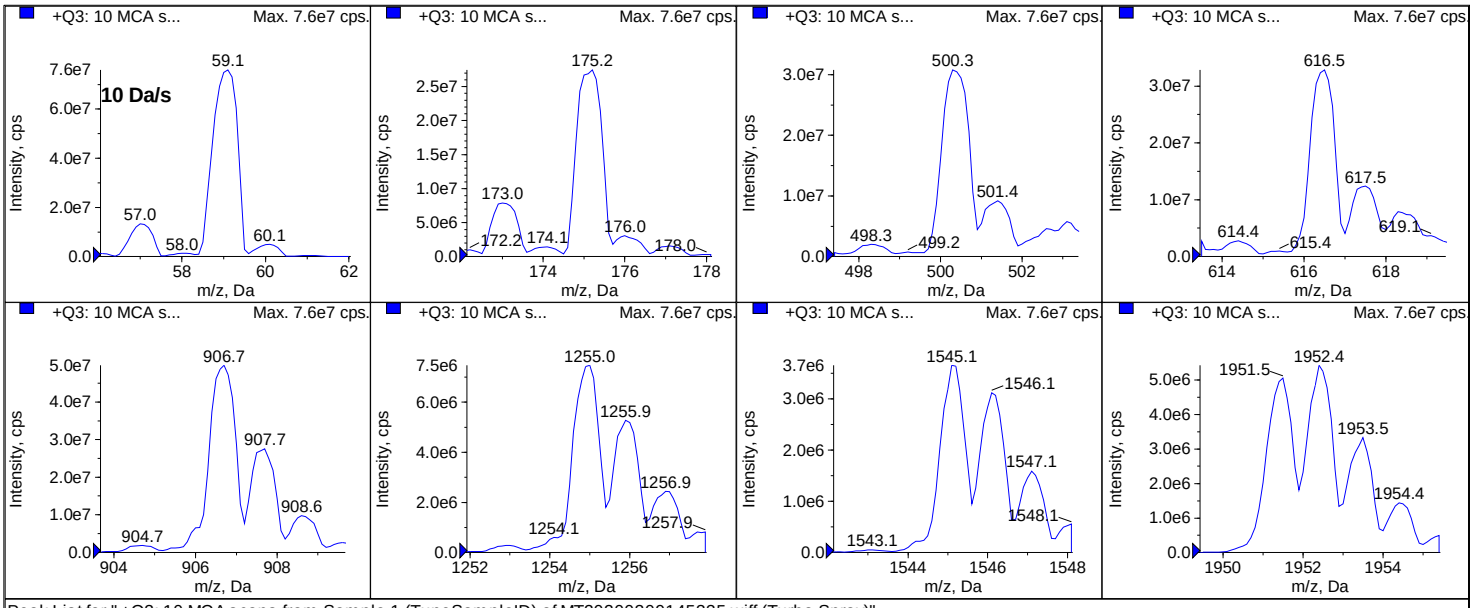
Peak List for " +Q1: 100 MCA scans from Sample 1 (TuneSampleID) of MT20200309144752.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0522	6.6290e8	0.7172	-2.2374e-3
2	175.1330	175.1580	2.7148e8	0.7493	-0.0250
3	500.3800	500.3949	2.7144e8	0.7271	-0.0149
4	616.4640	616.4704	2.9130e8	0.6476	-6.3561e-3
5	906.6730	906.6744	3.7100e8	0.6497	-1.3994e-3
6	1254.9250	1254.9073	5.2260e7	0.6858	0.0177
7	1545.1340	1545.1120	1.5800e7	0.6532	0.0220
8	1952.4270	1952.4295	2.9220e7	0.6414	-2.5268e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 14:53
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



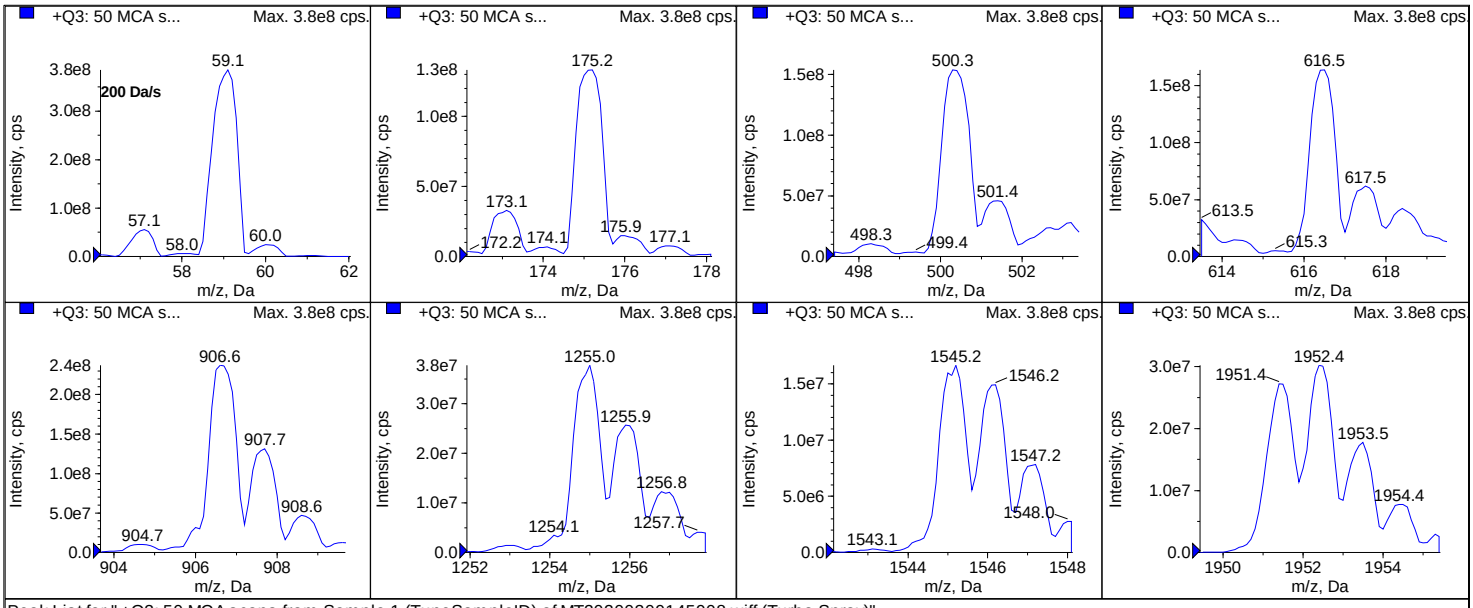
Peak List for " +Q3: 10 MCA scans from Sample 1 (TuneSampleID) of MT20200309145335.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0513	7.5905e7	0.6954	-1.3188e-3
2	175.1330	175.1236	2.7460e7	0.7285	9.3617e-3
3	500.3800	500.3774	3.0791e7	0.7606	2.5750e-3
4	616.4640	616.4578	3.2865e7	0.6715	6.2175e-3
5	906.6730	906.6698	4.9688e7	0.7026	3.2171e-3
6	1254.9250	1254.9194	7.4667e6	0.7363	5.5598e-3
7	1545.1340	1545.1297	3.6516e6	0.7119	4.2899e-3
8	1952.4270	1952.4240	5.4222e6	0.7396	2.9901e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 14:59
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



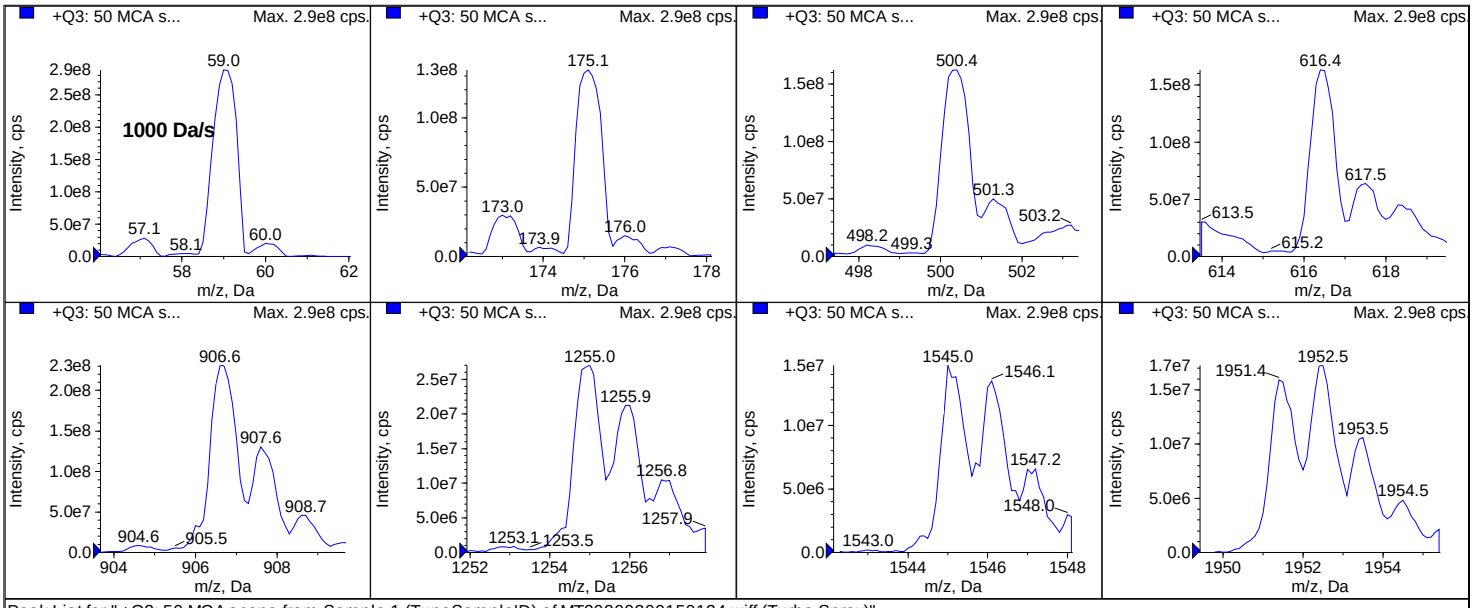
Peak List for " +Q3: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309145908.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0417	3.8495e8	0.6883	8.2519e-3
2	175.1330	175.1206	1.3316e8	0.7429	0.0124
3	500.3800	500.3761	1.5378e8	0.7795	3.8903e-3
4	616.4640	616.4581	1.6392e8	0.6983	5.8954e-3
5	906.6730	906.6698	2.3689e8	0.7180	3.1950e-3
6	1254.9250	1254.9230	3.7754e7	0.7466	2.0402e-3
7	1545.1340	1545.1237	1.6638e7	0.7683	0.0103
8	1952.4270	1952.4323	3.0168e7	0.7410	-5.3377e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:01
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



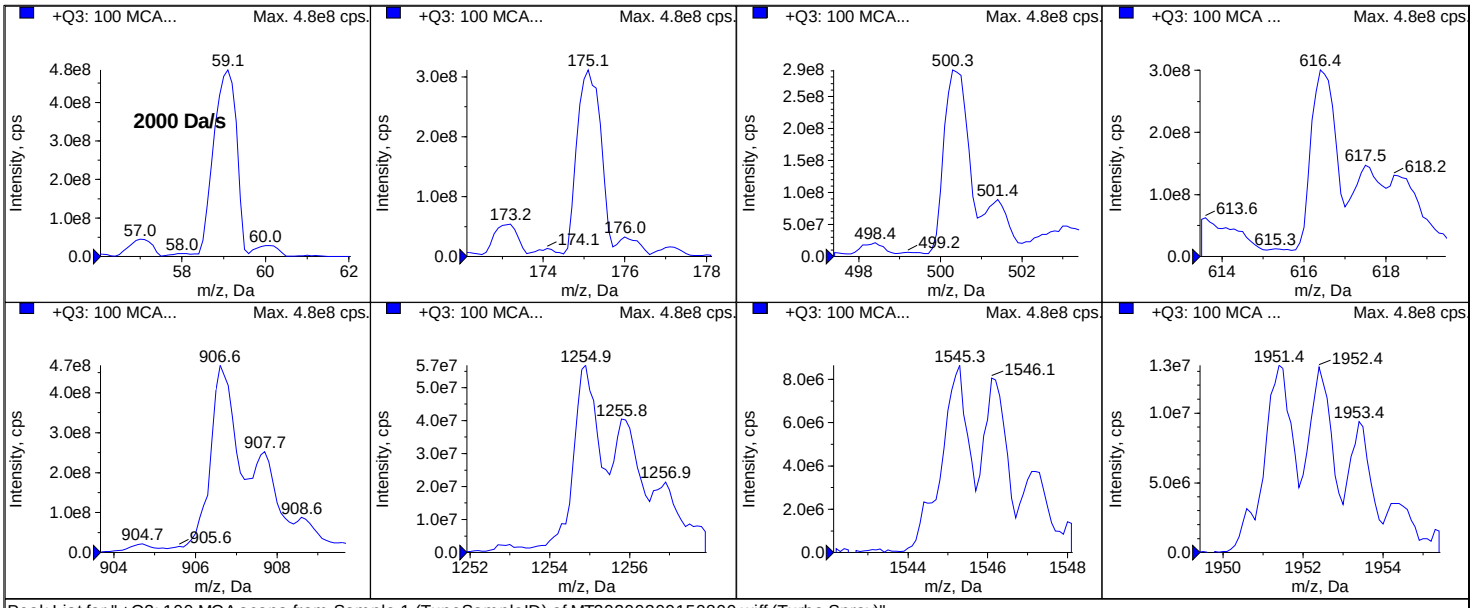
Peak List for " +Q3: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309150124.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0456	2.8843e8	0.6720	4.3685e-3
2	175.1330	175.1080	1.3443e8	0.7289	0.0250
3	500.3800	500.3716	1.6225e8	0.7737	8.4217e-3
4	616.4640	616.4572	1.6319e8	0.6772	6.8124e-3
5	906.6730	906.6761	2.3076e8	0.7093	-3.1097e-3
6	1254.9250	1254.9430	2.7010e7	0.7649	-0.0180
7	1545.1340	1545.1274	1.4710e7	0.7307	6.5536e-3
8	1952.4270	1952.4675	1.7250e7	0.7893	-0.0405

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:08
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



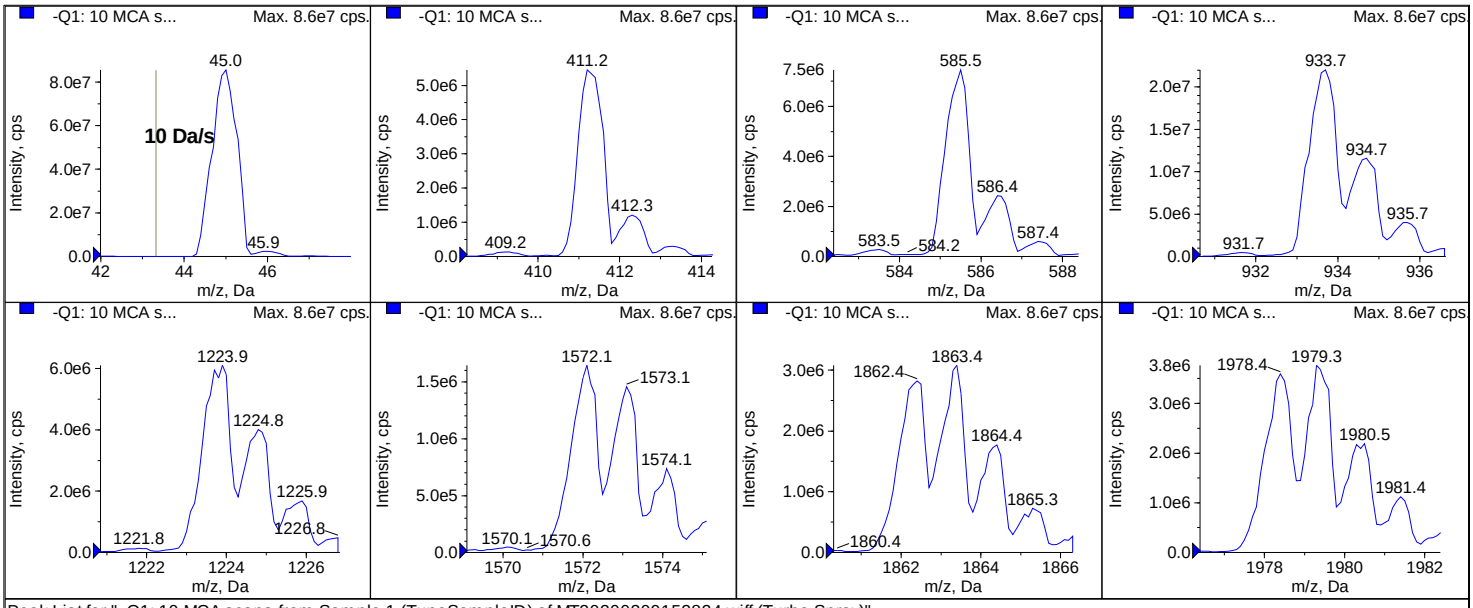
Peak List for " +Q3: 100 MCA scans from Sample 1 (TuneSampleID) of MT20200309150800.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0586	4.8450e8	0.6461	-8.6402e-3
2	175.1330	175.1219	3.1148e8	0.6940	0.0111
3	500.3800	500.3758	2.9134e8	0.6873	4.1700e-3
4	616.4640	616.4724	3.0084e8	0.7039	-8.3635e-3
5	906.6730	906.6726	4.6822e8	0.6683	4.4023e-4
6	1254.9250	1254.9151	5.6720e7	0.6771	9.9478e-3
7	1545.1340	1545.2148	8.6400e6	0.7237	-0.0808
8	1952.4270	1952.4301	1.3300e7	0.6979	-3.0947e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:28
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



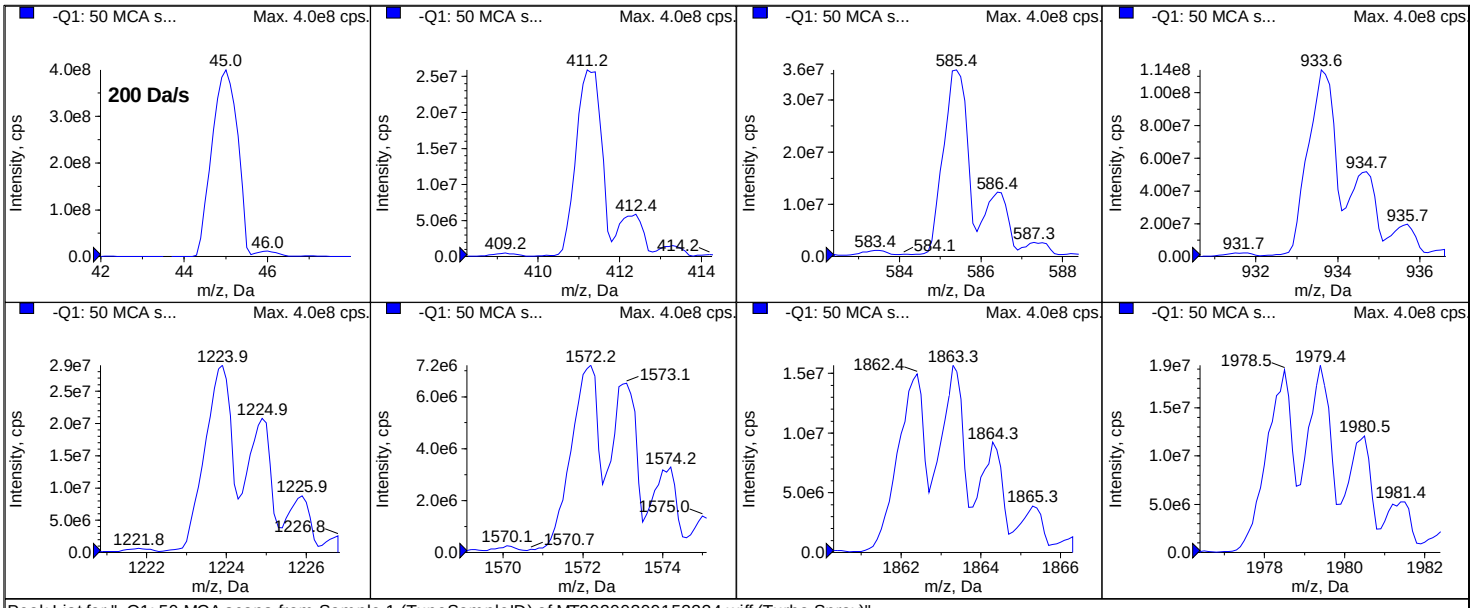
Peak List for "-Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20200309152824.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9918	8.5579e7	0.7257	6.1756e-3
2	411.2590	411.2931	5.4518e6	0.7033	-0.0341
3	585.3850	585.4343	7.4578e6	0.6701	-0.0493
4	933.6360	933.6510	2.2008e7	0.7625	-0.0150
5	1223.8450	1223.7823	6.0980e6	0.7651	0.0627
6	1572.0970	1572.0645	1.6439e6	0.7243	0.0325
7	1863.3060	1863.3143	3.0768e6	0.7252	-8.3485e-3
8	1979.3890	1979.3712	3.7634e6	0.7084	0.0178

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:33
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



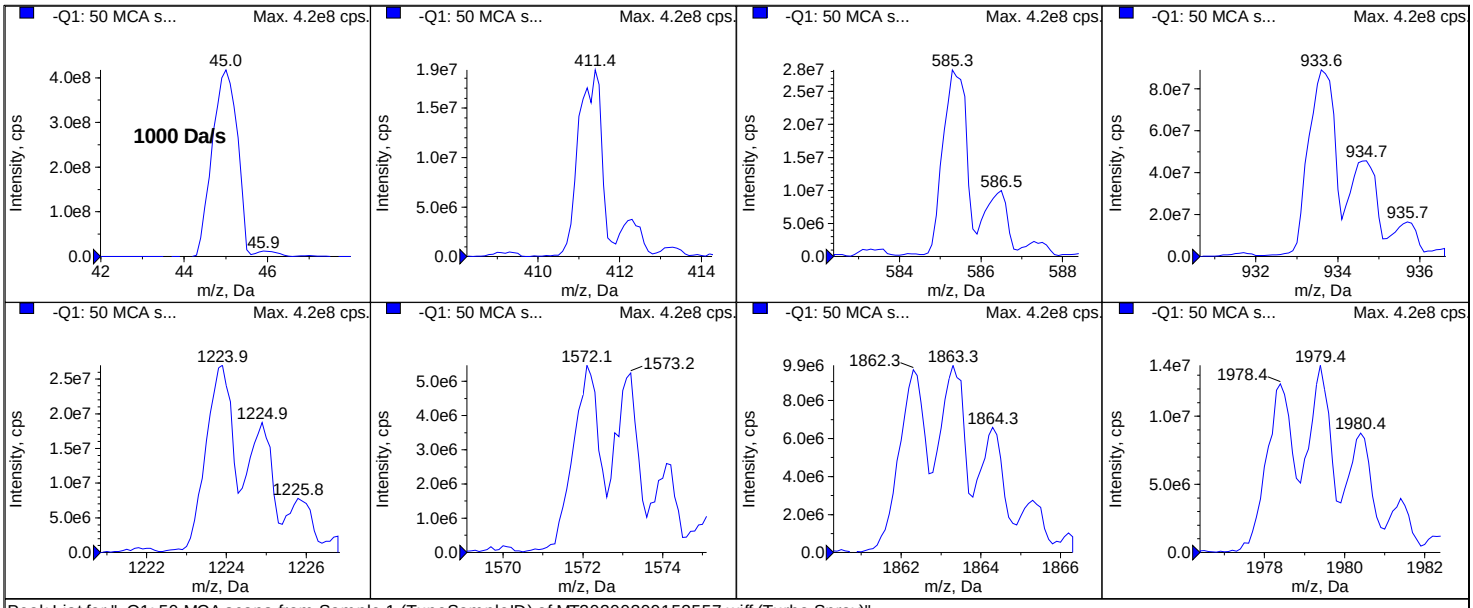
Peak List for "-Q1: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309153334.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9917	3.9936e8	0.7353	6.3073e-3
2	411.2590	411.2565	2.5886e7	0.6981	2.5178e-3
3	585.3850	585.3937	3.5740e7	0.6784	-8.7106e-3
4	933.6360	933.6327	1.1394e8	0.7673	3.2736e-3
5	1223.8450	1223.8361	2.8978e7	0.7422	8.8585e-3
6	1572.0970	1572.1208	7.2060e6	0.7626	-0.0238
7	1863.3060	1863.3024	1.5666e7	0.6735	3.5534e-3
8	1979.3890	1979.3764	1.9374e7	0.7004	0.0126

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:35
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



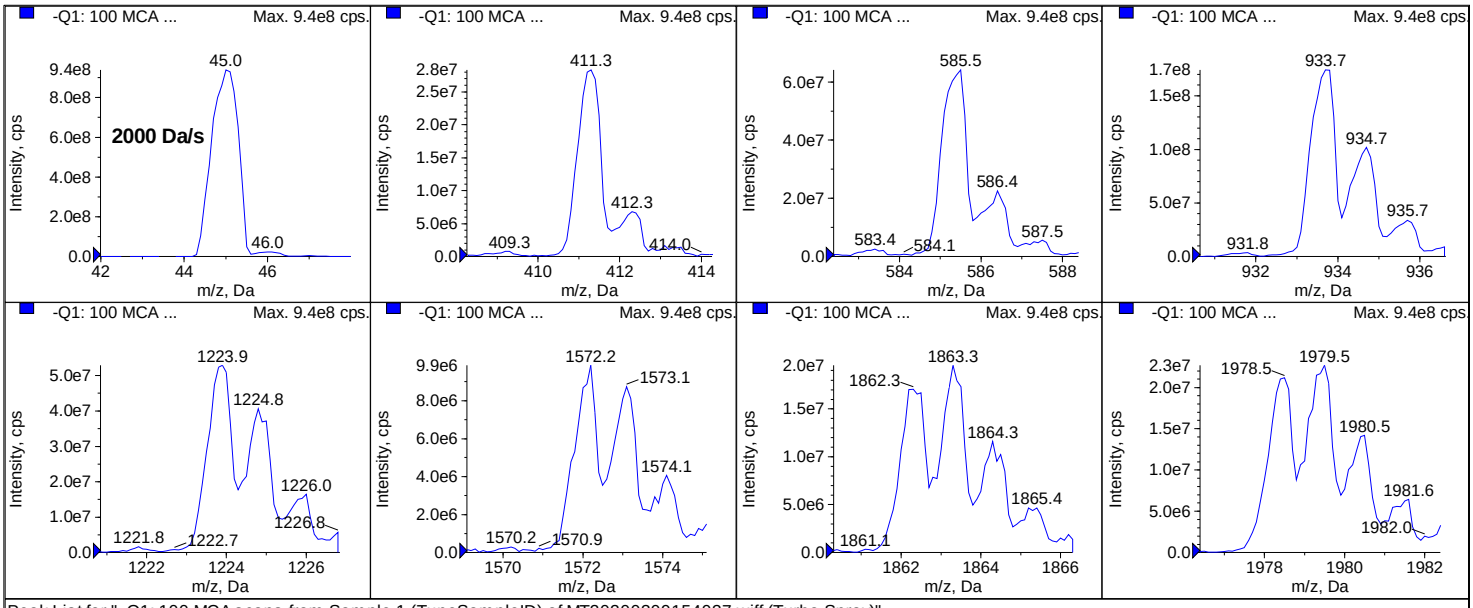
Peak List for "-Q1: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309153557.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9936	4.1751e8	0.7157	4.4174e-3
2	411.2590	411.2776	1.8850e7	0.6512	-0.0186
3	585.3850	585.3771	2.8250e7	0.6670	7.8938e-3
4	933.6360	933.6294	8.9130e7	0.7626	6.5713e-3
5	1223.8450	1223.8444	2.6960e7	0.7422	6.2591e-4
6	1572.0970	1572.1041	5.4600e6	0.7252	-7.0655e-3
7	1863.3060	1863.2936	9.8500e6	0.7713	0.0124
8	1979.3890	1979.3925	1.3720e7	0.6952	-3.4915e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:40
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



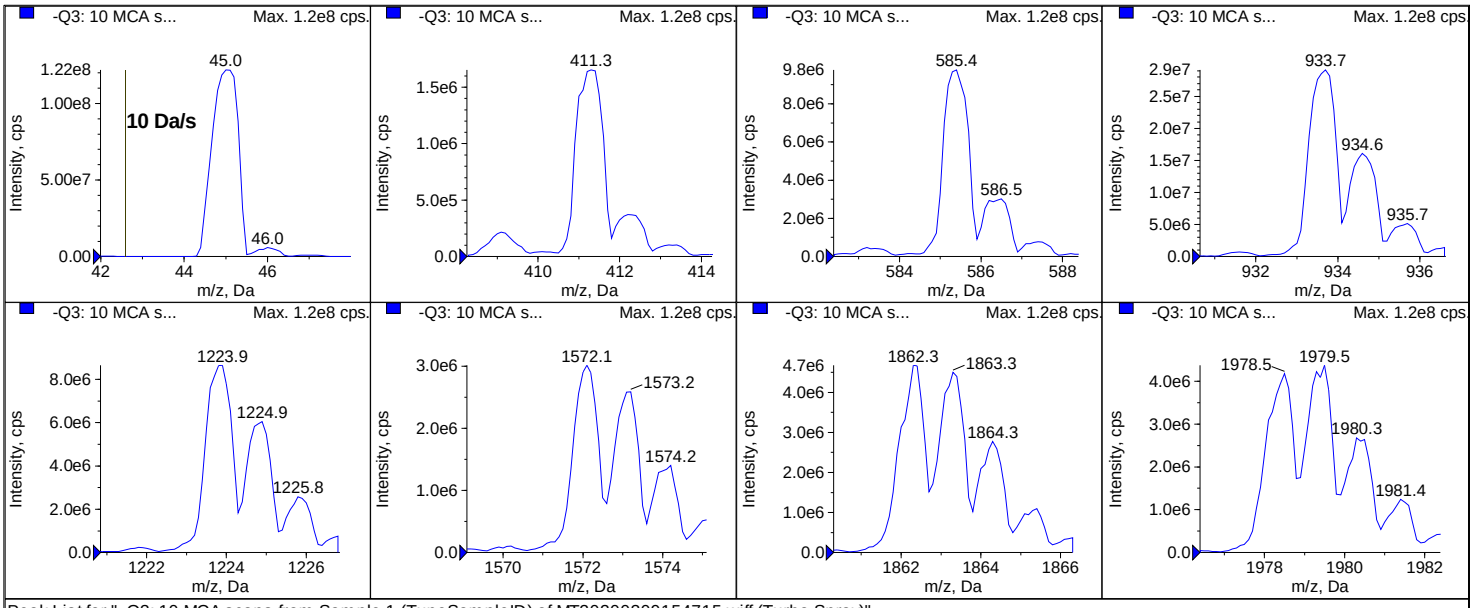
Peak List for "-Q1: 100 MCA scans from Sample 1 (TuneSampleID) of MT20200309154037.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	45.0003	9.3880e8	0.7560	-2.2824e-3
2	411.2590	411.2703	2.8340e7	0.6287	-0.0113
3	585.3850	585.3487	6.4180e7	0.6800	0.0363
4	933.6360	933.6511	1.7412e8	0.6811	-0.0151
5	1223.8450	1223.8511	5.2840e7	0.6856	-6.0596e-3
6	1572.0970	1572.1135	9.8600e6	0.6499	-0.0165
7	1863.3060	1863.3165	1.9540e7	0.6589	-0.0105
8	1979.3890	1979.3944	2.2660e7	0.7319	-5.3568e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:47
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



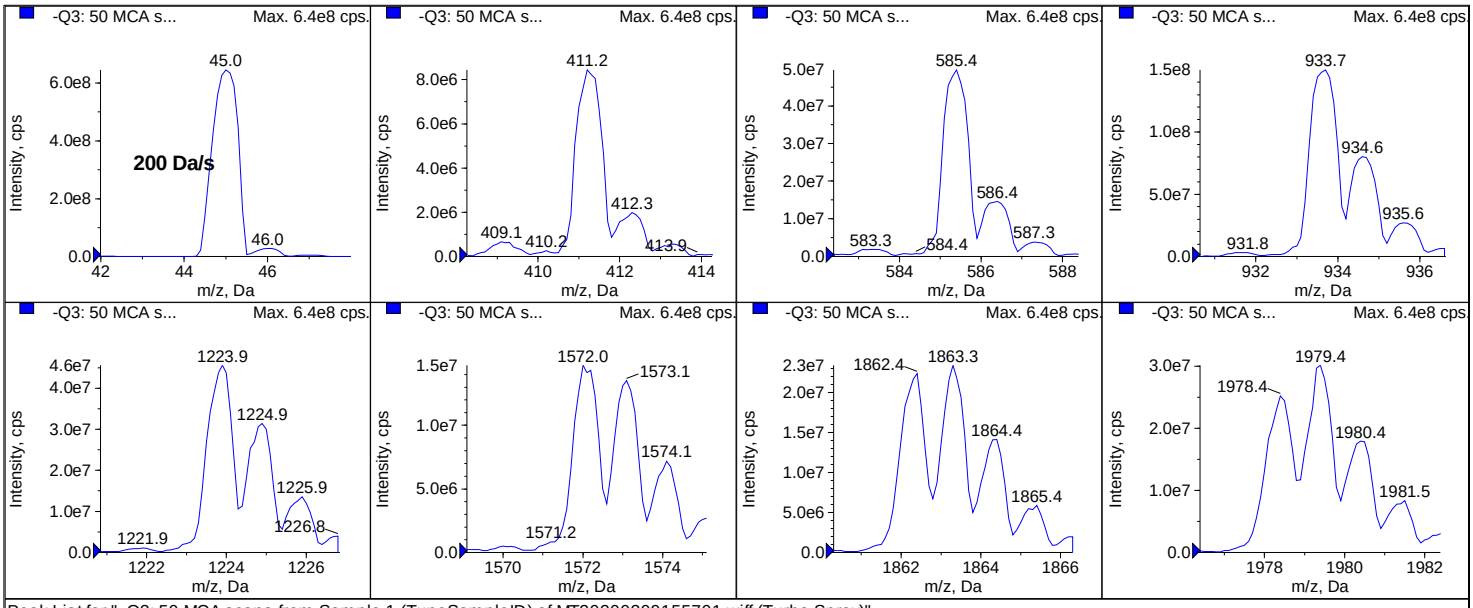
Peak List for "-Q3: 10 MCA scans from Sample 1 (TuneSampleID) of MT20200309154715.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	45.0082	1.2180e8	0.7404	-0.0102
2	411.2590	411.2610	1.6539e6	0.7632	-2.0391e-3
3	585.3850	585.3872	9.7699e6	0.6984	-2.2009e-3
4	933.6360	933.6266	2.9123e7	0.7487	9.4038e-3
5	1223.8450	1223.8149	8.6389e6	0.7511	0.0301
6	1572.0970	1572.0850	3.0115e6	0.7067	0.0120
7	1863.3060	1863.2855	4.5025e6	0.7447	0.0205
8	1979.3890	1979.3871	4.3712e6	0.7716	1.9019e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:57
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



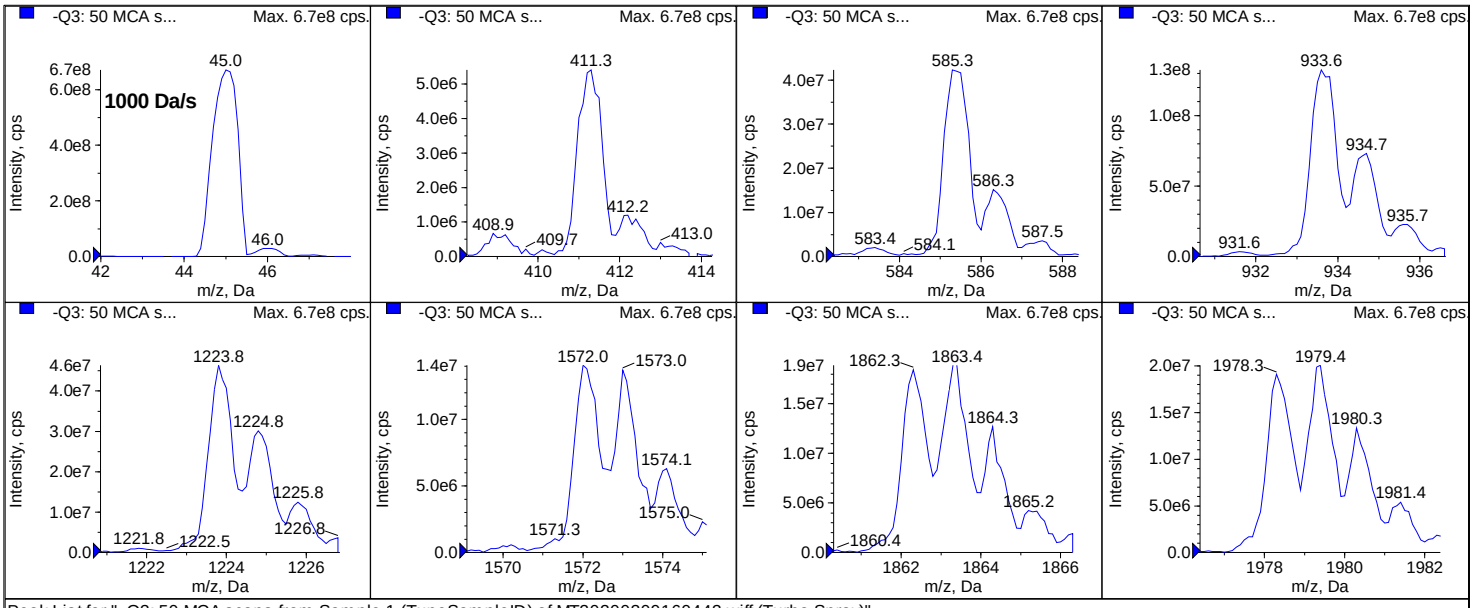
Peak List for "-Q3: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309155701.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	45.0060	6.4463e8	0.7254	-7.9934e-3
2	411.2590	411.2441	8.4440e6	0.7402	0.0149
3	585.3850	585.3776	4.9526e7	0.7000	7.4079e-3
4	933.6360	933.6448	1.4994e8	0.7558	-8.8291e-3
5	1223.8450	1223.8427	4.5540e7	0.7303	2.3178e-3
6	1572.0970	1572.0873	1.4708e7	0.7224	9.6943e-3
7	1863.3060	1863.3116	2.3372e7	0.6821	-5.6179e-3
8	1979.3890	1979.3871	3.0114e7	0.7684	1.9144e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 16:04
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



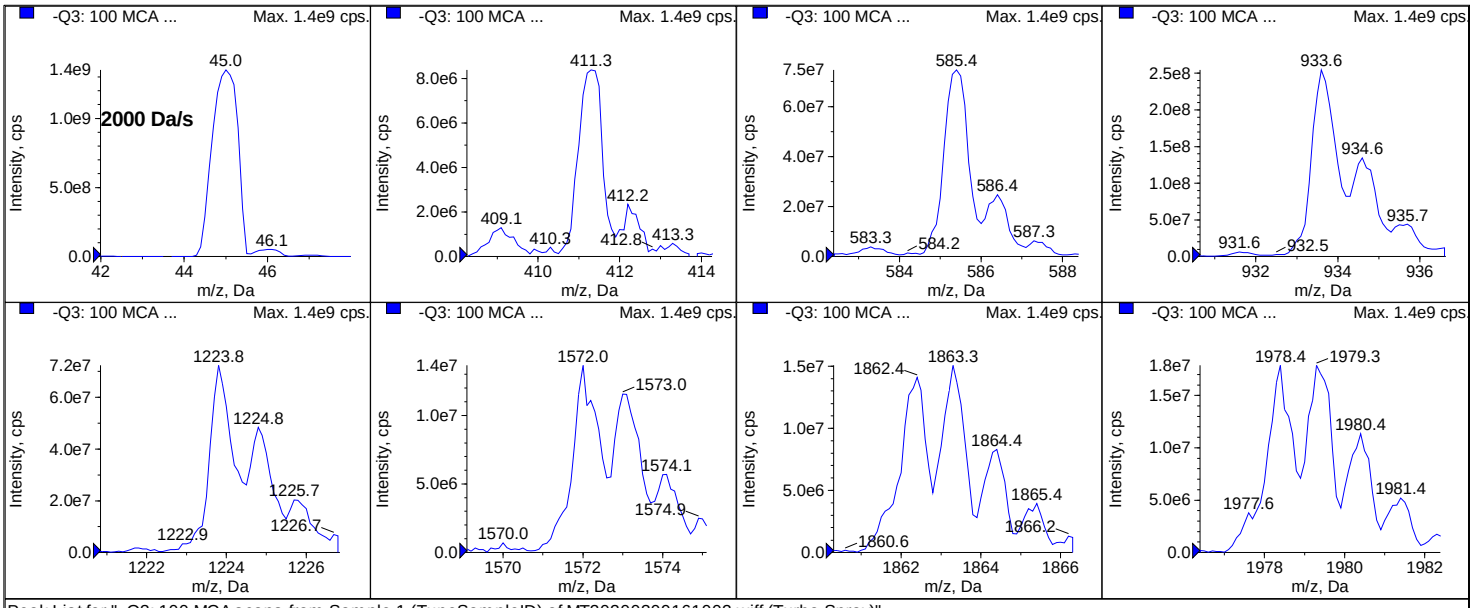
Peak List for "-Q3: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309160443.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	45.0043	6.7129e8	0.7277	-6.3300e-3
2	411.2590	411.2666	5.4100e6	0.6845	-7.6259e-3
3	585.3850	585.3966	4.2290e7	0.6976	-0.0116
4	933.6360	933.6496	1.3258e8	0.6805	-0.0136
5	1223.8450	1223.8557	4.6330e7	0.6552	-0.0107
6	1572.0970	1572.0882	1.4050e7	0.7080	8.8257e-3
7	1863.3060	1863.3356	1.8880e7	0.7932	-0.0296
8	1979.3890	1979.3810	2.0050e7	0.7797	7.9747e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 16:10
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



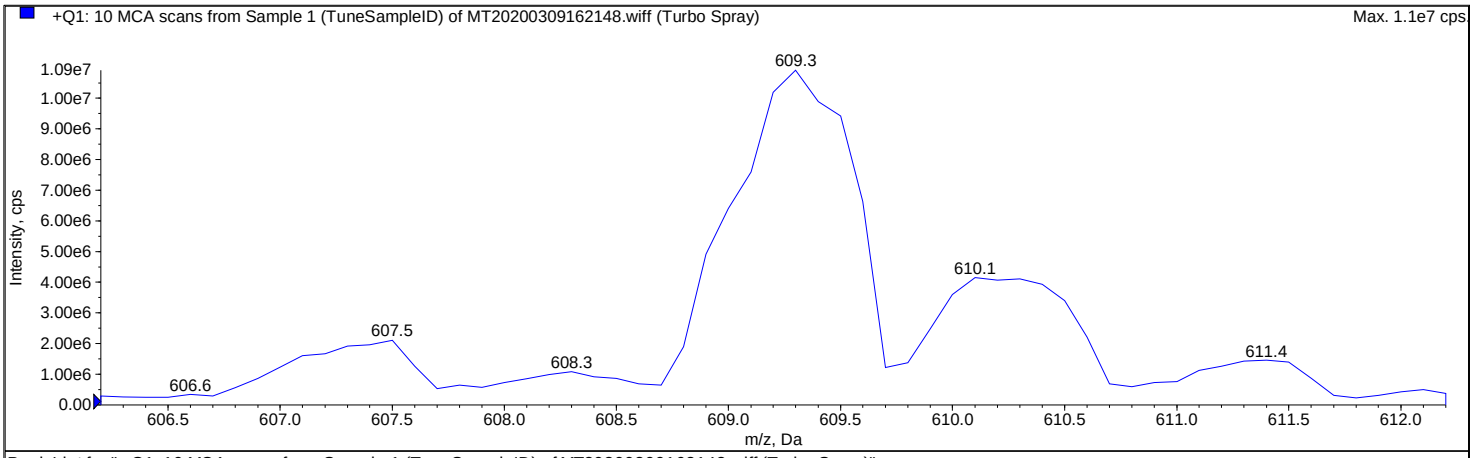
Peak List for "-Q3: 100 MCA scans from Sample 1 (TuneSampleID) of MT20200309161002.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	45.0025	1.3512e9	0.7334	-4.5334e-3
2	411.2590	411.2920	8.3800e6	0.6384	-0.0330
3	585.3850	585.3849	7.4680e7	0.6377	5.1195e-5
4	933.6360	933.6396	2.5452e8	0.6599	-3.5625e-3
5	1223.8450	1223.8458	7.2340e7	0.6032	-7.8090e-4
6	1572.0970	1572.0918	1.3640e7	0.7449	5.2106e-3
7	1863.3060	1863.3134	1.5060e7	0.7096	-7.4095e-3
8	1979.3890	1978.4049	1.7860e7	0.7051	0.9841

*Post-PM
*FSE: Lynne Russell

Acq. Time: 16:21
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



Peak List for " +Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20200309162148.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	174.1000	n/a	n/a	n/a	n/a
2	195.1000	n/a	n/a	n/a	n/a
3	397.2000	n/a	n/a	n/a	n/a
4	448.1000	n/a	n/a	n/a	n/a
5	609.2810	609.3177	1.0915e7	0.6852	-0.0367

*Post-PM
*FSE: Lynne Russell

Acq. Time: N/A
Acq. Date: N/A

Analyst Version: 1.7.0
*SN: EB250231807

State Parameter Editor

Ion Source: Turbo Spray
Ion Source Temperature Reached
Curtain Gas (CUR): 20.0
IonSpray Voltage (IS): 4000.0
Temperature (TEM): 0.0
Ion Source Gas 1 (GS1): 20.0
Ion Source Gas 2 (GS2): 0.0

Entrance Potential (EP): 10.0

Q1 Resolution: Unit
Ion Energy 1 (IE1): 1.0

Deflector (DF): -200.0
CEM (CEM): 2100.0

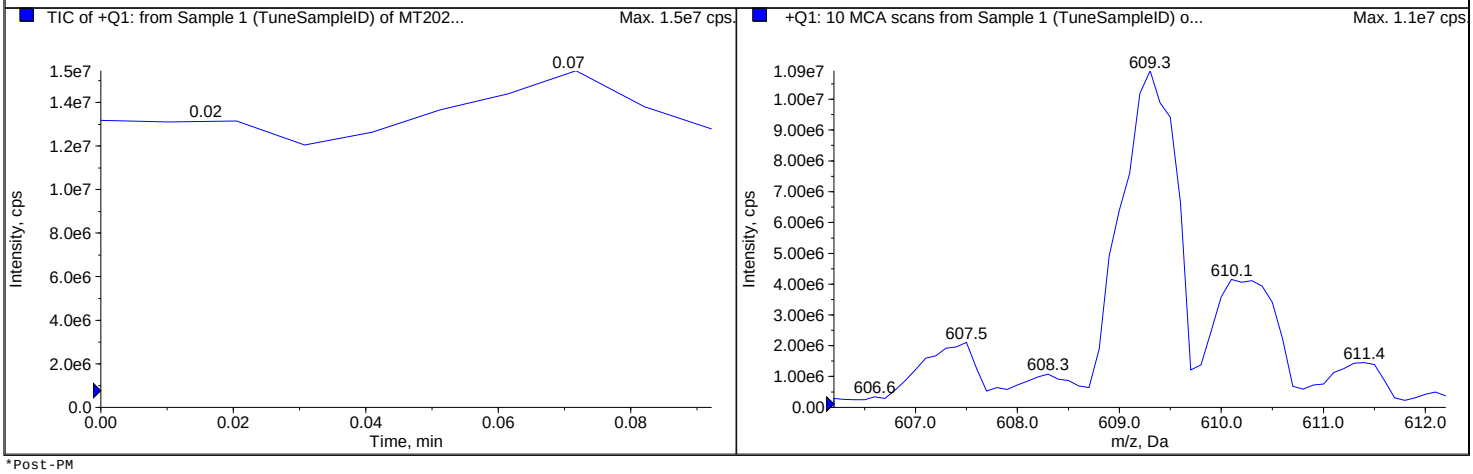
Mass Spectrometer Method Properties

Period 1:

Scans in Period: 10
Relative Start Time: 0.00 msec
Scheduled Ionization: Off
Experiments in Period: 1

Period 1 Experiment 1:

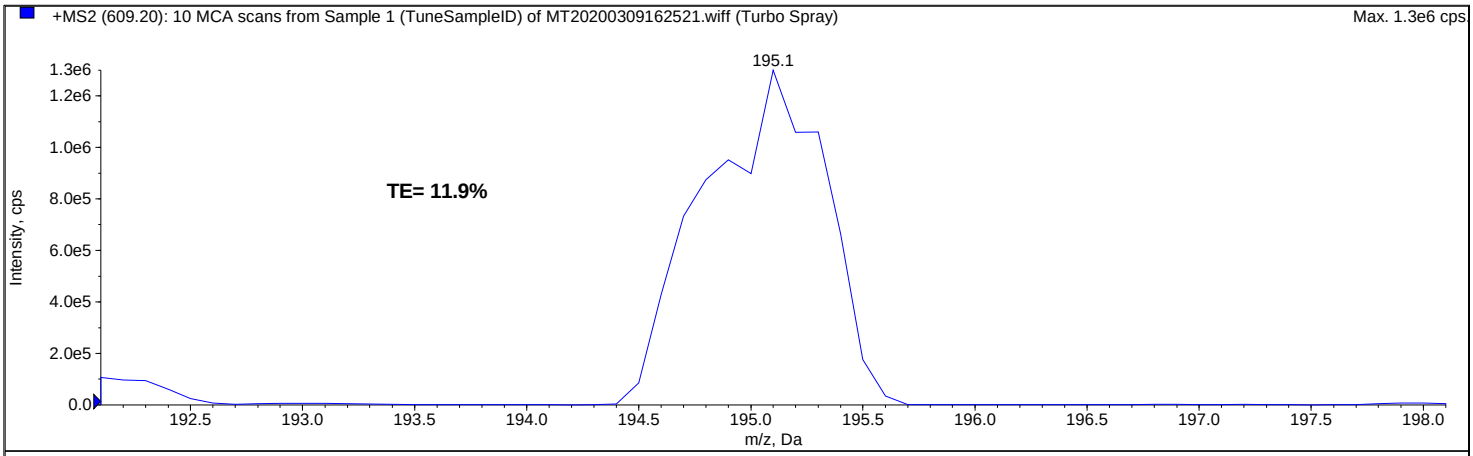
Scan Type: Q1 MS (Q1)
Polarity: Positive
Scan Mode: Profile
Ion Source: Turbo Spray
Scans to Sum: 1



*Post-PM
*FSE: Lynne Russell

Acq. Time: 16:25
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



Peak List for " +MS2 (609.20): 10 MCA scans from Sample 1 (TuneSampleID) of MT20200309162521.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	174.1000	n/a	n/a	n/a	n/a
2	195.1000	195.0747	1.3007e6	0.7298	0.0253
3	397.2000	n/a	n/a	n/a	n/a
4	448.1000	n/a	n/a	n/a	n/a
5	609.2810	n/a	n/a	n/a	n/a

*Post-PM
*FSE: Lynne Russell

Acq. Time: N/A
Acq. Date: N/A

Analyst Version: 1.7.0
*SN: EB250231807

State Parameter Editor

Ion Source: Turbo Spray
Ion Source Temperature Reached
Curtain Gas (CUR): 20.0
Collision Gas (CAD): 8
IonSpray Voltage (IS): 4000.0
Temperature (TEM): 0.0
Ion Source Gas 1 (GS1): 20.0
Ion Source Gas 2 (GS2): 0.0

Entrance Potential (EP): 10.0
Focusing Lens 1 (IQ1): -10.5
Collision Energy (CE): 44.0
Collision Cell Exit Potential (CXP): 7.0

Q1 Resolution: Unit Q3 Resolution: Unit

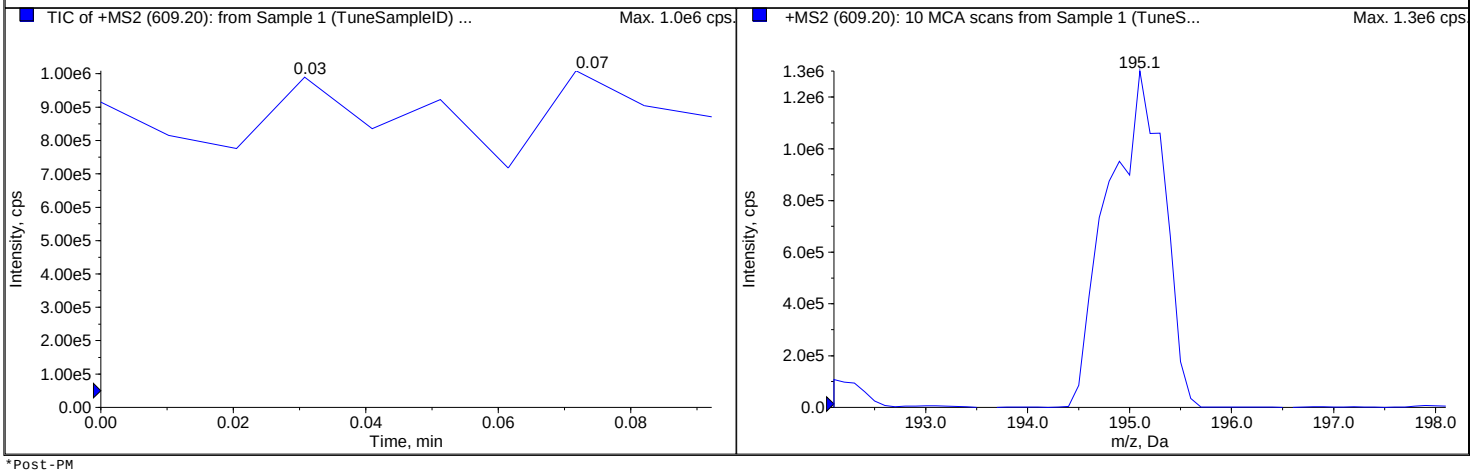
Mass Spectrometer Method Properties

Period 1:

Scans in Period: 10
Relative Start Time: 0.00 msec
Scheduled Ionization: Off
Experiments in Period: 1

Period 1 Experiment 1:

Scan Type: Product Ion (MS2)
Polarity: Positive
Scan Mode: Profile
Ion Source: Turbo Spray
Scans to Sum: 1



*Post-PM
*FSE: Lynne Russell

Pace Environmental Services, LLC
Initial Calibration Response Report

Batch: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b
Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02
Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01
Method Lock: Unlocked Lock Date:
No.Compounds: 66 Integrator: picker
Calib Method: PFAS-ID
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	012621007.d	ICAL 50_SVLC-1272	26-Jan-2021 13:22:18
2	012621008.d	ICAL 100_SVLC-1273	26-Jan-2021 13:32:55
3	012621009.d	ICAL 200_SVLC-1274	26-Jan-2021 13:43:33
4	012621010.d	ICAL 500_SVLC-1275	26-Jan-2021 13:54:07
5	012621011.d	ICAL 1000_SVLC-1276	26-Jan-2021 14:04:47
6	012621012.d	ICAL 2000_SVLC-1277	26-Jan-2021 14:15:21
7	012621013.d	ICAL 5000_SVLC-1278	26-Jan-2021 14:25:58
8	012621014.d	ICAL 10000_SVLC-1279	26-Jan-2021 14:36:40
9	012621015.d	ICAL 15000_SVLC-1280	26-Jan-2021 14:47:21
10	012621016.d	ICAL 20000_SVLC-1281	26-Jan-2021 14:58:01

Quantitation Standards (* - Istd) (D - Iso Dil Std)

* 37 13C2_PFDA	* 39 13C2_PFHxA	* 41 13C2_PFOA
* 43 13C3_PFBA	* 48 13C4_PFOS	D 38 13C2_PFDoA
D 40 13C2_PFHxDA	D 42 13C2_PFTeDA	D 44 13C3_PFBS
D 45 13C3_PFHxS	D 46 13C4_PFBA	D 47 13C4_PFHpA
D 49 13C5_PFHxA	D 50 13C5_PFPeA	D 51 13C6_PFDA
D 52 13C7_PFUdA	D 53 13C8_PFOA	D 54 13C8_PFOS
D 55 13C8_PFOSA	D 56 13C9_PFNA	D 57 d3-MeFOSA
D 58 d3-MeFOSAA	D 59 d5-EtFOSA	D 60 d5-EtFOSAA
D 61 d7-MeFOSE	D 62 d9-EtFOSE	D 63 13C2_4:2 FTS_2
D 64 13C2_6:2 FTS_2	D 65 13C2_8:2 FTS_2	D 66 13C3_GenX

Column: 1 Detector: LCMS-Q3

Compound	Level 1 Conc/Rsp	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp	Std #
D 46 13C4_PFBA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	683019	675994	684273	672473	720687	651337	644048	644832	666145	631467	
8 PFBA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#46
	38291	73157	144553	336486	737574	1307716	3227127	6316964	9987737	12564689	
D 50 13C5_PFPeA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	634189	646008	650219	636967	669031	646265	615145	608527	619477	608741	
21 PFPeA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#50
	37781	66352	138624	319548	666079	1228435	3082351	6185249	9425245	12256345	
D 44 13C3_PFBS	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	191891	196982	187090	194402	208034	186911	185619	183527	195681	183052	
7 PFBS	44.200	88.400	176.80	442.00	884.00	1768.00	4420.00	8840.00	13260	17680	#44
	10861	22854	40333	98156	211986	377633	941809	1933556	2937715	3810877	
1 4:2 FTS	46.700	93.400	186.80	467.00	934.00	1868.00	4670.00	9340.00	14010	18680	#63
	2143	4343	9107	22749	51188	91520	222081	421709	670079	861078	
D 63 13C2_4:2 FTS_2	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	110710	109979	118247	107929	122994	114881	108442	112217	102946	104236	
D 49 13C5_PFHxA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	695717	694949	705868	695880	773207	671018	663610	677281	656835	658516	
15 PFHxA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#49
	35226	75115	139959	337858	740873	1359193	3422647	6566741	10217509	12470888	

Compound	Level 1 Conc/Rsp	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp	Std #
22 PFPeS	46.900	93.800	187.60	469.00	938.00	1876.00	4690.00	9380.00	14070	18760	#44
	6832	14763	29062	78807	157706	306288	755101	1497844	2339904	3027304	
28 GenX	100.00	200.00	400.00	1000.00	2000.00	4000.00	10000	20000	30000	40000	#66
	17517	34442	73602	162510	369792	670477	1656532	3305338	5090244	6489165	
D 66 13C3_GenX	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	1225431	1193517	1227800	1205028	1294237	1189193	1193675	1182986	1223878	1121475	
13 PFHpA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#47
	32047	54894	114660	287635	589712	1118288	2661996	5459491	8426903	11091880	
D 47 13C4_PFHpA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	538894	543654	544215	527217	566534	531768	506304	511175	521771	475717	
14 PFHxS	45.500	91.000	182.00	455.00	910.00	1820.00	4550.00	9100.00	13650	18200	#45
	8352	15619	25426	67084	138237	261105	633398	1211840	1901996	2417291	
D 45 13C3_PFHxS	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	137108	139492	127733	137437	147201	139769	126370	118351	127228	124243	
29 ADONA	47.100	94.200	188.40	471.00	942.00	1884.00	4710.00	9420.00	14130	18840	#45
	47366	97120	188020	457276	948544	1734787	4406343	8453357	13016038	17315419	
D 64 13C2_6:2 FTS_2	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	84936	87774	85627	84113	89400	89077	82227	79636	78543	77794	
2 6:2 FTS	47.400	94.800	189.60	474.00	948.00	1896.00	4740.00	9480.00	14220	18960	#64
	2410	4060	8396	20683	43048	71276	172333	329954	522020	650051	
D 53 13C8_PFOA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	546023	538525	533423	526729	568086	509472	492790	476054	488804	475647	
20 PFOA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#53
	29198	63214	115686	279355	590062	1019789	2571251	4924707	7558627	9671776	
12 PFHpS	47.600	95.200	190.40	476.00	952.00	1904.00	4760.00	9520.00	14280	19040	#45
	5467	13765	24658	60668	126107	251207	613172	1126156	1762665	2247232	
D 54 13C8_PFOS	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	118012	117589	113334	115666	126288	113900	104943	108818	118833	116796	
18 PFOS	46.400	92.800	185.60	464.00	928.00	1856.00	4640.00	9280.00	13920	18560	#54
	9003	14339	27901	63088	147120	278028	658434	1294640	1970181	2633086	
D 56 13C9_PFNA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	653239	655826	646507	638062	703892	665794	639731	598888	626426	626662	
17 PFNA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#56
	32411	76646	143111	319219	730291	1298162	3150350	6315060	9566949	12327233	
30 9Cl-PF3ONS	46.600	93.200	186.40	466.00	932.00	1864.00	4660.00	9320.00	13980	18640	#54
	21669	43409	83891	191901	431623	792217	1998434	3858356	6122088	7876694	
D 55 13C8_PFOSA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	245906	263890	264706	253594	270927	245433	258598	243305	237386	225960	
19 PFOSA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#55
	13741	26543	56292	139419	281505	523694	1276898	2496481	3728297	4866255	
3 8:2 FTS	47.900	95.800	191.60	479.00	958.00	1916.00	4790.00	9580.00	14370	19160	#65
	1858	4574	6808	19413	37688	72682	172821	319182	509822	648828	
16 PFNS	48.000	96.000	192.00	480.00	960.00	1920.00	4800.00	9600.00	14400	19200	#54
	5133	9801	18403	46282	92157	179495	455857	851381	1310741	1652477	
D 65 13C2_8:2 FTS_2	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	85717	85819	79546	85094	91484	86437	81497	74666	72560	75271	
D 51 13C6_PFDA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	625394	622991	610209	596989	643340	603377	606074	588802	556862	560081	
10 PFDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#51
	33707	63666	122857	314562	646324	1174607	2915273	5655332	8613824	10869040	
D 58 d3-MeFOSAA	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	668378	649307	661578	643978	689696	644267	644653	593810	690968	600741	
6 N-MeFOSAA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#58
	4809	10468	20466	49641	102636	195793	478028	919895	1458648	1786874	
9 PFDS	48.200	96.400	192.80	482.00	964.00	1928.00	4820.00	9640.00	14460	19280	#54
	5182	9069	15404	46176	87539	158442	411150	766970	1250794	1544336	

Compound	Level 1 Conc/Rsp	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp	Std #
D 52 13C7_PFUdA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	575743	554807	527405	555828	564025	547387	522375	519758	519977	517000	
D 60 d5-EtFOSAA	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	562672	580829	561602	549440	568396	560775	557305	521525	533271	460640	
25 PFUdA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#52
	29430	55461	121895	272285	537435	1037602	2444822	4585068	7650536	9135698	
5 N-EtFOSAA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#60
	5569	13427	24748	56375	117985	237535	523872	1039015	1585192	1935498	
D 61 d7-MeFOSE	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	88861	93125	80727	85662	84617	80900	81223	77080	83168	74059	
32 MeFOSE	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#61
	4110	7593	19125	44723	96720	165817	400340	808211	1309436	1523822	
D 57 d3-MeFOSA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	47095	41177	43607	48936	44332	44752	47183	40805	47305	49186	
26 MeFOSA		100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000		#57
		6433	13335	27540	63347	109887	264800	525211	840828		
31 11Cl-PF3OUDS	47.100	94.200	188.40	471.00	942.00	1884.00	4710.00	9420.00	14130	18840	#54
	19364	39707	70264	170205	353616	688870	1685340	3415328	5122767	6772481	
D 62 d9-EtFOSE	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	95826	100977	95840	101518	98326	95373	94474	92410	95725	89076	
11 PFDoA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#38
	32449	58654	118246	262678	568760	1110803	2690311	4944659	7905263	9305148	
33 EtFOSE	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#62
	4911	10429	19306	47256	101931	179768	456455	832755	1379736	1723072	
D 38 13C2_PFDoA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	526437	556608	541488	531310	560944	503201	535210	487286	500925	481115	
4 10:2 FTS	48.200	96.400	192.80	482.00	964.00	1928.00	4820.00	9640.00	14460	19280	#65
	2042	4716	9714	20977	46472	77641	202451	385168	542269	728075	
D 59 d5-EtFOSA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	39142	42635	41724	41750	45663	43209	40516	43790	43209	40603	
27 EtFOSA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#59
	3013	5209	10980	22388	42180	90672	214862	438055	667451	833945	
34 PFDOS	48.400	96.800	193.60	484.00	968.00	1936.00	4840.00	9680.00	14520	19360	#54
	5322	11498	23051	56033	114903	211455	541908	1012764	1566090	2068671	
24 PFTrDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#38
	29538	53463	106921	243250	554569	1037053	2555223	4910787	7215002	9458149	
D 42 13C2_PFTeDA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	736456	747482	739782	728253	782673	703860	736505	719959	741303	708403	
23 PFTeDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#42
	36144	71764	133986	318847	689532	1236083	3046229	6240118	9223660	12079475	
35 PFHxDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#40
	30902	57400	104377	250537	520028	985088	2386535	4600812	7057697	8850408	
D 40 13C2_PFHxDA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	753644	755177	750700	733617	785856	730601	752213	737038	737566	713656	
36 PFODA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#40
	42881	80091	154693	368356	782949	1493548	3714101	7139168	11035071	14065311	

Report Date: 27-Jan-2021 16:50:50 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Initial Calibration RF Report

Batch: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b

Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02

Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	012621007.d	ICAL 50_SVLC-1272	26-Jan-2021 13:22:18
2	012621008.d	ICAL 100_SVLC-1273	26-Jan-2021 13:32:55
3	012621009.d	ICAL 200_SVLC-1274	26-Jan-2021 13:43:33
4	012621010.d	ICAL 500_SVLC-1275	26-Jan-2021 13:54:07
5	012621011.d	ICAL 1000_SVLC-1276	26-Jan-2021 14:04:47
6	012621012.d	ICAL 2000_SVLC-1277	26-Jan-2021 14:15:21
7	012621013.d	ICAL 5000_SVLC-1278	26-Jan-2021 14:25:58
8	012621014.d	ICAL 10000_SVLC-1279	26-Jan-2021 14:36:40
9	012621015.d	ICAL 15000_SVLC-1280	26-Jan-2021 14:47:21
10	012621016.d	ICAL 20000_SVLC-1281	26-Jan-2021 14:58:01

Curve Legend: Ex. Avg:H Wt:C2 Org:F Dep:A

Curve Type: Avg, Ln, Qd Response Type: H-Height, A-Area

Wt: Curve Weighting, C-1/Conc, C2-1/Conc^2, R-1/Rsp, R2-1/Rsp^2, N-None

Org: Origin, F-Force, I-Include, N-Neither

Dep: Dependent Variable, A-Amount, R-Response

%Rec = (Measured Amount / True Amount) * 100

Column: 1 Detector: LCMS-Q3

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
D 46 13C4_PFBA	683	676	684	672	721	651	644	645	666	631	Avg:A Wt:C2	667		RSD=3.9	
	102	101	103	101	108	97.6	96.5	96.6	99.8	94.6	Org:N Dep:A		✓		✓
8 PFBA	1.121228	1.082214	1.056252	1.000742	1.023432	1.003871	1.002139	0.979629	0.999556	0.994881	Avg:A Wt:C2	1.026394		RSD=4.4	
	109 ✓	105 ✓	103 ✓	97.5 ✓	99.7 ✓	97.8 ✓	97.6 ✓	95.4 ✓	97.4 ✓	96.9 ✓	Org:N Dep:A				
D 50 13C5_PFPeA	634	646	650	637	669	646	615	609	619	609	Avg:A Wt:C2	633		RSD=3.2	
	100	102	103	101	106	102	97.1	96.1	97.8	96.1	Org:N Dep:A				
21 PFPeA	1.191474	1.027108	1.065979	1.003342	0.995588	0.950411	1.002154	1.016430	1.014323	1.006696	Avg:A Wt:C2	1.027351		RSD=6.3	
	116	100	104	97.7	96.9	92.5	97.5	98.9	98.7	98	Org:N Dep:A				
D 44 13C3_PFBS	192	197	187	194	208	187	186	184	196	183	Avg:A Wt:C2	191		RSD=4.0	
	100	103	97.8	102	109	97.7	97	95.9	102	95.7	Org:N Dep:A				
7 PFBS	1.280539	1.312452	1.219348	1.142336	1.152711	1.142754	1.147937	1.191803	1.132185	1.177520	Avg:A Wt:C2	1.189959		RSD=5.3	
	108	110	102	96	96.9	96	96.5	100	95.1	99	Org:N Dep:A				

✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓

Report Date: 27-Jan-2021 16:50:50 AIM Revision: 2.0 05-Oct-2020 14:59:22
Method Path: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b\LCMSMS02_PFAS-ID.m

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
1 4:2 FTS	2.072471	2.113991	2.061476	2.256718	2.227960	2.132362	2.192638	2.011765	2.322996	2.211148	Avg:A Wt:C2	2.160353		RSD=4.5	
	95.9	97.9	95.4	104	103	98.7	101	93.1	108	102	Org:N Dep:A				
D 63 13C2_4:2 FTS_2	22.1420	21.9958	23.6494	21.5858	24.5988	22.9762	21.6884	22.4434	20.5892	20.8472	Avg:A Wt:C2	22.2516		RSD=5.5	
	99.5	98.9	106	97	111	103	97.5	101	92.5	93.7	Org:N Dep:A				
D 49 13C5_PFHxA	696	695	706	696	773	671	664	677	657	659	Avg:A Wt:C2	689		RSD=5.0	
	101	101	102	101	112	97.3	96.3	98.3	95.3	95.5	Org:N Dep:A				
15 PFHxA	1.012653	1.080871	0.991396	0.971024	0.958182	1.012784	1.031524	0.969574	1.037045	0.946893	Avg:A Wt:C2	1.001195		RSD=4.2	
	101	108	99	97	95.7	101	103	96.8	104	94.6	Org:N Dep:A				
22 PFPeS	0.759137	0.798997	0.828022	0.864353	0.808186	0.873499	0.867381	0.870089	0.849875	0.881554	Avg:A Wt:C2	0.840109		RSD=4.8	
	90.4	95.1	98.6	103	96.2	104	103	104	101	105	Org:N Dep:A				
28 GenX	0.714728	0.721439	0.749328	0.674300	0.714305	0.704760	0.693879	0.698516	0.693185	0.723285	Avg:A Wt:C2	0.708773		RSD=2.9	
	101	102	106	95.1	101	99.4	97.9	98.6	97.8	102	Org:N Dep:A				
D 66 13C3_GenX	245	239	246	241	259	238	239	237	245	224	Avg:A Wt:C2	241		RSD=3.6	
	102	99	102	99.9	107	98.6	99	98.1	102	93	Org:N Dep:A				
13 PFHpA	1.189362	1.009723	1.053444	1.091145	1.040912	1.051481	1.051541	1.068028	1.076705	1.165807	Avg:A Wt:C2	1.079815		RSD=5.2	
	110	93.5	97.6	101	96.4	97.4	97.4	98.9	99.7	108	Org:N Dep:A				
D 47 13C4_PFHpA	539	544	544	527	567	532	506	511	522	476	Avg:A Wt:C2	527		RSD=4.8	
	102	103	103	100	108	101	96.1	97	99.1	90.3	Org:N Dep:A				
14 PFHxS	1.338802	1.230446	1.093713	1.072763	1.031982	1.026439	1.101593	1.125206	1.095202	1.069019	Avg:A Wt:C2	1.118517		RSD=8.6	
	120	110	97.8	95.9	92.3	91.8	98.5	101	97.9	95.6	Org:N Dep:A				
D 45 13C3_PFHxS	137	139	128	137	147	140	126	118	127	124	Avg:A Wt:C2	132		RSD=6.8	
	103	105	96.4	104	111	105	95.4	89.3	96	93.8	Org:N Dep:A				
29 ADONA	7.334711	7.391090	7.813040	7.064051	6.840626	6.588012	7.403096	7.582394	7.240256	7.397418	Avg:A Wt:C2	7.265470		RSD=4.9	
	101	102	108	97.2	94.2	90.7	102	104	99.7	102	Org:N Dep:A				
D 64 13C2_6:2 FTS_2	16.9872	17.5548	17.1254	16.8226	17.8800	17.8154	16.4454	15.9272	15.7086	15.5588	Avg:A Wt:C2	16.7825		RSD=5.1	
	101	105	102	100	107	106	98	94.9	93.6	92.7	Org:N Dep:A				
2 6:2 FTS	2.993070	2.439618	2.585791	2.593833	2.539669	2.110131	2.210781	2.185273	2.336953	2.203601	Avg:A Wt:C2	2.419872		RSD=11.1	
	124	101	107	107	105	87.2	91.4	90.3	96.6	91.1	Org:N Dep:A				
D 53 13C8_PFOA	546	539	533	527	568	509	493	479	489	476	Avg:A Wt:C2	516		RSD=6.2	
	106	104	103	102	110	98.8	95.6	92.3	94.8	92.3	Org:N Dep:A				
20 PFOA	1.069479	1.173836	1.084374	1.060716	1.038684	1.000829	1.043548	1.034485	1.030901	1.016697	Avg:A Wt:C2	1.055355		RSD=4.6	
	101	111	103	101	98.4	94.8	98.9	98	97.7	96.3	Org:N Dep:A				
12 PFHpS	0.837682	1.036549	1.013883	0.927361	0.899894	0.943961	1.019369	0.999516	0.970195	0.949968	Avg:A Wt:C2	0.959838		RSD=6.4	
	87.3	108	106	96.6	93.8	98.3	106	104	101	99	Org:N Dep:A				
D 54 13C8_PFOS	118	118	113	116	126	114	105	109	119	117	Avg:A Wt:C2	115		RSD=5.0	
	102	102	98.2	100	109	98.7	90.9	94.3	103	101	Org:N Dep:A				
18 PFOS	1.644156	1.314027	1.326422	1.175501	1.255341	1.315185	1.352200	1.282036	1.191050	1.214672	Avg:A Wt:C2	1.307059		RSD=10.2	
	126	101	101	89.9	96	101	103	98.1	91.1	92.9	Org:N Dep:A				
D 56 13C9_PFNA	653	656	647	638	704	666	640	599	626	627	Avg:A Wt:C2	646		RSD=4.3	
	101	102	100	98.8	109	103	99.1	92.8	97	97.1	Org:N Dep:A				
17 PFNA	0.992317	1.168694	1.106802	1.000589	1.037504	0.974898	0.984898	1.054464	1.018152	0.983563	Avg:A Wt:C2	1.032188		RSD=6.1	
	96.1	113	107	96.9	101	94.4	95.4	102	98.6	95.3	Org:N Dep:A				

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
30 9Cl-PF3ONS	3.940277	3.960930	3.971086	3.560292	3.667132	3.731423	4.086490	3.804395	3.685151	3.618013	Avg:A Wt:C2	3.802519		RSD=4.7	
	104	104	104	93.6	96.4	98.1	107	100	96.9	95.1	Org:N Dep:A				
D 55 13C8_PFOSA	246	264	265	254	271	245	259	243	237	226	Avg:A Wt:C2	251		RSD=5.5	
	98	105	105	101	108	97.8	103	96.9	94.6	90	Org:N Dep:A				
19 PFOSA	1.117582	1.005836	1.063293	1.099545	1.039044	1.066878	0.987554	1.026071	1.047042	1.076796	Avg:A Wt:C2	1.052964		RSD=3.8	
	106	95.5	101	104	98.7	101	93.8	97.4	99.4	102	Org:N Dep:A				
3 8:2 FTS	2.262628	2.781744	2.233447	2.381377	2.150119	2.194329	2.213550	2.231105	2.444750	2.249450	Avg:A Wt:C2	2.314250		RSD=8.0	
	97.8	120	96.5	103	92.9	94.8	95.6	96.4	106	97.2	Org:N Dep:A				
16 PFNS	0.906158	0.868225	0.845721	0.833614	0.760142	0.820781	0.904969	0.814989	0.765980	0.736896	Avg:A Wt:C2	0.825748		RSD=7.1	
	110	105	102	101	92.1	99.4	110	98.7	92.8	89.2	Org:N Dep:A				
D 65 13C2_8:2 FTS_2	17.1434	17.1638	15.9092	17.0188	18.2968	17.2874	16.2994	14.9332	14.5120	15.0542	Avg:A Wt:C2	16.3618		RSD=7.5	
	105	105	97.2	104	112	106	99.6	91.3	88.7	92	Org:N Dep:A				
D 51 13C6_PFDA	625	623	610	597	643	603	606	589	557	560	Avg:A Wt:C2	601		RSD=4.6	
	104	104	101	99.3	107	100	101	97.9	92.6	93.1	Org:N Dep:A				
10 PFDA	1.077944	1.021941	1.006680	1.053828	1.004638	0.973361	0.962019	0.960481	1.031234	0.970310	Avg:A Wt:C2	1.006244		RSD=4.0	
	107	102	100	105	99.8	96.7	95.6	95.5	102	96.4	Org:N Dep:A				
D 58 d3-MeFOSAA	134	130	132	129	138	129	129	119	138	120	Avg:A Wt:C2	130		RSD=5.0	
	103	100	102	99.3	106	99.3	99.4	91.5	107	92.6	Org:N Dep:A				
6 N-MeFOSAA	0.719503	0.806090	0.773378	0.770849	0.744067	0.759751	0.741528	0.774570	0.703674	0.743612	Avg:A Wt:C2	0.753702		RSD=3.9	
	95.5	107	103	102	98.7	101	98.4	103	93.4	98.7	Org:N Dep:A				
9 PFDS	0.911012	0.800047	0.704963	0.828254	0.719056	0.721505	0.812830	0.731140	0.727915	0.685815	Avg:A Wt:C2	0.764254		RSD=9.3	
	119	105	92.2	108	94.1	94.4	106	95.7	95.2	89.7	Org:N Dep:A				
D 52 13C7_PFUdA	576	555	527	556	564	547	522	520	520	517	Avg:A Wt:C2	540		RSD=4.0	
	107	103	97.6	103	104	101	96.7	96.2	96.2	95.7	Org:N Dep:A				
D 60 d5-EtFOSAA	113	116	112	110	114	112	111	104	107	92.1280	Avg:A Wt:C2	109		RSD=6.3	
	103	106	103	101	104	103	102	95.6	97.7	84.4	Org:N Dep:A				
25 PFUdA	1.022331	0.999645	1.155611	0.979746	0.952857	0.947777	0.936041	0.882154	0.980881	0.883530	Avg:A Wt:C2	0.974057		RSD=8.0	
	105	103	119	101	97.8	97.3	96.1	90.6	101	90.7	Org:N Dep:A				
5 N-EtFOSAA	0.989742	1.155848	1.101670	1.026045	1.037877	1.058959	0.940010	0.996132	0.990861	1.050440	Avg:A Wt:C2	1.034758		RSD=6.0	
	95.6	112	106	99.2	100	102	90.8	96.3	95.8	102	Org:N Dep:A				
D 61 d7-MeFOSE	88.8610	93.1250	80.7270	85.6620	84.6170	80.9000	81.2230	77.0800	83.1680	74.0590	Avg:A Wt:C2	82.9422		RSD=6.7	
	107	112	97.3	103	102	97.5	97.9	92.9	100	89.3	Org:N Dep:A				
32 MeFOSE	0.925040	0.815356	1.184548	1.044174	1.143033	1.024827	0.985780	1.048535	1.049631	1.028789	Avg:A Wt:C2	1.024971		RSD=10.1	
	90.3	79.5	116	102	112	100	96.2	102	102	100	Org:N Dep:A				
D 57 d3-MeFOSA	47.0950	41.1770	43.6070	48.9360	44.3320	44.7520	47.1830	40.8050	47.3050	49.1860	Avg:A Wt:C2	45.4378		RSD=6.6	
	104	90.6	96	108	97.6	98.5	104	89.8	104	108	Org:N Dep:A				
26 MeFOSA		1.562280	1.528998	1.125552	1.428923	1.227733	1.122438	1.287124	1.184974		Avg:A Wt:C2	1.308503		RSD=13.5	
	Disabled	119	117	86	109	93.8	85.8	98.4	90.6	Disabled	Org:N Dep:A				
31 11Cl-PF3OUDS	3.483758	3.584672	3.290726	3.124249	2.972480	3.210204	3.409676	3.331814	3.050882	3.077790	Avg:A Wt:C2	3.253625		RSD=6.2	
	107	110	101	96	91.4	98.7	105	102	93.8	94.6	Org:N Dep:A				
D 62 d9-EtFOSE	95.8260	101	95.8400	102	98.3260	95.3730	94.4740	92.4100	95.7250	89.0760	Avg:A Wt:C2	95.9545		RSD=3.9	
	99.9	105	99.9	106	102	99.4	98.5	96.3	99.8	92.8	Org:N Dep:A				

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
11 PFDoA	1.232778	1.053776	1.091862	0.988794	1.013934	1.103737	1.005329	1.014734	1.052089	0.967040	Avg:A Wt:C2	1.052407		RSD=7.3	
	117	100	104	94	96.3	105	95.5	96.4	100	91.9	Org:N Dep:A				
33 EtFOSE	1.024983	1.032809	1.007199	0.930988	1.036664	0.942447	0.966308	0.901152	0.960903	0.967192	Avg:A Wt:C2	0.977065		RSD=4.8	
	105	106	103	95.3	106	96.5	98.9	92.2	98.3	99	Org:N Dep:A				
D 38 13C2_PFDoA	526	557	541	531	561	503	535	487	501	481	Avg:A Wt:C2	522		RSD=5.4	
	101	107	104	102	107	96.3	102	93.3	95.9	92.1	Org:N Dep:A				
4 10:2 FTS	2.471222	2.850252	3.166961	2.557216	2.634749	2.329455	2.576922	2.675594	2.584159	2.508484	Avg:A Wt:C2	2.635502		RSD=8.8	
	93.8	108	120	97	100	88.4	97.8	102	98.1	95.2	Org:N Dep:A				
D 59 d5-EtFOSA	39.1420	42.6350	41.7240	41.7500	45.6630	43.2090	40.5160	43.7900	43.2090	40.6030	Avg:A Wt:C2	42.2241		RSD=4.5	
	92.7	101	98.8	98.9	108	102	96	104	102	96.2	Org:N Dep:A				
27 EtFOSA	1.539523	1.221766	1.315789	1.072479	0.923724	1.049226	1.060628	1.000354	1.029802	1.026950	Ln:A Wt:C2	1.022646	26.0501	R^2=0.993	
	99.6	94	116	99.8	87.8	101	103	97.6	101	100	Org:N Dep:A			RSE=7.6	
34 PFDOS	0.931758	1.010137	1.050568	1.000905	0.939927	0.958934	1.066907	0.961462	0.907639	0.914867	Avg:A Wt:C2	0.974310		RSD=5.7	
	95.6	104	108	103	96.5	98.4	110	98.7	93.2	93.9	Org:N Dep:A				
24 PFTrDA	1.122186	0.960514	0.987289	0.915661	0.988635	1.030456	0.954849	1.007783	0.960224	0.982941	Avg:A Wt:C2	0.991054		RSD=5.6	
	113	96.9	99.6	92.4	99.8	104	96.3	102	96.9	99.2	Org:N Dep:A				
D 42 13C2_PFTeDA	736	747	740	728	783	704	737	720	741	708	Avg:A Wt:C2	734		RSD=3.0	
	100	102	101	99.2	107	95.8	100	98	101	96.5	Org:N Dep:A				
23 PFTeDA	0.981566	0.960077	0.905578	0.875649	0.880996	0.878074	0.827212	0.866732	0.829500	0.852585	Avg:A Wt:C2	0.885797		RSD=5.7	
	111	108	102	98.9	99.5	99.1	93.4	97.8	93.6	96.3	Org:N Dep:A				
35 PFHxDA	0.820069	0.760087	0.695198	0.683019	0.661734	0.674163	0.634537	0.624230	0.637927	0.620075	Avg:A Wt:C2	0.681104		RSD=9.4	
	120	112	102	100	97.2	99	93.2	91.6	93.7	91	Org:N Dep:A				
D 40 13C2_PFHxDA	754	755	751	734	786	731	752	737	738	714	Avg:A Wt:C2	745		RSD=2.6	
	101	101	101	98.5	105	98.1	101	98.9	99	95.8	Org:N Dep:A				
36 PFODA	1.137964	1.060559	1.030325	1.004219	0.996301	1.022137	0.987513	0.968630	0.997431	0.985441	Avg:A Wt:C2	1.019052		RSD=4.8	
	112	104	101	98.5	97.8	100	96.9	95.1	97.9	96.7	Org:N Dep:A				

Pace Environmental Services, LLC
Initial Calibration RT Report

Batch: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b
Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02
Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01
Method Lock: Unlocked Lock Date:
No.Compounds: 66 Integrator: picker
Calib Method: PFAS-ID
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	012621007.d	ICAL 50_SVLC-1272	26-Jan-2021 13:22:18
2	012621008.d	ICAL 100_SVLC-1273	26-Jan-2021 13:32:55
3	012621009.d	ICAL 200_SVLC-1274	26-Jan-2021 13:43:33
4	012621010.d	ICAL 500_SVLC-1275	26-Jan-2021 13:54:07
5	012621011.d	ICAL 1000_SVLC-1276	26-Jan-2021 14:04:47
6	012621012.d	ICAL 2000_SVLC-1277	26-Jan-2021 14:15:21
7	012621013.d	ICAL 5000_SVLC-1278	26-Jan-2021 14:25:58
8	012621014.d	ICAL 10000_SVLC-1279	26-Jan-2021 14:36:40
9	012621015.d	ICAL 15000_SVLC-1280	26-Jan-2021 14:47:21
10	012621016.d	ICAL 20000_SVLC-1281	26-Jan-2021 14:58:01

Column: 1 Detector: LCMS-Q3

Compound	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10	Avg. RT	%Rsd RT
D 46 13C4_PFBA	1.718	1.715	1.718	1.718	1.718	1.722	1.718	1.718	1.718	1.717	1.717	0.087
8 PFBA	1.718	1.722	1.718	1.724	1.724	1.722	1.724	1.724	1.724	1.724	1.722	0.165
D 50 13C5_PFPeA	2.099	2.104	2.098	2.109	2.109	2.104	2.109	2.109	2.109	2.108	2.106	0.211
21 PFPeA	2.099	2.104	2.109	2.109	2.109	2.104	2.109	2.109	2.109	2.108	2.107	0.171
D 44 13C3_PFBS	2.162	2.157	2.162	2.162	2.162	2.167	2.162	2.162	2.162	2.161	2.161	0.111
7 PFBS	2.162	2.157	2.162	2.162	2.162	2.167	2.162	2.162	2.162	2.161	2.161	0.111
1 4:2 FTS	2.416	2.424	2.424	2.424	2.416	2.423	2.425	2.425	2.425	2.415	2.421	0.175
D 63 13C2_4:2 FTS_2	2.416	2.415	2.416	2.424	2.416	2.423	2.416	2.416	2.425	2.415	2.418	0.177
D 49 13C5_PFHxA	2.451	2.450	2.451	2.460	2.460	2.459	2.460	2.460	2.460	2.460	2.457	0.179
15 PFHxA	2.451	2.459	2.460	2.460	2.460	2.459	2.460	2.460	2.460	2.460	2.459	0.113
22 PFPeS	2.487	2.486	2.496	2.487	2.496	2.495	2.496	2.496	2.496	2.495	2.492	0.179
28 GenX	2.567	2.566	2.567	2.567	2.567	2.566	2.567	2.567	2.567	2.567	2.567	0.019
D 66 13C3_GenX	2.567	2.566	2.567	2.567	2.567	2.566	2.567	2.567	2.567	2.567	2.567	0.019
13 PFHpA	2.819	2.818	2.819	2.818	2.819	2.827	2.828	2.828	2.828	2.827	2.822	0.169
D 47 13C4_PFHpA	2.819	2.818	2.819	2.818	2.828	2.827	2.828	2.828	2.828	2.827	2.823	0.167
14 PFHxS	2.837	2.845	2.837	2.837	2.837	2.845	2.846	2.846	2.846	2.836	2.841	0.169
D 45 13C3_PFHxS	2.837	2.836	2.837	2.837	2.846	2.845	2.846	2.846	2.837	2.845	2.841	0.176
29 ADONA	2.864	2.863	2.855	2.864	2.864	2.863	2.864	2.864	2.864	2.864	2.863	0.097
D 64 13C2_6:2 FTS_2	3.183	3.181	3.182	3.182	3.189	3.188	3.189	3.182	3.183	3.189	3.185	0.104
2 6:2 FTS	3.190	3.195	3.182	3.189	3.189	3.188	3.189	3.182	3.189	3.189	3.188	0.111
D 53 13C8_PFOA	3.203	3.208	3.209	3.209	3.210	3.215	3.216	3.216	3.209	3.216	3.211	0.133
20 PFOA	3.210	3.202	3.209	3.216	3.210	3.215	3.216	3.216	3.216	3.209	3.211	0.153
12 PFHpS	3.217	3.222	3.209	3.216	3.223	3.215	3.223	3.223	3.223	3.222	3.219	0.145
D 54 13C8_PFOS	3.593	3.591	3.592	3.584	3.592	3.591	3.592	3.592	3.584	3.592	3.590	0.091
18 PFOS	3.593	3.599	3.600	3.592	3.592	3.591	3.592	3.592	3.592	3.592	3.593	0.081
D 56 13C9_PFNA	3.593	3.591	3.592	3.592	3.592	3.598	3.600	3.592	3.592	3.592	3.593	0.088
17 PFNA	3.593	3.599	3.592	3.592	3.600	3.598	3.592	3.592	3.592	3.600	3.595	0.102
30 9Cl-PF3ONS	3.803	3.793	3.802	3.794	3.794	3.801	3.794	3.794	3.794	3.794	3.796	0.098
D 55 13C8_PFOSA	3.908	3.906	3.915	3.907	3.907	3.914	3.907	3.907	3.907	3.907	3.908	0.076
19 PFOSA	3.908	3.906	3.915	3.907	3.907	3.906	3.907	3.907	3.907	3.907	3.907	0.065
3 8:2 FTS	3.933	3.931	3.932	3.923	3.923	3.930	3.923	3.932	3.932	3.932	3.929	0.098
16 PFNS	3.933	3.931	3.932	3.923	3.932	3.930	3.932	3.932	3.932	3.932	3.930	0.065
D 65 13C2_8:2 FTS_2	3.933	3.931	3.932	3.932	3.932	3.930	3.923	3.932	3.923	3.932	3.929	0.086

Compound	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10	Avg. RT	%Rsd RT
D 51 13C6_PFDA	3.933	3.931	3.940	3.932	3.940	3.939	3.932	3.932	3.940	3.940	3.935	0.114
10 PFDA	3.950	3.931	3.940	3.932	3.940	3.939	3.932	3.940	3.940	3.940	3.938	0.146
D 58 d3-MeFOSAA	4.091	4.090	4.100	4.091	4.092	4.090	4.091	4.091	4.091	4.091	4.092	0.065
6 N-MeFOSAA	4.099	4.099	4.091	4.091	4.100	4.090	4.091	4.091	4.100	4.100	4.095	0.114
9 PFDS	4.227	4.227	4.238	4.228	4.228	4.227	4.228	4.228	4.228	4.228	4.228	0.077
D 52 13C7_PFUdA	4.247	4.247	4.248	4.248	4.238	4.247	4.238	4.248	4.248	4.248	4.245	0.093
D 60 d5-EtFOSAA	4.237	4.247	4.248	4.238	4.248	4.247	4.238	4.248	4.248	4.248	4.244	0.116
25 PFUdA	4.237	4.247	4.248	4.238	4.248	4.247	4.238	4.248	4.248	4.248	4.244	0.116
5 N-EtFOSAA	4.247	4.247	4.258	4.248	4.258	4.247	4.248	4.248	4.258	4.248	4.251	0.123
D 61 d7-MeFOSE	4.338	4.337	4.338	4.338	4.339	4.337	4.338	4.338	4.338	4.328	4.337	0.071
32 MeFOSE	4.347	4.347	4.348	4.348	4.348	4.347	4.338	4.348	4.348	4.348	4.346	0.068
D 57 d3-MeFOSA	4.357	4.357	4.357	4.348	4.358	4.356	4.348	4.358	4.358	4.348	4.354	0.107
26 MeFOSA		4.375	4.357	4.348	4.358	4.356	4.348	4.358	4.358		4.357	0.192
31 11Cl-PF3OUDS	4.383	4.383	4.384	4.384	4.384	4.383	4.384	4.384	4.384	4.384	4.383	0.013
D 62 d9-EtFOSE	4.501	4.500	4.501	4.501	4.501	4.500	4.492	4.501	4.501	4.492	4.499	0.081
11 PFDoA	4.510	4.509	4.510	4.510	4.510	4.509	4.510	4.510	4.510	4.510	4.510	0.011
33 EtFOSE	4.510	4.509	4.510	4.510	4.510	4.509	4.510	4.510	4.510	4.510	4.510	0.011
D 38 13C2_PFDoA	4.510	4.509	4.510	4.510	4.510	4.509	4.510	4.510	4.510	4.510	4.510	0.011
4 10:2 FTS	4.519	4.518	4.528	4.519	4.520	4.518	4.519	4.519	4.519	4.519	4.520	0.066
D 59 d5-EtFOSA	4.519	4.518	4.510	4.519	4.520	4.518	4.519	4.519	4.519	4.519	4.518	0.062
27 EtFOSA	4.510	4.536	4.528	4.528	4.520	4.527	4.519	4.528	4.528	4.528	4.525	0.164
34 PFDOS	4.717	4.723	4.724	4.724	4.725	4.723	4.724	4.724	4.731	4.724	4.724	0.075
24 PFTrDA	4.744	4.751	4.751	4.745	4.745	4.750	4.745	4.752	4.752	4.752	4.748	0.073
D 42 13C2_PFTeDA	4.964	4.970	4.964	4.964	4.964	4.963	4.964	4.964	4.971	4.964	4.965	0.060
23 PFTeDA	4.964	4.970	4.971	4.964	4.964	4.963	4.964	4.971	4.971	4.971	4.967	0.080
35 PFHxDA	5.351	5.351	5.351	5.351	5.343	5.350	5.352	5.352	5.351	5.352	5.350	0.046
D 40 13C2_PFHxDA	5.351	5.351	5.351	5.351	5.343	5.350	5.343	5.352	5.351	5.352	5.349	0.061
36 PFODA	5.702	5.702	5.702	5.702	5.703	5.701	5.703	5.703	5.709	5.703	5.702	0.041

Pace Environmental Services, LLC
Initial Calibration Signal Ratios Report

Batch: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b
Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02
Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01
Method Lock: Unlocked Lock Date:
No.Compounds: 66 Integrator: picker
Calib Method: PFAS-ID
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	012621007.d	ICAL 50_SVLC-1272	26-Jan-2021 13:22:18
2	012621008.d	ICAL 100_SVLC-1273	26-Jan-2021 13:32:55
3	012621009.d	ICAL 200_SVLC-1274	26-Jan-2021 13:43:33
4	012621010.d	ICAL 500_SVLC-1275	26-Jan-2021 13:54:07
5	012621011.d	ICAL 1000_SVLC-1276	26-Jan-2021 14:04:47
6	012621012.d	ICAL 2000_SVLC-1277	26-Jan-2021 14:15:21
7	012621013.d	ICAL 5000_SVLC-1278	26-Jan-2021 14:25:58
8	012621014.d	ICAL 10000_SVLC-1279	26-Jan-2021 14:36:40
9	012621015.d	ICAL 15000_SVLC-1280	26-Jan-2021 14:47:21
10	012621016.d	ICAL 20000_SVLC-1281	26-Jan-2021 14:58:01

Column: 1 Detector: LCMS-Q3

Compound	Ratio Level 1	Ratio Level 2	Ratio Level 3	Ratio Level 4	Ratio Level 5	Ratio Level 6	Ratio Level 7	Ratio Level 8	Ratio Level 9	Ratio Level 10	Average Ratio	L-5 +/-3 SD Ratio Limits	StdD Limit	50% Limit
7 PFBS	3.180	4.148	3.337	3.477	3.822	3.557	3.590	3.600	3.605	3.759	3.607	3.009-4.634	0.27082	1.911
1 4:2 FTS	1.578	1.190	1.530	1.782	2.187	2.034	2.064	1.787	1.929	2.046	1.812	1.235-3.138	0.31721	1.093
15 PFHxA	23.313	18.271	16.477	16.423	18.187	19.962	19.695	19.548	19.594	18.565	19.003	12.316-24.057	1.95682	9.093
22 PFPeS	2.877	2.742	2.752	3.225	3.031	3.002	3.108	3.138	3.137	3.105	3.011	2.549-3.512	0.16060	1.515
28 GenX	0.730	0.777	0.875	0.742	0.841	0.801	0.803	0.806	0.785	0.796	0.795	0.720-0.961	0.04025	0.420
13 PFHpA	4.105	3.962	4.135	3.787	3.911	3.761	3.767	3.986	3.852	3.887	3.915	3.522-4.299	0.12948	1.955
14 PFHxS	3.320	4.697	3.266	3.169	3.015	3.129	3.115	2.991	3.103	3.128	3.293	1.463-4.566	0.51712	1.507
29 ADONA	3.511	3.353	3.411	3.180	3.134	3.246	3.359	3.192	3.190	3.200	3.277	2.761-3.506	0.12427	1.567
2 6:2 FTS	1.968	2.459	2.114	2.701	2.201	1.691	1.805	1.917	1.965	1.858	2.067	1.262-3.139	0.31275	1.100
20 PFOA	3.001	3.289	2.881	2.956	3.135	3.008	2.923	2.947	2.965	3.027	3.013	2.791-3.478	0.11444	1.567
12 PFHpS	2.721	3.171	2.886	3.008	3.089	3.474	3.467	3.299	3.205	3.360	3.168	2.375-3.802	0.23769	1.544
18 PFOS	4.238	3.106	2.930	3.966	3.635	3.608	3.503	3.700	3.554	3.805	3.604	2.540-4.729	0.36467	1.817
17 PFNA	5.656	8.721	6.560	6.489	6.413	6.351	6.328	6.926	6.503	6.213	6.616	4.015-8.810	0.79915	3.206
3 8:2 FTS	1.381	2.166	1.762	1.673	1.981	2.065	2.011	1.913	1.965	1.908	1.882	1.268-2.693	0.23763	0.990
16 PFNS	2.526	2.940	2.481	2.857	2.878	2.813	2.706	2.860	2.878	2.747	2.768	2.348-3.407	0.17648	1.439
10 PFDA	12.959	12.156	16.627	13.795	13.299	14.295	13.047	14.045	13.448	13.832	13.750	9.752-16.845	1.18220	6.649
6 N-MeFOSAA	1.324	1.640	1.491	1.277	1.349	1.331	1.391	1.267	1.324	1.271	1.366	0.981-1.716	0.12246	0.674
9 PFDS	3.157	2.406	2.463	3.034	2.678	2.395	2.774	2.715	2.839	2.743	2.720	1.757-3.598	0.30694	1.339
25 PFUdA	13.401	15.946	23.441	14.080	13.465	15.460	14.267	13.792	16.115	14.571	15.453	4.594-22.335	2.95690	6.732
5 N-EtFOSAA	1.606	1.668	1.665	1.603	1.661	1.569	1.517	1.585	1.579	1.588	1.604	1.515-1.806	0.04855	0.830
26 MeFOSA		1.319	1.078	1.060	1.141	1.079	1.061	1.050	1.090		1.109	0.856-1.425	0.09492	0.570
11 PFDoA	12.062	11.444	12.119	11.626	10.121	11.649	11.034	11.156	11.049	10.021	11.228	7.808-12.433	0.77070	5.060
4 10:2 FTS	3.180	2.813	4.203	3.383	3.471	3.181	3.377	3.354	3.226	3.366	3.355	2.472-4.469	0.33295	1.735
27 EtFOSA	1.847	0.940	1.369	1.058	0.882	1.044	1.010	1.024	1.026	1.007	1.120	-0.025-1.789	0.30240	0.441
34 PFDOS	2.768	3.306	3.426	3.289	3.398	3.068	3.335	3.231	3.198	3.232	3.225	2.815-3.980	0.19419	1.699
24 PFTrDA	8.434	8.268	8.361	7.679	8.643	7.950	8.461	8.643	8.312	8.427	8.317	7.729-9.556	0.30455	4.321
23 PFTeDA	12.092	12.413	11.552	12.259	12.552	12.003	11.923	12.650	12.118	11.985	12.154	11.557-13.546	0.33153	6.276
35 PFHxDA	11.294	11.500	11.423	12.230	11.541	12.009	11.424	11.307	11.443	11.494	11.566	10.571-12.510	0.32318	5.770
36 PFODA	15.380	14.711	15.469	14.891	14.589	15.244	15.137	15.108	14.743	14.602	14.987	13.618-15.559	0.32355	7.294

Report Date: 27-Jan-2021 16:50:51 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Initial Calibration Ion Suppression Report

Batch: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b
Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02
Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01
Method Lock: Unlocked Lock Date:
No.Compounds: 66 Integrator: picker
Calib Method: PFAS-ID
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	012621007.d	ICAL 50_SVLC-1272	26-Jan-2021 13:22:18
2	012621008.d	ICAL 100_SVLC-1273	26-Jan-2021 13:32:55
3	012621009.d	ICAL 200_SVLC-1274	26-Jan-2021 13:43:33
4	012621010.d	ICAL 500_SVLC-1275	26-Jan-2021 13:54:07
5	012621011.d	ICAL 1000_SVLC-1276	26-Jan-2021 14:04:47
6	012621012.d	ICAL 2000_SVLC-1277	26-Jan-2021 14:15:21
7	012621013.d	ICAL 5000_SVLC-1278	26-Jan-2021 14:25:58
8	012621014.d	ICAL 10000_SVLC-1279	26-Jan-2021 14:36:40
9	012621015.d	ICAL 15000_SVLC-1280	26-Jan-2021 14:47:21
10	012621016.d	ICAL 20000_SVLC-1281	26-Jan-2021 14:58:01

Column: 1 Detector: LCMS-Q3

Compound	Response Level 1	Response Level 2	Response Level 3	Response Level 4	Response Level 5	Response Level 6	Response Level 7	Response Level 8	Response Level 9	Response Level 10	RPD
* 37 13C2_PFDA	647660	639805	629380	636255	719384	630458	613187	587491	606195	595771	2.08
* 39 13C2_PFHxA	706562	679015	706106	681277	743628	661029	673718	643220	685960	648714	2.13
* 41 13C2_PFOA	563220	540114	556163	535037	584844	547271	533563	507346	512024	510390	2.46
* 43 13C3_PFBA	664462	658173	659260	635606	696867	629855	619965	607196	636670	606180	2.29
* 48 13C4_PFOS	139790	129956	133653	134096	139913	123626	126018	116836	127318	127299	2.33

13C2_PFDA ((|595771 - 647660| / (595771 + 647660)) / 2) * 100 = 2.09
13C2_PFHxA ((|648714 - 706562| / (648714 + 706562)) / 2) * 100 = 2.13
13C2_PFOA ((|510390 - 563220| / (510390 + 563220)) / 2) * 100 = 2.46
13C3_PFBA ((|606180 - 664462| / (606180 + 664462)) / 2) * 100 = 2.29
13C4_PFOS ((|127299 - 139790| / (127299 + 139790)) / 2) * 100 = 2.34

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b\012621019.d
Injection Date: 26-Jan-2021 15:29:51 Injection Vol: 10.0 uL
Sample Type: CheckStd Auto Sampler: 13
Sample Info: ISOMER CHECK_SVLC-1266 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Surrogates Conc. Level: Smp Vol. Added: 1.00 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	T RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	Cal Conc ng/L	OnCol Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.717	1.718	0	654453	23	>100:1			100000	980.56	90.8	
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.108	2.109	0	610244	18	>100:1			100000	963.36	91.2	
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.161	2.162	0	184485	17	>100:1			100000	964.28	88.7	
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.414	2.416	0	111864	21	>100:1			500000	5027.23	91	
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.450	2.460	0	652375	20	>100:1			100000	946.45	84.4	
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.566	2.567	0	1162594	21	>100:1			500000	4821.15	89.8	
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.817	2.828	0	514768	20	>100:1			100000	977.30	90.9	
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.836	2.846	0	131363	22	>100:1			100000	991.47	89.2	
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.188	3.189	0	80272	27	>100:1			500000	4783.07	89.8	
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.208	3.210	0	499667	23	>100:1			100000	969.18	88	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.215	3.210	1/1	5166087	36	>100:1	Target = 3.13	0.15	0	979676		
413 > 169	53	3.215	3.210		1877496	38	>100:1	2.75 (1.56-4.70)	0.24				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.598	3.592	1	116725	21	>100:1			100000	1011.32	92.4	
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.598	3.592	1	607013	23	>100:1			100000	940.37	86.2	
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.914	3.907	1	255788	20	>100:1			100000	1019.20	94.4	
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.930	3.932	0	82228	19	>100:1			500000	5025.60	89.9	
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		3.939	3.940	0	593218	20	>100:1			100000	986.38	92.2	
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.090	4.092	0	631186	19	>100:1			500000	4864.72	91.5	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													
570 > 419	58	4.099	4.100	0/0	1084420	31	>100:1	Target = 1.34	0.12	0	1139752		
570 > 483	58	4.099	4.100		867554	33	>100:1	1.24 (0.67-2.02)	0.22				
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.247	4.238	1	538647	16				100000	996.70	95.5	
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.247	4.248	0	544435	17	>100:1			500000	4988.91	95.8	

Report Date: 27-Jan-2021 16:50:23 AIM Revision: 2.0 12-Dec-2020 09:34:50

Pace Environmental Services, LLC

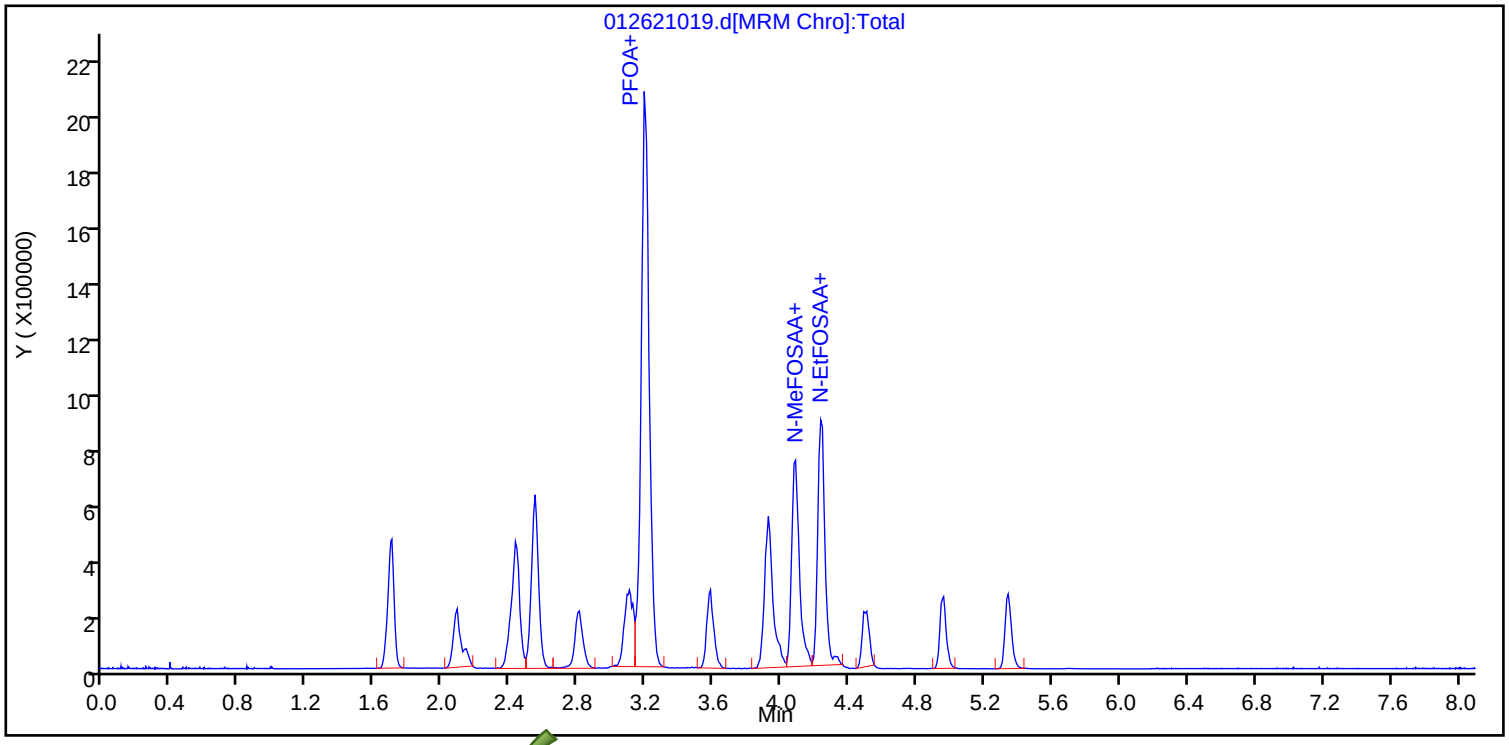
Data File: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b\012621019.d

Injection Date: 26-Jan-2021 15:29:51 Inst. ID: LCMSMS02

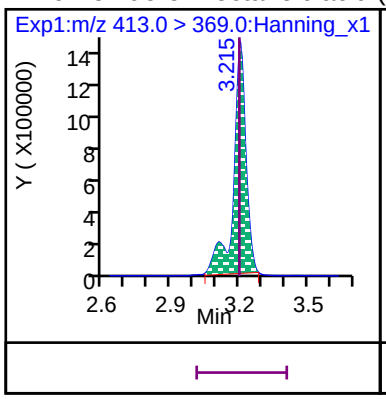
Client ID: Lab ID: ISOMER CHECK_SVLC-1266

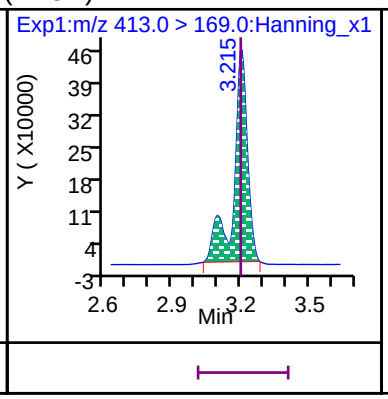
Sample Info: ISOMER CHECK_SVLC-1266

Dil. Factor: 1 Operator: Stephen E. Somerville

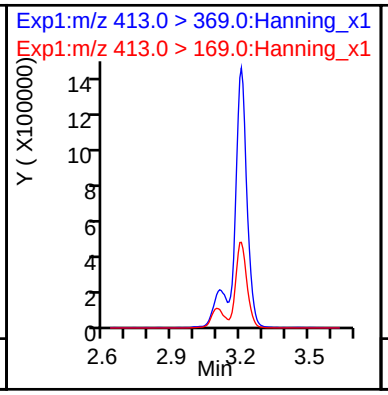


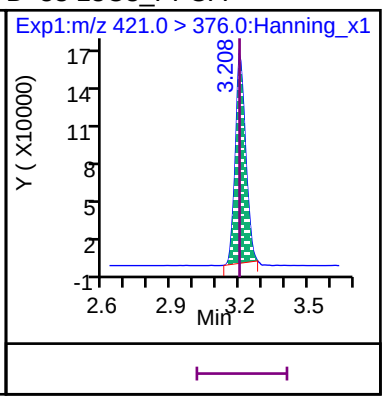
20 Perfluoro-n-octanoic acid (PFOA)



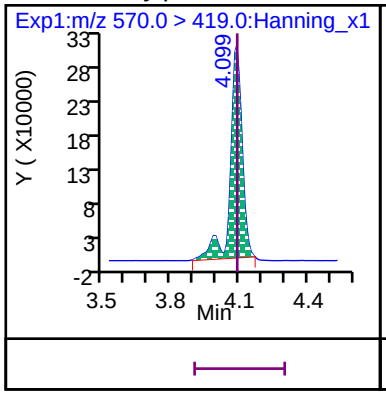


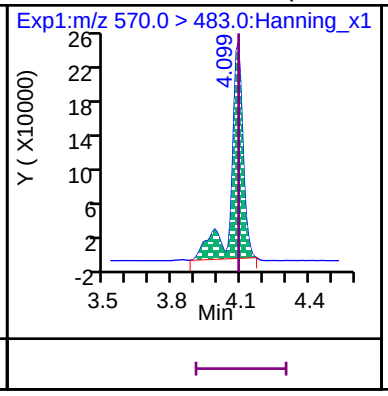
D 53 13C8_PFOA



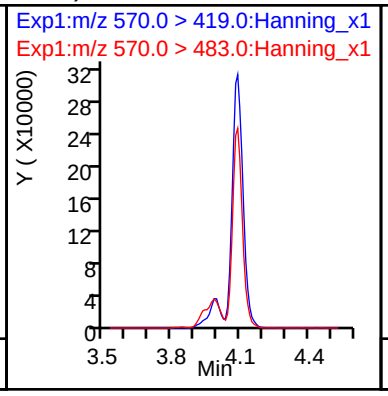


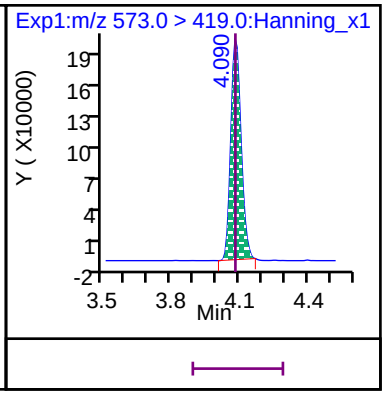
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA)





D 58 d3-MeFOSAA





Pace Environmental Services, LLC
Initial Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b\012621018.d
Injection Date: 26-Jan-2021 15:19:16 Injection Vol: 10.0 uL
Sample Type: ICV Auto Sampler: 12
Sample Info: ICV 500_SVLC-1285 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: ICV Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	720687	699035			97	50 - 150
8 PFBA			500.00	471.27	94.3	70 - 130
D 50 13C5_PFPeA	669031	680342			102	50 - 150
21 PFPeA			500.00	460.84	92.2	70 - 130
7 PFBS			442.50	406.75	91.9	70 - 130
D 44 13C3_PFBS	208034	198698			95.5	50 - 150
1 4:2 FTS			467.50	470.55	101	70 - 130
D 63 13C2_4:2 FTS_2	122994	116717			94.9	50 - 150
D 49 13C5_PFHxA	773207	709894			91.8	50 - 150
15 PFHxA			500.00	463.92	92.8	70 - 130
22 PFPeS			470.00	464.63	98.9	70 - 130
28 GenX			2500.00	2241.13	89.6	70 - 130
D 66 13C3_GenX	1294237	1281902			99	50 - 150
13 PFHpA			500.00	463.06	92.6	70 - 130
D 47 13C4_PFHpA	566534	560736			99	50 - 150
14 PFHxS			456.00	380.01	83.3	70 - 130
D 45 13C3_PFHxS	147201	140519			95.5	50 - 150
29 ADONA			2355.00	2182.02	92.7	70 - 130
D 64 13C2_6:2 FTS_2	89400	83804			93.7	50 - 150
2 6:2 FTS			475.00	392.81	82.7	70 - 130
20 PFOA			500.00	429.32	85.9	70 - 130
D 53 13C8_PFOA	568086	585654			103	50 - 150
12 PFHpS			475.00	436.25	91.8	70 - 130
18 PFOS			462.75	364.99	78.9	70 - 130
D 56 13C9_PFNA	703892	658324			93.5	50 - 150
D 54 13C8_PFOS	126288	124972			99	50 - 150
17 PFNA			500.00	485.78	97.2	70 - 130
30 9Cl-PF3ONS			2330.00	2128.26	91.3	70 - 130
D 55 13C8_PFOSA	270927	281894			104	50 - 150
19 PFOSA			500.00	429.55	85.9	70 - 130
3 8:2 FTS			480.00	502.90	105	70 - 130
16 PFNS			480.00	472.25	98.4	70 - 130
D 65 13C2_8:2 FTS_2	91484	83770			91.6	50 - 150
10 PFDA			500.00	457.62	91.5	70 - 130
D 51 13C6_PFDA	643340	651256			101	50 - 150
D 58 d3-MeFOSAA	689696	679685			98.5	50 - 150

Report Date: 27-Jan-2021 16:50:22 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b\012621018.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			500.00	508.30	102	70 - 130
9 PFDS			482.50	403.91	83.7	70 - 130
D 52 13C7_PFUdA	564025	568614			101	50 - 150
25 PFUdA			500.00	476.59	95.3	70 - 130
D 60 d5-EtFOSAA	568396	617946			109	50 - 150
5 N-EtFOSAA			500.00	516.53	103	70 - 130
D 61 d7-MeFOSE	84617	85662			101	50 - 150
D 57 d3-MeFOSA	44332	41455			93.5	50 - 150
31 11Cl-PF3OUDS			2355.00	2041.80	86.7	70 - 130
D 62 d9-EtFOSE	98326	96309			97.9	50 - 150
11 PFDoA			500.00	467.62	93.5	70 - 130
D 38 13C2_PFDoA	560944	602860			107	50 - 150
D 59 d5-EtFOSA	45663	42759			93.6	50 - 150
4 10:2 FTS			2410.00	2619.78	109	70 - 130
24 PFTrDA			500.00	490.52	98.1	70 - 130
23 PFTeDA			500.00	464.35	92.9	70 - 130
D 42 13C2_PFTeDA	782673	798669			102	50 - 150
D 40 13C2_PFHxDA	785856	792820			101	50 - 150

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\020521-nonDOD.b\020521005.d
Injection Date: 05-Feb-2021 11:54:00 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 95
Sample Info: ID CCV 100_SVLC-1273 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-2 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	720687	609590			84.6	50 - 150
8 PFBA			100.00	110.29	110	70 - 130
D 50 13C5_PFPeA	669031	589875			88.2	50 - 150
21 PFPeA			100.00	100.78	101	70 - 130
7 PFBS			88.400	99.081	112	70 - 130
D 44 13C3_PFBS	208034	183373			88.1	50 - 150
1 4:2 FTS			93.400	111.84	120	70 - 130
D 63 13C2_4:2 FTS_2	122994	97964			79.6	50 - 150
D 49 13C5_PFHxA	773207	650690			84.2 ✓	50 - 150 ✓
15 PFHxA			100.00	102.41	102	70 - 130
22 PFPeS			93.800	107.08	114	70 - 130
28 GenX			200.00	216.51	108	70 - 130
D 66 13C3_GenX	1294237	1173114			90.6	50 - 150
13 PFHpA			100.00	96.366	96.4	70 - 130
D 47 13C4_PFHpA	566534	518637			91.5	50 - 150
14 PFHxS			91.000	106.46	117	70 - 130
D 45 13C3_PFHxS	147201	130090			88.4	50 - 150
29 ADONA			94.200	94.885	101	70 - 130
D 64 13C2_6:2 FTS_2	89400	76666			85.8	50 - 150
2 6:2 FTS			94.800	98.425	104	70 - 130
20 PFOA			100.00	102.10	102	70 - 130
D 53 13C8_PFOA	568086	515820			90.8	50 - 150
12 PFHpS			95.200	105.35	111	70 - 130
18 PFOS			92.800	82.143	88.5	70 - 130
D 56 13C9_PFNA	703892	620421			88.1	50 - 150
D 54 13C8_PFOS	126288	118203			93.6	50 - 150
17 PFNA			100.00	110.80	111	70 - 130
30 9Cl-PF3ONS			93.200	90.956	97.6	70 - 130
D 55 13C8_PFOSA	270927	257370			95	50 - 150
19 PFOSA			100.00	104.63	105	70 - 130
3 8:2 FTS			95.800	81.383	85	70 - 130
16 PFNS			96.000	93.847	97.8	70 - 130
D 65 13C2_8:2 FTS_2	91484	69608			76.1	50 - 150
10 PFDA			100.00	100.03	100 ✓	70 - 130 ✓
D 51 13C6_PFDA	643340	579706			90.1	50 - 150
D 58 d3-MeFOSAA	689696	625960			90.8	50 - 150

Report Date: 09-Feb-2021 14:28:24 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\organics\LL\LCMSMS02.i\020521-nonDOD.b\020521005.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			100.00	129.25	129	70 - 130
9 PFDS			96.400	105.17	109	70 - 130
D 52 13C7_PFUdA	564025	554481			98.3	50 - 150
25 PFUdA			100.00	97.446	97.4	70 - 130
D 60 d5-EtFOSAA	568396	581940			102	50 - 150
5 N-EtFOSAA			100.00	104.41	104	70 - 130
D 61 d7-MeFOSE	84617	96466			114	50 - 150
32 MeFOSE			100.00	112.67	113	70 - 130
26 MeFOSA non target			100.00	139.79	140	70 - 130
D 57 d3-MeFOSA	44332	37017			83.5	50 - 150
31 11Cl-PF3OUDS			94.200	102.80	109	70 - 130
D 62 d9-EtFOSE	98326	99837			102	50 - 150
33 EtFOSE			100.00	102.01	102	70 - 130
11 PFDoA			100.00	103.03	103	70 - 130
D 38 13C2_PFDoA	560944	520987			92.9	50 - 150
D 59 d5-EtFOSA	45663	44014			96.4	50 - 150
4 10:2 FTS			96.400	83.428	86.5	70 - 130
27 EtFOSA			100.00	78.857	78.9	70 - 130
34 PFDOS			96.800	93.152	96.2	70 - 130
24 PFTrDA			100.00	122.27	122	70 - 130
23 PFTeDA			100.00	101.38	101	70 - 130
D 42 13C2_PFTeDA	782673	708324			90.5	50 - 150
35 PFHxDA			100.00	109.58	110	70 - 130
D 40 13C2_PFHxDA	785856	776051			98.8	50 - 150
36 PFODA			100.00	101.69	102	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\020521-nonDOD.b\020521006.d
Injection Date: 05-Feb-2021 12:04:35 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 96
Sample Info: ID CCV 200_SVLC-1274 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-3 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	609590	629586			103	50 - 150
8 PFBA			200.00	201.80	101	70 - 130
D 50 13C5_PFPeA	589875	620165			105	50 - 150
21 PFPeA			200.00	198.08	99	70 - 130
7 PFBS			176.80	183.72	104	70 - 130
D 44 13C3_PFBS	183373	183205			99.9	50 - 150
1 4:2 FTS			186.80	186.72	100	70 - 130
D 63 13C2_4:2 FTS_2	97964	98470			101	50 - 150
D 49 13C5_PFHxA	650690	688380			106	50 - 150
15 PFHxA			200.00	191.68	95.8	70 - 130
22 PFPeS			187.60	195.22	104	70 - 130
28 GenX			400.00	437.35	109	70 - 130
D 66 13C3_GenX	1173114	1209972			103	50 - 150
13 PFHpA			200.00	211.07	106	70 - 130
D 47 13C4_PFHpA	518637	513594			99	50 - 150
14 PFHxS			182.00	167.32	91.9	70 - 130
D 45 13C3_PFHxS	130090	138180			106	50 - 150
29 ADONA			188.40	181.18	96.2	70 - 130
D 64 13C2_6:2 FTS_2	76666	80927			106	50 - 150
2 6:2 FTS			189.60	205.05	108	70 - 130
20 PFOA			200.00	197.00	98.5	70 - 130
D 53 13C8_PFOA	515820	522956			101	50 - 150
12 PFHpS			190.40	182.79	96	70 - 130
18 PFOS			185.60	173.26	93.3	70 - 130
D 56 13C9_PFNA	620421	646643			104	50 - 150
D 54 13C8_PFOS	118203	114561			96.9	50 - 150
17 PFNA			200.00	202.24	101	70 - 130
30 9Cl-PF3ONS			186.40	175.32	94.1	70 - 130
D 55 13C8_PFOSA	257370	271235			105	50 - 150
19 PFOSA			200.00	185.49	92.7	70 - 130
3 8:2 FTS			191.60	169.45	88.4	70 - 130
16 PFNS			192.00	206.97	108	70 - 130
D 65 13C2_8:2 FTS_2	69608	76031			109	50 - 150
10 PFDA			200.00	197.87	98.9	70 - 130
D 51 13C6_PFDA	579706	605872			105	50 - 150
D 58 d3-MeFOSAA	625960	646794			103	50 - 150

Report Date: 09-Feb-2021 14:28:26 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\organics\LL\LCMSMS02.i\020521-nonDOD.b\020521006.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			200.00	215.65	108	70 - 130
9 PFDS			192.80	203.89	106	70 - 130
D 52 13C7_PFUdA	554481	555298			100	50 - 150
25 PFUdA			200.00	194.42	97.2	70 - 130
D 60 d5-EtFOSAA	581940	585851			101	50 - 150
5 N-EtFOSAA			200.00	213.02	107	70 - 130
D 61 d7-MeFOSE	96466	85435			88.6	50 - 150
32 MeFOSE			200.00	206.43	103	70 - 130
26 MeFOSA			200.00	171.48	85.7	70 - 130
D 57 d3-MeFOSA	37017	44923			121	50 - 150
31 11Cl-PF3OUDS			188.40	208.32	111	70 - 130
D 62 d9-EtFOSE	99837	97607			97.8	50 - 150
33 EtFOSE			200.00	235.56	118	70 - 130
11 PFDoA			200.00	194.33	97.2	70 - 130
D 38 13C2_PFDoA	520987	564223			108	50 - 150
D 59 d5-EtFOSA	44014	46266			105	50 - 150
4 10:2 FTS			192.80	213.39	111	70 - 130
27 EtFOSA			200.00	161.26	80.6	70 - 130
34 PFDOS			193.60	189.22	97.7	70 - 130
24 PFTrDA			200.00	236.38	118	70 - 130
23 PFTeDA			200.00	209.98	105	70 - 130
D 42 13C2_PFTeDA	708324	723182			102	50 - 150
35 PFHxDA			200.00	201.75	101	70 - 130
D 40 13C2_PFHxDA	776051	793722			102	50 - 150
36 PFODA			200.00	194.44	97.2	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\020521-nonDOD.b\020521025.d
Injection Date: 05-Feb-2021 15:26:30 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 18
Sample Info: ID CCV 1000_SVLC-1324 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-5 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	609590	659196			108	50 - 150
8 PFBA			1000.00	940.88	94.1	70 - 130
D 50 13C5_PFPeA	589875	651937			111	50 - 150
21 PFPeA			1000.00	939.09	93.9	70 - 130
7 PFBS			884.00	804.62	91	70 - 130
D 44 13C3_PFBS	183373	203362			111	50 - 150
1 4:2 FTS			934.00	870.65	93.2	70 - 130
D 63 13C2_4:2 FTS_2	97964	111571			114	50 - 150
D 49 13C5_PFHxA	650690	692529			106	50 - 150
15 PFHxA			1000.00	941.11	94.1	70 - 130
22 PFPeS			938.00	934.43	99.6	70 - 130
28 GenX			2000.00	1905.84	95.3	70 - 130
D 66 13C3_GenX	1173114	1256801			107	50 - 150
13 PFHpA			1000.00	948.12	94.8	70 - 130
D 47 13C4_PFHpA	518637	554394			107	50 - 150
14 PFHxS			910.00	812.40	89.3	70 - 130
D 45 13C3_PFHxS	130090	150925			116	50 - 150
29 ADONA			942.00	831.12	88.2	70 - 130
D 64 13C2_6:2 FTS_2	76666	87644			114	50 - 150
2 6:2 FTS			948.00	823.25	86.8	70 - 130
20 PFOA			1000.00	874.18	87.4	70 - 130
D 53 13C8_PFOA	515820	567791			110	50 - 150
12 PFHpS			952.00	856.00	89.9	70 - 130
18 PFOS			928.00	777.67	83.8	70 - 130
D 56 13C9_PFNA	620421	675994			109	50 - 150
D 54 13C8_PFOS	118203	129043			109	50 - 150
17 PFNA			1000.00	971.23	97.1	70 - 130
30 9Cl-PF3ONS			932.00	855.40	91.8	70 - 130
D 55 13C8_PFOSA	257370	277291			108	50 - 150
19 PFOSA			1000.00	963.93	96.4	70 - 130
3 8:2 FTS			958.00	956.93	99.9	70 - 130
16 PFNS			960.00	808.53	84.2	70 - 130
D 65 13C2_8:2 FTS_2	69608	80483			116	50 - 150
10 PFDA			1000.00	997.09	99.7	70 - 130
D 51 13C6_PFDA	579706	662471			114	50 - 150
D 58 d3-MeFOSAA	625960	718325			115	50 - 150

Report Date: 09-Feb-2021 14:28:32 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\organics\LL\LCMSMS02.i\020521-nonDOD.b\020521025.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			1000.00	912.31	91.2	70 - 130
9 PFDS			964.00	836.19	86.7	70 - 130
D 52 13C7_PFUdA	554481	585284			106	50 - 150
25 PFUdA			1000.00	867.10	86.7	70 - 130
D 60 d5-EtFOSAA	581940	665088			114	50 - 150
5 N-EtFOSAA			1000.00	887.60	88.8	70 - 130
D 61 d7-MeFOSE	96466	115424			120	50 - 150
32 MeFOSE			1000.00	864.66	86.5	70 - 130
26 MeFOSA			1000.00	859.67	86	70 - 130
D 57 d3-MeFOSA	37017	49133			133	50 - 150
31 11Cl-PF3OUDS			942.00	844.30	89.6	70 - 130
D 62 d9-EtFOSE	99837	120300			120	50 - 150
33 EtFOSE			1000.00	918.57	91.9	70 - 130
11 PFDoA			1000.00	952.89	95.3	70 - 130
D 38 13C2_PFDoA	520987	594033			114	50 - 150
D 59 d5-EtFOSA	44014	48707			111	50 - 150
4 10:2 FTS			964.00	928.14	96.3	70 - 130
27 EtFOSA			1000.00	918.47	91.8	70 - 130
34 PFDOS			968.00	884.88	91.4	70 - 130
24 PFTrDA			1000.00	1108.73	111	70 - 130
23 PFTeDA			1000.00	976.18	97.6	70 - 130
D 42 13C2_PFTeDA	708324	779910			110	50 - 150
35 PFHxDA			1000.00	935.49	93.5	70 - 130
D 40 13C2_PFHxDA	776051	848637			109	50 - 150
36 PFODA			1000.00	909.31	90.9	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821005.d
Injection Date: 08-Feb-2021 11:56:37 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 95
Sample Info: ID CCV 100_SVLC-1273 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-2 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	720687	629382			87.3	50 - 150
8 PFBA			100.00	105.74	106	70 - 130
D 50 13C5_PFPeA	669031	605332			90.5	50 - 150
21 PFPeA			100.00	101.31	101	70 - 130
7 PFBS			88.400	102.64	116	70 - 130
D 44 13C3_PFBS	208034	194467			93.5	50 - 150
1 4:2 FTS			93.400	109.75	118	70 - 130
D 63 13C2_4:2 FTS_2	122994	107257			87.2	50 - 150
D 49 13C5_PFHxA	773207	692380			89.5	50 - 150
15 PFHxA			100.00	99.439	99.4	70 - 130
22 PFPeS			93.800	97.048	103	70 - 130
28 GenX			200.00	208.26	104	70 - 130
D 66 13C3_GenX	1294237	1201937			92.9	50 - 150
13 PFHpA			100.00	104.13	104	70 - 130
D 47 13C4_PFHpA	566534	532291			94	50 - 150
14 PFHxS			91.000	94.746	104	70 - 130
D 45 13C3_PFHxS	147201	136023			92.4	50 - 150
29 ADONA			94.200	92.432	98.1	70 - 130
D 64 13C2_6:2 FTS_2	89400	85634			95.8	50 - 150
2 6:2 FTS			94.800	117.10	124	70 - 130
20 PFOA			100.00	112.58	113	70 - 130
D 53 13C8_PFOA	568086	522077			91.9	50 - 150
12 PFHpS			95.200	93.528	98.2	70 - 130
18 PFOS			92.800	95.323	103	70 - 130
D 56 13C9_PFNA	703892	680992			96.7	50 - 150
D 54 13C8_PFOS	126288	122286			96.8	50 - 150
17 PFNA			100.00	100.89	101	70 - 130
30 9Cl-PF3ONS			93.200	102.73	110	70 - 130
D 55 13C8_PFOSA	270927	279089			103	50 - 150
19 PFOSA			100.00	104.25	104	70 - 130
3 8:2 FTS			95.800	91.060	95.1	70 - 130
16 PFNS			96.000	88.604	92.3	70 - 130
D 65 13C2_8:2 FTS_2	91484	78772			86.1	50 - 150
10 PFDA			100.00	106.25	106	70 - 130
D 51 13C6_PFDA	643340	636238			98.9	50 - 150
D 58 d3-MeFOSAA	689696	680163			98.6	50 - 150

Report Date: 10-Feb-2021 17:19:43 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\Organics\ll\LCMSMS02.i\020821-nonDOD.b\020821005.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			100.00	112.95	113	70 - 130
9 PFDS			96.400	112.50	117	70 - 130
D 52 13C7_PFUdA	564025	559034			99.1	50 - 150
25 PFUdA			100.00	110.15	110	70 - 130
D 60 d5-EtFOSAA	568396	603434			106	50 - 150
5 N-EtFOSAA			100.00	96.515	96.5	70 - 130
D 61 d7-MeFOSE	84617	98439			116	50 - 150
32 MeFOSE			100.00	113.74	114	70 - 130
26 MeFOSA			100.00	97.364	97.4	70 - 130
D 57 d3-MeFOSA	44332	44882			101	50 - 150
31 11Cl-PF3OUDS			94.200	98.474	105	70 - 130
D 62 d9-EtFOSE	98326	111389			113	50 - 150
33 EtFOSE			100.00	107.82	108	70 - 130
11 PFDoA			100.00	106.48	106	70 - 130
D 38 13C2_PFDoA	560944	589944			105	50 - 150
D 59 d5-EtFOSA	45663	42428			92.9	50 - 150
4 10:2 FTS			96.400	116.91	121	70 - 130
27 EtFOSA			100.00	106.22	106	70 - 130
34 PFDOS			96.800	99.224	103	70 - 130
24 PFTrDA			100.00	111.07	111	70 - 130
23 PFTeDA			100.00	104.75	105	70 - 130
D 42 13C2_PFTeDA	782673	748079			95.6	50 - 150
35 PFHxDA			100.00	109.94	110	70 - 130
D 40 13C2_PFHxDA	785856	800223			102	50 - 150
36 PFODA			100.00	98.656	98.7	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821006.d
Injection Date: 08-Feb-2021 12:07:14 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 96
Sample Info: ID CCV 200_SVLC-1274 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-3 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	629382	605562			96.2	50 - 150
8 PFBA			200.00	211.28	106	70 - 130
D 50 13C5_PFPeA	605332	609735			101	50 - 150
21 PFPeA			200.00	202.48	101	70 - 130
7 PFBS			176.80	180.18	102	70 - 130
D 44 13C3_PFBS	194467	199562			103	50 - 150
1 4:2 FTS			186.80	175.52	94	70 - 130
D 63 13C2_4:2 FTS_2	107257	103224			96.2	50 - 150
D 49 13C5_PFHxA	692380	656668			94.8	50 - 150
15 PFHxA			200.00	211.18	106	70 - 130
22 PFPeS			187.60	191.79	102	70 - 130
28 GenX			400.00	424.43	106	70 - 130
D 66 13C3_GenX	1201937	1195486			99.5	50 - 150
13 PFHpA			200.00	207.13	104	70 - 130
D 47 13C4_PFHpA	532291	509777			95.8	50 - 150
14 PFHxS			182.00	200.51	110	70 - 130
D 45 13C3_PFHxS	136023	134329			98.8	50 - 150
29 ADONA			188.40	186.06	98.8	70 - 130
D 64 13C2_6:2 FTS_2	85634	81057			94.7	50 - 150
2 6:2 FTS			189.60	199.24	105	70 - 130
20 PFOA			200.00	213.33	107	70 - 130
D 53 13C8_PFOA	522077	530320			102	50 - 150
12 PFHpS			190.40	211.27	111	70 - 130
18 PFOS			185.60	186.67	101	70 - 130
D 56 13C9_PFNA	680992	643026			94.4	50 - 150
D 54 13C8_PFOS	122286	116691			95.4	50 - 150
17 PFNA			200.00	200.18	100	70 - 130
30 9Cl-PF3ONS			186.40	187.09	100	70 - 130
D 55 13C8_PFOSA	279089	268086			96.1	50 - 150
19 PFOSA			200.00	204.26	102	70 - 130
3 8:2 FTS			191.60	214.27	112	70 - 130
16 PFNS			192.00	211.15	110	70 - 130
D 65 13C2_8:2 FTS_2	78772	79545			101	50 - 150
10 PFDA			200.00	207.51	104	70 - 130
D 51 13C6_PFDA	636238	629968			99	50 - 150
D 58 d3-MeFOSAA	680163	642110			94.4	50 - 150

Report Date: 10-Feb-2021 17:19:44 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\Organics\ll\LCMSMS02.i\020821-nonDOD.b\020821006.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			200.00	209.66	105	70 - 130
9 PFDS			192.80	190.80	99	70 - 130
D 52 13C7_PFUdA	559034	565006			101	50 - 150
25 PFUdA			200.00	185.69	92.8	70 - 130
D 60 d5-EtFOSAA	603434	581533			96.4	50 - 150
5 N-EtFOSAA			200.00	220.96	110	70 - 130
D 61 d7-MeFOSE	98439	87744			89.1	50 - 150
32 MeFOSE			200.00	231.16	116	70 - 130
26 MeFOSA			200.00	183.39	91.7	70 - 130
D 57 d3-MeFOSA	44882	45090			100	50 - 150
31 11Cl-PF3OUDS			188.40	199.42	106	70 - 130
D 62 d9-EtFOSE	111389	114956			103	50 - 150
33 EtFOSE			200.00	213.60	107	70 - 130
11 PFDoA			200.00	192.39	96.2	70 - 130
D 38 13C2_PFDoA	589944	617396			105	50 - 150
D 59 d5-EtFOSA	42428	43530			103	50 - 150
4 10:2 FTS			192.80	247.59	128	70 - 130
27 EtFOSA			200.00	185.73	92.9	70 - 130
34 PFDOS			193.60	202.85	105	70 - 130
24 PFTrDA			200.00	206.67	103	70 - 130
23 PFTeDA			200.00	205.37	103	70 - 130
D 42 13C2_PFTeDA	748079	766523			102	50 - 150
35 PFHxDA			200.00	198.08	99	70 - 130
D 40 13C2_PFHxDA	800223	810023			101	50 - 150
36 PFODA			200.00	192.17	96.1	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821043.d
Injection Date: 08-Feb-2021 18:40:47 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 36
Sample Info: ID CCV 1000B_SVLC-1324 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-5 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	629382	638167			101	50 - 150
8 PFBA			1000.00	921.65	92.2	70 - 130
D 50 13C5_PFPeA	605332	621248			103	50 - 150
21 PFPeA			1000.00	954.72	95.5	70 - 130
7 PFBS			884.00	802.11	90.7	70 - 130
D 44 13C3_PFBS	194467	202691			104	50 - 150
1 4:2 FTS			934.00	926.72	99.2	70 - 130
D 63 13C2_4:2 FTS_2	107257	101474			94.6	50 - 150
D 49 13C5_PFHxA	692380	668977			96.6	50 - 150
15 PFHxA			1000.00	968.66	96.9	70 - 130
22 PFPeS			938.00	855.95	91.3	70 - 130
28 GenX			2000.00	1884.43	94.2	70 - 130
D 66 13C3_GenX	1201937	1248160			104	50 - 150
13 PFHpA			1000.00	997.16	99.7	70 - 130
D 47 13C4_PFHpA	532291	529257			99.4	50 - 150
14 PFHxS			910.00	890.54	97.9	70 - 130
D 45 13C3_PFHxS	136023	141260			104	50 - 150
29 ADONA			942.00	871.34	92.5	70 - 130
D 64 13C2_6:2 FTS_2	85634	81811			95.5	50 - 150
2 6:2 FTS			948.00	865.37	91.3	70 - 130
20 PFOA			1000.00	914.11	91.4	70 - 130
D 53 13C8_PFOA	522077	548624			105	50 - 150
12 PFHpS			952.00	969.60	102	70 - 130
18 PFOS			928.00	804.22	86.7	70 - 130
D 56 13C9_PFNA	680992	671327			98.6	50 - 150
D 54 13C8_PFOS	122286	123516			101	50 - 150
17 PFNA			1000.00	933.54	93.4	70 - 130
30 9Cl-PF3ONS			932.00	846.50	90.8	70 - 130
D 55 13C8_PFOSA	279089	271451			97.3	50 - 150
19 PFOSA			1000.00	984.84	98.5	70 - 130
3 8:2 FTS			958.00	940.31	98.2	70 - 130
16 PFNS			960.00	932.06	97.1	70 - 130
D 65 13C2_8:2 FTS_2	78772	82188			104	50 - 150
10 PFDA			1000.00	945.42	94.5	70 - 130
D 51 13C6_PFDA	636238	624601			98.2	50 - 150
D 58 d3-MeFOSAA	680163	740538			109	50 - 150

Report Date: 10-Feb-2021 17:20:05 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\ORGANICS\LL\LCMSMS02.i\020821-nonDOD.b\020821043.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			1000.00	874.92	87.5	70 - 130
9 PFDS			964.00	950.17	98.6	70 - 130
D 52 13C7_PFUdA	559034	591262			106	50 - 150
25 PFUdA			1000.00	926.60	92.7	70 - 130
D 60 d5-EtFOSAA	603434	591746			98.1	50 - 150
5 N-EtFOSAA			1000.00	939.62	94	70 - 130
D 61 d7-MeFOSE	98439	101868			103	50 - 150
32 MeFOSE			1000.00	949.87	95	70 - 130
26 MeFOSA			1000.00	952.40	95.2	70 - 130
D 57 d3-MeFOSA	44882	45432			101	50 - 150
31 11Cl-PF3OUDS			942.00	905.20	96.1	70 - 130
D 62 d9-EtFOSE	111389	116548			105	50 - 150
33 EtFOSE			1000.00	960.20	96	70 - 130
11 PFDoA			1000.00	896.95	89.7	70 - 130
D 38 13C2_PFDoA	589944	604051			102	50 - 150
D 59 d5-EtFOSA	42428	48130			113	50 - 150
4 10:2 FTS			964.00	951.68	98.7	70 - 130
27 EtFOSA			1000.00	932.88	93.3	70 - 130
34 PFDOS			968.00	907.42	93.7	70 - 130
24 PFTrDA			1000.00	1063.01	106	70 - 130
23 PFTeDA			1000.00	970.78	97.1	70 - 130
D 42 13C2_PFTeDA	748079	742278			99.2	50 - 150
35 PFHxDA			1000.00	947.29	94.7	70 - 130
D 40 13C2_PFHxDA	800223	847510			106	50 - 150
36 PFODA			1000.00	907.29	90.7	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821056.d
Injection Date: 08-Feb-2021 20:59:27 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 49
Sample Info: ID CCV 1000C_SVLC-1324 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-5 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	629382	698627			111	50 - 150
8 PFBA			1000.00	913.25	91.3	70 - 130
D 50 13C5_PFPeA	605332	704388			116	50 - 150
21 PFPeA			1000.00	911.03	91.1	70 - 130
7 PFBS			884.00	802.49	90.8	70 - 130
D 44 13C3_PFBS	194467	226798			117	50 - 150
1 4:2 FTS			934.00	787.89	84.4	70 - 130
D 63 13C2_4:2 FTS_2	107257	121296			113	50 - 150
D 49 13C5_PFHxA	692380	748114			108	50 - 150
15 PFHxA			1000.00	923.40	92.3	70 - 130
22 PFPeS			938.00	898.93	95.8	70 - 130
28 GenX			2000.00	1889.73	94.5	70 - 130
D 66 13C3_GenX	1201937	1357157			113	50 - 150
13 PFHpA			1000.00	989.57	99	70 - 130
D 47 13C4_PFHpA	532291	588463			111	50 - 150
14 PFHxS			910.00	839.24	92.2	70 - 130
D 45 13C3_PFHxS	136023	154546			114	50 - 150
29 ADONA			942.00	853.19	90.6	70 - 130
D 64 13C2_6:2 FTS_2	85634	94879			111	50 - 150
2 6:2 FTS			948.00	870.55	91.8	70 - 130
20 PFOA			1000.00	862.39	86.2	70 - 130
D 53 13C8_PFOA	522077	636867			122	50 - 150
12 PFHpS			952.00	965.95	101	70 - 130
18 PFOS			928.00	815.92	87.9	70 - 130
D 56 13C9_PFNA	680992	741942			109	50 - 150
D 54 13C8_PFOS	122286	142985			117	50 - 150
17 PFNA			1000.00	917.39	91.7	70 - 130
30 9Cl-PF3ONS			932.00	787.27	84.5	70 - 130
D 55 13C8_PFOSA	279089	306420			110	50 - 150
19 PFOSA			1000.00	928.41	92.8	70 - 130
3 8:2 FTS			958.00	847.59	88.5	70 - 130
16 PFNS			960.00	865.13	90.1	70 - 130
D 65 13C2_8:2 FTS_2	78772	94008			119	50 - 150
10 PFDA			1000.00	1025.86	103	70 - 130
D 51 13C6_PFDA	636238	668185			105	50 - 150
D 58 d3-MeFOSAA	680163	768922			113	50 - 150

Report Date: 10-Feb-2021 17:20:14 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\ORGANICS\LL\LCMSMS02.i\020821-nonDOD.b\020821056.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			1000.00	1007.89	101	70 - 130
9 PFDS			964.00	832.52	86.4	70 - 130
D 52 13C7_PFUdA	559034	664999			119	50 - 150
25 PFUdA			1000.00	874.78	87.5	70 - 130
D 60 d5-EtFOSAA	603434	683274			113	50 - 150
5 N-EtFOSAA			1000.00	957.75	95.8	70 - 130
D 61 d7-MeFOSE	98439	115699			118	50 - 150
32 MeFOSE			1000.00	887.20	88.7	70 - 130
26 MeFOSA			1000.00	846.23	84.6	70 - 130
D 57 d3-MeFOSA	44882	56406			126	50 - 150
31 11Cl-PF3OUDS			942.00	845.68	89.8	70 - 130
D 62 d9-EtFOSE	111389	127838			115	50 - 150
33 EtFOSE			1000.00	895.46	89.5	70 - 130
11 PFDoA			1000.00	921.60	92.2	70 - 130
D 38 13C2_PFDoA	589944	649121			110	50 - 150
D 59 d5-EtFOSA	42428	48914			115	50 - 150
4 10:2 FTS			964.00	931.76	96.7	70 - 130
27 EtFOSA			1000.00	979.75	98	70 - 130
34 PFDOS			968.00	865.35	89.4	70 - 130
24 PFTrDA			1000.00	1073.70	107	70 - 130
23 PFTeDA			1000.00	929.49	92.9	70 - 130
D 42 13C2_PFTeDA	748079	816326			109	50 - 150
35 PFHxDA			1000.00	960.03	96	70 - 130
D 40 13C2_PFHxDA	800223	938426			117	50 - 150
36 PFODA			1000.00	888.24	88.8	70 - 130

Report Date: 11-Feb-2021 10:00:29 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Initial Calibration Response Report

Batch: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b
Method: LCMSMS01_PFAS-ID.M Instrument: LCMSMS01
Cal Start Date: 07-Feb-2021 14:32:59 Cal End Date: 07-Feb-2021 16:08:04
Method Lock: Unlocked Lock Date:
No.Compounds: 66 Integrator: picker
Calib Method: PFAS-ID
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	020721021.d	ICAL 50_SVLC-1333	07-Feb-2021 14:32:59
2	020721022.d	ICAL 100_SVLC-1334	07-Feb-2021 14:43:30
3	020721023.d	ICAL 200_SVLC-1335	07-Feb-2021 14:54:02
4	020721024.d	ICAL 500_SVLC-1336	07-Feb-2021 15:04:36
5	020721025.d	ICAL 1000_SVLC-1337	07-Feb-2021 15:15:08
6	020721026.d	ICAL 2000_SVLC-1338	07-Feb-2021 15:25:43
7	020721027.d	ICAL 5000_SVLC-1339	07-Feb-2021 15:36:16
8	020721028.d	ICAL 10000_SVLC-1340	07-Feb-2021 15:46:51
9	020721029.d	ICAL 15000_SVLC-1341	07-Feb-2021 15:57:27
10	020721030.d	ICAL 20000_SVLC-1342	07-Feb-2021 16:08:04

Quantitation Standards (* - Istd) (D - Iso Dil Std)

* 37 13C2_PFDA	* 39 13C2_PFHxA	* 41 13C2_PFOA
* 43 13C3_PFBA	* 48 13C4_PFOS	D 38 13C2_PFDoA
D 40 13C2_PFHxDA	D 42 13C2_PFTeDA	D 44 13C3_PFBS
D 45 13C3_PFHxS	D 46 13C4_PFBA	D 47 13C4_PFHpA
D 49 13C5_PFHxA	D 50 13C5_PFPeA	D 51 13C6_PFDA
D 52 13C7_PFUdA	D 53 13C8_PFOA	D 54 13C8_PFOS
D 55 13C8_PFOSA	D 56 13C9_PFNA	D 57 d3-MeFOSA
D 58 d3-MeFOSAA	D 59 d5-EtFOSA	D 60 d5-EtFOSAA
D 61 d7-MeFOSE	D 62 d9-EtFOSE	D 63 13C2_4:2 FTS_2
D 64 13C2_6:2 FTS_2	D 65 13C2_8:2 FTS_2	D 66 13C3_GenX

Column: 1 Detector: LCMS-Q3

Compound	Level 1 Conc/Rsp	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp	Std #
D 46 13C4_PFBA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	901222	886400	968332	963607	940437	906240	902469	881761	820980	944971	
8 PFBA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#46
	77344	119455	211253	501023	935381	1854377	4362836	8540964	11888709	17121726	
D 50 13C5_PFPeA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	858447	912438	998952	1000355	980305	891737	923554	888535	850111	972233	
21 PFPeA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#50
	50991	97843	199890	538219	904402	1961187	4496670	8628879	11757673	17222944	
D 44 13C3_PFBS	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	299249	299580	330601	341516	306015	321904	307314	308894	288335	330875	
7 PFBS	44.200	88.400	176.80	442.00	884.00	1768.00	4420.00	8840.00	13260	17680	#44
	22950	36287	71897	183496	333068	690386	1591181	3265604	4574427	6971400	
1 4:2 FTS	46.700	93.400	186.80	467.00	934.00	1868.00	4670.00	9340.00	14010	18680	#63
	4052	6981	14202	38569	81999	149217	337052	679170	950347	1423506	
D 63 13C2_4:2 FTS_2	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	235443	253854	241712	271700	258946	256205	240065	244931	227361	259814	
D 49 13C5_PFHxA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	832211	780674	876458	928356	925301	792263	925552	820798	793381	871732	
15 PFHxA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#49
	47022	96418	170202	434567	844592	1716616	3733007	7311433	10127070	15673511	

Compound	Level 1 Conc/Rsp	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp	Std #
22 PFPeS	46.900	93.800	187.60	469.00	938.00	1876.00	4690.00	9380.00	14070	18760	#44
	13165	26749	54209	131260	266300	523596	1220275	2604422	3648320	5195862	
28 GenX	100.00	200.00	400.00	1000.00	2000.00	4000.00	10000	20000	30000	40000	#66
	13899	27687	54412	129352	263408	489288	1271317	2379166	3190790	4554993	
D 66 13C3_GenX	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	660623	714268	753305	731709	798996	767589	720275	735458	688373	719711	
D 47 13C4_PFHpA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	817200	810122	766797	835666	738956	794045	789434	779868	686519	768407	
13 PFHpA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#47
	38678	71314	151323	377509	766828	1483906	3418434	6936935	9091957	14226862	
14 PFHxS	45.500	91.000	182.00	455.00	910.00	1820.00	4550.00	9100.00	13650	18200	#45
	10587	24498	49344	122372	240876	484688	1115644	2283360	2986160	4465261	
D 45 13C3_PFHxS	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	222702	247416	228268	255577	238770	214820	242552	225054	199213	226589	
29 ADONA	47.100	94.200	188.40	471.00	942.00	1884.00	4710.00	9420.00	14130	18840	#45
	58297	118484	254466	619232	1147535	2575302	5563777	11477594	14997499	21618370	
D 64 13C2_6:2 FTS_2	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	193300	198669	203934	206074	208098	206526	193374	202674	185967	217726	
2 6:2 FTS	47.400	94.800	189.60	474.00	948.00	1896.00	4740.00	9480.00	14220	18960	#64
	2846	4667	10665	28257	58183	98719	244563	484308	666461	1029574	
D 53 13C8_PFOA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	729032	703579	770973	788680	784254	807653	750051	700848	627097	709251	
20 PFOA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#53
	36292	77746	165414	430024	759340	1587385	3470589	6674915	9696101	13595083	
12 PFHpS	47.600	95.200	190.40	476.00	952.00	1904.00	4760.00	9520.00	14280	19040	#45
	11482	25252	46706	123648	246554	459422	1171859	2278688	2953858	4416856	
D 54 13C8_PFOS	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	196976	227872	216215	230490	217839	218576	201274	176598	192041	212075	
18 PFOS	46.400	92.800	185.60	464.00	928.00	1856.00	4640.00	9280.00	13920	18560	#54
	12027	21443	50274	118570	218781	489552	1108489	2171461	3035261	4457960	
17 PFNA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#56
	30806	61743	126608	305968	612430	1157114	2673906	5683747	7683251	10936738	
D 56 13C9_PFNA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	686633	708861	696260	826362	714408	768130	711546	696705	615638	711579	
30 9Cl-PF3ONS	46.600	93.200	186.40	466.00	932.00	1864.00	4660.00	9320.00	13980	18640	#54
	27211	54715	102245	272763	513033	1131508	2352488	5165825	7024396	10920282	
D 55 13C8_PFOSA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	525230	434122	436500	460198	445030	377224	441039	368120	386742	404404	
3 8:2 FTS	47.900	95.800	191.60	479.00	958.00	1916.00	4790.00	9580.00	14370	19160	#65
	2529	4889	7651	21175	34783	86412	203374	374496	526211	748631	
16 PFNS	48.000	96.000	192.00	480.00	960.00	1920.00	4800.00	9600.00	14400	19200	#54
	10034	17819	41958	99145	171750	368068	887860	1774662	2545636	3635302	
19 PFOSA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#55
	19672	48094	91602	245875	492039	875507	1725613	3978818	5450711	8469644	
D 65 13C2_8:2 FTS_2	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	152739	157456	174468	153749	166309	158836	166003	149364	144445	163461	
D 51 13C6_PFDA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	566937	592709	657692	651893	558348	652423	551842	545885	541902	566298	
10 PFDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#51
	29724	64281	118830	292298	596398	1141131	2760833	5228069	6509228	10159243	
D 58 d3-MeFOSAA	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	671480	669833	848170	849486	774575	805878	770979	790490	768389	798485	
6 N-MeFOSAA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#58
	7143	11812	25433	55979	108347	206342	485920	1157260	1561007	2387349	
9 PFDS	48.200	96.400	192.80	482.00	964.00	1928.00	4820.00	9640.00	14460	19280	#54
	13258	19609	42289	109051	205399	416150	948656	1859262	2669223	3919041	

Compound	Level 1 Conc/Rsp	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp	Std #
D 60 d5-EtFOSAA	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	691078	740307	693116	762620	690005	693851	708938	703246	644729	678152	
D 52 13C7_PFUdA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	427586	573256	574250	629677	575243	560632	531297	524676	473627	526717	
5 N-EtFOSAA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#60
	9318	13516	24331	68317	128914	249982	685434	1207121	1552086	2478173	
25 PFUdA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#52
	22238	52975	111460	299255	517369	1044245	2330825	4378846	5941524	8669733	
D 61 d7-MeFOSE	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	163270	176440	168549	166023	169919	160550	159644	155363	149701	170461	
32 MeFOSE	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#61
	7813	14215	30470	84028	143733	317130	702982	1527466	2033792	3224151	
26 MeFOSA		100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#57
		8009	14815	30605	63088	126885	274512	574470	829474	1321165	
D 57 d3-MeFOSA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	58638	55783	53635	66308	59860	67203	59183	61581	50131	73393	
31 11Cl-PF3OUDS	47.100	94.200	188.40	471.00	942.00	1884.00	4710.00	9420.00	14130	18840	#54
	20814	49709	91854	254199	473793	926555	2253249	4613155	6329931	10137194	
11 PFDoA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#38
	26235	57423	125013	305431	575454	1169660	2707010	5560236	7431668	11282035	
D 38 13C2_PFDoA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	614041	608891	639847	694182	647718	622102	588140	622361	539674	610472	
4 10:2 FTS	48.200	96.400	192.80	482.00	964.00	1928.00	4820.00	9640.00	14460	19280	#65
	2293	4545	11714	25479	52827	102027	237783	468935	637465	900502	
D 62 d9-EtFOSE	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	139955	141002	168164	158286	157828	158142	153830	161651	148132	158918	
33 EtFOSE	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#62
	6404	14660	29153	63822	124930	256232	610856	1237595	1738597	2678025	
D 59 d5-EtFOSA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	59809	56267	65620	60318	60047	65526	58098	56740	55075	66341	
27 EtFOSA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#59
	2307	7370	13085	33737	59745	124430	302664	624889	839509	1330920	
34 PFDOS	48.400	96.800	193.60	484.00	968.00	1936.00	4840.00	9680.00	14520	19360	#54
	9488	16975	33031	91987	171480	357950	837794	1612773	2458637	3650462	
24 PFTrDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#38
	13823	22771	52182	127290	228525	496102	1130004	2283753	3148854	4985157	
D 42 13C2_PFTeDA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	597622	640095	684303	699909	680063	648501	653313	674191	626749	701764	
23 PFTeDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#42
	27667	51202	106894	266350	519338	1037132	2397039	5079664	6816439	9924989	
35 PFHxDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#40
	36307	63258	126879	309466	601035	1161853	2851081	5459847	7438392	11219825	
D 40 13C2_PFHxDA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	346221	341286	367178	374301	369178	357983	348686	342607	317066	383500	
36 PFODA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#40
	19384	36797	79775	203654	386352	779417	1810706	3710438	5334828	7949069	

Report Date: 11-Feb-2021 10:00:29 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Initial Calibration RF Report

Batch: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b

Method: LCMSMS01_PFAS-ID.M Instrument: LCMSMS01

Cal Start Date: 07-Feb-2021 14:32:59 Cal End Date: 07-Feb-2021 16:08:04

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	020721021.d	ICAL 50_SVLC-1333	07-Feb-2021 14:32:59
2	020721022.d	ICAL 100_SVLC-1334	07-Feb-2021 14:43:30
3	020721023.d	ICAL 200_SVLC-1335	07-Feb-2021 14:54:02
4	020721024.d	ICAL 500_SVLC-1336	07-Feb-2021 15:04:36
5	020721025.d	ICAL 1000_SVLC-1337	07-Feb-2021 15:15:08
6	020721026.d	ICAL 2000_SVLC-1338	07-Feb-2021 15:25:43
7	020721027.d	ICAL 5000_SVLC-1339	07-Feb-2021 15:36:16
8	020721028.d	ICAL 10000_SVLC-1340	07-Feb-2021 15:46:51
9	020721029.d	ICAL 15000_SVLC-1341	07-Feb-2021 15:57:27
10	020721030.d	ICAL 20000_SVLC-1342	07-Feb-2021 16:08:04

Curve Legend: Ex. Avg:H Wt:C2 Org:F Dep:A

Curve Type: Avg, Ln, Qd Response Type: H-Height, A-Area

Wt: Curve Weighting, C-1/Conc, C2-1/Conc^2, R-1/Rsp, R2-1/Rsp^2, N-None

Org: Origin, F-Force, I-Include, N-Neither

Dep: Dependent Variable, A-Amount, R-Response

%Rec = (Measured Amount / True Amount) * 100

Column: 1 Detector: LCMS-Q3

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
D 46 13C4_PFBA	901	886	968	964	940	906	902	882	821	945	Avg:A Wt:C2	912		RSD=4.9	
	98.9	97.2	106	106	103	99.4	99	96.7	90.1	104	Org:N Dep:A				
8 PFBA	1.716425	1.347642	1.090809	1.039891	0.994624	1.023116	0.966867	0.968626	0.965408	0.905939	Ln:A Wt:C2	0.954414	37.9067	R^2=0.998	
	100	101	94.4	101	100	105	101	101	101	94.7	Org:N Dep:A			RSE=3.4	
D 50 13C5_PFPeA	858	912	999	1000	980	892	924	889	850	972	Avg:A Wt:C2	928		RSD=6.1	
	92.5	98.4	108	108	106	96.1	99.6	95.8	91.6	105	Org:N Dep:A				
21 PFPeA	1.187982	1.072325	1.000499	1.076056	0.922572	1.099644	0.973775	0.971136	0.922050	0.885742	Avg:A Wt:C2	1.011178		RSD=9.4	
	117	106	98.9	106	91.2	109	96.3	96	91.2	87.6	Org:N Dep:A				
D 44 13C3_PFBS	299	300	331	342	306	322	307	309	288	331	Avg:A Wt:C2	313		RSD=5.4	
	95.5	95.6	105	109	97.6	103	98	98.6	92	106	Org:N Dep:A				
7 PFBS	1.735113	1.370206	1.230054	1.215607	1.231226	1.213063	1.171426	1.195919	1.196453	1.191719	Ln:A Wt:C2	1.175491	22.6217	R^2=0.998	
	104	94.8	93.8	99.1	103	102	99.2	102	102	101	Org:N Dep:A			RSE=3.6	

Report Date: 11-Feb-2021 10:00:29 AIM Revision: 2.0 05-Oct-2020 14:59:22
Method Path: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b\LCMSMS01_PFAS-ID.m

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
1 4:2 FTS	1.842624	1.472166	1.572695	1.519854	1.695206	1.558920	1.503215	1.484424	1.491757	1.466526	Avg:A Wt:C2	1.560739		RSD=7.7	
	118	94.3	101	97.4	109	99.9	96.3	95.1	95.6	94	Org:N Dep:A				
D 63 13C2_4:2 FTS_2	47.0886	50.7708	48.3424	54.3400	51.7892	51.2410	48.0130	48.9862	45.4722	51.9628	Avg:A Wt:C2	49.8006		RSD=5.4	
	94.6	102	97.1	109	104	103	96.4	98.4	91.3	104	Org:N Dep:A				
D 49 13C5_PFHxA	832	781	876	928	925	792	926	821	793	872	Avg:A Wt:C2	855		RSD=6.9	
	97.4	91.3	103	109	108	92.7	108	96	92.8	102	Org:N Dep:A				
15 PFHxA	1.130050	1.235061	0.970965	0.936208	0.912775	1.083362	0.806655	0.890771	0.850963	0.898987	Avg:A Wt:C2	0.971580		RSD=13.9	
	116	127	99.9	96.4	93.9	112	83	91.7	87.6	92.5	Org:N Dep:A				
22 PFPeS	0.938027	0.951901	0.874046	0.819499	0.927739	0.867036	0.846647	0.898874	0.899294	0.837068	Avg:A Wt:C2	0.886013		RSD=5.0	
	106	107	98.6	92.5	105	97.9	95.6	101	101	94.5	Org:N Dep:A				
28 GenX	1.051962	0.969069	0.902888	0.883903	0.824184	0.796794	0.882522	0.808736	0.772544	0.791115	Avg:A Wt:C2	0.868372		RSD=10.2	
	121	112	104	102	94.9	91.8	102	93.1	89	91.1	Org:N Dep:A				
D 66 13C3_GenX	132	143	151	146	160	154	144	147	138	144	Avg:A Wt:C2	146		RSD=5.4	
	90.6	98	103	100	110	105	98.8	101	94.4	98.7	Org:N Dep:A				
D 47 13C4_PFHpA	817	810	767	836	739	794	789	780	687	768	Avg:A Wt:C2	779		RSD=5.5	
	105	104	98.5	107	94.9	102	101	100	88.2	98.7	Org:N Dep:A				
13 PFHpA	0.946598	0.880287	0.986721	0.903493	1.037718	0.934397	0.866047	0.889501	0.882904	0.925737	Avg:A Wt:C2	0.925340		RSD=5.8	
	102	95.1	107	97.6	112	101	93.6	96.1	95.4	100	Org:N Dep:A				
14 PFHxS	1.044810	1.088082	1.187731	1.052323	1.108594	1.239699	1.010903	1.114927	1.098153	1.082771	Avg:A Wt:C2	1.102799		RSD=6.1	
	94.7	98.7	108	95.4	101	112	91.7	101	99.6	98.2	Org:N Dep:A				
D 45 13C3_PFHxS	223	247	228	256	239	215	243	225	199	227	Avg:A Wt:C2	230		RSD=7.2	
	96.8	108	99.2	111	104	93.4	105	97.8	86.6	98.5	Org:N Dep:A				
29 ADONA	5.557778	5.083713	5.917031	5.144116	5.101939	6.363156	4.870168	5.413937	5.327936	5.064111	Avg:A Wt:C2	5.384388		RSD=8.5	
	103	94.4	110	95.5	94.8	118	90.4	101	99	94.1	Org:N Dep:A				
D 64 13C2_6:2 FTS_2	38.6600	39.7338	40.7868	41.2148	41.6196	41.3052	38.6748	40.5348	37.1934	43.5452	Avg:A Wt:C2	40.3268		RSD=4.5	
	95.9	98.5	101	102	103	102	95.9	101	92.2	108	Org:N Dep:A				
2 6:2 FTS	1.553083	1.238994	1.379123	1.446420	1.474653	1.260543	1.334088	1.260333	1.260112	1.247036	Avg:A Wt:C2	1.345439		RSD=8.4	
	115	92.1	103	108	110	93.7	99.2	93.7	93.7	92.7	Org:N Dep:A				
D 53 13C8_PFOA	729	704	771	789	784	808	750	701	627	709	Avg:A Wt:C2	737		RSD=7.4	
	98.9	95.4	105	107	106	110	102	95.1	85.1	96.2	Org:N Dep:A				
20 PFOA	0.995622	1.105007	1.072761	1.090490	0.968232	0.982715	0.925427	0.952406	1.030792	0.958411	Avg:A Wt:C2	1.008186		RSD=6.2	
	98.8	110	106	108	96	97.5	91.8	94.5	102	95.1	Org:N Dep:A				
12 PFHpS	1.083145	1.072090	1.074634	1.016385	1.084664	1.123234	1.014994	1.063558	1.038350	1.023782	Avg:A Wt:C2	1.059484		RSD=3.3	
	102	101	101	95.9	102	106	95.8	100	98	96.6	Org:N Dep:A				
D 54 13C8_PFOS	197	228	216	230	218	219	201	177	192	212	Avg:A Wt:C2	209		RSD=8.1	
	94.2	109	103	110	104	105	96.3	84.5	91.9	101	Org:N Dep:A				
18 PFOS	1.315909	1.014020	1.252794	1.108676	1.082246	1.206753	1.186932	1.325007	1.135436	1.132580	Avg:A Wt:C2	1.176035		RSD=8.6	
	112	86.2	107	94.3	92	103	101	113	96.5	96.3	Org:N Dep:A				
17 PFNA	0.897306	0.871017	0.909201	0.740518	0.857255	0.753202	0.751576	0.815804	0.832010	0.768484	Avg:A Wt:C2	0.819637		RSD=7.7	
	109	106	111	90.3	105	91.9	91.7	99.5	102	93.8	Org:N Dep:A				
D 56 13C9_PFNA	687	709	696	826	714	768	712	697	616	712	Avg:A Wt:C2	714		RSD=7.6	
	96.2	99.3	97.6	116	100	108	99.7	97.6	86.3	99.7	Org:N Dep:A				

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
30 9Cl-PF3ONS	2.964458	2.576318	2.536941	2.539496	2.526933	2.777213	2.508152	3.138615	2.616422	2.762476	Avg:A Wt:C2	2.694702		RSD=8.0	
	110	95.6	94.1	94.2	93.8	103	93.1	116	97.1	103	Org:N Dep:A				
D 55 13C8_PFOSA	525	434	437	460	445	377	441	368	387	404	Avg:A Wt:C2	428		RSD=10.9	
	123	101	102	108	104	88.2	103	86	90.4	94.5	Org:N Dep:A				
3 8:2 FTS	1.728357	1.620561	1.144398	1.437625	1.091581	1.419710	1.278833	1.308596	1.267566	1.195166	Avg:A Wt:C2	1.349239		RSD=15.1	
	128	120	84.8	107	80.9	105	94.8	97	93.9	88.6	Org:N Dep:A				
16 PFNS	1.061255	0.814556	1.010713	0.896143	0.821277	0.877050	0.919000	1.046788	0.920534	0.892791	Avg:A Wt:C2	0.926011		RSD=9.4	
	115	88	109	96.8	88.7	94.7	99.2	113	99.4	96.4	Org:N Dep:A				
19 PFOSA	0.749081	1.107845	1.049278	1.068562	1.105631	1.160460	0.782522	1.080848	0.939595	1.047176	Avg:A Wt:C2	1.009100		RSD=13.9	
	74.2	110	104	106	110	115	77.5	107	93.1	104	Org:N Dep:A				
D 65 13C2_8:2 FTS_2	30.5478	31.4912	34.8936	30.7498	33.2618	31.7672	33.2006	29.8728	28.8890	32.6922	Avg:A Wt:C2	31.7366		RSD=5.7	
	96.3	99.2	110	96.9	105	100	105	94.1	91	103	Org:N Dep:A				
D 51 13C6_PFDA	567	593	658	652	558	652	552	546	542	566	Avg:A Wt:C2	589		RSD=8.0	
	96.3	101	112	111	94.9	111	93.8	92.7	92.1	96.2	Org:N Dep:A				
10 PFDA	1.048582	1.084529	0.903386	0.896767	1.068147	0.874533	1.000588	0.957724	0.800788	0.896987	Avg:A Wt:C2	0.953203		RSD=9.9	
	110	114	94.8	94.1	112	91.7	105	100	84	94.1	Org:N Dep:A				
D 58 d3-MeFOSAA	134	134	170	170	155	161	154	158	154	160	Avg:A Wt:C2	155		RSD=8.0	
	86.7	86.5	109	110	100	104	99.5	102	99.2	103	Org:N Dep:A				
6 N-MeFOSAA	1.063770	0.881712	0.749643	0.658975	0.699396	0.640116	0.630264	0.731989	0.677177	0.747462	Ln:A Wt:C2	0.672568	19.3959	R^2=0.995	
	100	102	97	92.2	101	93.7	93.1	109	100	111	Org:N Dep:A			RSE=6.7	
9 PFDS	1.396425	0.892663	1.014459	0.981591	0.978105	0.987507	0.977854	1.092139	0.961220	0.958481	Ln:A Wt:C	0.986207	9.372732	R^2=0.997	
	122	80.7	97.9	97.6	98.2	99.6	99	111	97.4	97.1	Org:N Dep:A			RSE=11.2	
D 60 d5-EtFOSAA	138	148	139	153	138	139	142	141	129	136	Avg:A Wt:C2	140		RSD=4.6	
	98.6	106	98.9	109	98.5	99	101	100	92	96.8	Org:N Dep:A				
D 52 13C7_PFUdA	428	573	574	630	575	561	531	525	474	527	Avg:A Wt:C2	540		RSD=10.6	
	79.2	106	106	117	107	104	98.4	97.2	87.8	97.6	Org:N Dep:A				
5 N-EtFOSAA	1.348328	0.912865	0.877595	0.895820	0.934153	0.900705	0.966846	0.858249	0.802449	0.913576	Ln:A Wt:C	0.874106	17.2040	R^2=0.995	
	115	84.8	90.6	98.5	105	102	110	98	91.7	104	Org:N Dep:A			RSE=9.8	
25 PFUdA	1.040165	0.924107	0.970483	0.950503	0.899392	0.931311	0.877409	0.834581	0.836315	0.822997	Avg:A Wt:C2	0.908726		RSD=7.6	
	114	102	107	105	99	102	96.6	91.8	92	90.6	Org:N Dep:A				
D 61 d7-MeFOSE	163	176	169	166	170	161	160	155	150	170	Avg:A Wt:C2	164		RSD=4.8	
	99.6	108	103	101	104	97.9	97.3	94.7	91.3	104	Org:N Dep:A				
32 MeFOSE	0.957065	0.805656	0.903891	1.012245	0.845891	0.987636	0.880687	0.983159	0.905713	0.945715	Avg:A Wt:C2	0.922766		RSD=7.2	
	104	87.3	98	110	91.7	107	95.4	107	98.2	102	Org:N Dep:A				
26 MeFOSA		1.435742	1.381094	0.923116	1.053926	0.944043	0.927672	0.932869	1.103075	0.900062	Ln:A Wt:C	0.964691	48.6017	R^2=0.991	
	Disabled	98.4	118	85.6	104	95.3	95.2	96.2	114	93	Org:N Dep:A			RSE=11	
D 57 d3-MeFOSA	58.6380	55.7830	53.6350	66.3080	59.8600	67.2030	59.1830	61.5810	50.1310	73.3930	Avg:A Wt:C2	60.5715		RSD=11.4	
	96.8	92.1	88.5	109	98.8	111	97.7	102	82.8	121	Org:N Dep:A				
31 11Cl-PF3OUDS	2.243475	2.315758	2.254921	2.341536	2.308884	2.250028	2.376844	2.773073	2.332721	2.537157	Avg:A Wt:C2	2.373440		RSD=6.9	
	94.5	97.6	95	98.7	97.3	94.8	100	117	98.3	107	Org:N Dep:A				
11 PFDoA	0.854503	0.943075	0.976898	0.879974	0.888433	0.940087	0.920533	0.893410	0.918044	0.924042	Avg:A Wt:C2	0.913900		RSD=3.9	
	93.5	103	107	96.3	97.2	103	101	97.8	100	101	Org:N Dep:A				

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
D 38 13C2_PFDoA	614	609	640	694	648	622	588	622	540	610	Avg:A Wt:C2	619		RSD=6.5	
	99.2	98.4	103	112	105	101	95.1	101	87.2	98.7	Org:N Dep:A				
4 10:2 FTS	1.557317	1.497158	1.741215	1.719068	1.647529	1.665824	1.485894	1.628395	1.526004	1.428675	Avg:A Wt:C2	1.589708		RSD=6.7	
	98	94.2	110	108	104	105	93.5	102	96	89.9	Org:N Dep:A				
D 62 d9-EtFOSE	140	141	168	158	158	158	154	162	148	159	Avg:A Wt:C2	155		RSD=5.8	
	90.5	91.2	109	102	102	102	99.5	105	95.8	103	Org:N Dep:A				
33 EtFOSE	0.915151	1.039702	0.866803	0.806414	0.791558	0.810133	0.794196	0.765597	0.782454	0.842581	Avg:A Wt:C2	0.841459		RSD=9.8	
	109	124	103	95.8	94.1	96.3	94.4	91	93	100	Org:N Dep:A				
D 59 d5-EtFOSA	59.8090	56.2670	65.6200	60.3180	60.0470	65.5260	58.0980	56.7400	55.0750	66.3410	Avg:A Wt:C2	60.3841		RSD=6.8	
	99	93.2	109	99.9	99.4	109	96.2	94	91.2	110	Org:N Dep:A				
27 EtFOSA	0.771456	1.309826	0.997028	1.118638	0.994971	0.949470	1.041908	1.101320	1.016201	1.003090	Avg:A Wt:C2	1.030391		RSD=13.3	
	74.9	127	96.8	109	96.6	92.1	101	107	98.6	97.4	Org:N Dep:A				
34 PFDOS	0.995213	0.769562	0.789097	0.824573	0.813210	0.845891	0.860011	0.943435	0.881726	0.889105	Avg:A Wt:C2	0.861182		RSD=8.1	
	116	89.4	91.6	95.7	94.4	98.2	99.9	110	102	103	Org:N Dep:A				
24 PFTrDA	0.450231	0.373975	0.407769	0.366734	0.352816	0.398730	0.384264	0.366950	0.388982	0.408303	Avg:A Wt:C2	0.389875		RSD=7.2	
	115	95.9	105	94.1	90.5	102	98.6	94.1	99.8	105	Org:N Dep:A				
D 42 13C2_PFTeDA	598	640	684	700	680	649	653	674	627	702	Avg:A Wt:C2	661		RSD=5.1	
	90.5	96.9	104	106	103	98.2	98.9	102	94.9	106	Org:N Dep:A				
23 PFTeDA	0.925903	0.799913	0.781043	0.761099	0.763662	0.799638	0.733810	0.753446	0.725058	0.707146	Avg:A Wt:C2	0.775072		RSD=7.9	
	119	103	101	98.2	98.5	103	94.7	97.2	93.5	91.2	Org:N Dep:A				
35 PFHxDA	2.097331	1.853519	1.727759	1.653568	1.628036	1.622777	1.635329	1.593618	1.564005	1.462819	Avg:A Wt:C2	1.683876		RSD=10.5	
	125	110	103	98.2	96.7	96.4	97.1	94.6	92.9	86.9	Org:N Dep:A				
D 40 13C2_PFHxDA	346	341	367	374	369	358	349	343	317	384	Avg:A Wt:C2	355		RSD=5.5	
	97.6	96.2	103	105	104	101	98.3	96.6	89.4	108	Org:N Dep:A				
36 PFODA	1.119747	1.078187	1.086326	1.088183	1.046520	1.088623	1.038588	1.083001	1.121707	1.036384	Avg:A Wt:C2	1.078727		RSD=2.8	
	104	99.9	101	101	97	101	96.3	100	104	96.1	Org:N Dep:A				

Report Date: 11-Feb-2021 10:00:30 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Initial Calibration RT Report

Batch: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b

Method: LCMSMS01_PFAS-ID.M Instrument: LCMSMS01

Cal Start Date: 07-Feb-2021 14:32:59 Cal End Date: 07-Feb-2021 16:08:04

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	020721021.d	ICAL 50_SVLC-1333	07-Feb-2021 14:32:59
2	020721022.d	ICAL 100_SVLC-1334	07-Feb-2021 14:43:30
3	020721023.d	ICAL 200_SVLC-1335	07-Feb-2021 14:54:02
4	020721024.d	ICAL 500_SVLC-1336	07-Feb-2021 15:04:36
5	020721025.d	ICAL 1000_SVLC-1337	07-Feb-2021 15:15:08
6	020721026.d	ICAL 2000_SVLC-1338	07-Feb-2021 15:25:43
7	020721027.d	ICAL 5000_SVLC-1339	07-Feb-2021 15:36:16
8	020721028.d	ICAL 10000_SVLC-1340	07-Feb-2021 15:46:51
9	020721029.d	ICAL 15000_SVLC-1341	07-Feb-2021 15:57:27
10	020721030.d	ICAL 20000_SVLC-1342	07-Feb-2021 16:08:04

Column: 1 Detector: LCMS-Q3

Compound	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10	Avg. RT	%Rsd RT
D 46 13C4_PFBA	1.720	1.719	1.718	1.719	1.718	1.719	1.719	1.719	1.719	1.719	1.719	0.025
8 PFBA	1.720	1.719	1.718	1.719	1.718	1.719	1.719	1.719	1.719	1.719	1.719	0.025
D 50 13C5_PFPeA	2.099	2.098	2.097	2.098	2.095	2.099	2.098	2.098	2.098	2.098	2.097	0.054
21 PFPeA	2.099	2.098	2.097	2.098	2.095	2.099	2.098	2.098	2.098	2.098	2.097	0.054
D 44 13C3_PFBS	2.161	2.161	2.160	2.161	2.158	2.161	2.161	2.150	2.160	2.161	2.159	0.153
7 PFBS	2.161	2.161	2.160	2.161	2.158	2.161	2.161	2.160	2.160	2.161	2.160	0.053
1 4:2 FTS	2.424	2.423	2.431	2.432	2.424	2.433	2.432	2.432	2.432	2.432	2.429	0.157
D 63 13C2_4:2 FTS_2	2.433	2.432	2.431	2.432	2.424	2.433	2.432	2.432	2.432	2.432	2.431	0.097
D 49 13C5_PFHxA	2.467	2.467	2.474	2.467	2.468	2.467	2.467	2.467	2.475	2.467	2.468	0.140
15 PFHxA	2.467	2.475	2.474	2.467	2.468	2.467	2.475	2.467	2.475	2.467	2.470	0.174
22 PFPeS	2.502	2.501	2.500	2.501	2.502	2.502	2.502	2.501	2.510	2.501	2.502	0.101
28 GenX	2.587	2.586	2.586	2.586	2.587	2.587	2.586	2.586	2.586	2.594	2.587	0.085
D 66 13C3_GenX	2.587	2.586	2.586	2.586	2.587	2.587	2.586	2.586	2.594	2.586	2.587	0.085
D 47 13C4_PFHpA	2.856	2.854	2.854	2.847	2.848	2.856	2.847	2.845	2.854	2.854	2.851	0.153
13 PFHpA	2.856	2.854	2.854	2.847	2.848	2.847	2.855	2.845	2.854	2.854	2.851	0.149
14 PFHxS	2.865	2.872	2.872	2.864	2.866	2.865	2.873	2.872	2.872	2.872	2.869	0.126
D 45 13C3_PFHxS	2.865	2.872	2.872	2.873	2.866	2.865	2.864	2.863	2.881	2.872	2.869	0.190
29 ADONA	2.899	2.898	2.898	2.891	2.900	2.899	2.891	2.890	2.898	2.898	2.896	0.148
D 64 13C2_6:2 FTS_2	3.220	3.226	3.219	3.219	3.221	3.220	3.219	3.219	3.226	3.219	3.220	0.078
2 6:2 FTS	3.220	3.219	3.219	3.219	3.221	3.220	3.219	3.219	3.226	3.219	3.220	0.059
D 53 13C8_PFOA	3.245	3.251	3.245	3.245	3.247	3.245	3.245	3.245	3.252	3.251	3.247	0.098
20 PFOA	3.245	3.245	3.245	3.245	3.247	3.245	3.251	3.245	3.258	3.251	3.247	0.144
12 PFHpS	3.252	3.258	3.251	3.251	3.253	3.258	3.251	3.258	3.265	3.258	3.255	0.134
D 54 13C8_PFOS	3.620	3.624	3.624	3.624	3.622	3.627	3.624	3.617	3.634	3.624	3.624	0.122
18 PFOS	3.627	3.632	3.624	3.624	3.629	3.627	3.624	3.624	3.634	3.624	3.627	0.092
17 PFNA	3.627	3.624	3.632	3.632	3.629	3.627	3.624	3.632	3.634	3.632	3.629	0.091
D 56 13C9_PFNA	3.627	3.624	3.624	3.632	3.629	3.627	3.624	3.624	3.634	3.632	3.627	0.096
30 9Cl-PF3ONS	3.834	3.832	3.832	3.832	3.831	3.834	3.832	3.832	3.834	3.832	3.832	0.034
D 55 13C8_PFOSA	3.947	3.952	3.952	3.952	3.944	3.947	3.952	3.952	3.955	3.953	3.951	0.085
3 8:2 FTS	3.955	3.952	3.961	3.961	3.961	3.964	3.961	3.961	3.972	3.961	3.961	0.131
16 PFNS	3.964	3.961	3.961	3.952	3.961	3.964	3.961	3.961	3.964	3.961	3.961	0.081
19 PFOSA	3.955	3.952	3.952	3.952	3.961	3.955	3.944	3.952	3.955	3.953	3.953	0.102
D 65 13C2_8:2 FTS_2	3.955	3.961	3.961	3.952	3.961	3.955	3.961	3.961	3.964	3.961	3.959	0.091

Compound	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10	Avg. RT	%Rsd RT
D 51 13C6_PFDA	3.964	3.970	3.970	3.970	3.969	3.964	3.970	3.970	3.972	3.970	3.968	0.072
10 PFDA	3.973	3.970	3.970	3.970	3.969	3.973	3.970	3.970	3.972	3.970	3.970	0.037
D 58 d3-MeFOSAA	4.118	4.114	4.114	4.114	4.122	4.117	4.122	4.122	4.125	4.122	4.119	0.109
6 N-MeFOSAA	4.126	4.130	4.122	4.122	4.122	4.126	4.122	4.122	4.133	4.122	4.124	0.098
9 PFDS	4.253	4.258	4.249	4.248	4.258	4.253	4.249	4.258	4.262	4.258	4.254	0.115
D 60 d5-EtFOSAA	4.271	4.267	4.267	4.267	4.267	4.271	4.267	4.277	4.280	4.277	4.271	0.113
D 52 13C7_PFUdA	4.262	4.267	4.267	4.267	4.276	4.271	4.267	4.277	4.271	4.268	4.269	0.103
5 N-EtFOSAA	4.281	4.277	4.277	4.277	4.276	4.281	4.286	4.277	4.280	4.277	4.278	0.072
25 PFUdA	4.271	4.267	4.267	4.267	4.276	4.271	4.267	4.277	4.280	4.277	4.272	0.114
D 61 d7-MeFOSE	4.381	4.377	4.377	4.377	4.377	4.381	4.377	4.386	4.381	4.377	4.378	0.070
32 MeFOSE	4.390	4.394	4.394	4.386	4.394	4.390	4.386	4.395	4.389	4.386	4.390	0.090
26 MeFOSA		4.394	4.403	4.403	4.403	4.407	4.403	4.403	4.407	4.403	4.402	0.079
D 57 d3-MeFOSA	4.399	4.403	4.394	4.395	4.403	4.398	4.394	4.403	4.398	4.395	4.398	0.083
31 11Cl-PF3OUDS	4.407	4.411	4.411	4.411	4.410	4.415	4.411	4.411	4.414	4.411	4.410	0.051
11 PFDoA	4.530	4.534	4.534	4.534	4.534	4.538	4.534	4.534	4.538	4.534	4.534	0.050
D 38 13C2_PFDoA	4.530	4.534	4.534	4.534	4.534	4.538	4.534	4.534	4.538	4.534	4.534	0.050
4 10:2 FTS	4.538	4.534	4.551	4.543	4.542	4.547	4.543	4.551	4.546	4.551	4.544	0.119
D 62 d9-EtFOSE	4.547	4.543	4.543	4.543	4.542	4.547	4.543	4.543	4.546	4.543	4.543	0.043
33 EtFOSE	4.547	4.551	4.559	4.551	4.559	4.555	4.551	4.559	4.555	4.559	4.554	0.104
D 59 d5-EtFOSA	4.563	4.567	4.567	4.559	4.567	4.563	4.559	4.567	4.571	4.567	4.565	0.082
27 EtFOSA	4.563	4.575	4.575	4.567	4.575	4.571	4.567	4.575	4.571	4.567	4.570	0.094
34 PFDOS	4.746	4.743	4.743	4.743	4.743	4.746	4.743	4.749	4.746	4.743	4.744	0.049
24 PFTrDA	4.771	4.767	4.767	4.767	4.773	4.771	4.767	4.773	4.771	4.773	4.770	0.052
D 42 13C2_PFTeDA	4.983	4.980	4.980	4.980	4.980	4.983	4.980	4.987	4.990	4.987	4.983	0.073
23 PFTeDA	4.983	4.980	4.980	4.980	4.987	4.983	4.987	4.987	4.990	4.987	4.984	0.070
35 PFHxDA	5.353	5.356	5.356	5.356	5.356	5.361	5.356	5.356	5.361	5.356	5.357	0.050
D 40 13C2_PFHxDA	5.353	5.356	5.348	5.348	5.356	5.353	5.356	5.356	5.361	5.356	5.354	0.082
36 PFODA	5.691	5.694	5.693	5.686	5.694	5.691	5.694	5.693	5.698	5.695	5.692	0.058

Report Date: 11-Feb-2021 10:00:30 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Initial Calibration Signal Ratios Report

Batch: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b

Method: LCMSMS01_PFAS-ID.M Instrument: LCMSMS01

Cal Start Date: 07-Feb-2021 14:32:59 Cal End Date: 07-Feb-2021 16:08:04

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	020721021.d	ICAL 50_SVLC-1333	07-Feb-2021 14:32:59
2	020721022.d	ICAL 100_SVLC-1334	07-Feb-2021 14:43:30
3	020721023.d	ICAL 200_SVLC-1335	07-Feb-2021 14:54:02
4	020721024.d	ICAL 500_SVLC-1336	07-Feb-2021 15:04:36
5	020721025.d	ICAL 1000_SVLC-1337	07-Feb-2021 15:15:08
6	020721026.d	ICAL 2000_SVLC-1338	07-Feb-2021 15:25:43
7	020721027.d	ICAL 5000_SVLC-1339	07-Feb-2021 15:36:16
8	020721028.d	ICAL 10000_SVLC-1340	07-Feb-2021 15:46:51
9	020721029.d	ICAL 15000_SVLC-1341	07-Feb-2021 15:57:27
10	020721030.d	ICAL 20000_SVLC-1342	07-Feb-2021 16:08:04

Column: 1 Detector: LCMS-Q3

Compound	Ratio Level 1	Ratio Level 2	Ratio Level 3	Ratio Level 4	Ratio Level 5	Ratio Level 6	Ratio Level 7	Ratio Level 8	Ratio Level 9	Ratio Level 10	Average Ratio	L-5 +/-3 SD Ratio Limits	StdD Limit	50% Limit
7 PFBS	3.028	3.005	3.373	3.778	3.467	3.750	3.827	3.672	3.704	3.607	3.521	2.467-4.466	0.33308	1.733
1 4:2 FTS	1.365	1.262	1.277	1.655	1.718	1.513	1.511	1.572	1.589	1.514	1.497	1.243-2.192	0.15805	0.859
15 PFHxA	18.246	16.484	15.299	16.952	17.175	15.593	15.031	16.445	15.697	15.058	16.198	13.540-20.809	1.21159	8.587
22 PFPeS	3.432	3.187	3.465	3.076	3.263	2.973	3.143	3.227	3.478	3.165	3.240	2.766-3.759	0.16551	1.631
28 GenX	0.952	0.905	0.816	0.881	0.852	0.782	1.021	0.812	0.852	0.852	0.872	0.628-1.075	0.07437	0.426
13 PFHpA	3.358	2.960	2.995	2.805	3.049	3.173	3.023	3.228	3.023	3.064	3.067	2.607-3.490	0.14712	1.524
14 PFHxS	2.372	3.670	2.915	3.172	3.667	3.215	3.413	3.613	3.227	3.353	3.261	2.538-4.795	0.37615	1.833
29 ADONA	2.259	2.441	2.509	2.313	2.508	2.843	2.680	2.399	2.299	2.199	2.445	1.836-3.179	0.22370	1.254
2 6:2 FTS	1.199	1.072	1.005	1.138	1.398	1.093	1.269	1.163	1.235	1.182	1.175	1.077-1.718	0.10687	0.699
20 PFOA	2.042	2.457	2.566	2.560	2.383	2.477	2.372	2.402	2.361	2.432	2.405	1.939-2.826	0.14799	1.191
12 PFHpS	3.109	4.252	3.365	3.598	3.561	3.400	3.756	3.803	3.489	3.638	3.597	2.634-4.487	0.30885	1.780
18 PFOS	4.623	3.495	4.114	3.814	4.006	4.674	4.243	4.189	4.136	3.962	4.125	2.920-5.091	0.36169	2.003
17 PFNA	4.222	4.113	4.104	3.913	3.995	4.082	3.884	4.133	4.158	3.703	4.030	3.517-4.472	0.15925	1.997
3 8:2 FTS	1.820	1.306	1.307	1.122	0.977	1.086	1.156	1.183	1.211	1.231	1.239	0.308-1.645	0.22272	0.488
16 PFNS	2.798	2.919	3.469	3.457	2.713	3.101	3.433	3.289	3.263	3.529	3.197	1.794-3.631	0.30619	1.356
10 PFDA	9.720	11.919	8.988	8.960	9.021	8.511	9.948	8.917	7.590	8.395	9.196	5.632-12.409	1.12946	4.510
6 N-MeFOSAA	1.514	1.466	1.258	1.157	1.305	1.226	1.248	1.509	1.402	1.301	1.338	0.790-1.819	0.17134	0.652
9 PFDS	4.140	3.292	3.349	3.322	3.647	3.226	3.408	2.975	3.288	3.449	3.409	2.728-4.565	0.30627	1.823
5 N-EtFOSAA	1.959	2.136	1.634	1.707	1.631	1.637	1.923	1.784	1.596	1.669	1.767	1.084-2.177	0.18201	0.815
25 PFUdA	5.608	6.898	12.027	10.019	8.378	8.528	8.189	7.710	7.838	7.683	8.287	3.424-13.331	1.65123	4.189
26 MeFOSA		1.614	0.931	0.991	1.240	1.210	1.124	1.148	1.188	1.356	1.200	0.637-1.842	0.20083	0.620
11 PFDoA	5.009	5.486	6.127	5.702	6.026	6.168	6.480	6.262	6.300	6.035	5.959	4.525-7.526	0.50017	3.013
4 10:2 FTS	1.693	1.211	1.640	1.778	1.696	1.939	1.846	1.764	1.831	1.724	1.712	1.135-2.256	0.18696	0.848
27 EtFOSA	0.581	1.344	1.213	1.168	1.114	1.079	1.114	1.148	1.148	1.142	1.105	0.506-1.721	0.20238	0.557
34 PFDOS	3.499	3.830	3.533	3.642	3.155	3.327	3.455	3.121	3.438	3.404	3.440	2.519-3.790	0.21167	1.577
24 PFTrDA	3.005	2.852	2.909	2.762	2.644	2.951	2.709	2.855	2.809	2.992	2.848	2.292-2.995	0.11720	1.322
23 PFTeDA	8.229	8.349	7.936	7.775	7.710	7.835	7.413	7.732	7.477	7.232	7.768	6.577-8.842	0.37750	3.855
35 PFHxDA	12.943	12.854	12.443	12.706	12.078	12.082	13.172	12.549	12.315	11.780	12.492	10.763-13.392	0.43811	6.039
36 PFODA	10.321	11.488	11.194	11.183	10.675	10.883	10.763	11.129	11.190	11.130	10.995	9.582-11.767	0.36432	5.337

Pace Environmental Services, LLC
Initial Calibration Ion Suppression Report

Batch: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b
Method: LCMSMS01_PFAS-ID.M Instrument: LCMSMS01
Cal Start Date: 07-Feb-2021 14:32:59 Cal End Date: 07-Feb-2021 16:08:04
Method Lock: Unlocked Lock Date:
No.Compounds: 66 Integrator: picker
Calib Method: PFAS-ID
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	020721021.d	ICAL 50_SVLC-1333	07-Feb-2021 14:32:59
2	020721022.d	ICAL 100_SVLC-1334	07-Feb-2021 14:43:30
3	020721023.d	ICAL 200_SVLC-1335	07-Feb-2021 14:54:02
4	020721024.d	ICAL 500_SVLC-1336	07-Feb-2021 15:04:36
5	020721025.d	ICAL 1000_SVLC-1337	07-Feb-2021 15:15:08
6	020721026.d	ICAL 2000_SVLC-1338	07-Feb-2021 15:25:43
7	020721027.d	ICAL 5000_SVLC-1339	07-Feb-2021 15:36:16
8	020721028.d	ICAL 10000_SVLC-1340	07-Feb-2021 15:46:51
9	020721029.d	ICAL 15000_SVLC-1341	07-Feb-2021 15:57:27
10	020721030.d	ICAL 20000_SVLC-1342	07-Feb-2021 16:08:04

Column: 1 Detector: LCMS-Q3

Compound	Response Level 1	Response Level 2	Response Level 3	Response Level 4	Response Level 5	Response Level 6	Response Level 7	Response Level 8	Response Level 9	Response Level 10	RPD
* 37 13C2_PFDA	618359	562439	587666	650609	608256	558319	591928	559560	546670	577103	1.72
* 39 13C2_PFHxA	695820	732591	821730	861966	836294	726113	753233	718857	676987	790551	3.18
* 41 13C2_PFOA	752472	805148	773358	829061	794645	801033	748016	720801	670983	729223	0.78
* 43 13C3_PFBA	861081	821418	842918	912455	830556	863456	836036	812446	755323	856318	0.13
* 48 13C4_PFOS	217314	224894	225272	229533	217059	218308	215527	211143	196556	223206	0.66

13C2_PFDA ((|577103 - 618359| / (577103 + 618359)) / 2) * 100 = 1.73
13C2_PFHxA ((|790551 - 695820| / (790551 + 695820)) / 2) * 100 = 3.19
13C2_PFOA ((|729223 - 752472| / (729223 + 752472)) / 2) * 100 = 0.78
13C3_PFBA ((|856318 - 861081| / (856318 + 861081)) / 2) * 100 = 0.14
13C4_PFOS ((|223206 - 217314| / (223206 + 217314)) / 2) * 100 = 0.67

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b\020721033.d
Injection Date: 07-Feb-2021 16:39:49 Injection Vol: 10.0 uL
Sample Type: CheckStd Auto Sampler: 12
Sample Info: ISOMER CHECK_SVLC-1266 Misc. Info:
Inst. ID: LCMSMS01 Operator: Matthew M. Miller

Method Name: LCMSMS01_PFAS-ID Version: 2020-09-23 10:00:21
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Surrogates Conc. Level: Smp Vol. Added: 1.00 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	T RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	Cal Conc ng/L	OnCol Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.719	1.718	1	985446	19	>100:1			100000	1080.96	105	
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.099	2.095	1	985384	16	>100:1			100000	1062.22	101	
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.161	2.158	1	349762	14	>100:1			100000	1115.92	114	
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.433	2.424	1	255426	17	>100:1			500000	5128.97	98.6	
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.476	2.468	1	819022	17	>100:1			100000	958.29	88.5	
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.595	2.587	1	771095	17	>100:1			500000	5288.49	96.5	
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.856	2.848	1	859152	18	>100:1			100000	1103.31	116	
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.874	2.866	1	247935	18	>100:1			100000	1077.53	104	
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.226	3.221	1	199392	20	>100:1			500000	4944.40	95.8	
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.246	3.247	0	730884	21	>100:1			100000	991.51	93.2	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.252	3.247	1/1	7923014	34	>100:1	Target = 2.38	0.14	0	1075229		
413 > 169	53	3.246	3.247		3460356	35	>100:1	2.28 (1.19-3.57)	0.22				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.627	3.622	1	212284	20	>100:1			100000	1015.73	97.4	
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.634	3.629	1	692973	18	>100:1			100000	971.08	97	
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.955	3.944	1	485027	17	>100:1			100000	1133.61	109	
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.955	3.961	0	220564	17	>100:1			500000	6949.83	133	
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		3.964	3.969	0	688611	19	>100:1			100000	1169.93	123	
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.118	4.122	0	842437	17	>100:1			500000	5436.65	109	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													
570 > 419	58	4.126	4.122	1/1	1457762	35	>100:1	Target = 1.30	0.12	0	1286392		M
570 > 483	58	4.126	4.122		1023460	31	>100:1	1.42 (0.65-1.95)	0.27				
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.272	4.267	1	701485	18	>100:1			500000	5006.29	102	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													
584 > 419	60	4.281	4.276	1/0	1765750	31	>100:1	Target = 1.63	0.13	0	1439828		
584 > 526	60	4.281	4.276		976515	32	>100:1	1.80 (0.81-2.44)	0.23				

Report Date: 11-Feb-2021 10:00:28 AIM Revision: 2.0 12-Dec-2020 09:34:50

Pace Environmental Services, LLC

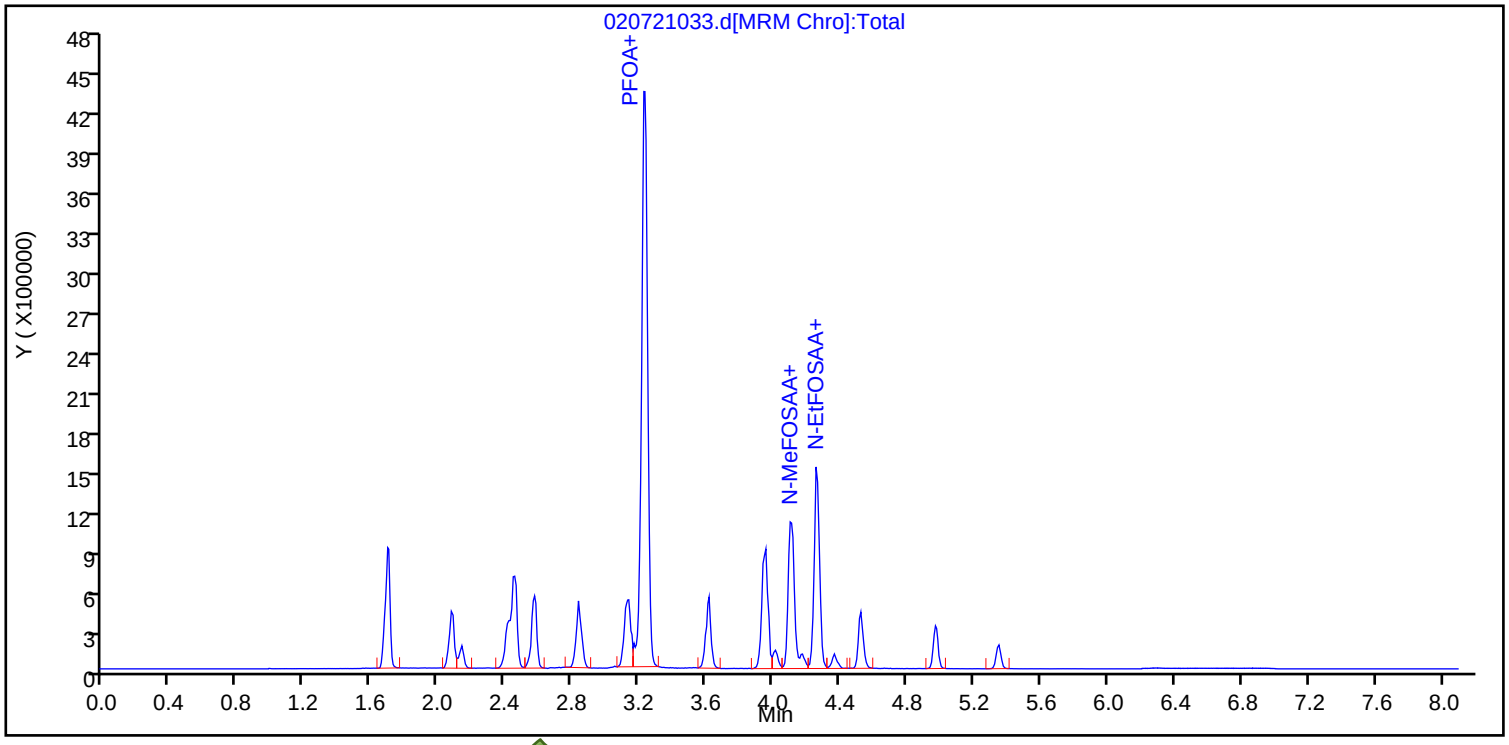
Data File: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b\020721033.d

Injection Date: 07-Feb-2021 16:39:49 Inst. ID: LCMSMS01

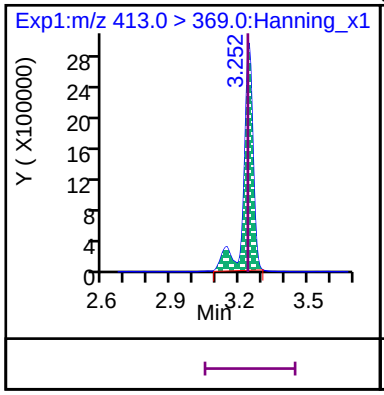
Client ID: Lab ID: ISOMER CHECK_SVLC-1266

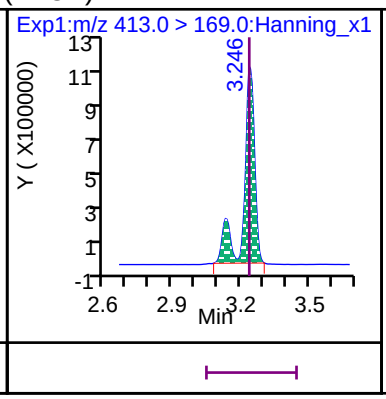
Sample Info: ISOMER CHECK_SVLC-1266

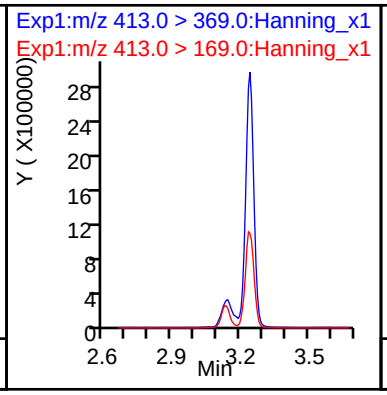
Dil. Factor: 1 Operator: Matthew M. Miller



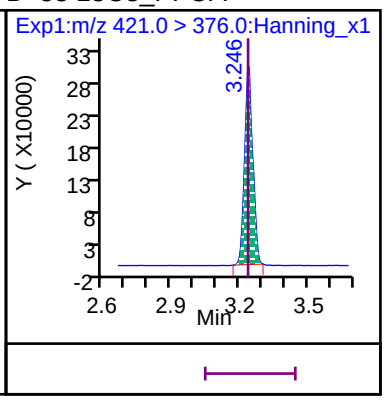
20 Perfluoro-n-octanoic acid (PFOA)



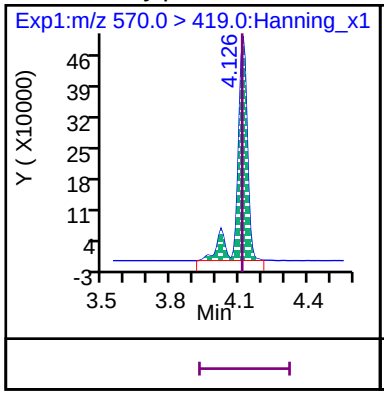


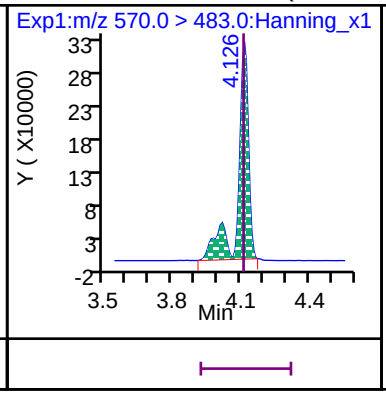


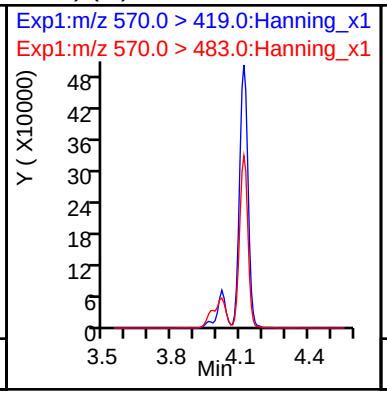
D 53 13C8_PFOA



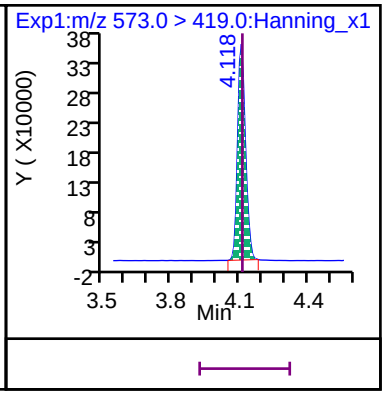
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) (M)







D 58 d3-MeFOSAA



Pace Environmental Services, LLC
Initial Calibration Verification Report

Data File: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b\020821015.d
Injection Date: 08-Feb-2021 11:48:09 Injection Vol: 10.0 uL
Sample Type: ICV Auto Sampler: 98
Sample Info: ID ICV 500_SVLC-1343 Misc. Info:
Inst. ID: LCMSMS01 Operator: Matthew M. Miller

Method Name: LCMSMS01_PFAS-ID Version: 2020-09-23 10:00:21
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: ICV Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
8 PFBA			500.00	470.96	94.2	70 - 130
D 46 13C4_PFBA	940437	1027111			109	50 - 150
D 50 13C5_PFPeA	980305	1053070			107	50 - 150
21 PFPeA			500.00	470.79	94.2	70 - 130
7 PFBS			442.50	465.67	105	70 - 130
D 44 13C3_PFBS	306015	348660			114	50 - 150
1 4:2 FTS			467.50	486.95	104	70 - 130
D 63 13C2_4:2 FTS_2	258946	332040			128	50 - 150
D 49 13C5_PFHxA	925301	1013144			109	50 - 150
15 PFHxA			500.00	495.74	99.1	70 - 130
22 PFPeS			470.00	493.36	105	70 - 130
28 GenX			2500.00	2401.91	96.1	70 - 130
D 66 13C3_GenX	798996	792864			99.2	50 - 150
D 47 13C4_PFHpA	738956	905397			123	50 - 150
13 PFHpA			500.00	459.63	91.9	70 - 130
D 45 13C3_PFHxS	238770	280828			118	50 - 150
14 PFHxS			456.00	423.78	92.9	70 - 130
29 ADONA			2355.00	2028.25	86.1	70 - 130
D 64 13C2_6:2 FTS_2	208098	274530			132	50 - 150
2 6:2 FTS			475.00	485.86	102	70 - 130
20 PFOA			500.00	495.29	99.1	70 - 130
D 53 13C8_PFOA	784254	872046			111	50 - 150
12 PFHpS			475.00	422.67	89	70 - 130
D 54 13C8_PFOS	217839	245629			113	50 - 150
18 PFOS			462.75	408.34	88.2	70 - 130
17 PFNA			500.00	483.61	96.7	70 - 130
D 56 13C9_PFNA	714408	821116			115	50 - 150
30 9Cl-PF3ONS			2330.00	2055.22	88.2	70 - 130
D 55 13C8_PFOSA	445030	537480			121	50 - 150
16 PFNS			480.00	442.10	92.1	70 - 130
19 PFOSA			500.00	454.45	90.9	70 - 130
D 65 13C2_8:2 FTS_2	166309	225085			135	50 - 150
3 8:2 FTS			480.00	377.88	78.7	70 - 130
10 PFDA			500.00	459.03	91.8	70 - 130
D 51 13C6_PFDA	558348	680851			122	50 - 150
6 N-MeFOSAA			500.00	597.14	119	70 - 130

Report Date: 11-Feb-2021 10:00:28 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b\020821015.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 58 d3-MeFOSAA	774575	949383			123	50 - 150
9 PFDS			482.50	477.64	99	70 - 130
D 60 d5-EtFOSAA	690005	897991			130	50 - 150
25 PFUdA			500.00	540.31	108	70 - 130
D 52 13C7_PFUdA	575243	555310			96.5	50 - 150
5 N-EtFOSAA			500.00	494.54	98.9	70 - 130
D 61 d7-MeFOSE	169919	167867			98.8	50 - 150
D 57 d3-MeFOSA	59860	61923			103	50 - 150
31 11Cl-PF3OUDS			2355.00	2157.07	91.6	70 - 130
11 PFDoA			500.00	515.52	103	70 - 130
D 38 13C2_PFDoA	647718	687377			106	50 - 150
D 62 d9-EtFOSE	157828	166828			106	50 - 150
4 10:2 FTS			2410.00	1813.65	75.3	70 - 130
D 59 d5-EtFOSA	60047	58625			97.6	50 - 150
24 PFTrDA			500.00	521.35	104	70 - 130
D 42 13C2_PFTeDA	680063	760607			112	50 - 150
23 PFTeDA			500.00	514.53	103	70 - 130
D 40 13C2_PFHxDA	369178	410169			111	50 - 150

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821005.d
Injection Date: 08-Feb-2021 10:02:45 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 95
Sample Info: ID CCV 100_SVLC-1334 Misc. Info:
Inst. ID: LCMSMS01 Operator: Matthew M. Miller

Method Name: LCMSMS01_PFAS-ID Version: 2020-09-23 10:00:21
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-2 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
8 PFBA			100.00	87.246	87.2	70 - 130
D 46 13C4_PFBA	940437	1018417			108	50 - 150
D 50 13C5_PFPeA	980305	1027157			105	50 - 150
21 PFPeA			100.00	98.141	98.1	70 - 130
7 PFBS			88.400	93.986	106	70 - 130
D 44 13C3_PFBS	306015	349891			114	50 - 150
1 4:2 FTS			93.400	101.05	108	70 - 130
D 63 13C2_4:2 FTS_2	258946	279266			108	50 - 150
D 49 13C5_PFHxA	925301	870198			94	50 - 150
15 PFHxA			100.00	112.35	112	70 - 130
22 PFPeS			93.800	91.940	98	70 - 130
28 GenX			200.00	237.03	119	70 - 130
D 66 13C3_GenX	798996	749783			93.8	50 - 150
D 47 13C4_PFHpA	738956	852436			115	50 - 150
13 PFHpA			100.00	98.103	98.1	70 - 130
D 45 13C3_PFHxS	238770	262249			110	50 - 150
14 PFHxS			91.000	77.280	84.9	70 - 130
29 ADONA			94.200	92.809	98.5	70 - 130
D 64 13C2_6:2 FTS_2	208098	263528			127	50 - 150
2 6:2 FTS			94.800	118.43	125	70 - 130
20 PFOA			100.00	111.50	111	70 - 130
D 53 13C8_PFOA	784254	801193			102	50 - 150
12 PFHpS			95.200	87.130	91.5	70 - 130
D 54 13C8_PFOS	217839	226466			104	50 - 150
18 PFOS			92.800	90.049	97	70 - 130
17 PFNA			100.00	98.531	98.5	70 - 130
D 56 13C9_PFNA	714408	790887			111	50 - 150
30 9Cl-PF3ONS			93.200	98.661	106	70 - 130
D 55 13C8_PFOSA	445030	464386			104	50 - 150
16 PFNS			96.000	108.06	113	70 - 130
19 PFOSA			100.00	109.67	110	70 - 130
D 65 13C2_8:2 FTS_2	166309	201463			121	50 - 150
3 8:2 FTS			95.800	75.693	79	70 - 130
10 PFDA			100.00	94.048	94	70 - 130
D 51 13C6_PFDA	558348	696423			125	50 - 150
6 N-MeFOSAA			100.00	99.726	99.7	70 - 130

Report Date: 11-Feb-2021 10:19:07 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821005.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 58 d3-MeFOSAA	774575	771725			99.6	50 - 150
9 PFDS			96.400	78.943	81.9	70 - 130
D 60 d5-EtFOSAA	690005	868665			126	50 - 150
25 PFUdA			100.00	101.11	101	70 - 130
D 52 13C7_PFUdA	575243	615503			107	50 - 150
5 N-EtFOSAA			100.00	101.63	102	70 - 130
D 61 d7-MeFOSE	169919	160062			94.2	50 - 150
32 MeFOSE			100.00	110.03	110	70 - 130
D 57 d3-MeFOSA	59860	65967			110	50 - 150
26 MeFOSA non target			100.00	56.898	56.9	70 - 130
31 11Cl-PF3OUDS			94.200	102.40	109	70 - 130
11 PFDoA no +			100.00	139.45	139	70 - 130
D 38 13C2_PFDoA	647718	665222			103	50 - 150
D 62 d9-EtFOSE	157828	172463			109	50 - 150
4 10:2 FTS			96.400	97.981	102	70 - 130
33 EtFOSE			100.00	87.224	87.2	70 - 130
D 59 d5-EtFOSA	60047	61187			102	50 - 150
27 EtFOSA			100.00	101.83	102	70 - 130
34 PFDOS			96.800	100.00	103	70 - 130
24 PFTrDA			100.00	99.733	99.7	70 - 130
D 42 13C2_PFTeDA	680063	754678			111	50 - 150
23 PFTeDA			100.00	104.38	104	70 - 130
35 PFHxDA			100.00	111.20	111	70 - 130
D 40 13C2_PFHxDA	369178	372820			101	50 - 150
36 PFODA			100.00	109.00	109	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821006.d
Injection Date: 08-Feb-2021 10:13:17 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 96
Sample Info: ID CCV 200_SVLC-1335 Misc. Info:
Inst. ID: LCMSMS01 Operator: Matthew M. Miller

Method Name: LCMSMS01_PFAS-ID Version: 2020-09-23 10:00:21
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-3 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
8 PFBA			200.00	172.88	86.4	70 - 130
D 46 13C4_PFBA	1018417	995278			97.7	50 - 150
D 50 13C5_PFPeA	1027157	1021752			99.5	50 - 150
21 PFPeA			200.00	211.83	106	70 - 130
7 PFBS			176.80	165.28	93.5	70 - 130
D 44 13C3_PFBS	349891	342829			98	50 - 150
1 4:2 FTS			186.80	185.86	99.5	70 - 130
D 63 13C2_4:2 FTS_2	279266	293804			105	50 - 150
D 49 13C5_PFHxA	870198	935627			108	50 - 150
15 PFHxA			200.00	213.26	107	70 - 130
22 PFPeS			187.60	182.65	97.4	70 - 130
28 GenX			400.00	374.35	93.6	70 - 130
D 66 13C3_GenX	749783	786896			105	50 - 150
D 47 13C4_PFHpA	852436	868482			102	50 - 150
13 PFHpA			200.00	208.35	104	70 - 130
D 45 13C3_PFHxS	262249	248976			94.9	50 - 150
14 PFHxS			182.00	190.20	105	70 - 130
29 ADONA			188.40	193.16	103	70 - 130
D 64 13C2_6:2 FTS_2	263528	265874			101	50 - 150
2 6:2 FTS			189.60	190.91	101	70 - 130
20 PFOA			200.00	199.38	99.7	70 - 130
D 53 13C8_PFOA	801193	831812			104	50 - 150
12 PFHpS			190.40	203.46	107	70 - 130
D 54 13C8_PFOS	226466	244575			108	50 - 150
18 PFOS			185.60	183.99	99.1	70 - 130
17 PFNA			200.00	201.96	101	70 - 130
D 56 13C9_PFNA	790887	818008			103	50 - 150
30 9Cl-PF3ONS			186.40	176.08	94.5	70 - 130
D 55 13C8_PFOSA	464386	495386			107	50 - 150
16 PFNS			192.00	183.95	95.8	70 - 130
19 PFOSA			200.00	188.08	94	70 - 130
D 65 13C2_8:2 FTS_2	201463	195053			96.8	50 - 150
3 8:2 FTS			191.60	228.73	119	70 - 130
10 PFDA			200.00	186.81	93.4	70 - 130
D 51 13C6_PFDA	696423	742353			107	50 - 150
6 N-MeFOSAA			200.00	231.78	116	70 - 130

Report Date: 11-Feb-2021 10:19:08 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821006.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 58 d3-MeFOSAA	771725	828824			107	50 - 150
9 PFDS			192.80	183.26	95.1	70 - 130
D 60 d5-EtFOSAA	868665	864294			99.5	50 - 150
25 PFUdA			200.00	211.81	106	70 - 130
D 52 13C7_PFUdA	615503	670702			109	50 - 150
5 N-EtFOSAA			200.00	153.25	76.6	70 - 130
D 61 d7-MeFOSE	160062	183649			115	50 - 150
32 MeFOSE			200.00	210.56	105	70 - 130
D 57 d3-MeFOSA	65967	65677			99.6	50 - 150
26 MeFOSA			200.00	225.20	113	70 - 130
31 11Cl-PF3OUDS			188.40	177.24	94.1	70 - 130
11 PFDoA			200.00	216.46	108	70 - 130
D 38 13C2_PFDoA	665222	678240			102	50 - 150
D 62 d9-EtFOSE	172463	153262			88.9	50 - 150
4 10:2 FTS			192.80	216.22	112	70 - 130
33 EtFOSE			200.00	195.58	97.8	70 - 130
D 59 d5-EtFOSA	61187	60261			98.5	50 - 150
27 EtFOSA			200.00	222.28	111	70 - 130
34 PFDOS			193.60	181.10	93.5	70 - 130
24 PFTrDA			200.00	197.11	98.6	70 - 130
D 42 13C2_PFTeDA	754678	756837			100	50 - 150
23 PFTeDA			200.00	197.47	98.7	70 - 130
35 PFHxDA			200.00	203.13	102	70 - 130
D 40 13C2_PFHxDA	372820	392693			105	50 - 150
36 PFODA			200.00	203.21	102	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821042.d
Injection Date: 08-Feb-2021 16:33:23 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 27
Sample Info: ID CCV 1000A_SVLC-1337 Misc. Info:
Inst. ID: LCMSMS01 Operator: Matthew M. Miller

Method Name: LCMSMS01_PFAS-ID Version: 2020-09-23 10:00:21
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-5 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
8 PFBA			1000.00	1025.19	103	70 - 130
D 46 13C4_PFBA	1018417	954683			93.7	50 - 150
D 50 13C5_PFPeA	1027157	1004174			97.8	50 - 150
21 PFPeA			1000.00	1019.71	102	70 - 130
7 PFBS			884.00	900.31	102	70 - 130
D 44 13C3_PFBS	349891	347711			99.4	50 - 150
1 4:2 FTS			934.00	987.46	106	70 - 130
D 63 13C2_4:2 FTS_2	279266	295925			106	50 - 150
D 49 13C5_PFHxA	870198	921108			106	50 - 150
15 PFHxA			1000.00	845.41	84.5	70 - 130
22 PFPeS			938.00	904.25	96.4	70 - 130
28 GenX			2000.00	1796.10	89.8	70 - 130
D 66 13C3_GenX	749783	843785			113	50 - 150
D 47 13C4_PFHpA	852436	858139			101	50 - 150
13 PFHpA			1000.00	1074.84	107	70 - 130
D 45 13C3_PFHxS	262249	263569			101	50 - 150
14 PFHxS			910.00	904.82	99.4	70 - 130
29 ADONA			942.00	919.98	97.7	70 - 130
D 64 13C2_6:2 FTS_2	263528	258487			98.1	50 - 150
2 6:2 FTS			948.00	909.54	95.9	70 - 130
20 PFOA			1000.00	966.82	96.7	70 - 130
D 53 13C8_PFOA	801193	793804			99.1	50 - 150
12 PFHpS			952.00	926.64	97.3	70 - 130
D 54 13C8_PFOS	226466	222205			98.1	50 - 150
18 PFOS			928.00	881.85	95	70 - 130
17 PFNA			1000.00	1139.35	114	70 - 130
D 56 13C9_PFNA	790887	731290			92.5	50 - 150
30 9Cl-PF3ONS			932.00	996.83	107	70 - 130
D 55 13C8_PFOSA	464386	506686			109	50 - 150
16 PFNS			960.00	930.95	97	70 - 130
19 PFOSA			1000.00	976.18	97.6	70 - 130
D 65 13C2_8:2 FTS_2	201463	275668			137	50 - 150
3 8:2 FTS			958.00	678.24	70.8	70 - 130
10 PFDA			1000.00	911.69	91.2	70 - 130
D 51 13C6_PFDA	696423	665623			95.6	50 - 150
6 N-MeFOSAA			1000.00	1034.16	103	70 - 130

Report Date: 11-Feb-2021 10:19:19 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821042.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 58 d3-MeFOSAA	771725	936944			121	50 - 150
9 PFDS			964.00	1009.50	105	70 - 130
D 60 d5-EtFOSAA	868665	879638			101	50 - 150
25 PFUdA			1000.00	1156.54	116	70 - 130
D 52 13C7_PFUdA	615503	587870			95.5	50 - 150
5 N-EtFOSAA			1000.00	954.60	95.5	70 - 130
D 61 d7-MeFOSE	160062	181158			113	50 - 150
32 MeFOSE			1000.00	994.67	99.5	70 - 130
D 57 d3-MeFOSA	65967	70799			107	50 - 150
26 MeFOSA			1000.00	830.67	83.1	70 - 130
31 11Cl-PF3OUDS			942.00	953.31	101	70 - 130
11 PFDoA			1000.00	1147.98	115	70 - 130
D 38 13C2_PFDoA	665222	603198			90.7	50 - 150
D 62 d9-EtFOSE	172463	166767			96.7	50 - 150
4 10:2 FTS			964.00	685.09	71.1	70 - 130
33 EtFOSE			1000.00	995.63	99.6	70 - 130
D 59 d5-EtFOSA	61187	64798			106	50 - 150
27 EtFOSA			1000.00	1103.33	110	70 - 130
34 PFDOS			968.00	1011.66	105	70 - 130
24 PFTrDA			1000.00	1050.56	105	70 - 130
D 42 13C2_PFTeDA	754678	724869			96.1	50 - 150
23 PFTeDA			1000.00	1032.49	103	70 - 130
35 PFHxDA			1000.00	940.48	94	70 - 130
D 40 13C2_PFHxDA	372820	390351			105	50 - 150
36 PFODA			1000.00	963.02	96.3	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821057.d
Injection Date: 08-Feb-2021 19:12:13 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 42
Sample Info: ID CCV 1000B_SVLC-1337 Misc. Info:
Inst. ID: LCMSMS01 Operator: Matthew M. Miller

Method Name: LCMSMS01_PFAS-ID Version: 2020-09-23 10:00:21
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-5 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
8 PFBA			1000.00	973.15	97.3	70 - 130
D 46 13C4_PFBA	1018417	964623			94.7	50 - 150
D 50 13C5_PFPeA	1027157	1007602			98.1	50 - 150
21 PFPeA			1000.00	948.29	94.8	70 - 130
7 PFBS			884.00	898.27	102	70 - 130
D 44 13C3_PFBS	349891	344226			98.4	50 - 150
1 4:2 FTS			934.00	1010.84	108	70 - 130
D 63 13C2_4:2 FTS_2	279266	280895			101	50 - 150
D 49 13C5_PFHxA	870198	916492			105	50 - 150
15 PFHxA			1000.00	965.17	96.5	70 - 130
22 PFPeS			938.00	918.37	97.9	70 - 130
28 GenX			2000.00	1957.49	97.9	70 - 130
D 66 13C3_GenX	749783	742945			99.1	50 - 150
D 47 13C4_PFHpA	852436	847091			99.4	50 - 150
13 PFHpA			1000.00	939.01	93.9	70 - 130
D 45 13C3_PFHxS	262249	252649			96.3	50 - 150
14 PFHxS			910.00	899.40	98.8	70 - 130
29 ADONA			942.00	932.77	99	70 - 130
D 64 13C2_6:2 FTS_2	263528	246197			93.4	50 - 150
2 6:2 FTS			948.00	958.36	101	70 - 130
20 PFOA			1000.00	1026.42	103	70 - 130
D 53 13C8_PFOA	801193	767248			95.8	50 - 150
12 PFHpS			952.00	1034.14	109	70 - 130
D 54 13C8_PFOS	226466	233425			103	50 - 150
18 PFOS			928.00	881.48	95	70 - 130
17 PFNA			1000.00	1137.62	114	70 - 130
D 56 13C9_PFNA	790887	680800			86.1	50 - 150
30 9Cl-PF3ONS			932.00	885.27	95	70 - 130
D 55 13C8_PFOSA	464386	451200			97.2	50 - 150
16 PFNS			960.00	921.13	96	70 - 130
19 PFOSA			1000.00	1073.60	107	70 - 130
D 65 13C2_8:2 FTS_2	201463	196514			97.5	50 - 150
3 8:2 FTS			958.00	1013.32	106	70 - 130
10 PFDA			1000.00	1041.07	104	70 - 130
D 51 13C6_PFDA	696423	590827			84.8	50 - 150
6 N-MeFOSAA			1000.00	1302.33	130	70 - 130

Report Date: 11-Feb-2021 10:19:38 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821057.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 58 d3-MeFOSAA	771725	742853			96.3	50 - 150
9 PFDS			964.00	896.50	93	70 - 130
D 60 d5-EtFOSAA	868665	788304			90.7	50 - 150
25 PFUdA			1000.00	891.56	89.2	70 - 130
D 52 13C7_PFUdA	615503	646576			105	50 - 150
5 N-EtFOSAA			1000.00	1033.49	103	70 - 130
D 61 d7-MeFOSE	160062	165834			104	50 - 150
32 MeFOSE			1000.00	988.49	98.8	70 - 130
D 57 d3-MeFOSA	65967	66308			101	50 - 150
26 MeFOSA			1000.00	949.37	94.9	70 - 130
31 11Cl-PF3OUDS			942.00	967.74	103	70 - 130
11 PFDoA			1000.00	979.97	98	70 - 130
D 38 13C2_PFDoA	665222	680113			102	50 - 150
D 62 d9-EtFOSE	172463	155424			90.1	50 - 150
4 10:2 FTS			964.00	866.73	89.9	70 - 130
33 EtFOSE			1000.00	941.79	94.2	70 - 130
D 59 d5-EtFOSA	61187	56649			92.6	50 - 150
27 EtFOSA			1000.00	1079.05	108	70 - 130
34 PFDOS			968.00	925.46	95.6	70 - 130
24 PFTrDA			1000.00	932.88	93.3	70 - 130
D 42 13C2_PFTeDA	754678	698159			92.5	50 - 150
23 PFTeDA			1000.00	1026.31	103	70 - 130
35 PFHxDA			1000.00	955.82	95.6	70 - 130
D 40 13C2_PFHxDA	372820	374092			100	50 - 150
36 PFODA			1000.00	1014.93	101	70 - 130

Report Date: 27-Jan-2021 16:50:50 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Batch Run Log Report

Batch: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b

Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02

Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
1	ICAL 50_SVLC-1272	26-Jan-2021 13:22:18	012621007.d	ICal					Analytes	L-1	1.00		
2	ICAL 100_SVLC-1273	26-Jan-2021 13:32:55	012621008.d	ICal					Analytes	L-2	1.00		
3	ICAL 200_SVLC-1274	26-Jan-2021 13:43:33	012621009.d	ICal					Analytes	L-3	1.00		
4	ICAL 500_SVLC-1275	26-Jan-2021 13:54:07	012621010.d	ICal					Analytes	L-4	1.00		
5	ICAL 1000_SVLC-1276	26-Jan-2021 14:04:47	012621011.d	ICal					Analytes	L-5	1.00		
6	ICAL 2000_SVLC-1277	26-Jan-2021 14:15:21	012621012.d	ICal					Analytes	L-6	1.00		
7	ICAL 5000_SVLC-1278	26-Jan-2021 14:25:58	012621013.d	ICal					Analytes	L-7	1.00		
8	ICAL 10000_SVLC-1279	26-Jan-2021 14:36:40	012621014.d	ICal					Analytes	L-8	1.00		
9	ICAL 15000_SVLC-1280	26-Jan-2021 14:47:21	012621015.d	ICal					Analytes	L-9	1.00		
10	ICAL 20000_SVLC-1281	26-Jan-2021 14:58:01	012621016.d	ICal					Analytes	L-10	1.00		
11	ID IBLK A	26-Jan-2021 15:08:41	012621017.d	InstBlk					Surrogates	Smp	0.1100		
12	ICV 500_SVLC-1285	26-Jan-2021 15:19:16	012621018.d	ICV					Analytes	ICV	1.00		
13	ISOMER CHECK_SVLC-1266	26-Jan-2021 15:29:51	012621019.d	CheckStd					Surrogates	Smp	1.00		
14	ID BLK B	26-Jan-2021 15:51:09	012621021.d	InstBlk					Surrogates	Smp	0.1100		
17	ID CCV 1000_SVLC-1276	26-Jan-2021 16:12:22	012621023.d	CCV					Analytes	L-5	1.00		
18	WQ80489-001	26-Jan-2021 16:23:01	012621024.d	MBlk		Aqueous	1	80489	Surrogates	Smp	0.1100		
19	WQ80489-002	26-Jan-2021 16:33:38	012621025.d	LCS		Aqueous	1	80489	Analytes	100x PDS	0.2000		
20	WA11027-006	26-Jan-2021 16:44:17	012621026.d	Client	MDLv PFAS AQ Full List L	Aqueous	1	80206	Surrogates	Smp	0.1100		
21	WA11029-006	26-Jan-2021 16:54:58	012621027.d	Client	LOQ PFAS AQ Full List LC	Aqueous	1	80206	Surrogates	Smp	0.1100		
22	WA11027-008	26-Jan-2021 17:05:32	012621028.d	Client	MDLv PFAS SOIL Full List	Soil	1	80348	Surrogates	Smp	0.1100		RX
23	WA11029-008	26-Jan-2021 17:16:10	012621029.d	Client	LOQ PFAS SOIL Full List	Soil	1	80348	Surrogates	Smp	0.1100		RX
24	WA14018-001	26-Jan-2021 17:26:48	012621030.d	Client	Effluent Grab	Aqueous	1	79746	Surrogates	Smp	0.1100		
25	WA20010-009	26-Jan-2021 17:37:27	012621031.d	Client	MW-13	Aqueous	1	80206	Surrogates	Smp	0.1100		SUR/ND, NCM
26	WA20010-009DU	26-Jan-2021 17:48:04	012621032.d	Client		Aqueous	1	80206	Surrogates	Smp	0.1100		SUR/ND
27	WA20010-010	26-Jan-2021 17:58:42	012621033.d	Client	MW-9D	Aqueous	1	80206	Surrogates	Smp	0.1100		SUR, RR
28	WA20010-011	26-Jan-2021 18:09:24	012621034.d	Client	S8MW-R	Aqueous	1	80206	Surrogates	Smp	0.1100		
29	WA16019-016	26-Jan-2021 18:20:04	012621035.d	Client	MW-3	Aqueous	1	80489	Surrogates	Smp	0.1100		
30	WA16019-016MS	26-Jan-2021 18:30:42	012621036.d	MS		Aqueous	1	80489	Analytes	100x PDS	0.2000		
31	WA16019-017	26-Jan-2021 18:41:21	012621037.d	Client	MW-3I	Aqueous	1	80489	Surrogates	Smp	0.1100		
32	ID CCV 1000A_SVLC-1276	26-Jan-2021 18:51:55	012621038.d	CCV					Analytes	L-5	1.00		
33	WA16019-018	26-Jan-2021 19:02:31	012621039.d	Client	MW-3D	Aqueous	1	80489	Surrogates	Smp	0.1100		
34	WA16019-019	26-Jan-2021 19:13:06	012621040.d	Client	MW-9	Aqueous	1	80489	Surrogates	Smp	0.1100		SUR 4:2(ND), 6:2(DETECT); RR to confirm
35	WA16019-020	26-Jan-2021 19:23:44	012621041.d	Client	MW-9I	Aqueous	1	80489	Surrogates	Smp	0.1100		
36	WA16019-020DU	26-Jan-2021 19:34:27	012621042.d	Client		Aqueous	1	80489	Surrogates	Smp	0.1100		
37	WA16019-021	26-Jan-2021 19:45:05	012621043.d	Client	Duplicate #1	Aqueous	1	80489	Surrogates	Smp	0.1100		
38	WA16019-022	26-Jan-2021 19:55:44	012621044.d	Client	Equipment Blank #2	Aqueous	1	80489	Surrogates	Smp	0.1100		
39	WA16019-023	26-Jan-2021 20:06:22	012621045.d	Client	MW-28	Aqueous	1	80489	Surrogates	Smp	0.1100		
40	WA19030-001	26-Jan-2021 20:17:02	012621046.d	Client	335-0	Aqueous	1	80489	Surrogates	Smp	0.1100		
41	WA19030-002	26-Jan-2021 20:27:46	012621047.d	Client	362-0	Aqueous	1	80489	Surrogates	Smp	0.1100		
42	WA19030-003	26-Jan-2021 20:38:22	012621048.d	Client	182-0	Aqueous	1	80489	Surrogates	Smp	0.1100		
43	WA20026-001	26-Jan-2021 20:48:58	012621049.d	Client	1694-0	Aqueous	1	80489	Surrogates	Smp	0.1100		
44	ID CCV 1000B_SVLC-1276	26-Jan-2021 20:59:38	012621050.d	CCV					Analytes	L-5	1.00		
45	WA20027-001	26-Jan-2021 21:10:16	012621051.d	Client	1694-16	Aqueous	1	80489	Surrogates	Smp	0.1100		
46	WA20028-001	26-Jan-2021 21:20:53	012621052.d	Client	372-0	Aqueous	1	80489	Surrogates	Smp	0.1100		

Report Date: 09-Feb-2021 14:28:36 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Batch Run Log Report

Batch: \\organics\LL\LCMSMS02.i\020521-nonDOD.b

Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02

Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
95	ID CCV 100_SVLC-1273	05-Feb-2021 11:54:00	020521005.d	CCV					Analytes	L-2	1.00		
96	ID CCV 200_SVLC-1274	05-Feb-2021 12:04:35	020521006.d	CCV					Analytes	L-3	1.00		
97	ID IBLK A	05-Feb-2021 12:15:09	020521007.d	InstBlk					Surrogates	Smp	0.1100		
1	WQ81820-001	05-Feb-2021 12:25:44	020521008.d	MBlk		Soil	1	81820	Surrogates	Smp	0.1100		
2	WQ81820-002	05-Feb-2021 12:36:21	020521009.d	LCS		Soil	1	81820	Analytes	100x PDS	0.1000		
3	WQ81803-001	05-Feb-2021 12:46:56	020521010.d	MBlk		Aqueous	1	81803	Surrogates	Smp	0.1100		
4	WQ81803-002	05-Feb-2021 12:57:34	020521011.d	LCS		Aqueous	1	81803	Analytes	100x PDS	0.2000		
7	WA29014-001	05-Feb-2021 13:29:25	020521014.d	Client	EQ Blank	Aqueous	1	81803	Surrogates	Smp	0.1100		
9	WA28026-007	05-Feb-2021 13:50:47	020521016.d	Client	FIELD BLANK	Aqueous	1	81803	Surrogates	Smp	0.1100		
10	WA28026-008	05-Feb-2021 14:01:27	020521017.d	Client	EQUIPMENT BLANK	Aqueous	1	81803	Surrogates	Smp	0.1100		
18	ID CCV 1000_SVLC-1324	05-Feb-2021 15:26:30	020521025.d	CCV					Analytes	L-5	1.00		
43	ID CCV 1000B_SVLC-1324	05-Feb-2021 19:52:32	020521050.d	CCV					Analytes	L-5	1.00		
59	WA29014-002	05-Feb-2021 22:11:03	020521066.d	Client	LMW-6	Aqueous	1	81803	Surrogates	Smp	0.1100		RR - 10+ SAMPLES B/W CCVs
60	WA29014-003	05-Feb-2021 22:21:43	020521067.d	Client	LMW-10	Aqueous	1	81803	Surrogates	Smp	0.1100		RR - 10+ SAMPLES B/W CCVs
61	WA29014-004	05-Feb-2021 22:32:27	020521068.d	Client	LMW-11R	Aqueous	1	81803	Surrogates	Smp	0.1100		RR - 10+ SAMPLES B/W CCVs
62	WA29014-005	05-Feb-2021 22:43:09	020521069.d	Client	LMW-12	Aqueous	1	81803	Surrogates	Smp	0.1100		RR - 10+ SAMPLES B/W CCVs
63	WA29014-006	05-Feb-2021 22:53:48	020521070.d	Client	LMW-14	Aqueous	1	81803	Surrogates	Smp	0.1100		RR - 10+ SAMPLES B/W CCVs
64	ID CCV 1000D_SVLC-1324	05-Feb-2021 23:04:28	020521071.d	CCV					Analytes	L-5	1.00		

Report Date: 10-Feb-2021 17:20:23 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Batch Run Log Report

Batch: \\organics\LL\LCMSMS02.i\020821-nonDOD.b

Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02

Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
95	ID CCV 100_SVLC-1273	08-Feb-2021 11:56:37	020821005.d	CCV					Analytes	L-2	1.00		
96	ID CCV 200_SVLC-1274	08-Feb-2021 12:07:14	020821006.d	CCV					Analytes	L-3	1.00		
97	ID IBLK A	08-Feb-2021 12:17:49	020821007.d	InstBlk					Surrogates	Smp	0.1100		
1	WQ82105-001	08-Feb-2021 12:28:23	020821008.d	MBlk		Aqueous	1	82105	Surrogates	Smp	0.1100		
2	WQ82105-002	08-Feb-2021 12:39:00	020821009.d	LCS		Aqueous	1	82105	Analytes	100x PDS	0.2000		
4	WA28028-008	08-Feb-2021 13:00:13	020821011.d	Client	BLANK-10	Aqueous	1	82105	Surrogates	Smp	0.1100		
5	WB04011-003	08-Feb-2021 13:10:51	020821012.d	Client	EQB-1	Aqueous	1	82105	Surrogates	Smp	0.1100		
6	WB04011-004	08-Feb-2021 13:21:27	020821013.d	Client	Field Blank	Aqueous	1	82105	Surrogates	Smp	0.1100		
7	WB04011-015	08-Feb-2021 13:32:02	020821014.d	Client	EQB-2	Aqueous	1	82105	Surrogates	Smp	0.1100		
8	WA29014-002	08-Feb-2021 13:42:44	020821015.d	Client	LMW-6	Aqueous	1	81803	Surrogates	Smp	0.1100		SUR; 4:2,6:2 (ND), NCM
9	WA29014-003	08-Feb-2021 13:53:26	020821016.d	Client	LMW-10	Aqueous	1	81803	Surrogates	Smp	0.1100		SUR: 4:2, 6:2, 8:2(ND), NCM
10	WA29014-004	08-Feb-2021 14:04:05	020821017.d	Client	LMW-11R	Aqueous	1	81803	Surrogates	Smp	0.1100		SUR; 4:2, 6:2, 8:2 (ND), NCM
11	WA29014-005	08-Feb-2021 14:14:45	020821018.d	Client	LMW-12	Aqueous	1	81803	Surrogates	Smp	0.1100		SUR; 4:2 (ND), NCM
12	WA29014-006	08-Feb-2021 14:25:19	020821019.d	Client	LMW-14	Aqueous	1	81803	Surrogates	Smp	0.1100		SUR; 4:2 (ND), NCM
13	ID CCV 1000_SVLC-1324	08-Feb-2021 14:35:54	020821020.d	CCV					Analytes	L-5	1.00		
17	WA29015-012	08-Feb-2021 15:18:27	020821024.d	Client	B-6	Aqueous	1	82105	Surrogates	Smp	0.1100		
18	WA29015-013	08-Feb-2021 15:29:05	020821025.d	Client	B-7	Aqueous	1	82105	Surrogates	Smp	0.1100		
19	WA29015-014	08-Feb-2021 15:39:43	020821026.d	Client	B-5	Aqueous	1	82105	Surrogates	Smp	0.1100		
20	WA29015-015	08-Feb-2021 15:50:24	020821027.d	Client	B-4	Aqueous	1	82105	Surrogates	Smp	0.1100		
21	WA29015-017	08-Feb-2021 16:01:08	020821028.d	Client	B-2	Aqueous	1	82105	Surrogates	Smp	0.1100		
22	WA28028-005	08-Feb-2021 16:11:47	020821029.d	Client	375-0	Aqueous	1	82105	Surrogates	Smp	0.1100		
23	WA28028-006	08-Feb-2021 16:22:23	020821030.d	Client	471-0	Aqueous	1	82105	Surrogates	Smp	0.1100		
24	ID CCV 1000A_SVLC-1324	08-Feb-2021 16:32:57	020821031.d	CCV					Analytes	L-5	1.00		
25	WA29015-016	08-Feb-2021 16:43:38	020821032.d	Client	EB-126	Aqueous	1	82105	Surrogates	Smp	0.1100		
28	WA29014-007	08-Feb-2021 17:15:34	020821035.d	Client	LMW-7	Aqueous	1	81803	Surrogates	Smp	0.1100		SUR 4:2, 6:2, 8:2 (ND) - NCM 47952 - REPORT
29	WA28026-003	08-Feb-2021 17:26:11	020821036.d	Client	SMW-5	Aqueous	5	81803	Surrogates	Smp	0.1100		
30	WA28026-004	08-Feb-2021 17:36:52	020821037.d	Client	CPMW02	Aqueous	5	81803	Surrogates	Smp	0.1100		
31	WA28026-005	08-Feb-2021 17:47:31	020821038.d	Client	CPMW03	Aqueous	5	81803	Surrogates	Smp	0.1100		
32	WA28026-005DU	08-Feb-2021 17:58:05	020821039.d	Client		Aqueous	5	81803	Surrogates	Smp	0.1100		
33	WA28026-006	08-Feb-2021 18:08:41	020821040.d	Client	DUPLICATE	Aqueous	5	81803	Surrogates	Smp	0.1100		
34	WA28028-007	08-Feb-2021 18:19:26	020821041.d	Client	DUP 10	Aqueous	1	82105	Surrogates	Smp	0.1100		
35	WA28028-009	08-Feb-2021 18:30:04	020821042.d	Client	406-2	Aqueous	1	82105	Surrogates	Smp	0.1100		
36	ID CCV 1000B_SVLC-1324	08-Feb-2021 18:40:47	020821043.d	CCV					Analytes	L-5	1.00		
37	WA28028-010	08-Feb-2021 18:51:26	020821044.d	Client	144-0	Aqueous	1	82105	Surrogates	Smp	0.1100		
38	WA28028-011	08-Feb-2021 19:02:07	020821045.d	Client	85-0	Aqueous	1	82105	Surrogates	Smp	0.1100		
39	WA28028-012	08-Feb-2021 19:12:46	020821046.d	Client	94-0	Aqueous	1	82105	Surrogates	Smp	0.1100		
40	WA28028-013	08-Feb-2021 19:23:25	020821047.d	Client	408-0	Aqueous	1	82105	Surrogates	Smp	0.1100		
41	WA28028-014	08-Feb-2021 19:34:11	020821048.d	Client	412-0	Aqueous	1	82105	Surrogates	Smp	0.1100		
42	WA28028-014MS	08-Feb-2021 19:44:50	020821049.d	MS		Aqueous	1	82105	Analytes	100x PDS	0.2000		
43	WA28028-015	08-Feb-2021 19:55:27	020821050.d	Client	144-1	Aqueous	1	82105	Surrogates	Smp	0.1100		
44	WA28028-015DU	08-Feb-2021 20:06:08	020821051.d	Client		Aqueous	1	82105	Surrogates	Smp	0.1100		
45	WA28027-002	08-Feb-2021 20:16:48	020821052.d	Client	HS-PW-2.5 (B)	Aqueous	1	81803	Surrogates	Smp	0.1100		
46	WA28027-001	08-Feb-2021 20:27:25	020821053.d	Client	HS-PW-2.5 (A)	Aqueous	5	81803	Surrogates	Smp	0.1100		
47	WA28027-003	08-Feb-2021 20:38:06	020821054.d	Client	HS-PW-3 (A)	Aqueous	5	81803	Surrogates	Smp	0.1100		

Report Date: 10-Feb-2021 17:20:23 AIM Revision: 2.0 05-Oct-2020 14:59:22

Batch Path: \\organics\LL\LCMSMS02.i\020821-nonDOD.b

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
48	WA28027-004	08-Feb-2021 20:48:46	020821055.d	Client	HS-PW-3 (A) DUP	Aqueous	5	81803	Surrogates	Smp	0.1100		
49	ID CCV 1000C_SVLC-1324	08-Feb-2021 20:59:27	020821056.d	CCV					Analytes	L-5	1.00		
50	WB03046-001	08-Feb-2021 21:10:08	020821057.d	Client	MW-1 (0-6-inch)	Soil	1	81820	Surrogates	Smp	0.1100		
51	WB03046-002	08-Feb-2021 21:20:48	020821058.d	Client	MW-1 (6-inch-2ft)	Soil	1	81820	Surrogates	Smp	0.1100		
52	WB03046-003	08-Feb-2021 21:31:23	020821059.d	Client	SB-7 (0-6-inch)	Soil	1	81820	Surrogates	Smp	0.1100		
53	WB03046-004	08-Feb-2021 21:41:59	020821060.d	Client	SB-7 (6-24-inch)	Soil	1	81820	Surrogates	Smp	0.1100		
54	WB02009-001	08-Feb-2021 21:52:39	020821061.d	Client	B1 @1	Soil	1	81820	Surrogates	Smp	0.1100		
55	WB02009-001MS	08-Feb-2021 22:03:22	020821062.d	MS		Soil	1	81820	Analytes	100x PDS	0.1000		
56	WB02009-001MD	08-Feb-2021 22:14:08	020821063.d	MSD		Soil	1	81820	Analytes	100x PDS	0.1000		
57	WB02009-002	08-Feb-2021 22:24:48	020821064.d	Client	B1 @10	Soil	1	81820	Surrogates	Smp	0.1100		
58	WB02009-003	08-Feb-2021 22:35:28	020821065.d	Client	B3 @5	Soil	1	81820	Surrogates	Smp	0.1100		
59	WB02009-004	08-Feb-2021 22:46:09	020821066.d	Client	B3 @15	Soil	1	81820	Surrogates	Smp	0.1100		
60	ID CCV 1000D_SVLC-1324	08-Feb-2021 22:57:08	020821067.d	CCV					Analytes	L-5	1.00		
61	WB02009-007	08-Feb-2021 23:07:47	020821068.d	Client	B13 @1	Soil	1	81820	Surrogates	Smp	0.1100		
62	WB02009-008	08-Feb-2021 23:18:27	020821069.d	Client	B13 @10	Soil	1	81820	Surrogates	Smp	0.1100		
63	WB02009-009	08-Feb-2021 23:29:03	020821070.d	Client	B1300 @10	Soil	1	81820	Surrogates	Smp	0.1100		
64	ID CCV 1000E_SVLC-1324	08-Feb-2021 23:39:44	020821071.d	CCV					Analytes	L-5	1.00		

Report Date: 11-Feb-2021 10:00:29 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Batch Run Log Report

Batch: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b

Method: LCMSMS01_PFAS-ID.M Instrument: LCMSMS01

Cal Start Date: 07-Feb-2021 14:32:59 Cal End Date: 07-Feb-2021 16:08:04

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
1	ICAL 50_SVLC-1333	07-Feb-2021 14:32:59	020721021.d	ICal					Analytes	L-1	1.00		
2	ICAL 100_SVLC-1334	07-Feb-2021 14:43:30	020721022.d	ICal					Analytes	L-2	1.00		
3	ICAL 200_SVLC-1335	07-Feb-2021 14:54:02	020721023.d	ICal					Analytes	L-3	1.00		
4	ICAL 500_SVLC-1336	07-Feb-2021 15:04:36	020721024.d	ICal					Analytes	L-4	1.00		
5	ICAL 1000_SVLC-1337	07-Feb-2021 15:15:08	020721025.d	ICal					Analytes	L-5	1.00		
6	ICAL 2000_SVLC-1338	07-Feb-2021 15:25:43	020721026.d	ICal					Analytes	L-6	1.00		
7	ICAL 5000_SVLC-1339	07-Feb-2021 15:36:16	020721027.d	ICal					Analytes	L-7	1.00		
8	ICAL 10000_SVLC-1340	07-Feb-2021 15:46:51	020721028.d	ICal					Analytes	L-8	1.00		
9	ICAL 15000_SVLC-1341	07-Feb-2021 15:57:27	020721029.d	ICal					Analytes	L-9	1.00		
10	ICAL 20000_SVLC-1342	07-Feb-2021 16:08:04	020721030.d	ICal					Analytes	L-10	1.00		
95	ID BLK	07-Feb-2021 16:18:43	020721031.d	InstBlk					Surrogates	Smp	0.1100		
12	ISOMER CHECK_SVLC-1266	07-Feb-2021 16:39:49	020721033.d	CheckStd					Surrogates	Smp	1.00	Yes	
98	ID ICV 500_SVLC-1343	08-Feb-2021 11:48:09	020821015.d	ICV					Analytes	ICV	1.00		

Report Date: 11-Feb-2021 10:19:47 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Batch Run Log Report

Batch: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b

Method: LCMSMS01_PFAS-ID.M Instrument: LCMSMS01

Cal Start Date: 07-Feb-2021 14:32:59 Cal End Date: 07-Feb-2021 16:08:04

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
95	ID CCV 100_SVLC-1334	08-Feb-2021 10:02:45	020821005.d	CCV					Analytes	L-2	1.00		RR-PFDoA high
96	ID CCV 200_SVLC-1335	08-Feb-2021 10:13:17	020821006.d	CCV					Analytes	L-3	1.00		All dilutions refortified w/EIS SVLC-1328
97	ID IBLK A	08-Feb-2021 10:23:47	020821007.d	InstBlk					Surrogates	Smp	0.1100		
95	ID CCV 100A_SVLC-1334	08-Feb-2021 10:34:22	020821008.d	CCV					Analytes	L-2	1.00		All pass
95	ID CCV 100A DUP_SVLC-1334	08-Feb-2021 10:44:55	020821009.d	CCV					Analytes	L-2	1.00		Confirms all pass
97	ID IBLK A	08-Feb-2021 10:55:27	020821010.d	InstBlk					Surrogates	Smp	0.1100		
98	ID ICV 500_SVLC-1343	08-Feb-2021 11:06:02	020821011.d	Client		Aqueous	1						
1	WQ81967-001	08-Feb-2021 11:16:36	020821012.d	MBlk		Aqueous	1	81967	Surrogates	Smp	0.1100		RR after ICV
94	ID BLK B2	08-Feb-2021 11:27:08	020821013.d	InstBlk					Surrogates	Smp	0.1100		
94	ID BLK B3	08-Feb-2021 11:37:39	020821014.d	InstBlk					Surrogates	Smp	0.1100		
98	ID ICV 500_SVLC-1343	08-Feb-2021 11:48:09	020821015.d	ICV					Analytes	ICV	1.00		
27	ID CCV 1000A_SVLC-1337	08-Feb-2021 16:33:23	020821042.d	CCV					Analytes	L-5	1.00		
28	WQ81968-001	08-Feb-2021 16:43:57	020821043.d	MBlk		Aqueous	1	81968	Surrogates	Smp	0.1100		
29	WQ81968-002	08-Feb-2021 16:54:33	020821044.d	LCS		Aqueous	1	81968	Analytes	100x PDS	0.2000		
30	WQ81971-001	08-Feb-2021 17:05:09	020821045.d	MBlk		Soil	1	81971	Surrogates	Smp	0.1100		
31	WQ81971-002	08-Feb-2021 17:15:47	020821046.d	LCS		Soil	1	81971	Analytes	100x PDS	0.1000		
32	WA28027-005	08-Feb-2021 17:26:20	020821047.d	Client	HS-PW-3.5 (A)	Aqueous	1	81968	Surrogates	Smp	0.1100		
33	WA28027-005MS	08-Feb-2021 17:36:54	020821048.d	MS		Aqueous	1	81968	Analytes	100x PDS	0.2000		EIS double spiked, NCM #47852
34	WA28027-005MD	08-Feb-2021 17:47:28	020821049.d	MSD		Aqueous	1	81968	Analytes	100x PDS	0.2000		
35	WA28027-006	08-Feb-2021 17:58:02	020821050.d	Client	FB-1/26	Aqueous	1	81968	Surrogates	Smp	0.1100		
36	WA28027-007	08-Feb-2021 18:08:36	020821051.d	Client	EB-HT	Aqueous	1	81968	Surrogates	Smp	0.1100		
37	WA28028-001	08-Feb-2021 18:19:13	020821052.d	Client	354-0	Aqueous	1	81968	Surrogates	Smp	0.1100		
38	WA28028-002	08-Feb-2021 18:29:49	020821053.d	Client	358-0	Aqueous	1	81968	Surrogates	Smp	0.1100		
39	WA28028-003	08-Feb-2021 18:40:24	020821054.d	Client	359-0	Aqueous	1	81968	Surrogates	Smp	0.1100		
40	WA28028-004	08-Feb-2021 18:51:01	020821055.d	Client	381-0	Aqueous	1	81968	Surrogates	Smp	0.1100		
41	WB03053-001	08-Feb-2021 19:01:40	020821056.d	Client	GTW-3	Aqueous	1	81968	Surrogates	Smp	0.1100		
42	ID CCV 1000B_SVLC-1337	08-Feb-2021 19:12:13	020821057.d	CCV					Analytes	L-5	1.00		
43	WB04011-001	08-Feb-2021 19:22:48	020821058.d	Client	MW-3 (0-6-inch)	Soil	50	81971	Surrogates	Smp	0.1100		RR-1X
44	WB04011-002	08-Feb-2021 19:33:23	020821059.d	Client	MW-3 (6-inch-2ft)	Soil	50	81971	Surrogates	Smp	0.1100		RR-1X
45	WB04011-005	08-Feb-2021 19:43:57	020821060.d	Client	SB-8 (0-6-inch)	Soil	50	81971	Surrogates	Smp	0.1100		RR-1X
46	WB04011-006	08-Feb-2021 19:54:33	020821061.d	Client	SB-8 (6-inch-2ft)	Soil	50	81971	Surrogates	Smp	0.1100		RR-1X
47	WB04011-007	08-Feb-2021 20:05:07	020821062.d	Client	SB-9 (0-6-inch)	Soil	50	81971	Surrogates	Smp	0.1100		RR-1X
48	WB04011-008	08-Feb-2021 20:15:43	020821063.d	Client	SB-9 (6-inch-2ft)	Soil	50	81971	Surrogates	Smp	0.1100		RR-1X
49	WB04011-009	08-Feb-2021 20:26:18	020821064.d	Client	SB-10 (0-6-inch)	Soil	50	81971	Surrogates	Smp	0.1100		RR-1X
50	WB04011-010	08-Feb-2021 20:36:55	020821065.d	Client	SB-10 (6-inch-2ft)	Soil	50	81971	Surrogates	Smp	0.1100		

Analyst: MBR **Level 2 Analyst:** NA

Status: Level 1 review released

Matrix: Aqueous

Printed: 02/16/21 0834

Prep Batch: 81803

PFAS Prep by ID - PFAS Aqueous Preparation

Start Date: 02/04/2021 1209

End Date: 02/04/2021 1621

Conc Analyst: MBR

Conc Start Date: 02/04/2021 1621

Conc End Date: 02/04/2021 1621

Ext Solvent: MECH>96%MECH/4%H2O

Surrogate: SVLC-1307B

Surrogate Vol. (mL): 0.110

Reagents Vol. (mL): 10

Chem ID: 20-2857>20-2857/21-252

Balance ID: Balance # 20-1123

Sample ID	QC Code	Client Sample ID	Run	Analysis Method	Container + Sample (g)	Container Empty (g)	Initial Vol. (mL)	Spike ID	Spike Vol. (mL)	Final Vol. (mL)	Comments
WQ81803-001	MB		1	PFAS by ID SOP	280	30	250		0.000	10.0	MB init:300.77g,fin:30.95g;LCS init:301.82g,fin:30.68g;
WQ81803-002	LCS		1	PFAS by ID SOP	280	30	250	SVLC-1327	0.200	10.0	Sorbent dry start/end:1st:1306/1311,2nd:1534/1539;Buf 384;Amm-MeOH:SV21-385(4mL);QC Water:21-252
WA29014-001	Sample	EQ Blank	1	PFAS by ID SOP	307.89	42.59	265		0.000	10.0	Bottletop#:329;Pipettes:383,20-2315;QC Bottles:M0-322-01BB;XL-AW: 20-2827;Reservoirs:20-2623
WA29014-002	Sample	LMW-6	1	PFAS by ID SOP	302.89	43.45	259		0.000	10.0	Filter cartridges: 21-254/21-190; Elution tubes:20-1843;Falcon tubes:21-33;Centrifuge tubes:20-2051
WA29014-003	Sample	LMW-10	1	PFAS by ID SOP	301.48	43.23	258		0.000	10.0	Storage bottles:20-2252;MeOH Ext:4mL,Filt:2mL;IS:SVLC-1303(0.010mL); ASV/Caps:21-208/21-207
WA29014-004	Sample	LMW-11R	1	PFAS by ID SOP	297.8	43.59	254		0.000	10.0	NCM#47659
WA29014-005	Sample	LMW-12	1	PFAS by ID SOP	290.94	43.67	247		0.000	10.0	
WA29014-006	Sample	LMW-14	1	PFAS by ID SOP	295.1	43.43	252		0.000	10.0	
WA29014-007	Sample	LMW-7	1	PFAS by ID SOP	288.3	43.98	244		0.000	10.0	
WA28022-001	Sample	C-6 (110)	1	PFAS by ID SOP	308.43	40.17	268		0.000	10.0	
WA28026-001	Sample	SMW-1	1	PFAS by ID SOP	308.26	32.41	276		0.000	10.0	NCM#47660
WA28026-002	Sample	SMW-2	1	PFAS by ID SOP	313.11	60.25	253		0.000	10.0	NCM#47662
WA28026-003	Sample	SMW-5	1	PFAS by ID SOP	314.55	32.17	282		0.000	10.0	
WA28026-003MSMS			1	PFAS by ID SOP	322.58	31.97	291	SVLC-1327	0.200	10.0	

Analyst: MBR **Level 2 Analyst:** NA

Status: Level 1 review released

Matrix: Aqueous

Printed: 02/16/21 0834

Prep Batch: 81803

PFAS Prep by ID - PFAS Aqueous Preparation

Start Date: 02/04/2021 1209
End Date: 02/04/2021 1621

Conc Analyst: MBR
Conc Start Date: 02/04/2021 1621
Conc End Date: 02/04/2021 1621

Surrogate: SVLC-1307B
Surrogate Vol. (mL): 0.110

Ext Solvent: MECH>96%/MECH/4%/H2O
Reagents Vol. (mL): 10
Chem ID: 20-2857>20-2857/21-252

Balance ID: Balance # 20-1123

Sample ID	QC Code	Client Sample ID	Run	Analysis Method	Container + Sample (g)	Container Empty (g)	Initial Vol. (mL)	Spike ID	Spike Vol. (mL)	Final Vol. (mL)	Comments
WA28026-004	Sample	CRMW02	1	PFAS by ID SOP	313.57	31.62	282		0.000	10.0	
WA28026-005	Sample	CRMW03	1	PFAS by ID SOP	311.86	32.04	280		0.000	10.0	
WA28026-005DU	Duplicate		1	PFAS by ID SOP	320.58	31.82	289		0.000	10.0	
WA28026-006	Sample	DUPLICATE	1	PFAS by ID SOP	321.42	32.2	289		0.000	10.0	
WA28026-007	Sample	FIELD BLANK	1	PFAS by ID SOP	265.69	32.17	234		0.000	10.0	
WA28026-008	Sample	EQUIPMENT BLANK	1	PFAS by ID SOP	274.03	32.01	242		0.000	10.0	
WA28027-001	Sample	HS-PW-2.5 (A)	1	PFAS by ID SOP	315.32	33.61	282	✓	0.000	10.0	
WA28027-002	Sample	HS-PW-2.5 (B)	1	PFAS by ID SOP	314.27	31.52	283	✓	0.000	10.0	
WA28027-003	Sample	HS-PW-3 (A)	1	PFAS by ID SOP	301.91	31.83	270	✓	0.000	10.0	
WA28027-004	Sample	HS-PW-3 (A) DUP	1	PFAS by ID SOP	321.87	33.51	288	✓	0.000	10.0	

(end of report) **Total Samples: 20**

Analyst: ALM **Level 2 Analyst:** NA

Status: Level 1 review released

Matrix: Aqueous

Printed: 02/16/21 0835

Prep Batch: 81968

PFAS Prep by ID - PFAS Aqueous Preparation

Start Date: 02/05/2021 1201

End Date: 02/05/2021 1530

Conc Analyst: ALM

Conc Start Date: 02/05/2021 1530

Conc End Date: 02/05/2021 1530

Surrogate: SVLC-1326

Surrogate Vol. (mL): 0.110

Ext Solvent: MECH-96%/MECH/4%/H2O

Reagents Vol. (mL): 10

Chem ID: 20-2857>20-2857/21-252

Balance ID: Balance # 20-1123

Sample ID	QC Code	Client Sample ID	Run	Analysis Method	Container + Sample (g)	Container Empty (g)	Initial Vol. (mL)	Spike ID	Spike Vol. (mL)	Final Vol. (mL)	Comments
WQ81968-001	MB		1	PFAS by ID SOP	310.93	31.23	280		0.000	10.0	Init: 310.93g; Final: 31.23g
WQ81968-002	LCS		1	PFAS by ID SOP	307.37	31.56	276	SVLC-1327	0.200	10.0	Init: 307.37g; Final: 31.56g
WA28027-005	Sample	HS-PW-3.5 (A)	1	PFAS by ID SOP	307.94	31.4	277		0.000	10.0	Sorbent dry start/end:1431/1436;Buffer:SV21-384;Amm-MeOH:SV21-385(4mL);QC Water:21-252;
WA28027-005MS	MS	HS-PW-3.5 (A)MS	1	PFAS by ID SOP	316.99	33.26	284	SVLC-1327	0.200	10.0	NCM47724
WA28027-005MD	MSD	HS-PW-3.5 (A)MD	1	PFAS by ID SOP	302.37	31.62	271	SVLC-1327	0.200	10.0	NCM47724
WA28027-006	Sample	FB-1/26	1	PFAS by ID SOP	303.36	33.1	270		0.000	10.0	Bottletop#:329;Pipettes:383,20-2315;QC Bottles:M0-322-01BB;XL-AW: 20-2827;Reservoirs:20-2623;
WA28027-007	Sample	EB-HT	1	PFAS by ID SOP	279.5	32.9	247		0.000	10.0	Filter cartridges: 21-254; Elution tubes:20-1843;Storage bottles:20-2828;
WA28028-001	Sample	354-0	1	PFAS by ID SOP	272.66	32.43	240		0.000	10.0	MeOH Ext:4mL,Filt:2mL;IS:SVLC-1303(0.010mL); ASV/Caps:21-208/21-207;
WA28028-002	Sample	358-0	1	PFAS by ID SOP	265.27	32.06	233		0.000	10.0	
WA28028-003	Sample	359-0	1	PFAS by ID SOP	298.83	32.99	266		0.000	10.0	
WA28028-004	Sample	381-0	1	PFAS by ID SOP	289.41	32.44	257		0.000	10.0	
WB03053-001	Sample	GTW-3	1	PFAS by ID SOP	273.73	32.94	241		0.000	10.0	

(end of report) **Total Samples: 8**

SECTION 4

CASE NARRATIVE AND CHAIN-OF-CUSTODY RECORD

Sample Summary

GZA GeoEnvironmental, Inc.

Lot Number: WA28027

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	HS-PW-2.5 (A)	Aqueous	01/26/2021 1130	01/28/2021
002	HS-PW-2.5 (B)	Aqueous	01/26/2021 1215	01/28/2021
003	HS-PW-3 (A)	Aqueous	01/26/2021 1430	01/28/2021
004	HS-PW-3 (A) DUP	Aqueous	01/26/2021 1430	01/28/2021
005	HS-PW-3.5 (A)	Aqueous	01/26/2021 1540	01/28/2021
006	FB-1/26	Aqueous	01/26/2021 1550	01/28/2021
007	EB-HT	Aqueous	01/26/2021 1705	01/28/2021

(7 samples)

Case Narrative
GZA GeoEnvironmental, Inc.
Lot Number: WA28027

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the most current approved The NELAC Institute (TNI) standards, the Pace Analytical Services, LLC ("Pace") Laboratory Quality Manual, standard operating procedures (SOPs), and Pace policies. Any exceptions to the TNI standards, the Laboratory Quality Manual, SOPs or policies are qualified on the results page or discussed below.

If you have any questions regarding this report please contact the Pace Project Manager listed on the cover page.

Due to a spiking error, the WA28027-005 Matrix Spike and Matrix Spike Duplicate (MS/MSD) were double-spiked with the EIS and Surrogate standard, affecting the recoveries. There was insufficient sample remaining to perform a re-extraction; therefore, the data have been reported and qualified. Parent sample WA28027-005 was correctly spiked.

double spike confirmed. MS/MSD not used to qualify data as the parent had acceptable "surrogate" recoveries

REVISED REPORT - February 11, 2021
A revised report was issued. The following PFAS note below was added to the Case Narrative page.

All other sample results are as reported in the original PDF report. This report supersedes and replaces any prior reports issued under this lot number.

PFAS – by Isotope Dilution

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the Pace Quality Assurance Management Plan (QAMP), applicable Shealy standard operating procedures (SOPs), the 2003 NELAC standard, and Shealy policies. Additionally, the DoD QSM version 5.3 has been followed for these samples, and specifically Table B-15 was followed for all PFAS samples. Any exceptions to the QAMP, SOPs, NELAC standards, the DoD QSM, or policies are qualified on the results page or discussed below.

All QC associated with these samples was in compliance with DOD QSM 5.3 table B-15 and our PFAS SOP.

Correction factors (CF) are used to calculate the original sample concentration. The CF is the inverse of the concentration factor (sample volume / extract final volume) times the dilution factor (DF). For undiluted analysis. For undiluted analysis, the extract is prepared for injection by adding 182 uL of

sample extract + 8 uL of reagent water + 10 uL of internal standard solution to a polypropylene autosampler vial. An extra correction factor of 0.91 (182 uL / 200 uL = 0.91) applies. The CF is calculated as follows:

CF = DF * FV / Vo

FV is volume of extract (mL)
Vo is initial sample volume (mL)
DF is dilution factor. For undiluted analysis, DF = 1/0.91.

Sample concentration for aqueous samples:
Concentration (ng/L) = Cs*CF,

$$C_s = \frac{\left(\frac{(A_s x C_{is})}{A_{is}}\right) - B}{M1}$$

Where

C_s is on column concentration of target analyte in the sample (ng/L)
C_{is} is concentration of internal standard in the sample (ng/L)
A_s is peak response of target analyte in the sample
A_{is} is peak response of internal standard in the sample
M1 is the average RF from ICAL or the slope from linear regression ICAL
B is the y-intercept from the ICAL

Shealy Environmental Services, Inc.
106 Vantage Point Drive
West Columbia, South Carolina 29172
Telephone No. (803) 791-9700 Fax No. (803) 791-9111
www.shealylab.com

Chain of Custody Record

Number

Client	Report to Contact	Telephone No. / E-mail	Quote No.
Rose and Westra / GZA	Lori Powers	616-556-6123 loretta.powers@gza.com	

Address	Sampler's Signature	Analysis (Attach list if more space is needed)	Page
601 Fifth Street NW, Suite 102	X Makayla Myers		1 of 1

City	State	Zip Code	Printed Name
Grand Rapids	MI	49504	Makayla Myers

Project Name: 16.0062961.51 T1

Project Number: 16.0062961.51 T1 | P.O No:

WA28027

KLC2

Sample ID / Description (Containers for each sample may be combined on one line)	Date	Time	G=Grab C=Composite	Matrix: Aqueous	Solid	Non-Aqueous	No of Containers by Preservative Type: Unpres	H2SO4	HNO3	HCl	NaOH	H2O	MeOH	PFAS	Remarks / Cooler I.D.
HS-PW-2.5(A)	1/26/2021	11:30	G	x			2							x	
HS-PW-2.5(B)	1/26/2021	12:15	G	x			2							x	
HS-PW-3(A)	1/26/2021	14:30	G	x			2							x	
HS-PW-3(A) DUP	1/26/2021	14:30	G	x			2							x	
HS-PW-3.5(A)	1/26/2021	15:40	G	x			2							x	
HS-PW-3.5(A) MD/MSD	1/26/2021	15:40	G	x			2							x	
FB-1/26	1/26/2021	15:50	G	x			2							x	
EB-HT	1/26/2021	17:05	G	x			2							x	

Turn Around Time Required (Prior lab approval required for expedited TAT)
☐ Standard ☒ Rush (Please Specify) 2 week

Sample Disposal
☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification (List any known hazards in the remarks)
☒ Non-Hazardous ☐ Flammable ☐ Skin Irritant ☐ SDS provided ☐ Unknown

QC Requirements

1. Relinquished by	Date	Time	1. Received by	Date	Time
Makayla Myers	1/27/2021	12:00			
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by FedEx	Date 1/28/21	Time 0930	4. Laboratory Received by	Date 1/28/21	Time 0930

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Check) ☑ Y ☐ N ☐ Ice Pack
Receipt Temp. 1.8 °C

Document Number: ME002OW-01

PACE ANALYTICAL SERVICES, LLC

Pace Analytical

Samples Receipt Checklist (SRC) (ME0018C-15)
Issuing Authority: Pace ENV - WCOL

Revised:9/29/2020
Page 1 of 1

Sample Receipt Checklist (SRC)

Client: GZA Cooler Inspected by/date: JSH / 01/28/2021 Lot #: WA28027

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other: ____

☑ Yes	☐ No		1. Were custody seals present on the cooler?
☑ Yes	☐ No	☐ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA

1.8 / 1.8 °C NA / NA °C NA / NA °C NA / NA °C

Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 5 IR Gun Correction Factor: 0 °C

Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☐ Yes	☐ No	☑ NA	3. If temperature of any cooler exceeded 6.0°C, was Project Manager Notified? PM was Notified by: phone / email / face-to-face (circle one).
☑ Yes	☐ No	☐ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC?
☑ Yes	☐ No		7. Were sample IDs listed on all sample containers?
☑ Yes	☐ No		8. Was collection date & time listed on the COC?
☑ Yes	☐ No		9. Was collection date & time listed on all sample containers?
☑ Yes	☐ No		10. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		11. Were tests to be performed listed on the COC?
☑ Yes	☐ No		12. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)? ____
☑ Yes	☐ No		13. Was adequate sample volume available?
☑ Yes	☐ No		14. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☐ Yes	☑ No		15. Were any samples containers missing/excess (circle one) samples Not listed on COC?
☐ Yes	☐ No	☑ NA	16. For VOA and RSK-175 samples, were bubbles present >"pea-size" (¼"or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	17. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	18. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	19. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☐ No	☑ NA	20. Were client remarks/requests (i.e. requested dilutions, MS/MSD designations, etc…) correctly transcribed from the COC into the comment section in LIMS?
☐ Yes	☑ No		21. Was the quote number listed on the container label? If yes, Quote # NA

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H2SO4, HNO3, HCl, NaOH using SR # NA.
Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA were received with bubbles >6 mm in diameter.

Samples(s) NA were received with TRC > 0.5 mg/L (If #19 is ***no***) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Shealy ID: NA.

SR barcode labels applied by: KHS Date: 01/28/2021

Comments:

SECTION 5

PROJECT CORRESPONDENCE

From:	Karen Coonan
To:	Jared K. Acker; Katherine McDonald
Cc:	Meg Michell; David Blye
Subject:	RE: Pace SC / GZA requests for VI10034,VJ29012,WA28027
Date:	Wednesday, May 26, 2021 2:49:37 PM
Attachments:	image001.png image002.png image003.png VJ29012_Report (1).pdf VI10034_Report.pdf

This sender is trusted.

Hi Jared,

I have attached a revised Level 2 report for VJ29012 and VI10034. The Level IVs are in the process of being revised to include the attached Level 2 reports. As soon as those are completed, I will forward to you.

For VJ29012, the COC was revised to reflect the correct preservative.

For VI10034, a note has been added to the Case Narrative page regarding the VI10034-001DU and VI10034-005MS.

For WA28027 – We no longer supply Internal Standard summary sheets (Form 8) for the Isotope Dilution (ID) methods (ID-AQ and ID-Solid) as they are not required by the methods (QSM Table B-15 or Wisconsin guidance); they are not used in the calculation of PFAS by ID. We only provide Form 8 for EPA 537.1 and 533.

Thank you,

Karen Coonan
Project Manager | Pace South Carolina
formerly Shealy Environmental Services, Inc.
106 Vantage Point Drive, West Columbia, SC 29172
office: 803.509.8398 | main: 803.791.9700 X106 | pacelabs.com

---

From: Karen Coonan
Sent: Monday, May 17, 2021 12:20 PM
To: 'Jared K. Acker' <jacker@envstd.com>; Katherine McDonald <Katherine.McDonald@gza.com>
Cc: Meg Michell <mmichell@envstd.com>; David Blye <DBLYE@envstd.com>; Mike McFadden <mcflylab@aol.com>; Dan Wright <Dan.Wright@pacelabs.com>
Subject: RE: Pace SC / GZA requests for VI10034,VJ29012,WA28027

Hi Jared,

For WA28027, the revision to the report was that the "PFAS – by Isotope Dilution" note that was added to the Case Narrative. It is the note following the statement that is bold. The note pertains to the correction factor.

For the other requests below, I have asked the lab to look into these and provide the requested information. I will forward the information as soon as I receive it.

Thank you,

Karen Coonan
Project Manager | Pace South Carolina
formerly Shealy Environmental Services, Inc.
106 Vantage Point Drive, West Columbia, SC 29172
office: 803.509.8398 | main: 803.791.9700 X106 | pacelabs.com

---

From: Jared K. Acker <jacker@envstd.com>
Sent: Monday, May 17, 2021 11:59 AM
To: Karen Coonan <Karen.Coonan@pacelabs.com>; Katherine McDonald <Katherine.McDonald@gza.com>
Cc: Meg Michell <mmichell@envstd.com>; David Blye <DBLYE@envstd.com>; Mike McFadden <mcflylab@aol.com>; Dan Wright <Dan.Wright@pacelabs.com>
Subject: Pace SC / GZA requests for VI10034,VJ29012,WA28027

CAUTION: This email originated from outside Pace Analytical. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good afternoon all, we have some requests for both the laboratory and GZA for a few items in SDGs VI10034, VJ29012, WA28027. Can these please be addressed and revised data packages issued?

VI10034 – Samples VI10034-001DU and VI10034-005 each had a failing pre-injection internal standard, the run log indicated they were to be re-ran. Can details of these failures be noted in the Case Narrative (if the samples were re-ran and confirmed the failure, ect) as it is a method deviation?

VJ29012 – Page 2 of the Chain of Custody indicated water preservation instead of Trizma, this appears to be in error; can this be confirmed and a revised CoC issued?

WA28027 –

1. A pre-injection internal standard summary form was not included. Historically this was provided for 537ID in the old data package format. Can this please be provided?
2. The Case Narrative includes language about the report being revised with a note added. However, I'm not seeing a note indicating a reason for the revision, only language about the repot superseding prior reports. Can this be checked or explained?

Thanks everyone

Jared Acker
Staff Chemist III
Environmental Standards, Inc.
1140 Valley Forge Road • PO Box 810 • Valley Forge, PA 19482
610.935.5577 x403 • www.envstd.com • jacker@envstd.com

Emergency Response Quality Assurance Hotline: 855.374.7272

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GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

APPENDIX C

PORE-WATER SAMPLING WORKSHEETS

Attachment A – Pore Water Sampling Worksheet

Date: 12/9/20

Location ID: WWW-PW-1(A)

Weather Conditions: Sunny, 46°

Sampler's Name: TAZ

Water Depth ~~(ft)~~: 3'11

Sampler Screen ~~Interval (ft) (below water surface)~~ top 3'

Sediment Thickness ~~(ft)~~ (est): 25'

Sample Depth (ft below ground surface of the river bottom): 3-3.13

Start time 15:53

Sample Time 16:15

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
15:45				3.7		654		11.47		4.2		6.9		2.79	
15:55					5.1		837		0.49		-13.6		7.5		10,8
16:00					5.0		841		.43		-24.2		7.47		5.50
16:05					4.9		842		.41		-28.9		7.56		19.3
16:10					4.8		842		.41		-27.2		7.54		13.7

Attachment A – Pore Water Sampling Worksheet

Date: 12/9/20

Location ID: WWW-PW-1(B)

Weather Conditions: Sunny, 46°

Sampler's Name: TAL

Water Depth ~~(ft)~~: 5'

Sampler Screen ~~Interval (ft)~~ (~~below water surface~~) top 4'

Sediment Thickness ~~(ft)~~ (est): 2.5'

Sample Depth (ft below ground surface of the river bottom): 4-4.13

Start time 16:35

Sample Time 16:55

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
16:30	–	–		3.7		654		11.47		4.2		6.9		2.79	
16:35	–	–			4.5		849		.42		-31		7.52		32.3
16:40					4.5		622		.40		-33		7.49		17.5
16:45					4.5		560		.11		-38.2		7.52		9.5
16:50					4.5		450.1		.08		-39.6		7.47		10.8

Attachment A – Pore Water Sampling Worksheet

Date: 12/9/2020

Location ID: WVNW - PW - 2(A)

Weather Conditions: Sunny, 45°

Sampler's Name: TAL

Water Depth ~~(ft)~~: 4"

Sampler Screen ~~Interval (ft)~~ ~~(below water surface)~~: ~~2.3~~' top 2.33'

Sediment Thickness ~~(ft)~~ (est): Sediment/Clay - 2'

Sample Depth (ft below ground surface of the river bottom): 2.33-2.46

Start time 14:20

Sample Time 14:40

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
14:10	—	-		3.6		654		11.17		-9.8		8.51		6.06	
14:20	—	—	100ml		5.8		597		.80		-29.3		6.93		6.85
14:25	—	-	100 ml		5.7		599		.23		-21.4		6.89		3.44
14:30	—	—	100 ml		5.8		608		.10		-25.4		6.87		2.47
14:35	—	-	100 ml		5.9		613		.19		-28.2		6.87		2.53

Attachment A – Pore Water Sampling Worksheet

Date: 12/9/20

Location ID: WWW-PW-2(B)

Weather Conditions: Sunny, 46°

Sampler's Name: TAL

Water Depth ~~(ft)~~: 4''

Sampler Screen ~~Interval (ft)~~ ~~(below water surface)~~ top ~~3.3'~~ 3.33'

Sediment Thickness ~~(ft)~~ (est): Sediment/Clay - 2'

Sample Depth (ft below ground surface of the river bottom): 3.33-3.46

Start time 15:00

Sample Time 15:20

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
14:50 ~~Time~~	—	—		3.6		654		11.18		-9.7		8.51		6.06	
15:00	—	—	100 ml		5.5		631		.22		-15.7		6.94		9.34
15:05	—	—	100 ml		5.6		631		.10		-20.9		6.89		~~9.23~~ 2.94
15:10	—	—	100 ml		5.6		631		.11		-23		6.89		1.95
15:15	—	—	100 ml		5.6		631		.09		-25.4		6.87		1.37

Attachment A – Pore Water Sampling Worksheet

★ MS/MSD taken

Date: 12/2/20

Location ID: WWW-PW-3 (A)

Weather Conditions: Sunny, 45°

Sampler's Name: TAL

Water Depth ~~(ft)~~: 12"

Sampler Screen ~~Interval (ft) (below water surface)~~ top 18"

Sediment Thickness ~~(ft)~~ (est): 16"

Sample Depth (ft below ground surface of the river bottom): 1.5-1.63

Start time 1425

Sample Time 1440

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
14:20	–	–		2.6		C23		12.95		171.7		7.8		9	
1425			150		7.2		554		1.4		171		7.7		26
1430			150		7.3		557		1.2		157		7.6		5
1435			150		7.4		557		1.1		143		7.6		7
1440			150		7.4		557		1.1		133		7.5		1

☆ DUP taken "WVNW-PW-4(A)-DUP"

Attachment A – Pore Water Sampling Worksheet

Date: 12/2/20

Location ID: WVNW-PW-4(A)

Weather Conditions: mid 40's, sunny

Sampler's Name: JAL / MKM

Water Depth ~~(ft)~~: 12"

Sampler Screen ~~Interval (ft) (below water surface)~~ top 0 20"

Sediment Thickness ~~(ft)~~ (est): 19"

Sample Depth (ft below ground surface of the river bottom): 1.67-1.79

Start time 1140

Sample Time 1200

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1135				2.1		498		26.3		137		9.6		5	
1145			150		6.2		604		5.2		167		8.4		2616
1150			150		6.8		706		1.4		43		7.9		279
1155			150		6.8		716		1.3		-24		7.5		78
1200			150		6.9		716		1.2		-41		7.5		16

DUP

Attachment A – Pore Water Sampling Worksheet

Date: 7/20/22

Location ID: WVNW-PW-5(A)

Weather Conditions: mostly sunny, humid, 80°

Sampler's Name: M. Myers

Water Depth ~~(ft)~~: 3"

Sampler Screen ~~Interval (ft) (below water surface)~~ top 12"

Sediment Thickness ~~(ft)~~ (est): 0 (gravel)

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 1045

Sample Time 1100

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1040	—	—	—	22.4		618		7.36		202		8.0		3.2	
1045	—	—	600		17.1		780		2.45		206		7.27		1.1
1050	—	—	↓		16.9		790		1.82		192		7.21		2.1
1055	—	—			16.9		794		1.72		184		7.21		1.1
1100	—	—			16.8		800		1.48		175		7.20		1.1

MS/MSD

Attachment A – Pore Water Sampling Worksheet

WNW-PW-(A)

Date: 7/20/22 **Location ID:** [illegible]

Weather Conditions: Mostly sunny, 80's, humid **Sampler's Name:** M. Myers

Water Depth ~~(ft)~~: 6" **Sampler Screen ~~Interval (ft) (below~~ top ~~sed water surface)~~** 12"

Sediment Thickness ~~(ft)~~ (est): 1"

Sample Depth
(ft below ground surface of the river bottom): 1-1.13

Start time 1350 **Sample Time** 1405

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1345	—	—	—	23.7		618		7.55		174		8.14		1.9	
1355	—	—			18.5		461		2.5		174		7.37		8.6
1400	—	—			18.5		459		2.5		169		7.33		4.5
1405	—	—			18.6		453		2.5		157		7.31		45

Pore Water Sampling Procedure **SOP A27**

Attachment A – Pore Water Sampling Worksheet

Date: 7/20/22 **Location ID:** ~~[illegible]~~ WVNW-PW-06(B)

Weather Conditions: Mostly sunny, 80's, humid **Sampler's Name:** M. Myers

Water Depth ~~(ft)~~: 6" **Sampler Screen ~~Interval (ft) (below sed/water surface)~~:** top 20" 20.4"

Sediment Thickness ~~(ft)~~ (est): 1" Sample Depth (ft below ground surface of the river bottom): 1.7-1.83

Start time 1420 **Sample Time** 1435

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1415	—	—	—	23.8		619		7.46		152		8.12		2.1	
1425	—	—			17.2		426		4.5		144		7.41		13.8
1430	—	—			17.2		427		4.5		125		7.36		9.6
1435	—	—													

Attachment A – Pore Water Sampling Worksheet

Date: 7/20/22

Location ID: WVNW-PW-7A)

Weather Conditions: Mostly sunny, 85°F, humid

Sampler's Name: NMYers

Water Depth ~~(ft)~~: 6"

Sampler Screen ~~Interval (ft) (below water surface)~~ top to 16" 15.6"

Sediment Thickness ~~(ft)~~ (est): 4"

Sample Depth (ft below ground surface of the river bottom): 1.3-1.43

Start time ~~0800~~ 1513

Sample Time 1525

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1510	—	—	—	24.1		619		7.96		185		8.16		2.2	
1515	—				20.1		419		0.60		58		7.61		5.6
1520	—				20.3		418		0.5		14		7.5		3.5
1525	—				20.2		419		<.5		-35		7.5		<5

Attachment A – Pore Water Sampling Worksheet

Date: 11/30/20

Location ID: Area19 - PW-1 (A)

Weather Conditions: Overcast 34°

Sampler's Name: MKM

Water Depth ~~(ft)~~: 12"

Sampler Screen ~~Interval (ft) (below water surface)~~ top 0 12"

Sediment Thickness ~~(ft)~~ (est): 12"

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 1020

Sample Time 1035

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
10:20	12"	—	—	4.2		596.0		13.13		256.1		8.57		4	
1025		—	300		6		582		1.4		256		7.9		4
1030		—	300		6		582		1.3		198		7.8		2
1035		—	300		6		582		1.3		130		7.6		1

Attachment A – Pore Water Sampling Worksheet

Date: 11/30/20

Location ID: Area19- PW-2(A)

Weather Conditions: Overcast

Sampler's Name: MKM

Water Depth ~~(ft)~~: 9"

Sampler Screen ~~Interval (ft) (below water surface)~~ top: 12"

Sediment Thickness ~~(ft)~~ (est): No sediment

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 1335

Sample Time 1355

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1335	9"	—	—	4.2		548		27.1		250		7.9		3	
1340			150	~~6.0~~	6.0		1289		4.9		200		7.5		30
1345			150		6.0		1292		2.6		186		7.4		46
1350			150		6.0		1289		2.1		107		7.3		29
1355			150		6.0		1286		1.7		43		7.4		65

Attachment A – Pore Water Sampling Worksheet

Date: 11/30

Location ID: Area19-PW-2(B)

Weather Conditions: Cloudy, Low 30's

Sampler's Name: TAL/MKM

Water Depth ~~(ft)~~: 9"

Sampler Screen ~~Interval (ft) (below water surface)~~ top: 17"

Sediment Thickness ~~(ft)~~ (est): none

Sample Depth (ft below ground surface of the river bottom): 1.42-1.54

Start time: 1415

Sample Time: 1430

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1410	9"			4.2		599.0		13.7		-70		7.6		16	
1415			150		6.4		1212		1.4		-28		7.4		6
1420			150		6.5		1212		1.0		<50		7.2		8
1425			150		6.8		1230		1.0		-68		7.1		10
1430			150		6.7		1237		1.1		-74		7.1		7

Attachment A – Pore Water Sampling Worksheet

Date: 11/30/20 **Location ID:** ~~Area~~ 9-PW-3 (A)

Weather Conditions: Overcast, 34° **Sampler's Name:** JAL

Water Depth ~~(ft)~~: 3" **Sampler Screen Interval ~~(ft) (below water surface)~~** top 12"

Sediment Thickness ~~(ft)~~ (est): none Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 1520 **Sample Time** 1535

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1515	3"	—	—	4.4		600		13.3		-61	[illegible]	7.5		4	
1520			150		6.9		760		8.2		-15		7.4		14
1525			150		6.60		762		6.1		-5.4		7.4		20
1530			150		7.0		737		5.5		9.4		7.4		12
1535			150		6.7		737		5.3		23.1		7.9		10

Attachment A – Pore Water Sampling Worksheet

Date: 12/1/20

Location ID: Area 19 - PW-4(A)

Weather Conditions: Partly Sunny, 30°

Sampler's Name: TAL

Water Depth ~~(ft)~~: 9"

Sampler Screen ~~Interval (ft) (below water surface)~~ top 12"

Sediment Thickness ~~(ft)~~ (est): 2"

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 1035

Sample Time 1050

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
10:25	9"	—	—	3.2		523.9		19.38		121.9		9.43		3	
1035		—	150		5.7		946		1.9		122		8.3		296
1040		—	150		5.8		962		1.2		107		8.0		114
1045		—	150		6.0		952		1.2		96.0		7.8		78
1050		—	150		5.7		941		1.2		81		7.7		70

Attachment A – Pore Water Sampling Worksheet

Date: 12/1/20 Location ID: Araln-PW-4(B)

Weather Conditions: Sunny 30° Sampler's Name: TAL

Water Depth ~~(ft)~~: 9" Sampler Screen ~~Interval (ft) (below water surface)~~ top 17"

Sediment Thickness ~~(ft)~~ (est): 2" Sample Depth (ft below ground surface of the river bottom): 1.42-1.54

Start time 1120 Sample Time 1135

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
11:15				3.2		534		11.8		79		7.9		17	
1120			150		5.2		931		1.4		94		7.7		192
1125			150		5.3		921		1.2		90		7.7		71
1130			150		5.3		906		1.3		89		7.7		56
1135			150		5.4		890		1.4		89		7.6		70

Attachment A – Pore Water Sampling Worksheet

Date: 12/1/2020

Location ID: Area19-PW-5(A)

Weather Conditions: Sunny 34°

Sampler's Name: TAL

Water Depth ~~(ft)~~: 6"

Sampler Screen ~~Interval (ft) (below water surface)~~ top 12"

Sediment Thickness ~~(ft)~~ (est): 4"

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 1205

Sample Time 1220

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
12:00				3.3		522.8		12.32		147.6		7.95		24	
1205			150		6.3		528		1.3		144		7.8		74
1210			150		6.5		534		0.8		6.2		7.7		20
1215			150		6.7		533		0.7		-42		7.6		9
1220			150		6.7		533		0.8		-58		7.5		5
~~1225~~			"												

Attachment A – Pore Water Sampling Worksheet

Date: 12/1/20 **Location ID:** Area19-PW-6(A)

Weather Conditions: Sunny, 38° **Sampler's Name:** TAL

Water Depth ~~(ft)~~: ~~8"~~ 12" **Sampler Screen ~~Interval (ft) (below water surface)~~** top ~~12"~~ 18"

Sediment Thickness ~~(ft)~~ (est): ~~3"~~ 3"

Sample Depth (ft below ground surface of the river bottom): 1.5-1.63

Start time 1500 **Sample Time** 1515

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
14:55				3.7		520.2		12.8		195.2		8.13		2	
1500				~~5.4~~	6.4		562		1.2		179		7.9		478
1505					6.9		562		1.0		34		7.8		40
1510					6.9		562		1.0		-27		7.7		32
1515					6.9		561		1.0		-48		7.6		17

Attachment A – Pore Water Sampling Worksheet

Date: 12/1/20

Location ID: Area19-PW-6(B)

Weather Conditions: Sunny, 39°

Sampler's Name: TAL

Water Depth ~~(ft)~~: 12"

Sampler Screen ~~Interval (ft) (below water surface)~~ top 24"

Sediment Thickness ~~(ft)~~ (est): 3"

Sample Depth (ft below ground surface of the river bottom): 2-2.13

Start time 15:35

Sample Time 15:50

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
15:30	–	–		3.7		518.7		12.4		-11.1		7.96		8	
15:35	–	–		[illegible]	6.6		559.7	[illegible]	1.11		8.1		7.79		55
15:40	–	–			6.9		561.5		.75		-38.6		7.70		26
15:45	–	–			6.9		561.9		.78		-48.9		7.63		14
15:50	–	–			6.8		561.8		.78		-55.4		7.57		9

Attachment A – Pore Water Sampling Worksheet

Date: 12/1/20

Location ID: Area 9- PW-7 (A)

Weather Conditions: Sunny 38°

Sampler's Name: TAL

Water Depth ~~(ft)~~: 2"

Sampler Screen ~~Interval (ft) (below water surface)~~ top 5'

Sediment Thickness/Muck ~~(ft)~~ (est): 4.5'

Sample Depth (ft below ground surface of the river bottom): 5-5.13

Start time 1625

Sample Time 1640

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1620				3.6		519.6		12.19		48.8		7.81		10	
1625				~~8.3~~	8.3		644		1.24		82		7.6		49
1630					7.9		697		0.7		59		7.4		28
1635					8.0		698		0.7		40		7.6		12
1640					8.0		699		0.7		30		7.5		

Attachment A – Pore Water Sampling Worksheet

Date: 7/19/22

Location ID: Area19-PW-8A

Weather Conditions: sunny, humid, 85°

Sampler's Name: M. Myers

Water Depth ~~(ft)~~: 18"

Sampler Screen ~~Interval (ft) (below water surface)~~ top: 12 ~~12.5~~"

Sediment Thickness ~~(ft)~~ (est): 12"

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time: 1020

Sample Time: 1105

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
955	—	—	—	20.7		609		9.11		228		8.03		2.2	
1025	—	—	—		20.3		627		5.81		223		7.31		25.5
1030	—	—	—		20.4		624		5.20		223		7.23		22.2
1035	—	—	—		20.6		627		4.91		222		7.20		9.1
1040	—	—	—		20.8		627		4.86		220		7.20		4.5
1045 (moved flow-thru cell into shade)	—	—	—		21.2		630		4.92		214		7.20		2.7
1050	—	—	—		19.8		628		4.69		208		7.18		<5
1055	—	—	—		20.3		624		4.50		196		7.19		<5
1100	—	—	—		20.7		625		4.49		196		7.19		<5
1105	—	—	150		20.9		629		4.52		197		7.19		<5

Revision 02
Publication Date 09/15/2020
Review Date 05/13/2022

Attachment A – Pore Water Sampling Worksheet

Date: 7/19/22

Location ID: Area 19 - PW - 9A

Weather Conditions: mostly sunny, humid, 86°

Sampler's Name: M. Myers

Water Depth (~~ft~~): ~~9"~~ 3"

Sampler Screen ~~Interval (ft) (below water surface)~~ top: 12" - ~~12.5"~~

Sediment Thickness ~~(ft) (est)~~: ~~32"~~

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 1345

Sample Time 1420

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1320	—	—	—	22.5		609		10.66		209		8.2		2.5	
1350	—	—			18.7		886		<1.5		-83		7.11		2.2
1355	—	—			18.8		881		<1.5		-99		7.05		2.5
1400	—	—			18.6		868		<1.5		-111		7.04		<1
1405	—	—			18.6		862		<1.5		-118		7.03		<1
1410	—	—			18.5		854		<1.5		-125		7.03		<1
1415	—	—			18.4		852		<1.5		-129		7.03		<1
1420	—	—	250		18.5		847		<1.5		-133		7.03		<1

Attachment A – Pore Water Sampling Worksheet

Date: 7/19/22

Location ID: Area 19-PW-9B

Weather Conditions: mostly sunny, 86°, humid

Sampler's Name: M. Myers

Water Depth (ft): 3"

Sampler Screen ~~Interval (ft) (below water surface)~~ top: 18"

Sediment Thickness (ft) (est): 2"

Sample Depth (ft below ground surface of the river bottom): 1.5-1.63

Start time 1440

Sample Time 1505

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1435	—	—		23.2		612		10.88		-38		8.3		2.5	
1445	—	—			17.7		843		<.5		-106		7.07		6.0
1450	—	—			18.3		852		<.5		-108		7.05		3.2
1455	—	—			18.1		863		<.5		-109		7.03		5.3
1500	—	—			18.1		866		<.5		-110		7.03		5.7
1505	—	—			18.3		865		<.5		-111		7.02		5.8

PW = 24 5/8 | 24'
RW = 22 3/4 | ~~24~~ 24 1/16'

Pore Water Sampling Procedure **SOP A27**

Attachment A – Pore Water Sampling Worksheet

Date: 7/19/22 **Location ID:** Area 19 - PW-10A

Weather Conditions: mostly sunny, 85°, humid **Sampler's Name:** M. Myers / J. Thompson

Water Depth (ft): 3" **Sampler Screen ~~Interval (ft) (below water surface)~~ top** 12" ~~12.5"~~

Sediment Thickness (ft) (est): 0 (sand)

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 1605 **Sample Time** 1640

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1600				23.7		~~417~~ 617		11.7		124.7		8.37		2.8	
1620 ~~1615~~				~~20.~~	20.4		621		<~~0.5~~		-76.4		7.40		~~79~~ <1
1630					20.4		619		<~~0.5~~		-78.9		7.39		<~~1~~
1635					20.4		618		<0.5		-79.4		7.39		–
1640					20.4		617		<0.5		-79.2		7.39		–

Attachment A – Pore Water Sampling Worksheet

Date: 12/7/20

Location ID: WV/CH-PW-1(A)

Weather Conditions: Cloudy, 29°

Sampler's Name: TAL

Water Depth ~~(ft)~~: 3"

Sampler Screen ~~Interval (ft) (below water surface)~~ top 9"

Sediment Thickness ~~(ft)~~ (est): 0"

Sample Depth (ft below ground surface of the river bottom): 0.75-0.88

Start time 10:45

Sample Time 1100

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1040	-	-	-	2.8		892		12.0		147		8.4		2.9	
1045					4.3		1104		0.9		-58		7.4		3.6
1050					4.8		1101		1.1		-77		7.4		2.5
1055					4.7		1100		0.8		-90		7.4		2.8
1100					4.6		1102		0.8		-95		7.4		3.0

Attachment A – Pore Water Sampling Worksheet

Date: 12/7/20

Location ID: WVCH-PW-2(A)

Weather Conditions: Cloudy. 31°

Sampler's Name: TAL

Water Depth ~~(ft)~~: 5"

Sampler Screen ~~Interval (ft)~~ ~~(below water surface)~~ top 9"

Sediment Thickness ~~(ft)~~ (est): 2"

Sample Depth (ft below ground surface of the river bottom): 0.75-0.88

Start time 1140

Sample Time 1155

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1135	–	–		2.8		604		11.82		113.4		8.45		3.76	
1140	–	–	150		5.4		788		0.3		-42		7.4		1.4
1145	–	–	150		5.2		790		0.2		-60		7.5		0.2
1150	–	–	150		5.2		790		0.1		-65		7.4		0.3
1155	–	–	150		4.8		790		0.1		-69		7.4		3.0

Attachment A – Pore Water Sampling Worksheet

Date: 12/7/20

Location ID: WV/CH -PW-3(A)

Weather Conditions: Cloudy, 30°s

Sampler's Name: TAL

Water Depth ~~(ft)~~: 7"

Sampler Screen ~~Interval (ft) (below water surface)~~ top 12"

Sediment Thickness ~~(ft)~~ (est): ~~Ft~~ 0"

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 1425

Sample Time 1440

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1420				3.2		603.0		13.0		124		8.8		6.36	
1425					4.9		711		6.8		170		7.6		8.6
1430					4.9		722		6.7		192		7.6		5.4
1435					4.9		721		6.7		213		7.6		3.9
1440					4.9		723		6.7		227		7.6		1.3

MS/MSD taken

Attachment A – Pore Water Sampling Worksheet

Date: 12/7/20

Location ID: [redacted] WW/CH-PW-4(A)

Weather Conditions: Cloudy, 35°

Sampler's Name: TAL

Water Depth ~~(ft)~~: 5"

Sampler Screen ~~Interval (ft) (below water surface)~~ top 12"

Sediment Thickness ~~(ft)~~ (est): 0"

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 1515

Sample Time 1530

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
15:10	—	—		3.3		604		13.6		213.8		8.73		2.68	
1515	5"		150		5.2		1015		0.3		2.0		6.9		2.3
1520			150		5.3		1024		0.1		-25		7.1		0.6
1525			150		5.4		1024		0.1		-32		7.1		0.4
1530			150		5.4		1025		0.1		-37		7.1		0.4

Attachment A – Pore Water Sampling Worksheet

Date: 12/8/2020

Location ID: WV/CH-PW-5(A)

Weather Conditions: Cloudy, 33

Sampler's Name: TAL

Water Depth ~~(ft)~~: 6"

Sampler Screen ~~Interval (ft) (below water surface)~~ top: 10"

Sediment Thickness ~~(ft)~~ (est): 0"

Sample Depth (ft below ground surface of the river bottom): 0.83-0.96

Start time 11:15

Sample Time 11:30

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
11:10	—	—		3.4		674		5.05		97.3		8.47		2.9	
11:15			100ml		5.3		786		1.43		97.5		7.46		295
11:20			100ml		5.3		797		.16		58.6		7.28		36.9
11:25			100ml		5.3		796		.11		43.4		7.33		13.4
11:30			100ml		5.3		798		.09		31.6		7.28		15.6

Attachment A – Pore Water Sampling Worksheet

Date: 12/8/20

Location ID: WV/LH-PW 6(A)

Weather Conditions: Cloudy, 38°

Sampler's Name: TAL

Water Depth ~~(ft)~~: 5"

Sampler Screen ~~Interval (ft) (below water surface)~~ top of 12"

Sediment Thickness ~~(ft)~~ (est): 4"

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 12:10

Sample Time 12:30

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
12:00	—	-		3.3		674		12.78		216.7		8.42		8.9	
12:10			100		5.5		747		.96		-46.1		7.06		7.97
12:15					5.5		743		.47		-63.4		7.03		3.58
12:20					5.5		743.7		.46		-66.5		7.03		2.07
12:25					5.4		749		.47		-67.3		7.07		.99

Attachment A – Pore Water Sampling Worksheet

Date: 12/8/20 Location ID: WV/LH-PW-6(B)

Weather Conditions: Cloudy, 34° Sampler's Name: TAL

Water Depth (~~ft~~): 5" Sampler Screen ~~Interval (ft) (below water surface)~~ top 24"

Sediment Thickness (~~ft~~) (est): 4" Sample Depth (ft below ground surface of the river bottom): 2-2.13

Start time 12:50 Sample Time 13:10

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
12:45	—	—		3.3		674		12.78		216.7		8.42		8.5	
12:50			100ml		6.9		686		1.20		-82.1		7.40		4.06
12:55			100		7.0		695		1.52		-95.1		7.39		1.61
13:00			100		7.0		684		1.67		-86.4		7.39		~~4.84~~ 1.4
13:05			100		7.0		686		1.29		-89.6		7.38		

Attachment A – Pore Water Sampling Worksheet

Date: 12/3/20

Location ID: HS - PW-1 (A)

Weather Conditions: Cloudy & 30's

Sampler's Name: Alexis Blackmore

Water Depth ~~(ft)~~: 12 in

Sampler Screen ~~Interval (ft) (below water surface)~~ top ~~22~~ 24"

Sediment Thickness ~~(ft)~~ (est): 10 in

Sample Depth (ft below ground surface of the river bottom): 2-2.13

Start time 1150

Sample Time 1205

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
11 40				2.8		513.8		6.62		268.6		7.86		1	
1150			152		4.6	~~1053~~	1053		2.09		225.9	~~7.60~~	7.60		4
1155			150		6.1		1066		1.24		189.0		7.48		3
1200			150		5.8		1064		1.22		181.2		7.44		2
1205			150		5.6		1067		1.19		177		7.4		2

Attachment A – Pore Water Sampling Worksheet

Date: 12/3/20

Location ID: HS-PW-1(3)

Weather Conditions: Cloudy & 30's

Sampler's Name: Alexis Blackmore

Water Depth ~~(ft)~~: 12in

Sampler Screen ~~Interval (ft) (below water surface)~~ top 30 in.

Sediment Thickness ~~(ft)~~ (est): 10in

Sample Depth (ft below ground surface of the river bottom): 2.5-2.63

Start time 1230

Sample Time 1250

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1220				2.6		571.9		12.84		186.2		7.83		15	
1230															
1235					5.9		1060		2.48		198.8		7.40		4
1240					6.0		1061		1.22		192.4		7.36		3
1245					6.1		1062		1.25		187.8		7.31		2
1250					5.8		1064		0.9		185		7.3		1

YSI turned off

Attachment A – Pore Water Sampling Worksheet

Date: 12/4/2020 **Location ID:** HS - PW - 2 (A)

Weather Conditions: cloudy & 30s **Sampler's Name:** Alexis Blackmore

Water Depth ~~(ft)~~: 5 in **Sampler Screen ~~Interval (ft) (below water surface)~~ top:** 17 in

Sediment Thickness ~~(ft)~~ (est): 2 in * Pore water has strong sulfur odor

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 1430 **Sample Time** 1445

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1415				2.9		566.5		16.30		240.3		7.94		76	
1430			150		5.9		809		1.13		143.1		7.84		2
1435			150		5.7		818		1.03		-75.4		7.74		4
1440			150		5.9		819		0.94		-110.8		7.66		2
1445			150		5.9		820		0.94		-123		7.63		2

Attachment A – Pore Water Sampling Worksheet

Date: 1/26/21

Location ID: HS-PW-~~3~~ 2.5 ~~(A)~~

Weather Conditions: snow, low 20's, cloudy

Sampler's Name: Melissa Myers

Water Depth ~~(ft)~~: 6"

Sampler Screen ~~Interval (ft) (below water surface)~~ top ~~6-12~~ 6"

Sediment Thickness ~~(ft)~~ (est): 6-12"

Sample Depth (ft below ground surface of the river bottom): 0.5-0.63

Start time 1015 (arrive & setup)

Sample Time 1130

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1110				0.0		623		12.8		48		8.5		6.8	
1115					5.4		466		1.69		240		7.3		3.2
1118					5.5		466		0.57		232		7.3		2.1
1125					5.5		465		0.15		225		7.2		N.R.
1130					5.7		463		0.09		221		7.2		

Sample: WVNW-PW-3(A)

Attachment A – Pore Water Sampling Worksheet

Date: 1/26/21

Location ID: HS-PW-2.5(B)

Weather Conditions: SNOW

Sampler's Name: Mallory La Voyers

Water Depth (~~ft~~): 6"

Sampler Screen ~~Interval (ft) (below water surface)~~ top ~~12 - 18"~~ 12"

Sediment Thickness ~~(ft)~~ (est): 12 - 18"

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 1155

Sample Time 1215

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1155				0.0		623		12.8		481		8.5		6.8	
1200					7.0		454		1.7		398		7.4		8.0
1205					6.9		464		0.4		385		7.4		3
1210					6.9		465		0.2		380		7.4		3
1215					6.9		466		0.1		378		7.4		3

Attachment A – Pore Water Sampling Worksheet

Date: 12/4/20 **Location ID:** HS-PW-3 (A)

Weather Conditions: Cloudy & 30s **Sampler's Name:** Alexis Blackmore

Water Depth (~~ft~~): 2in **Sampler Screen ~~Interval (ft) (below water surface)~~** top 16in

Sediment Thickness (~~ft~~) (est): 2in

Sample Depth (ft below ground surface of the river bottom): 1.33-1.46

Start time 1020 **Sample Time** 1040

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1005				3.2		573.6		23.93		252.7		7.16		77.3	
1025					7.2	X	485.1		1.08		257.6		6.81		18.1
1030					6.9		489.7		0.95		178.2		6.60		3.5
1035					7.1		489.9		0.94		120.0		6.54		3.0
1040					7.1		492.1		1.02		71.8		6.51		2.3

Attachment A – Pore Water Sampling Worksheet

HS-PW-3R

Date: 1/26/21

Location ID: HS-PW-3(A) & DUP

Weather Conditions: Snowy, cloudy, 28°F

Sampler's Name: [illegible]

Water Depth ~~(ft)~~: 6"

Sampler Screen ~~Interval (ft) (below~~ top ~~water surface)~~: ~~6-12"~~ 6"

Sediment Thickness ~~(ft)~~ (est): 6-12"

Sample Depth (ft below ground surface of the river bottom): 0.5-0.63

Start time 1410

Sample Time 1430

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1410				0.1		619		13.3		455		8.7		5.3	8
1415					5.0		528		0.88		234		7.3		11
1420					5.0		528		0.22		201		7.2		5.1
1425					5.0		530		0.13		198		7.2		5.7
1430					5.0		531		0.12		197		7.2		3.0

Attachment A – Pore Water Sampling Worksheet

Date: 1/26/21

Location ID: HS-PW-3.5(A) & MS/MSD

Weather Conditions: snow, cloudy, @ 28°

Sampler's Name: Indiyamyers

Water Depth (~~ft~~): ~~1~~ 1.5'

Sampler Screen ~~Interval (ft) (below water surface)~~ top ~~1~~ ~~0~~ 14 10"

Sediment Thickness (~~ft~~) (est): ~~0 12~~ 4"

FB @ 1550

Sample Depth (ft below ground surface of the river bottom): 0.83-0.96

Start time 1515

Sample Time 1540

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1510				0.2		617		15.0		337		8.5		4.2	
1515					3.3	NOT >10% difference for all parameters → moved to new spot ~ 5ft downstream									
1520					5.1		720		3.4		228		7.5		5
1525					5.9		780		0.13		258		7.5		2.5
1530					5.2		784		0.10		271		7.5		N.R
1535					5.0		784		0.10		279		7.5		10.6
1540					5.2		781		0.09		295		7.5		12.7

Attachment A – Pore Water Sampling Worksheet

Date: 12/4/20

Location ID: AS-PW-4 (A)

Weather Conditions: Partly sunny & 30s

Sampler's Name: Alexis Blackmore

Water Depth ~~(ft)~~: 12in

Sampler Screen ~~Interval (ft) (below water surface)~~ top: 9in.

Sediment Thickness ~~(ft)~~ (est): 2in

Sample Depth (ft below ground surface of the river bottom): 0.75-0.88

Start time 1120

Sample Time 1140

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1116				7.1		671.3		19.05		63.3		6.71		17.5	
1126					9.3				1.04		78.0		6.91		4.8
1130					9.5		655.6		0.73		25.5		7.01		2.0
1135					9.6		655.7		0.67		-10.1		7.05		1.3
1140															

Date: 12/4/20

Attachment A – Pore Water Sampling Worksheet

Location ID: HS-PW-5 (A)

Weather Conditions: Cloudy and 40s

Sampler's Name: Alexis Blackmore

Water Depth ~~(ft)~~: 4 in

Sampler Screen ~~Interval (ft) (below water surface)~~ top 16 in

Sediment Thickness ~~(ft)~~ (est): 2 in

Sample Depth (ft below ground surface of the river bottom): 1.33-1.46

Start time 1400

Sample Time 1420

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1355				4.1		582.6		21.09		285.9		7.41		11.7	
1405					6.5		950		1.38		225.4		7.13		
1410					6.6		951		1.26		160.9		7.08		
1415					6.6		951		1.14		-0.3		6.98		
1420					6.6		953		1.05		-22.3		6.95		

*Turbidimeter Malfunctioning

Attachment A – Pore Water Sampling Worksheet

Date: 12/4/20

Location ID: HS-PW-6 (A)

Weather Conditions: Cloudy and 30s

Sampler's Name: Alexis Blackmore

Water Depth ~~(ft)~~: 2 in

Sampler Screen ~~Interval (ft) (below water surface)~~ top: 12 in

Sediment Thickness ~~(ft)~~ (est): 5 in

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time: 1455

Sample Time: 1515

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1445				4.7		644.8		15.73	x	15.41		7.46		x	
1500					6.9		707.8		1.00		13.7		7.38		
1505					6.9		707.6		0.78		-23.9		7.38		
1510					6.9		707.1		0.77		-49.7		7.36		
1515					6.9		707.7		0.70		-66.4		7.39		

Turbidimeter malfunctioning

Attachment A – Pore Water Sampling Worksheet

Date: 12/3/20

Location ID: HS-PW-7 (A)

Weather Conditions: Cloudy & 30s

Sampler's Name: Alexis Blackmon

Water Depth ~~(ft)~~: 6"

Sampler Screen ~~Interval (ft) (below water surface)~~ top: 18"

Sediment Thickness ~~(ft)~~ (est): 3"

Sample Depth (ft below ground surface of the river bottom): 1.5-1.63

Start time 1530

Sample Time 1545

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
1525				3.1		562.1		15.41		-62.5		7.78		4	
1530			150		5.5		857		2.22		-20.7		7.42		0.5
1535			↓		6.0		925		1.18		-57.8		7.37		3
1540					6.1		943		1.16		-75.5		7.20		3
1545					6.1		945		1.14		-78.3		7.18		2

Attachment A – Pore Water Sampling Worksheet

Date: 12/8/2020

Location ID: HS-PW-8(A)

Weather Conditions: Cloudy, 37

Sampler's Name: TAL

Water Depth ~~(ft)~~: 6"

Sampler Screen ~~Interval (ft) (below water surface)~~ top 12"

Sediment Thickness ~~(ft)~~ (est): 4"

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 14:45

Sample Time 15:10

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
14:40	—	—		3.5		682		12.66		25.9		8.85			
14:45	—	—	100 ml		5.5		660		.35		-172		7.89		36.5
14:50	—	—	100 ml		5.6		660		.21		-175		7.6		3.75
14:55	—	—	100		5.5		660		.21		-175		7.6		3.4
15:00	—	—	100		5.5		661		.22		-175.9		7.64		2.5
15:05	—	—	100		5.6		660		0.24		-176.3		7.66		1.25

Attachment A – Pore Water Sampling Worksheet

Date: 12/9/20

Location ID: HS-PW-9 (A)

Weather Conditions: Cloudy, ~~32~~ 36°

Sampler's Name: TAL

Water Depth ~~(ft)~~: 7"

Sampler Screen ~~Interval (ft) (below water surface)~~ top 12"

Sediment Thickness ~~(ft)~~ (est): 2"

Sample Depth (ft below ground surface of the river bottom): 1-1.13

Start time 16:25

Sample Time 16:45

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
16:20	—	—		3.5		679		12.48		-17.3		8.8		2.87	
16:25	—	—	100 ml		3.9		668		4.49		-44.9		7.74		18.1
16:30	—	—	100 ml		3.8		683		.93		-79.9		7.82		4.03
16:35	—	—	100 ml		3.8		682		.72		-81.7		7.47		0.80
16:40	—	—	100 ml		3.7		682		.71		-83.6		7.75		.63

Attachment A – Pore Water Sampling Worksheet

Date: 12/9/20 **Location ID:** HS-PW-10(A)

Weather Conditions: Cloudy, 39 **Sampler's Name:** TAL

Water Depth ~~(ft)~~: ~~5~~ 8" **Sampler Screen ~~Interval (ft) (below water surface)~~** top ~~10' - 5'~~ 5'

Sediment Thickness ~~(ft)~~ (est): 4.5', some clay / mud

Sample Depth
(ft below ground surface of the river bottom): 5-5.13

Start time 9:45 **Sample Time** 10:05

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
9:39	–	–		3.0	~~6.4~~	649	~~648~~	10.58	~~3.48~~	58.3		8.49	~~7.82~~	2.79	~~3.15~~
9:45	–	–	100 ml		6.4		648		3.48		-89.3		7.82		3.15
9:50	–	–	100ml		6.7		649		.41		-97.4		7.87		0.71
9:55	–	–	100		6.8		649		.20		-101.2		7.72		0.64
10:00					6.7		649		.11		-105.3		7.97		0.26

Attachment A – Pore Water Sampling Worksheet

Date: 12/9/2020

Location ID: HS-PW-11(A)

Weather Conditions: Cloudy, 40°

Sampler's Name: TAL

Water Depth ~~(ft)~~: 4"

Sampler Screen ~~Interval (ft) (below water surface)~~ top 4.5' ~~6.3'~~

Sediment Thickness ~~(ft)~~ (est): 4.2'

Sample Depth (ft below ground surface of the river bottom): 4.5-4.63

Start time 11:15

Sample Time 11:35

Time	Water Level (ft)	Drawdown (ft)	Purge Rate	Temp (°C)		Specific Conductance (us/cm)		Dissolved Oxygen (mg/L)		Oxidation Reduction Potential (mV)		pH (SU)		Turbidity (NTU)	
				River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water	River Water	Pore Water
10:40	—	—	-	3.1		657		10.8		82.4		8.48		5.17	
11:15	—	—	100 ml		5.6		624		.51		-101		7.84		13.1
11:20	—	—	100 ml		5.7		623		.18		-108		7.79		7.24
11:25	—	—	100 ml		5.7		624		.11		-112		7.82		5.25
11:30	—	—	100 ml		5.6		625		.08		-114.8		7.85		

APPENDIX D

SOIL BORING AND MONITORING WELL INSTALLATION LOGS

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide, Inc.
Area 19 - RAP Implementation
Rockford, Michigan

Boring No.: AREA19-MW-7
Page: 1 of 3
File No.: 16.0062961.11
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: D. Cooper
Logged by: C. Melby
Date Start/Finish: 3-29-22 / 4-11-22
Boring Location: 602,368.1310 N; 12,803,602.3874 E
GS Elev.: 703.45' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
4/9/22	-3.1	(artesian)	Augers	12 hrs

Surveyed By: EXXEL **Survey Date:** 8/25/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–8									None
5	1	24/18	4-6	11-3 3-2		Loose, black and brown, fine to coarse SAND and Peat, trace Silt, some Organic Matter (wood), dry.	SAND		
9							9' GRAVEL		
10	2	24/8	9-11	14-10 6-13		Medium dense, brown and orange, GRAVEL and fine to coarse Sand, trace Silt, wet.		1 2	
14–15	3	24/24	14-16	20-6 10-6		Medium dense, brown and orange, GRAVEL and fine to coarse Sand, trace Silt, wet.			
19							19' SAND		
20	4	24/14	19-21	17-5 7-8		Medium dense, brown and gray, fine to coarse SAND, trace Silt, wet.		3	
24							24' Silty CLAY		
25	5	24/12	24-26	20-14 6-8		Very stiff, gray, Silty CLAY, some fine to medium Sand embedded, moist.		4	
29							29' SAND		
30	6	24/18	29-31	13-14 17-17		Dense, gray, fine to medium SAND, some Silt, wet.		5	
34–35	7	24/18	34-36	10-22 20-18		Dense, gray, fine to medium SAND, some Silt, wet.			
39–40	8	24/20	39-41	5-14 27-54		Dense, gray, fine to medium SAND, some Silt, wet.		6	
44	9	24/20	44-46	3-13		Dense, gray, fine to medium SAND, some			

REMARKS

1. Groundwater was encountered at approximately 9.0 feet below ground surface.
2. VAP groundwater sample was collected from approximately 9.0 to 14.0 feet below ground surface and submitted for analytical laboratory testing.
3. VAP groundwater sample was collected from approximately 19.0 to 24.0 feet below ground surface and submitted for analytical laboratory testing.
4. 10-inch casing installed from ground surface to approximately 25.0 feet below ground surface and grouted in place.
5. VAP groundwater sample was collected from approximately 29.0 to 34.0 feet below ground surface and submitted for analytical laboratory testing.
6. VAP groundwater sample was collected from approximately 39.0 to 44.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.11 AREA19.GPJ GZA_CORP.GDT 2/6/23

GZA
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Engineers and Scientists

Wolverine World Wide, Inc.
Area 19 - RAP Implementation
Rockford, Michigan

Boring No.: AREA19-MW-7
Page: 2 **of** 3
File No.: 16.0062961.11
Check: J. Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
46				25-36		Silt, wet.	SAND		
47							47'		
48	10	24/24	47-49	14-29 43-63		Hard, gray, Silty CLAY, trace fine to meidum Sand, moist to dry.	Silty CLAY		
49							49'		
50	11	24/24	49-51	13-37 42-50		Hard, gray and brown, SILT, some Clay interbedded, moist.	SILT	7	
51									
52									
53							54'		
54	12	24/24	54-56	5-10 12-16		Medium dense, gray and brown, fine to coarse SAND, trace Silt, wet.	SAND	8	
55									
56									
57									
58									
59	13	18/18	59-60.5	24-44-61/6"		Very dense, gray and brown, fine to coarse SAND, trace Silt, wet. Rock in spoon tip.			
60									
61									
62									
63									
64	14	18/18	64-65.5	22-45-67		Very dense, gray and brown, fine to medium SAND, trace Silt, wet.		9	
65									
66									
67									
68									
69	15	15/15	69-70.3	28-59-50/3"		Very dense, gray and brown, fine to medium SAND, trace Silt, wet.			
70									
71									
72									
73									
74	16	24/24	74-76	12-19 27-41		Dense, gray and brown, fine to medium SAND, trace Silt, wet.		10	
75									
76									
77									
78									
79	17	24/24	79-81	11-17 30-55		Dense, gray and brown, fine to medium SAND, trace Silt, wet.			
80									
81									
82									
83									
84	18	18/18	84-85.5	15-22-60		Very dense, gray and brown, fine to medium SAND, trace Silt, wet.		11	
85									
86									
87									
88									
89	19	20/20	89-90.7	12-27 39-50/2"		Very dense, gray and brown, fine to medium SAND, trace Silt, wet.			
90									
91									
92									
93									
94	20	24/24	94-96	9-20 41-60		Very dense, gray and brown, fine to medium SAND, trace Silt, wet.		12	
95									
96								13	
97									

REMARKS

7. Original borehole was grouted and the location was offset approximately 15.0 feet northeast to resume drilling. 10-inch casing installed from ground surface to approximately 49.0 feet below ground surface and grouted in place.
8. VAP groundwater sample was collected from approximately 54.0 to 59.0 feet below ground surface and submitted for analytical laboratory testing.
9. VAP groundwater sample was collected from approximately 64.0 to 69.0 feet below ground surface and submitted for analytical laboratory testing.
10. VAP groundwater sample was collected from approximately 74.0 to 79.0 feet below ground surface and submitted for analytical laboratory testing.
11. VAP groundwater sample was collected from approximately 84.0 to 89.0 feet below ground surface and submitted for analytical laboratory testing.
12. VAP groundwater sample was collected from approximately 94.0 to 99.0 feet below ground surface and submitted for analytical laboratory testing.
13. Drilled noted a change in drilling at approximately 96.0 feet below ground surface, potentially a strata change from clay to sand.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.11 AREA19.GPJ GZA_CORP.GDT 2/6/23

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Area 19 - RAP Implementation
Rockford, Michigan

Boring No.: AREA19-MW-7
Page: 3 **of** 3
File No.: 16.0062961.11
Check: J. Groenleer

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
98							SAND		
99	21	22/22	99-100.8	6-18 30-50/4"		Dense, gray and brown, fine to medium SAND, trace Silt, wet.			
100									
101									
102									
103									
104	22	24/24	104-106	8-12 19-28		Dense, gray and brown, fine to medium SAND, trace Silt, wet.		14	
105									
106									
107									
108									
109	23	21/21	109-110.8	18-25 52-50/3"		Very dense, gray and brown, fine to medium SAND, little Silty Clay seams, wet.			
110									
111									
112									
113									
114	24	11/7	114-114.9	185-128/5"		Very dense, gray, GRAVEL and fine to coarse Sand, some Silt, wet.	114' GRAVEL	15	
115									
116									
117									
118	25	12/12	118-119	24-80		Hard, gray, Silty CLAY and fine to coarse Sand embedded, moist to dry.	118' 119' Silty CLAY		
119						Bottom of Borehole at 119.0 Feet		16	
120									
121									
122									
123									
124									
125									
126									
127									
128									
129									
130									
131									
132									
133									
134									
135									
136									
137									
138									
139									
140									
141									
142									
143									
144									
145									
146									
147									
148									
149									

REMARKS

14. VAP groundwater sample was collected from approximately 104.0 to 109.0 feet below ground surface and submitted for analytical laboratory testing.
15. VAP groundwater sample was collected from approximately 114.0 to 119.0 feet below ground surface and submitted for analytical laboratory testing.
16. Artesian conditions were noted from approximately 54.0 feet below ground surface to the end of the boring. Borehole was backfilled with grout upon completion.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.11 AREA19.GPJ GZA_CORP.GDT 2/6/23

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RAP GSI
Rockford, Michigan

Boring No.: AREA19-MW-7A
Page: 1 **of** 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: Daryll
Logged by: N. Kampfschulte
Date Start/Finish: 9-8-22 / 9-8-22
Boring Location: 602,370.8363 N; 12,803,599.8330 E
GS Elev.: 703.44' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	703.09'	NA

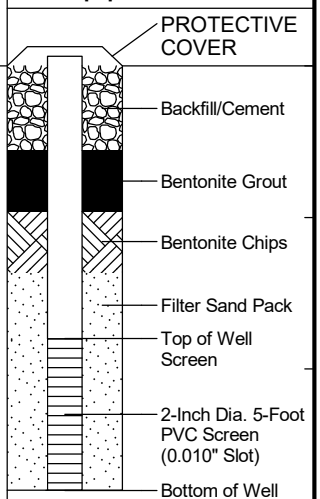
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 2/24/2023

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–13						See AREA19-MW-7 for soil and stratum descriptions.		
14						Bottom of Borehole at 14.0 Feet		1

Equipment Installed



REMARKS

1. Monitoring well installed in borehole upon completion. Well screen was set from approximately 9.0 to 14.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 4/24/23

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Boring No.: AREA19-MW-221A
Page: 1 of 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: J. Gryska
Logged by: D. Watt
Date Start/Finish: 2-14-22 / 2-16-22
Boring Location: 600,210.3531 N; 12,804,596.5319 E
GS Elev.: 709.08' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	708.66'	NA

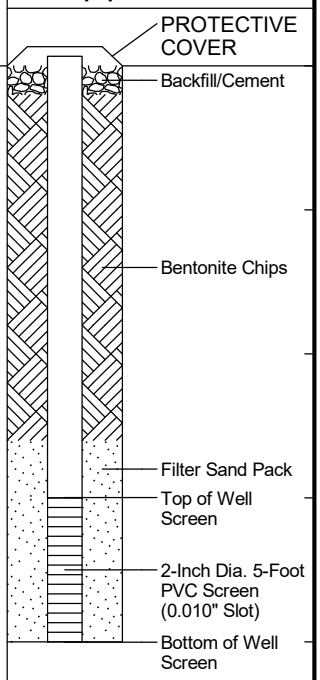
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
2/14/22	1145	17.0'	Augers	0
2/15/22	0830	14.1'	Augers	Overnight

Surveyed By: EXXEL **Survey Date:** 3/30/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1								
2								
3								
4	1	24/18	4-6	1-2 2-2		Brown, TOPSOIL and Organic Material, moist. Changing at 4.2 feet to: Very loose, brown, fine to medium SAND, trace Silt, moist.	4.2' TOPSOIL / SAND	
5								
6								
7								
8								
9	2	24/24	9-11	2-4 6-7		Loose, brown, fine to medium SAND, little Clay & Silt, moist.		
10								
11								
12								
13								
14	3	24/24	14-16	3-7 12-13		Medium dense, fine to coarse SAND, some Clay, trace Gravel, trace Silt, moist.		1
15								
16								
17								2
18								
19	4	24/12	19-21	5-13 5-6		Medium dense, fine to medium SAND, trace Gravel, wet.		
20								
21								
22								
23								
24	5	24/24	24-26	3-5 7-8		Medium dense, brown, fine to medium SAND, trace Silt, wet.		3
25								
26								
27								
28								
29	6	24/24	29-31	4-5 8-13		Medium dense, brown, fine to medium SAND, some Clay & Silt, wet. Changing at 30.0 feet to: Medium dense, brown, fine to medium SAND, some Clay & Silt, moist.		
30								
31								
32								
33								
34	7	24/8	34-36	3-7 5-10		Medium dense, brown, fine to coarse SAND, trace Silt, wet.		4
35								
36								
37								
38								
39	8	24/20	39-41	3-5		Medium dense, brown, fine to medium		

Equipment Installed



REMARKS

1. VAP groundwater sample was collected from approximately 14.0 to 19.0 feet below ground surface and submitted for analytical laboratory testing.
2. Groundwater was encountered at approximately 17.0 feet below ground surface.
3. VAP groundwater sample was collected from approximately 24.0 to 29.0 feet below ground surface and submitted for analytical laboratory testing.
4. VAP groundwater sample was collected from approximately 34.0 to 39.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/9/23

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Rockford, Michigan

Boring No.: AREA19-MW-221A
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
41				7-11		SAND, trace Silt, wet.	SAND		
42									
43									
44	9	24/24	44-46	2-5		Medium dense, brown, fine to medium		5	
45				9-11		SAND, trace Silt, wet.			
46									
47									
48									
49	10	24/18	49-51	5-5		Medium dense, brown, fine to medium			
50				9-14		SAND, trace Silt, wet.			
51									
52									
53									
54	11	12/6	54-55	16-31		Dense, brown, fine to coarse SAND, some		6	
55						Gravel, trace Silt, wet.			
56									
57								7	
58	12	5/0	58-58.4	50/5"		NO RECOVERY.	58' 58.5 NO RECOVERY		
59						Bottom of Borehole at 58.5 Feet		8	
60									
61									
62									
63									
64									
65									
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67									
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84									
85									
86									

REMARKS

5. VAP groundwater sample was collected from approximately 34.0 to 39.0 feet below ground surface and submitted for analytical laboratory testing.
6. VAP groundwater sample was collected from approximately 53.0 to 58.0 feet below ground surface and submitted for analytical laboratory testing.
7. Driller noted a change in drilling (potentially clay) at approximately 56.0 feet below ground surface.
8. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 15.0 to 20.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/9/23

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Rockford, Michigan

Boring No.: AREA19-MW-221B
Page: 1 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: Bryan
Logged by: N. Kampfschulte
Date Start/Finish: 7-7-22 / 7-8-22
Boring Location: 600,203.6210 N; 12,804,600.2161 E
GS Elev.: 709.30' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	708.81'	NA

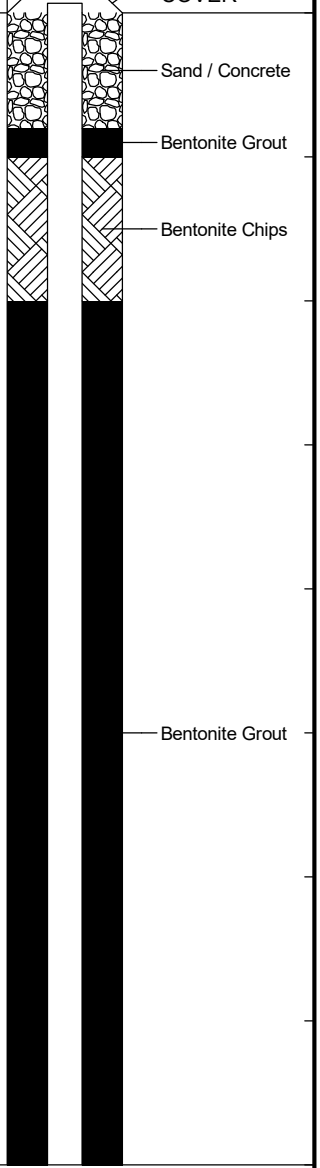
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 8/25/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–39						See AREA19-MW-221A for soil and stratum descriptions.		1

Equipment Installed



REMARKS

1. Bentonite grout settled overnight on 7/7/2022. Bentonite chips, bentonite grout, and sand were added to the annular space from approximately 1.0 to 10.0 feet below ground surface on 7/8/2022.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/31/23

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Boring No.: AREA19-MW-221B
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
41–50									Bentonite Chips; Filter Sand Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen
51						Bottom of Borehole at 50.5 Feet		2	

REMARKS

2. Monitoring well was installed in borehole upon completion. Well screen set from approximately 45.0 to 50.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/31/23

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Rockford, Michigan

Boring No.: AREA19-MW-222
Page: 1 of 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: J. Gryska
Logged by: D. Watt
Date Start/Finish: 2-18-22 / 2-21-22
Boring Location: 598,820.7026 N; 12,805,960.4008 E
GS Elev.: 696.52' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	699.41'	NA

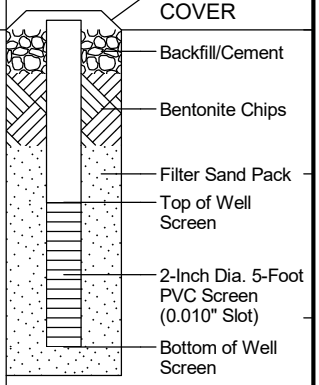
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
2/18/22	0921	3.3'	Augers 9'	

Surveyed By: EXXEL **Survey Date:** 3/30/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–5	1	24/2	4-6	1-1 2-2		Very loose, Sandy TOPSOIL and Organic Matter, moist.	TOPSOIL	1 2
6–8								3
9–13	2	24/12	9-11	6-12 14-30		Medium dense, brown, fine to coarse SAND and Gravel, trace Silt, wet. Changing at 10.7 feet to: Gray, fine to medium SAND, some Silt, trace Gravel, wet.	9' SAND	4
14–18	3	11/7	14-14.9	25-50/5"		Very dense, gray, medium to coarse SAND and Gravel, trace Silt, wet.		5 6
19–23	4	18/4	19-20.5	14-39-50/5"		Hard, gray, SILT & CLAY, some Sand, trace Gravel, moist.	19' SILT & CLAY	
24–28	5	18/12	24-25.5	10-25-40		Hard, gray, Clayey SILT, trace fine Sand, trace Gravel, moist with lens of gray, Silty Sand at 25.5 feet.	24' Clayey SILT	
29–39	6	10/0	29-29.8	35-50/4"		NO RECOVERY. 3.0" split spoon: Hard, gray, Clayey SILT, trace fine Sand, trace Gravel, moist. Bottom of Borehole at 29.8 Feet	29.8'	7 8

Equipment Installed



REMARKS

1. Groundwater was encountered at approximately 3.3 feet below ground surface.
2. VAP groundwater sample was collected from approximately 4.0 to 9.0 feet below ground surface and submitted for analtycial testing.
3. Cobble encountered at approximately 6.0 feet below ground surface. Drillers augered past cobble and resumed sampling.
4. Cobble encountered at approximately 10.0 feet below ground surface. Drillers augered past cobble and resumed sampling.
5. Cobble encountered at approximately 14.0 feet below ground surface. Drillers augered past cobble and resumed sampling.
6. VAP groundwater sample was collected from approximately 14.0 to 19.0 feet below ground surface and submitted for analytical laboratory testing.
7. Original borehole was plugged with grout from 0.0 to 30.0 feet below ground surface. Permanent monitoring well was offst approximately 5.0 feet to the east.
8. Monitoring well was installed in offset borehole upon completion. Well screen was set from approximately 6.0 to 11.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/9/23

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Rockford, Michigan

Boring No.: AREA19-MW-223
Page: 1 of 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: J. Gryska
Logged by: D. Watt
Date Start/Finish: 2-16-22 / 2-17-22
Boring Location: 596,990.3353 N; 12,804,834.3475 E
GS Elev.: 692.82' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	695.85'	NA

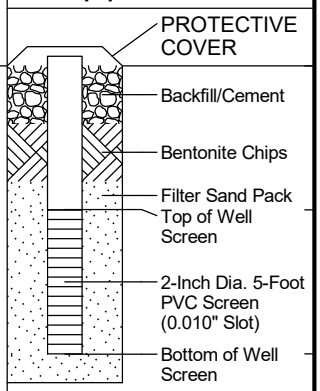
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
2/16/22	1100	2.2'	Augers	0

Surveyed By: EXXEL **Survey Date:** 3/30/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–4	1	24/2	4-6	2-1 1-0		Very loose, black, TOPSOIL, some Sand, little Silt & Clay, moist.	TOPSOIL	1 2
9–10	2	24/10	9-11	0-1 7-8		Very loose, black, TOPSOIL, some Sand, little Silt & Clay, wet. Changing at 9.2 feet to: Medium stiff, gray, SILT, trace fine Sand, trace Organic Matter, moist.	9.2' SILT	
14–15	3	24/14	14-16	1-12 17-24		Very stiff, gray, SILT, little fine Sand, trace Organic Matter, moist. Changing at 14.8 feet to: Medium dense, gray, fine to medium SAND, trace Silt, wet.	14.8' SAND	3
19–20	4	24/24	19-21	5-17 31-34		Dense, gray, fine to medium SAND, trace Silt, wet. Changing at 19.3 feet to: Hard, gray, SILT, trace fine Sand, trace Organic Matter, wet.	19.3' SILT	
24–25	5	24/24	24-26	14-31 37-50		Hard, gray, SILT, little fine Sand, trace Gravel, moist.		
29–30	6	24/18	29-31	7-17 20-22		Hard, gray, SILT & CLAY, trace fine Sand, trace Gravel, moist.	29' SILT & CLAY	
34–35	7	18	34-35.5	9-23->50/6"		Hard, gray, SILT & CLAY, trace fine to coarse Sand, moist.	35.5'	
36						Bottom of Borehole at 35.5 Feet		4

Equipment Installed



REMARKS

1. Groundwater was encountered at approximately 2.2 feet below ground surface.
2. VAP groundwater sample was collected from approximately 4.0 to 9.0 feet below ground surface and submitted for analytical laboratory testing.
3. VAP groundwater sample was collected from approximately 14.0 to 19.0 feet below ground surface and submitted for analytical laboratory testing.
4. Upon completion, artesian conditions were observed and the original borehole was plugged with a portland cement slurry. Offset approximately 6.0 feet to the south to install the monitoring well. Well screen was set from approximately 5.0 to 10.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/7/22

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Rockford, Michigan

Boring No.: AREA19-MW-224
Page: 1 of 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: J. Gryska
Logged by: C. Martin
Date Start/Finish: 2-10-22 / 2-11-22
Boring Location: 595,199.2719 N; 12,804,662.6069 E
GS Elev.: 695.46' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	698.37'	NA

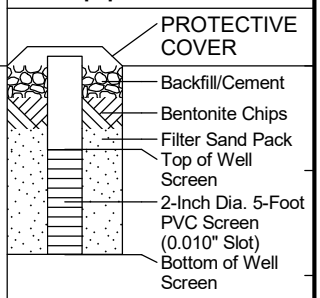
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
2/11/22	0845	0.5'	Augers	16 hrs

Surveyed By: EXXEL **Survey Date:** 3/30/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–5	1	24/22	4-6	2-3 5-8		Loose, light brown, SAND, trace Silt, trace Gravel, wet.	SAND	1 2
9–12	2	24/17	9-11	1-8 11-16		Soft, gray, CLAY, trace Silt, wet. Changing at 9.7 feet to: Medium dense, gray, Silty SAND, wet.	9' 9.7' CLAY Silty SAND	
14–17	3	24/21	14-16	5-8 12-17		Soft, gray, Silty CLAY, trace fine Sand, moist.	14' Silty CLAY	
19–22	4	24/22	19-21	3-14 10-12		Very stiff, gray, Silty CLAY, little fine to medium Sand, trace Gravel, moist.		
24–27	5	24/24	24-26	6-9 13-22		Very stiff, gray, Silty CLAY, little fine to medium Sand, trace Gravel, moist.		
29–32	6	24/24	29-31	6-10 15-29		Very stiff, gray, Silty CLAY, little fine to medium Sand, trace Gravel, moist.		
34–37	7	24/24	34-36	7-16 24-33		Hard, gray, SILT & CLAY, little fine to coarse Sand, moist.	34' SILT & CLAY	
39–42	8	24/24	39-41	9-27 36-48		Hard, gray, SILT & CLAY, little fine to coarse Sand, moist.		
44–47	9	24/24	44-46	10-13 41-53		Hard, gray, SILT & CLAY, little fine to coarse Sand, moist.		
49–50	10	17/17	49-50.4	25-44-50/5"		Hard, gray, SILT & CLAY, little fine to coarse Sand, moist.	50.4'	
51–54						Bottom of Borehole at 50.4 Feet		3 4

Equipment Installed



REMARKS

1. Groundwater was encountered at approximately 0.5 feet below ground surface.
2. VAP groundwater sample was collected from approximately 4.0 to 9.0 feet below ground surface and submitted for analytical laboratory testing.
3. Original borehole was plugged with grout from 0.0 to 50.0 feet below ground surface. Permanent monitoring well offset approximately 5.0 feet to the east.
4. Monitoring well was installed in offset borehole upon completion. Well screen was set from approximately 4.0 to 9.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/7/22

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Rockford, Michigan

Boring No.: AREA19-MW-225 VAP
Page: 1 of 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: D. Krause
Logged by: N. Kampfschulte
Date Start/Finish: 9-16-22 / 9-16-22
Boring Location: 603,871.9538 N; 12,802,519.6578 E
GS Elev.: 701.99' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 7/10/2023

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
									None
1–4	1	24/18	4-6	4-8 6-7		Medium dense, brown, fine to medium SAND, some fine to medium Gravel, some Silt, wet.	SAND	1 2	
5–8	2	24/12	9-11	1-1 2-3		Very loose, brown, fine to medium SAND, trace Organic Clay, wet.		3	
9–12	3	24/6	14-16	5-8 10-10		Medium dense, brown, fine to medium SAND, some shards of coarse Gravel, wet.			
13–16	4	24/12	19-21	3-3 5-7		Loose, brown, fine to medium SAND, some shards of coarse Gravel, wet. Changing at 20.0 feet to: Soft, light brown, Silty CLAY, some fine to medium Gravel, wet.	20' Silty CLAY		
17–20	5	24/18	24-26	4-8 18-15		Soft, light brown, Silty CLAY, some fine to medium Gravel, wet (interbedded with brown, fine to medium Sand, wet).		4	
21–24	6	24/22	29-31	4-7 16-18		Stiff, light brown, CLAY, some Silt, wet. Changing at 30.5 feet to: Stiff, brown, SILT, some fine Sand, wet.	30.5' SILT	5	
25–28	7	24/12	34-36	8-12 18-20		Stiff, brown, SILT, some fine Sand, trace Clay, wet.			

REMARKS

1. Groundwater was encountered at approximately 4.0 feet below ground surface.
2. VAP groundwater sample was collected from approximately 5.0 to 10.0 feet below ground surface and submitted for analytical laboratory testing.
3. VAP groundwater sample was collected from approximately 12.5 to 17.5 feet below ground surface and submitted for analytical laboratory testing.
4. A temporary well was set from approximately 25.0 to 30.0 feet below ground surface but did not produce enough volume to collect samples for analytical laboratory testing.
5. VAP groundwater sample was collected from approximately 30.0 to 35.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/17/24

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Rockford, Michigan

Boring No.: AREA19-MW-225 VAP
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
39	8	24/24	39-41	6-12 14-15		Stiff, brown, CLAY, trace fine Sand, moist.	39' SILT / CLAY		
44	9	24/24	44-46	3-3 6-8		Medium stiff, brown, CLAY, little interbedded Silty Sand, moist.			
49	10	24/24	49-51	4-8 11-16		Stiff, brown, CLAY, moist.			
54	11	24/24	54-56	3-4 7-11		Stiff, brown, CLAY, trace interbedded Silty fine Sand, moist.	56'		
56						Bottom of Borehole at 56.0 Feet		6	

REMARKS

6. Borehole was backfilled with drill cuttings and bentonite grout upon completion.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/17/24

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Rockford, Michigan

Boring No.: AREA19-MW-225A
Page: 1 **of** 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: D. Krause
Logged by: N. Kampfschulte
Date Start/Finish: 2-2-23 / 2-2-23
Boring Location: 603,866.1632 N; 12,802,517.4310 E
GS Elev.: 702.13' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	704.40'	NA

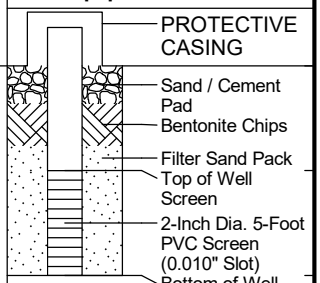
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 7/10/2023

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–9						See AREA19-MW-225 VAP for soil and stratum descriptions.		
10						Bottom of Borehole at 10.0 Feet		1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 5.0 to 10.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/17/24

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Rockford, Michigan

Boring No.: AREA19-MW-225B
Page: 1 **of** 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: D. Krause
Logged by: N. Kampfschulte
Date Start/Finish: 2-1-23 / 2-2-23
Boring Location: 603,871.9538 N; 12,802,519.6578 E
GS Elev.: 701.99' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	704.71'	NA

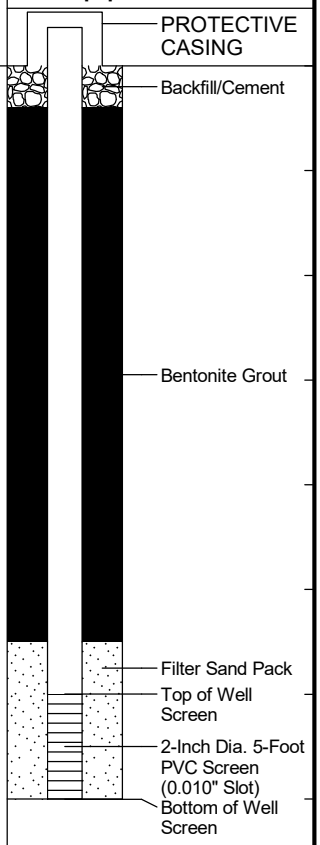
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 7/10/2023

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–34						See AREA19-MW-225 VAP for soil and stratum descriptions.		
35						Bottom of Borehole at 35.0 Feet		1
36–54								

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 30.0 to 35.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/17/24

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Boring No.: AREA19-MW-226A
Page: 1 **of** 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: T. Hawking
Logged by: C. Melby
Date Start/Finish: 5-11-23 / 5-11-23
Boring Location: 605,358.8437 N; 12,798,631.6385 E
GS Elev.: 705.73' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	708.69'	NA

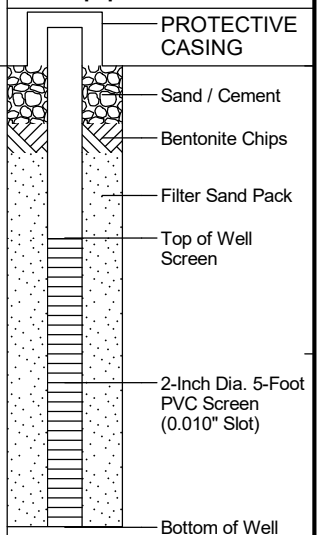
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 8/23/2023

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–7						See AREA19-MW-226B for soil and stratum descriptions.		
8						Bottom of Borehole at 8.0 Feet		1
9–19								

Equipment Installed



REMARKS

1. Monitoring well installed in borehole upon completion. Well screen was set from approximately 3.0 to 8.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/17/24

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Boring No.: AREA19-MW-226B
Page: 1 **of** 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: Gary
Logged by: N. Kampfschulte
Date Start/Finish: 3-23-23 / 3-24-23
Boring Location: 605,364.6064 N; 12,798,625.0732 E
GS Elev.: 705.56' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	708.32'	NA

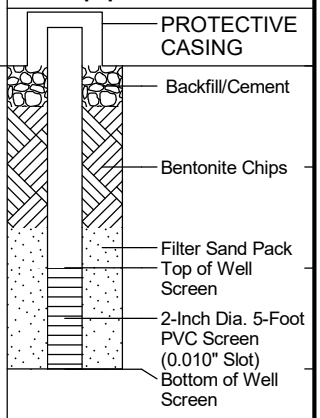
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
3/23/23	-	3.25'	-	-

Surveyed By: EXXEL **Survey Date:** 8/23/2023

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–4	1	24/24	3-5	1-1 1-1		Very loose, brown and gray, fine to medium SAND, little Organic Matter, moist to wet.	SAND	1 2
8							8'	
8–10	2	24/12	8-10	7-7 10-10		Medium dense, fine GRAVEL, moist. Changing at 9.5 feet to: Medium dense, light brown, fine to medium SAND, wet.	GRAVEL 9.5' SAND	
13–16	3	24/20	13-15	13-19 23-24		Dense, brown, fine to medium SAND, trace fine Gravel, wet.		3
18–20	4	24/20	18-20	12-22 23-19		Dense, brown, fine SAND, wet. Changing at 19.0 feet to: Very stiff, gray and brown, SILT, trace fine Gravel, wet.	19' SILT	
23	5	24/24	23-25	13-18 22-30		Very stiff, gray, Clayey SILT, moist.	23' Clayey SILT	
28–30	6	24/24	28-30	15-24 32-45		Very stiff, gray, Clayey SILT, trace fine Sand, moist.		
33–35	7	24/22	33-35	12-14 28-30		Very stiff, gray, Clayey SILT, trace fine Sand, moist.		
38–40	8	24/24	38-40	9-20 27-50		Very stiff, gray, Clayey SILT, little fine to medium Sand, trace fine Gravel, moist.		
43							43'	
43–45	9	24/24	43-45	20-30 41-44		Hard, gray, SILT, little fine to medium Sand, trace fine Gravel, moist.	SILT	
48–50	10	17/17	48-49.4	19-45-50/5"		Hard, gray, SILT, little fine to medium Sand, trace fine Gravel, moist.		4
53–54	11	17/17	53-54.4	26-35-50/5"		Hard, gray, SILT, little fine to medium Sand, trace fine Gravel, moist.	54.4'	
55–56						Bottom of Boring at 54.4 Feet		5

Equipment Installed



REMARKS

1. VAP groundwater sample was collected from approximately 3.0 to 8.0 feet below ground surface and submitted for analytical laboratory testing.
2. Groundwater was encountered at approximately 3.25 feet below ground surface.
3. VAP groundwater sample was collected from approximately 13.0 to 18.0 feet below ground surface and submitted for analytical laboratory testing.
4. Cobble encountered at approximately 46.0 feet below ground surface. Driller augered past cobble and continued sampling.
5. Monitoring well was installed approximately 5.0 feet north of original borehole upon completion. Well screen was set from approximately 10.0 to 15.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_62961.52 GSI.GPJ GZA_CORP.GDT 1/17/24

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Engineers and Scientists

Wolverine World Wide, Inc.
RAP GSI
Rockford, Michigan

Boring No.: HS-MW-260
Page: 1 of 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: D. Krause
Logged by: D. Watt
Date Start/Finish: 6-17-22 / 6-21-22
Boring Location: 579,304.2840 N; 12,795,521.7306 E
GS Elev.: 630.64' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	633.66'	NA

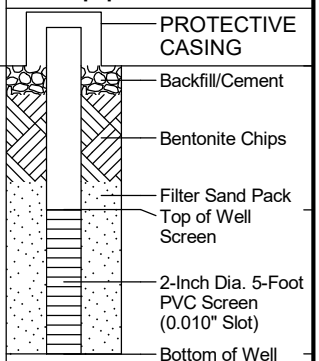
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
6/17/22	-	4.1'	Augers	5 min
6/20/22	-	3.12'	PVC	60 hrs

Surveyed By: EXXEL **Survey Date:** 8/25/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/14	0-2	2-2 2-3		Soft, black, SILT, trace to little Clay, trace fine Sand, trace Organic Matter, moist. Changing at 1.0 foot to: Soft, brown, SILT & CLAY, little fine to coarse Sand, moist.	1' SILT SILT & CLAY	
4	2	24/6	4-6	3-4 5-5		Loose, gray, fine to coarse SAND, trace Silt, trace Gravel, wet.	4' SAND	1 2 3
9	3	24/12	9-11	1-2 1-2		Very loose, brown, fine to medium SAND, wet.		
14	4	24/10	14-16	1-1 1-2		Very loose, brown, fine to coarse SAND, trace Silt, wet.		4
19	5	24/14	19-21	2-4 5-4		Loose, brown, fine to medium SAND, trace Silt, wet.		
24	6	24/12	24-26	2-3 8-8		Medium dense, brown, fine to medium SAND, trace Silt, wet.		5
29	7	24/9	29-31	3-7 8-9		Medium dense, brown, fine to medium SAND, trace Silt, wet.		
34	8	24/8	34-36	2-7 12-18		Medium dense, brown, fine to medium SAND, trace Silt, wet.		6
39	9	24/10	39-41	5-9		Medium dense, brown, fine to medium		

Equipment Installed



REMARKS

1. Groundwater was encountered at approximately 4.0 feet below ground surface.
2. VAP groundwater sample was collected from approximately 5.0 to 10.0 feet below ground surface and submitted for analytical testing.
3. Cobble encountered at approximately 6.0 feet below ground surface. Driller augered past cobble and continued sampling.
4. VAP groundwater sample was collected from approximately 15.0 to 20.0 feet below ground surface and submitted for analytical testing.
5. VAP groundwater sample was collected from approximately 25.0 to 30.0 feet below ground surface and submitted for analytical testing.
6. VAP groundwater sample was collected from approximately 35.0 to 40.0 feet below ground surface and submitted for analytical testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Rockford, Michigan

Boring No.: HS-MW-260
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
41				15-17		SAND, trace Silt, wet.	SAND		
42									
43									
44	10	24/6	44-46	3-7		Medium dense, brown, fine to medium SAND, trace Silt, wet.		7	
45				15-22					
46									
47									
48									
49	11	24/8	49-51	3-7		Medium dense, brown, fine to medium SAND, trace Silt, wet.			
50				13-16					
51							51'		
52						Bottom of Borehole at 51.0 Feet		8	
53									
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REMARKS

7. VAP groundwater sample was collected from approximately 45.0 to 50.0 feet below ground surface and submitted for analytical testing.
8. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 5.0 to 10.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Rockford, Michigan

Boring No.: HS-MW-261
Page: 1 of 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: D. Krause
Logged by: D. Watt
Date Start/Finish: 6-21-22 / 6-23-22
Boring Location: 579,110.9177 N; 12,794,886.3750 E
GS Elev.: 628.42' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	631.19'	NA

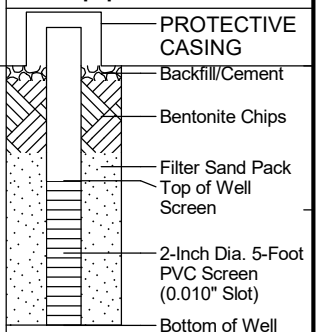
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 8/25/2022

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/20	0-2	1-1 2-2		Soft, dark brown, Organic SILT, trace Clay, trace Sand, moist. Changing at 1.5 feet to: Very loose, gray, fine to medium SAND, trace Silt, wet.	SILT 1.5' SAND	1
4	2	24/6	4-6	5-4 4-5		Loose, brown, fine GRAVEL, little coarse Sand, trace Silt, wet.	4' GRAVEL	2
9	3	24/18	9-11	2-2 2-2		Very loose to loose, brown, fine to medium SAND, trace Silt, wet.	9' SAND	
14	4	24/12	14-16	2-2 3-4		Loose, brown, fine to medium SAND, trace Silt, wet.		3
19	5	24/13	19-21	3-4 6-6		Loose, brown, fine to medium SAND, trace Silt, wet.		
24	6	24/14	24-26	2-7 9-10		Medium dense, brown, fine to medium SAND, trace Silt, wet.		4
29	7	24/14	29-31	4-6 9-9		Medium dense, brown, fine to medium SAND, trace Silt, wet.		
34	8	24/11	34-36	3-8 12-12		Medium dense, brown, fine to medium SAND, trace Silt, wet.		5
39	9	24/14	39-41	4-8		Medium dense, brown, fine to medium		

Equipment Installed



REMARKS

1. Groundwater was encountered at approximately 1.5 feet below ground surface.
2. VAP groundwater sample was collected from approximately 5.0 to 10.0 feet below ground surface and submitted for analytical testing.
3. VAP groundwater sample was collected from approximately 15.0 to 20.0 feet below ground surface and submitted for analytical testing.
4. VAP groundwater sample was collected from approximately 25.0 to 30.0 feet below ground surface and submitted for analytical testing.
5. VAP groundwater sample was collected from approximately 35.0 to 40.0 feet below ground surface and submitted for analytical testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: HS-MW-261

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

GZA
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Engineers and Scientists

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Rockford, Michigan

Boring No.: HS-MW-261
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
41				14-17		SAND, trace Silt, wet.	SAND		
42									
43									
44	10	23/11	44-45.9	8-20		Very dense, brown, fine to medium SAND,			
45				31-50/5"		trace Silt, wet.		6	
46									
47									
48									
49	11	24	49-51	4-7		Dense, brown, fine to medium SAND, trace			
50				22-31		Silt, wet.			
51							51'		
						Bottom of Borehole at 51.0 Feet		7	
52									
53									
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86									

REMARKS

6. VAP groundwater sample was collected from approximately 45.0 to 50.0 feet below ground surface and submitted for analytical testing.
7. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 4.0 to 9.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Rockford, Michigan

Boring No.: HS-MW-262
Page: 1 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: D. Krause
Logged by: D. Watt
Date Start/Finish: 6-24-22 / 6-27-22
Boring Location: 578,883.9593 N; 12,794,660.6982 E
GS Elev.: 628.53' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	631.60'	NA

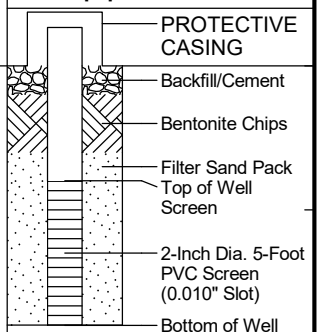
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
6/24/22	-	4.5'	Augers	5 min

Surveyed By: EXXEL **Survey Date:** 8/25/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/8	0-2	2-2 3-2		Medium stiff, dark brown, Organic SILT, trace Clay, trace Sand, moist.	SILT	
4	2	24/10	4-6	4-12 13-50/5"		Medium dense, brown, GRAVEL and coarse Sand, trace Silt, wet.	4' GRAVEL	1 2 3
9	3	24/16	9-11	3-2 1-2		Very loose, brown, fine to medium SAND, trace Silt, wet.	9' SAND	
14	4	24/13	14-16	2-2 3-1		Loose, brown, fine to medium SAND, trace Silt, wet.		4
19	5	24/15	19-21	3-4 4-6		Loose, brown, fine to medium SAND, trace Silt, wet.		
24	6	24/10	24-26	1-1 2-2		Very loose, brown, fine to medium SAND, trace Silt, wet.		5
29	7	24/18	29-31	4-8 10-10		Medium dense, brown, fine to medium SAND, trace Silt, wet.		
34	8	24/15	34-36	2-5 8-10		Medium dense, brown, fine to medium SAND, trace Silt, wet.		6
39	9	24/13	39-41	3-3		Loose, brown, fine to medium SAND, trace		

Equipment Installed



REMARKS

1. Groundwater was encountered at approximately 4.0 feet below ground surface.
2. VAP groundwater sample was collected from approximately 5.0 to 10.0 feet below ground surface and submitted for analytical laboratory testing.
3. Cobbles encountered between approximately 5.5 and 7.5 feet below ground surface. Driller augered past cobbles and continued sampling.
4. VAP groundwater sample was collected from approximately 15.0 to 20.0 feet below ground surface and submitted for analytical laboratory testing.
5. VAP groundwater sample was collected from approximately 25.0 to 30.0 feet below ground surface and submitted for analytical laboratory testing.
6. VAP groundwater sample was collected from approximately 35.0 to 40.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Rockford, Michigan

Boring No.: HS-MW-262
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
41				6-8		Silt, wet.	SAND		
42									
43								7	
44	10	24/14	44-46	1-3		Loose, brown, fine to medium SAND, trace Silt, wet.			
45				6-8					
46									
47							48'		
48	11	24/21	48-50	8-19		Hard, gray and brown, SILT & CLAY, trace fine to coarse Sand, moist.	SILT & CLAY		
49				38-50/6"					
50							50'		
51						Bottom of Borehole at 50.0 Feet		8	
52									
53									
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REMARKS

7. VAP groundwater sample was collected from approximately 43.0 to 48.0 feet below ground surface and submitted for analytical laboratory testing.
8. Monitoring well was installed in offset borehole upon completion. Well screen was set from approximately 4.0 to 9.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Rockford, Michigan

Boring No.: HS-MW-263A
Page: 1 of 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: J. Huntoon
Logged by: D. Watt
Date Start/Finish: 2-22-22 / 2-24-22
Boring Location: 576,721.1736 N; 12,794,459.3933 E
GS Elev.: 626.74' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	630.00'	NA

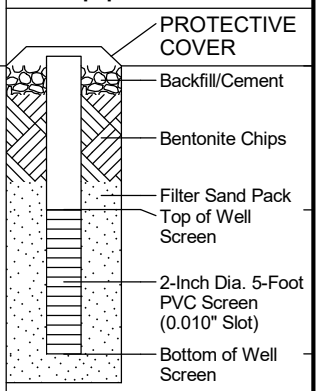
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
2/22/22	1455	5.5'	Augers 9'	0
2/23/22	1317	9.0'	Augers 44'	0

Surveyed By: EXXEL **Survey Date:** 3/30/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–39							SAND	
4–5	1	24/0	4-6	10-8 4-3		NO RECOVERY. Soil cuttings: SAND, some Gravel, trace Silt, wet.		1 2
9–10	2	24/12	9-11	10-14 26-14		Dense, brown, medium to coarse SAND, some Gravel, trace Silt, wet.		3
14–15	3	24/8	14-16	16-10 11-12		Medium dense, brown, fine to medium SAND, trace Silt, wet.		4
19–20	4	24/24	19-21	7-8 9-13		Medium dense, brown, fine to medium SAND, trace Silt, wet. Changing at 20.5 feet to: Stiff, gray, Clayey SILT and Sand, trace Gravel, moist.	20.5' Clayey SILT	
24–25	5	24/20	24-26	10-28 41-44		Very dense, gray, fine SAND and Silt, little Clay, trace Gravel, moist.	24' SAND	5
29–30	6	24/18	29-31	12-40 36-41		Very dense, gray, fine SAND and Silt, little Clay, trace Gravel, moist.		
34–35	7	23/23	34-35.9	14-20 34-50/5"		Hard, gray, SILT & CLAY, some fine to medium Sand, trace Gravel, moist.	34' SILT & CLAY	
39	8	20/20	39-40.7	10-24-37		Very dense, gray, fine SAND and Silt, little	39' SAND	

Equipment Installed



REMARKS

1. Cobble encountered at approximately 2.0 feet below ground surface. Drillers augered past cobble and resumed sampling.
2. VAP groundwater sample was collected from approximately 3.0 to 8.0 feet below ground surface and submitted for analytical testing.
3. Groundwater was encountered at approximately 5.5 feet below ground surface.
4. VAP groundwater sample collected from approximately 13.0 to 18.0 feet below ground surface and submitted for analytical testing.
5. Cobble encountered at approximately 23.0 feet below ground surface. Drillers augered past cobble and resumed sampling.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Boring No.: HS-MW-263A
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
41						Clay, trace Gravel, moist.	SAND		
42								6	
43									
44	9	24/18	44-46	15-2 1-1		Very loose, brown, fine to medium SAND, trace Silt, wet.			
45									
46									
47									
48									
49	10	24/20	49-51	6-5 13-21		Medium dense, fine to medium SAND, trace Silt, embedded lens of Clay, wet.	51'		
50									
51						Bottom of Borehole at 51.0 Feet		7 8	
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REMARKS

6. VAP groundwater sample was collected from approximately 42.0 to 47.0 feet below ground surface and submitted for analytical testing.
7. Original borehole was plugged with grout from 0.0 to 49.0 feet below ground surface. Permanent monitoring well was offset 5.0 feet to the east.
8. Monitoring well was installed in offset borehole upon completion. Well screen was set from approximately 5.0 to 10.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Rockford, Michigan

Boring No.: HS-MW-263B
Page: 1 **of** 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: Bryan
Logged by: N. Kampfschulte
Date Start/Finish: 7-12-22 / 7-13-22
Boring Location: 576,718.2746 N; 12,794,456.3563 E
GS Elev.: 626.95' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	629.18'	NA

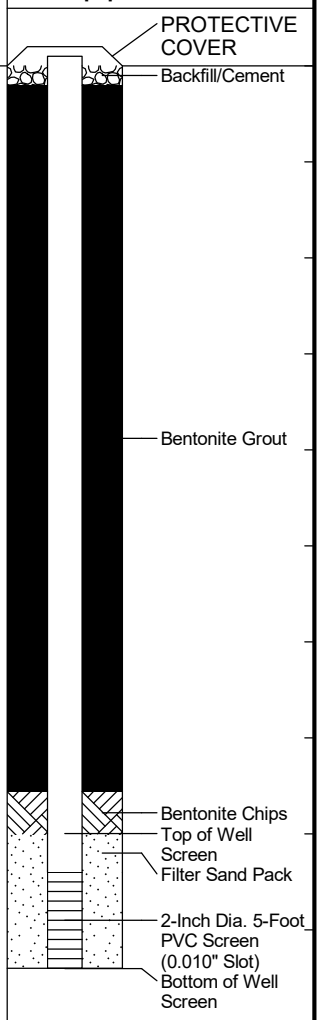
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 8/25/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–47						See HS-MW-263A for soil and stratum descriptions.		
47						Bottom of Borehole at 47.0 Feet		1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 42.0 to 47.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Boring No.: HS-MW-264
Page: 1 of 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: J. Gryska
Logged by: D. Watt
Date Start/Finish: 2-24-22 / 2-24-22
Boring Location: 574,868.3681 N; 12,794,561.2971 E
GS Elev.: 638.61' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	638.18'	NA

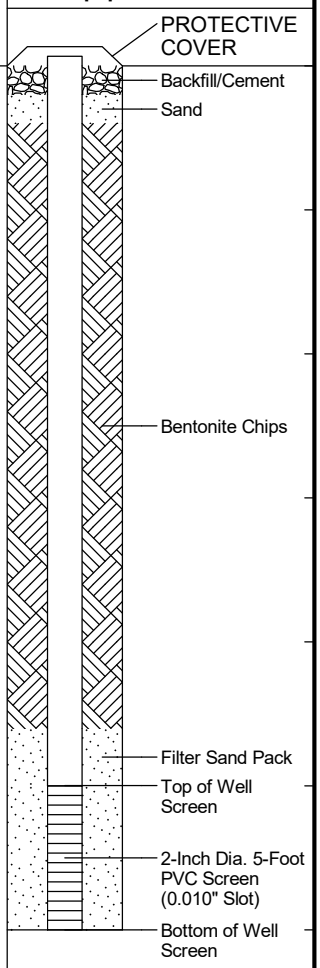
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
2/24/22	1401	22.0'	Augers 24'	

Surveyed By: EXXEL **Survey Date:** 3/30/2022

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1							TOPSOIL	
2								
3								
4	1	24/24	4-6	1-2 2-2		Dark brown, TOPSOIL and Organic Matter, dry. Changing at 4.2 feet to: Very loose, brown, fine to medium SAND, some Clay & Silt, trace Gravel, moist. Changing at 5.0 feet to: Very loose, brown, fine to medium SAND, little Clay & Silt, moist.	4.2' SAND	
5								
6								
7								
8								
9	2	24/24	9-11	5-14 18-18		Dense, brown, fine to medium SAND, some Clay & Silt, trace Gravel, moist.		
10								
11								
12								
13								
14	3	24/18	14-16	8-40 35-37		Very dense, brown, fine to medium SAND, some Clay & Silt, trace Gravel, moist. Changingat 15.5 feet to: Very dense, brown, fine to medium SAND, trace Clay & Silt, trace Gravel, moist.		
15								
16								
17								
18								
19	4	24/20	19-21	10-38 31-50		Very dense, brown, medium to coarse SAND, trace Gravel, trace Silt, moist.		
20								
21								
22								
23								
24	5	18/18	24-25.5	8-19-25		Dense, brown, fine to medium SAND, trace Silt, wet.		1
25								2
26								
27								
28								
29	6	18/10	29-30.5	8-18-35		Very dense, brown, fine to medium SAND, trace Silt, wet.		
30								
31								
32								
33								
34	7	12/12	34-35	26-50/6"		Very dense, gray, fine to medium SAND, some Silt & Clay, trace Gravel, moist.	35'	
35						Bottom of Borehole at 35.0 Feet		3 4
36								
37								
38								
39								

Equipment Installed



REMARKS

1. Groundwater was encountered at approximately 24.0 feet below ground surface. Static groundwater measured within augers at approximately 22.0 feet below ground surface.
2. VAP groundwater sample was collected from approximately 24.0 to 29.0 feet below ground surface and submitted for analytical laboratory testing.
3. Cobble encountered at approximately 35.0 feet below ground surface with auger refusal. Original borehole was plugged with grout from 0.0 to 35.0 feet below ground surface. Permanent monitoring well was offset approximately 10.0 feet to the east.
4. Monitoring well was installed in offset borehole upon completion. Well screen was set from approximately 25.0 to 30.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Rockford, Michigan

Boring No.: HS-MW-265
Page: 1 of 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: J. Gryska
Logged by: C. Martin
Date Start/Finish: 1-31-22 / 2-1-22
Boring Location: 571,010.2633 N; 12,792,622.2240 E
GS Elev.: 612.2' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	614.96'	NA

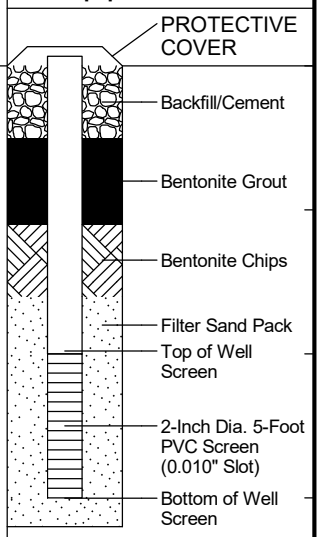
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
1/31/22	1141	6.35'	Augers	5 min
2/1/22	0826	5.0'	Augers	15 hrs

Surveyed By: EXXEL **Survey Date:** 3/30/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/17	4-6	1-1 1-2		Loose, brown, Clayey SILT, little fine Sand, damp.	Clayey SILT	1
2								2
9	2	24/13	9-11	2-1 2-4		Very loose, light brown, fine to medium SAND, trace Silt, wet.	9' SAND	
14	3	24/24	14-16	4-8 9-11		Medium dense, light brown, fine to medium SAND, trace Silt, trace Gravel, wet.		3
19	4	24/14	19-21	2-2 1-2		Very loose, light brown, fine to medium SAND, trace Silt, trace Gravel, wet.		
24	5	24/24	24-26	3-4 4-7		Loose, light brown, fine to medium SAND, trace Silt, trace Gravel, wet with 2 inches of light brown CLAY at 25.4 feet.		4
29	6	24/24	29-31	2-3 3-4		Loose, light brown, fine to medium SAND, trace Silt, trace Gravel, wet.		
34	7	24/13	34-36	11-14 14-13		Medium dense, light brown, fine to medium SAND, trace Silt, trace Gravel, wet with coarse Gravel in spoon tip.		5
39	8	24/20	39-41	11-3		Loose, light brown, fine to medium SAND,		

Equipment Installed



REMARKS

1. VAP groundwater sample was collected from approximately 4.0 to 9.0 feet below ground surface and submitted for analytical laboratory testing.
2. Groundwater was encountered at approximately 6.4 feet below ground surface.
3. VAP groundwater sample was collected from approximately 14.0 to 19.0 feet below ground surface and submitted for analytical laboratory testing.
4. VAP groundwater sample was collected from approximately 24.0 to 29.0 feet below ground surface and submitted for analytical laboratory testing.
5. VAP groundwater sample was collected from approximately 34.0 to 39.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Rockford, Michigan

Boring No.: HS-MW-265
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
41				5-6		trace Silt, trace Gravel, dry. Changing at 40.4 feet to: Light brown, Silty CLAY, wet.	40.4' Silty CLAY		
44	9	24/14	44-46	3-7 5-7		Brown, Silty CLAY, wet. Changing at 44.8 feet to: Medium dense, brown, medium GRAVEL, wet. Changing at 45.0 feet to: Brown, Silty CLAY, wet.	44.8' 45' GRAVEL Silty CLAY	6	
49	10	24/11	49-51	2-2 1-1		Very loose, light brown, fine to medium SAND, trace Silt, trace Gravel, wet.	49' SAND 51'		
51						Bottom of Borehole at 51.0 Feet		7	

REMARKS

6. VAP groundwater sample was collected from approximately 44.0 to 49.0 feet below ground surface and submitted for analytical laboratory testing.
7. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 10.0 to 15.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Rockford, Michigan

Boring No.: HS-MW-266A
Page: 1 of 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: D. Krause
Logged by: D. Watt
Date Start/Finish: 6-15-22 / 6-20-22
Boring Location: 579,706.4161 N; 12,794,679.0174 E
GS Elev.: 633.73' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	636.69'	NA

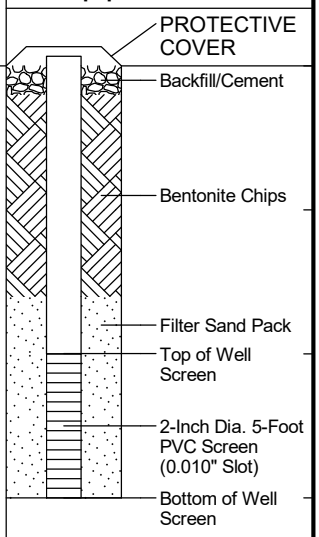
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
6/15/22	-	6.61'	Augers	2 min
6/16/22	-	1.2'	PVC	16 hrs

Surveyed By: EXXEL **Survey Date:** 8/25/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–3	1	24/10	0-2	1-1 1-2		Very soft to soft, black, SILT, trace fine Sand, trace Clay, moist. Changing at 1.0 foot to: Gray, SILT, trace Sand, moist.	SILT	
4–8	2	24/6	4-6	1-1 3-10		Soft, gray, SILT, some Gravel, trace fine Sand, moist.		1 2
9–13	3	24/12	9-11	11-7 3-3		Loose, brown, fine to coarse SAND, trace Silt, wet.	9' SAND	3
14–18	4	24/18	14-16	1-2 2-2		Loose, brown, fine to medium SAND, trace Silt, wet.		
19–23	5	24/18	19-21	1-3 3-3		Loose, brown, fine to medium SAND, trace Silt, wet.		4
24–28	6	24/20	24-26	5-7 8-10		Medium dense, brown, fine to medium SAND, trace Silt, wet.		
29–33	7	24/12	29-31	4-8 10-12		Medium dense, brown, fine to medium SAND, trace Silt, wet.		5
34–38	8	24/24	34-36	4-7 11-12		Medium dense, brown, fine to medium SAND, trace Silt, wet.		
39	9	24/10	39-41	1-6		Medium dense, brown, fine to medium		

Equipment Installed



REMARKS

1. Cobble encountered at approximately 5.0 feet below ground surface. Driller augered past cobble and continued sampling.
2. Groundwater encountered at approximately 6.5 feet below ground surface.
3. VAP groundwater sample was collected from approximately 10.0 to 15.0 feet below ground surface and submitted for analytical laboratory testing.
4. VAP groundwater sample was collected from approximately 20.0 to 25.0 feet below ground surface and submitted for analytical laboratory testing.
5. VAP groundwater sample was collected from approximately 30.0 to 35.0 feet below ground surface and submitted for analytical laboratory testing.
6. VAP groundwater sample was collected from approximately 40.0 to 45.0 feet below ground surface and submitted for analytical laboratory testing.

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BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Rockford, Michigan

Boring No.: HS-MW-266A
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
41				8-11		SAND, trace Silt, wet.	SAND	6	
44	10	24/10	44-46	1-5 10-12		Medium dense, brown, fine to medium SAND, trace Silt, wet.			
49	11	24/12	49-51	2-5 8-10		Medium dense, brown, fine to medium SAND, trace Silt, wet.			
54	12	24/22	54-56	4-5 9-12		Medium dense, brown, fine to medium SAND, trace Silt, wet.			
59	13	24/18	59-61	2-3 5-10		Loose, brown, fine to medium SAND, trace Silt, wet.			
64	14	24/10	64-66	2-3 8-10		Medium dense, brown, fine to medium SAND, trace Silt, wet.			
69	15	24/10	69-71	2-3 2-2		Loose, brown, fine to medium SAND, trace Silt, wet.			
74	16	24/8	74-76	4-2 1-2		Very loose, gray and brown, fine to coarse SAND, trace Silt, wet.	76'		
76						Bottom of Borehole at 76.0 Feet		7	

REMARKS

7. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 10.0 to 15.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Engineers and Scientists

Wolverine World Wide, Inc.
RAP GSI
Rockford, Michigan

Boring No.: HS-MW-266B
Page: 1 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: D. Krause
Logged by: N. Kampfschulte
Date Start/Finish: 9-13-22 / 9-14-22
Boring Location: 579,711.5286 N; 12,794,680.0811 E
GS Elev.: 633.71' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	636.69'	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 11/18/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–37						See HS-MW-266A for soil and stratum descriptions.			PROTECTIVE COVER; Backfill/Cement; Bentonite Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/10/23

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Rockford, Michigan

Boring No.: HS-MW-266B
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
39–54									Filter Sand Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
55						Bottom of Borehole at 55.0 Feet		1	Bottom of Well Screen
56–82									

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 50.0 to 55.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_62961.52 GSI.GPJ GZA_CORP.GDT 1/10/23

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Rockford, Michigan

Boring No.: WV/CH-MW-240
Page: 1 of 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: J. Gryska
Logged by: C. Martin
Date Start/Finish: 2-3-22 / 2-8-22
Boring Location: 591,991.6064 N; 12,804,009.7742 E
GS Elev.: 714.70' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	714.28'	NA

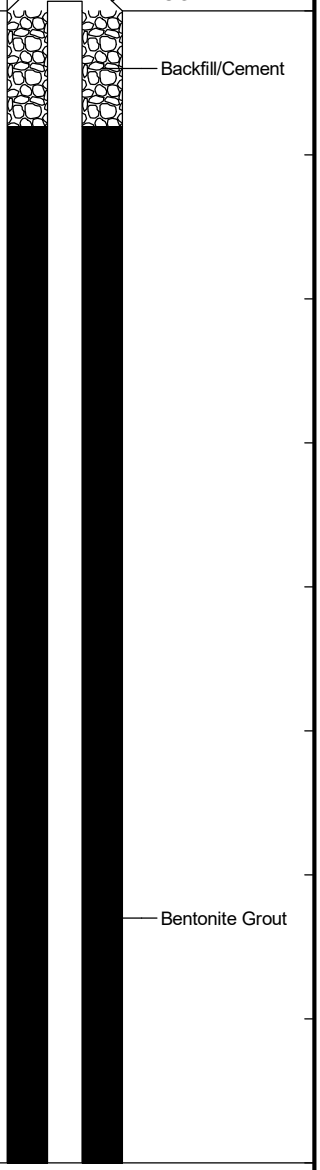
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
2/3/22	1230	24.34'	Augers	5 min
2/4/22	1045	24.7'	Augers	19 hrs

Surveyed By: EXXEL **Survey Date:** 3/30/2022

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–4	1	24/9	4-6	3-4 6-10		Loose, light brown, SAND, little Gravel, trace Silt, dry.	SAND	
5–8	2	24/12	9-11	4-4 6-11		Loose, light brown, SAND, little Gravel, trace Silt, dry.		
9–12	3	24/13	14-16	7-9 12-15		Medium dense, light brown, SAND and Gravel, trace Silt, dry.		
13–16	4	24/15	19-21	5-11 15-24		Medium dense, light brown, SAND and Gravel, trace Silt, dry.		
17–20	5	24/21	24-26	6-17 38-37		Very dense, light brown, coarse SAND, trace Gravel, wet. Changing at 24.3 feet to: Hard, light brown, CLAY, trace Silt, trace Gravel, dry.	24.3' CLAY	1
21–24	6	24/24	29-31	44-33 27-22		Hard, light brown, SILT, trace Clay, trace Gravel, dry.	29' SILT	
25–28	7	24/22	34-36	10-17 22-31		Hard, gray, CLAY, trace Silt, trace Gravel, moist.	34' CLAY	
29–32	8	24/23	39-41	10-17		Hard, gray, CLAY, trace Silt, trace Gravel,		

Equipment Installed



REMARKS

1. Groundwater was encountered at approximately 24.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Rockford, Michigan

Boring No.: WV/CH-MW-240
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
41				23-34		moist.	CLAY		
42									
43									
44	9	12/12	44-45	39-52		Hard, gray, Silty CLAY, trace fine Gravel, moist.			
45									
46									
47									
48									
49	10	8/1	49-49.7	52-50/2"		NO RECOVERY.		2	
50									
51									
52									
53									
54	11	18/18	54-55.5	7-36-54		Hard, gray, CLAY, trace Silt, grace fine Gravel, moist.			
55									
56									
57									
58									
59	12	18/15	59-60.5	4-7-21		Hard, gray, Silty CLAY, trace fine Gravel, moist.			Bentonite Chips
60									
61									Filter Sand Pack
62									
63									Top of Well Screen
64	13	14/14	64-65.2	19-34-50/2"		Very dense, light brown, SAND, trace Silt, trace Gravel, wet.	64' SAND		
65									
66									2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
67									
68									Bottom of Well Screen
69	14	15/12	69-70.3	22-47-50/3"		Hard, gray, CLAY, trace Silt, trace Gravel, moist.	69' CLAY 70.3'		
70						Bottom of Borehole at 70.3 Feet		3	
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									
85									
86									

REMARKS

2. Pushed Rock. Driller noted that it still drilled like clay.
3. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 63.0 to 68.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/2/22

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Rockford, Michigan

Boring No.: WV/CH-MW-241
Page: 1 of 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: D. Krause
Logged by: D. Watt
Date Start/Finish: 6-28-22 / 6-29-22
Boring Location: 589,655.3007 N; 12,804,025.7209 E
GS Elev.: 699.94' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 11/18/2022

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–28						See WV/CH-MW-241A for soil and stratum descriptions from 0.0-29.0 feet below ground surface.			None
29–30	1	18/14	29-30.5	18-29-42		Hard, gray, SILT & CLAY, little fine to coarse Sand, moist.	SILT & CLAY	1	
33							34'		
34–36	2	12/12	34-35	16-22		Dense, brown, fine to medium SAND, little Silt, wet.	SAND	2 3	
38								4	
39							39.4'		
40–42	3	5/5	39-39.4	50/5"		Very dense, brown, medium to coarse SAND, trace Silt, wet. Tip of spoon: Gray, SILT & CLAY, trace fine to coarse Sand, moist.	SILT & CLAY	5	
44							44'		
45–46	4	24/16	44-46	40-14 11-14		Dense, brown, fine SAND, little Silt, wet.	SAND	6	
49–51	5	18/18	49-50.5	15-34-50/6"		Very dense, brown, fine to medium SAND, little Silt, wet with lens of Clay at 49.5 feet.			
54–57	6	22/13	54-55.8	7-9 40-50/4"		Dense, brown, fine to medium SAND, little Silt, wet.		7	
59–60	7	22/18	59-60.8	9-15 41-50/4"		Very dense, brown, fine to coarse SAND, little Silt, wet.	61'		
61						Bottom of Borehole at 61.0 Feet		8	

REMARKS

1. Previously characterized by GZA on 2/8/2022 and 2/9/22. Borehole offset 5.0 feet north from previous boring location and monitoring well.
2. Groundwater was encountered at approximately 34.0 feet below ground surface.
3. VAP groundwater sample was collected from approximately 34.0 to 39.0 feet below ground surface and submitted for analytical laboratory testing.
4. Cobble encountered approximately 37.0 below ground surface. Driller augered past and continued sampling.
5. Cobble encountered at approximately 39.5 feet below ground surface. Driller augered past cobble and continued sampling. Driller noted soils below the cobble felt like silt/clay with interbedded sands.
6. VAP groundwater sample was collected from approximately 44.0 to 49.0 feet below ground surface and submitted for analytical laboratory testing.
7. VAP groundwater sample was collected from approximately 54.0 to 59.0 feet below ground surface and submitted for analytical laboratory testing.
8. Borehole was backfilled with grout upon completion.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 4/24/23

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Boring No.: WV/CH-MW-241A
Page: 1 of 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: J. Gryska
Logged by: C. Martin
Date Start/Finish: 2-8-22 / 2-9-22
Boring Location: 589,654.1053 N; 12,804,029.7239 E
GS Elev.: 699.52' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	702.05'	NA

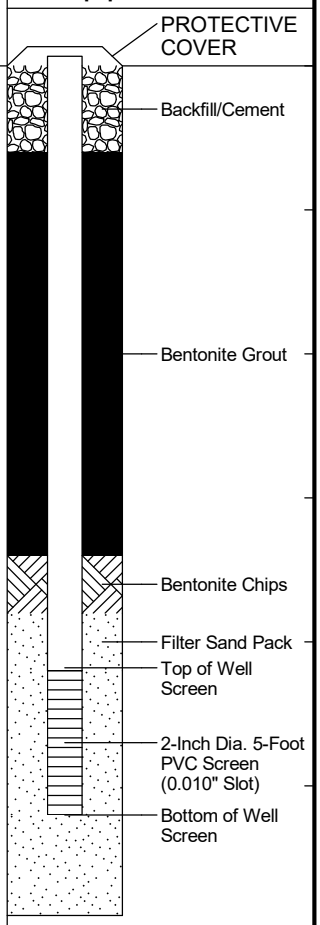
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 3/30/2022

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–7	1	24/7	3-5	3-9 10-12		Medium dense, brown, fine to medium SAND, trace Silt, trace Gravel, dry.	SAND	
8–12	2	24/14	8-10	11-18 16-15		Medium dense, brown, fine to medium SAND, trace Silt, trace Gravel, dry. Changing at 8.3 feet to: Medium dense, light brown, SAND, trace Silt, trace Gravel, dry.		
13–17	3	24/18	13-15	18-14 16-22		Dense, light brown, fine to medium SAND, trace Silt, trace Gravel, dry.		
18–22	4	24/24	18-20	14-19 25-31		Dense, light brown, Clayey SILT, trace Sand, wet.	18' Clayey SILT	1 2
23–27	5	24/24	23-25	8-18 15-21		Medium dense, light brown, fine to coarse SAND, trace Silt, trace Clay, trace Gravel, wet.	23' SAND	
28–29	6	18/18	28-29.5	18-25-50/2"		Hard, gray, CLAY, trace Silt, trace Gravel, dry.	28' CLAY 29.5'	
30–39						Bottom of Borehole at 29.5 Feet		3

Equipment Installed



REMARKS

1. VAP groundwater sample was collected from approximately 18.0 to 23.0 feet below ground surface and submitted for analytical laboratory testing.
2. Groundwater was encountered at approximately 18.0 feet below ground surface.
3. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 21.0 to 26.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/1/22

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Rockford, Michigan

Boring No.: WV/CH-MW-241B
Page: 1 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: D. Krause
Logged by: N. Kampfschulte
Date Start/Finish: 9-9-22 / 9-12-22
Boring Location: 589,655.3007 N; 12,804,025.7209 E
GS Elev.: 699.94' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	702.25'	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 11/18/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–37						See WV/CH-MW-241A for soil and stratum descriptions from 0.0 to 29.0 feet below ground surface. See WV/CH-MW-241 for soil and stratum descriptions from 29.0 to 61.0 feet below ground surface.			PROTECTIVE COVER; Backfill/Cement; Bentonite Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_62961.52 GSI.GPJ GZA_CORP.GDT 1/31/23

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Rockford, Michigan

Boring No.: WV/CH-MW-241B
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File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
59						Bottom of Borehole at 59 Feet		1	Filter Sand Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 54.0 to 59.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/31/23

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Boring No.: WV/CH-MW-242A
Page: 1 of 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: J. Gryska
Logged by: T. Litwiller/M. Myers
Date Start/Finish: 3-28-22 / 3-31-22
Boring Location: 588,547.6747 N; 12,801,456.0694 E
GS Elev.: 715.02' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	714.61'	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 5/20/2022

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–5							SAND	
1–5	1	24/24	4-6	2-2 2-3		Loose, brown, fine to medium, SAND, little Clay, moist.		
6–10	2	24/24	9-11	2-3 5-21		Loose, light brown, medium SAND, trace Gravel, dry.		
11–15	3	24/14	14-16	2-3 6-7		Loose, light brown, medium SAND, trace Gravel, dry.		
16–20	4	24/12	19-21	8-22 26-28		Dense, brown, medium to coarse SAND, some Gravel, dry. Changing at 20.0 feet to: Dense, light brown, fine to medium SAND, dry.		
21–25	5	17/4	24-25.4	6-16-50/5"		Very dense, brown, medium to coarse SAND, some coarse Gravel, dry. Changing at 25.0 feet to: Very dense, black, medium SAND, dry.		
26–30	6	4/4	29-29.3	50/4"		Very dense, brown, medium to coarse SAND and Gravel, dry.		
31–35	7	15/10	34-35.3	29-29-50/3"		Very dense, light brown and gray, medium to coarse SAND, some coarse Gravel, dry. Changing at 35.0 feet to: Stiff, brown, CLAY, trace Gravel, dry.	35' CLAY	
36–40	8	15/14	39-40.3	22-36-50/3"		Very dense, brown, fine to medium SAND, trace Gravel, wet.	39' SAND	1 2
41–45	9	18/11	44-45.5	36-37-50/6"		Very dense, brown, fine SAND, wet.		

Equipment Installed

PROTECTIVE COVER
Backfill/Cement
Bentonite Chips
Bentonite Grout
Bentonite Chips
Filter Sand Pack
Top of Well Screen
2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
Bottom of Well Screen

REMARKS

1. VAP groundwater sample was collected from approximately 38.0 to 43.0 feet below ground surface and submitted for analytical laboratory testing.
2. Groundwater was encountered at approximately 39.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_62961.52 GSI.GPJ GZA_CORP.GDT 1/9/23

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Rockford, Michigan

Boring No.: WV/CH-MW-242A
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File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
48							SAND		
49	10	24/24	49-51	16-12 40-50/6"		Stiff, gray, SILT, little fine Sand, wet.	49' SILT	3	
50									
51									
52									
53									
54	11	18/16	54-55.5	21-38-50/6"		Hard, gray, CLAY, some Silt, moist to dry.	54' CLAY		
55									
56									
57									
58									
59	12	17/14	59-60.4	2-17-50/5"		Hard, gray, CLAY, some Silt, moist to dry.			
60									
61									
62									
63									
64	13	24/24	64-66	6-8 21-29		Gray, SILT, little fine Sand, wet. Changing at 64.3 feet to: Medium dense, gray, fine SAND and Silt, wet.	64' 64.3' SILT SAND	4	
65									
66									
67									
68									
69	14	19/19	69-70.6	9-40-50/7"		Very dense, gray, fine SAND with interbedded Clay, wet.			
70									
71									
72									
73									
74	15	17/14	74-75.4	5-29-50/5"		Medium stiff, gray, CLAY, some fine Sand, moist to wet.	74' CLAY	5	
75									
76									
77									
78									
79	16	16/4	79-80.3	3-27-50/4"		Medium stiff, Gray, CLAY, some fine Sand, moist to wet.			
80									
81									
82									
83									
84	17	11/8	84-84.9	5-50/5"		Medium stiff, gray, CLAY, some fine Sand, moist to wet.		6	
85									
86									
87									
88									
89	18	15/15	89-90.3	54-20-50/3"		Very dense, gray, fine SAND, some Clay, some Silt, wet.	89' 90.3' SAND		
90						Bottom of Borehole at 90.3 Feet		7	
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									

REMARKS

3. VAP groundwater sample was collected from approximately 48.0 to 53.0 feet below ground surface and submitted for analytical laboratory testing.
4. VAP groundwater sample was collected from approximately 63.0 to 68.0 feet below ground surface and submitted for analytical laboratory testing.
5. VAP groundwater sample was collected from approximately 73.0 to 78.0 feet below ground surface and submitted for analytical laboratory testing.
6. VAP groundwater sample was collected from approximately 83.0 to 88.0 feet below ground surface and submitted for analytical laboratory testing.
7. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 40.0 to 45.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/9/23

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Wolverine World Wide, Inc.
RAP GSI
Rockford, Michigan

Boring No.: WV/CH-MW-242B
Page: 1 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: Daryll
Logged by: N. Kampfschulte
Date Start/Finish: 6-30-22 / 6-30-22
Boring Location: 588,539.7444 N; 12,801,452.2187 E
GS Elev.: 714.84' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	714.43'	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 8/25/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–37						See WVNW-MW-242A for soil and stratum descriptions.			PROTECTIVE COVER; Backfill / Cement; Bentonite Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/10/23

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Boring No.: WV/CH-MW-242B
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
39–82						Bottom of Borehole at 71.0 Feet		1	Filter Sand Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen

REMARKS

1. Monitoring well installed in borehole upon completion. Well screen was set from approximately 65.0 to 70.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_62961.52 GSI.GPJ GZA_CORP.GDT 1/10/23

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Boring No.: WVNW-MW-200
Page: 1 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: J. Gryska
Logged by: M. Myers/D. Watt
Date Start/Finish: 4-1-22 / 4-6-22
Boring Location: 596,054.203 N; 12,788,597.1508 E
GS Elev.: 732.39' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
4/4/22	0930	15.4'	Augers 19'	72 hrs
4/5/22	0815	15.4'	Augers 49'	16 hrs	

Surveyed By: EXXEL **Survey Date:** 5/20/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						SAND			None
1–4	1	24/19	4-6	2-2 3-2		Loose, dark brown, fine SAND, some Silt, trace Gravel, moist.			
5–8	2	24/9	9-11	1-1 1-WOH		Very loose, brown, fine to medium SAND, some Silt, moist.			
9–12	3	24/18	14-16	2-3 5-7		Loose, light brown, fine to medium SAND, little Silt, moist to wet.		1 2	
13–16	4	24/12	19-21	1-1 8-12		Loose, light brown, fine to medium SAND, little Silt, wet.			
17–20	5	24/18	24-26	2-3 5-5		Loose, brown, fine to coarse SAND, trace Gravel, wet.		3	
21–24	6	12/8	29-30	2-8		Loose, brown, fine to coarse SAND, trace Gravel, wet.			
25–28	7	18/12	34-35.5	1-2-3		Loose, brown, fine to coarse SAND, little Gravel, wet.		4	
29–32	8	24/8	39-41	9-5		Loose to medium dense, brown, coarse			

REMARKS

1. VAP groundwater sample was collected from approximately 14.0 to 19.0 feet below ground surface and submitted for analytical laboratory testing.
2. Groundwater was encountered at approximately 15.0 feet below ground surface.
3. VAP groundwater sample was collected from approximately 24.0 to 29.0 feet below ground surface and submitted for analytical laboratory testing.
4. VAP groundwater sample was collected from approximately 34.0 to 39.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_62961.52 GSI.GPJ GZA_CORP.GDT 6/2/22

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Rockford, Michigan

Boring No.: WVNW-MW-200
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
41				5-10		SAND and Gravel, wet.	SAND		
42									
43									
44	9	24/12	44-46	13-12		Medium dense, brown, fine to coarse		5	
45				8-10		SAND, little Gravel, wet.			
46									
47									
48									
49	10	24/12	49-51	8-7		Medium dense, brown, fine to coarse			
50				7-9		SAND, little Gravel, wet.			
51									
52									
53									
54	11	18/10	54-55.5	38-23-28		Very dense, brown, medium to coarse		6	
55						SAND, little Gravel, wet.			
56									
57									
58									
59	12	18/18	59-60.5	17-16-24		Very dense, brown, medium to coarse			
60						SAND, little Gravel, wet. Changing at 60.0			
61						feet to: Brown, fine SAND, some Silt, wet.			
62									
63									
64	13	24/6	64-66	9-5		Medium dense, brown, fine to coarse		7	
65				9-13		SAND, trace Gravel, trace Silt, wet.			
66									
67									
68									
69	14	12/10	69-70	50-50/6"		Hard, brown and gray, Clayey SILT, little	69' / 70' Clayey SILT		
70						fine to coarse Sand, moist.		8	
						Bottom of Borehole at 70.0 Feet			
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									
85									
86									

REMARKS

5. VAP groundwater sample was collected from approximately 44.0 to 49.0 feet below ground surface and submitted for analytical laboratory testing.
6. VAP groundwater sample was collected from approximately 54.0 to 59.0 feet below ground surface and submitted for analytical laboratory testing.
7. VAP groundwater sample was collected from approximately 64.0 to 69.0 feet below ground surface and submitted for analytical laboratory testing.
8. Borehole was backfilled with bentonite chips upon completion.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_62961.52 GSI.GPJ GZA_CORP.GDT 6/2/22

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Boring No.: WVNW-MW-200A
Page: 1 **of** 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: Bryan
Logged by: N. Kampfschulte
Date Start/Finish: 7-8-22 / 7-8-22
Boring Location: 596,050.4140 N; 12,788,597.9895 E
GS Elev.: 732.55' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	732.22'	NA

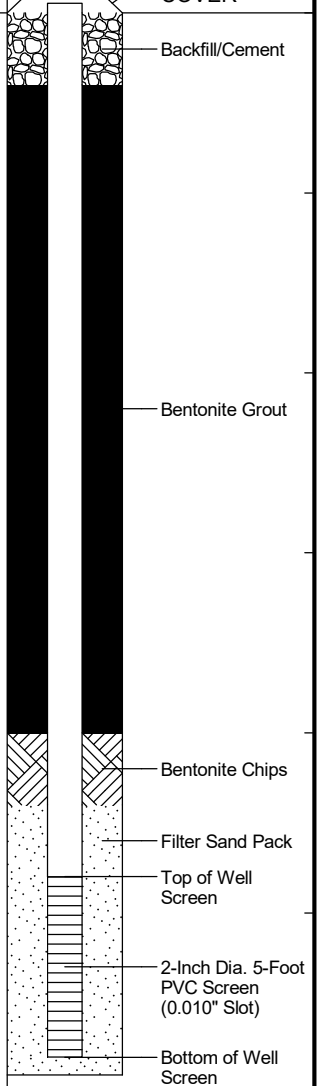
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 8/25/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–29						See WVNW-MW-200 for soil and stratum descriptions.		
30						Bottom of Borehole at 29.5 Feet		1
31								

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 24.0 to 29.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 2/6/23

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Boring No.: WVNW-MW-200B
Page: 1 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: Bryan
Logged by: N. Kampfschulte
Date Start/Finish: 7-11-22 / 7-11-22
Boring Location: 596,045.2180 N; 12,788,597.9699 E
GS Elev.: 732.66' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	732.35'	NA

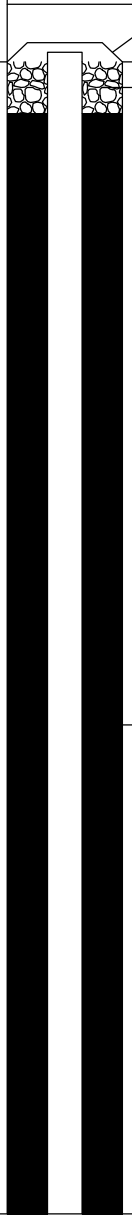
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 8/25/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1						See WVNW-MW-200 for soil and stratum descriptions.		

Equipment Installed



REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/16/22

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Boring No.: WVNW-MW-200B
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
46–59									Bentonite Chips; Filter Sand Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen
60						Bottom of Borehole at 59.5 Feet		1	

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 54.0 to 59.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/16/22

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Boring No.: WVNW-MW-201A
Page: 1 of 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: J. Gryska
Logged by: D. Watt
Date Start/Finish: 4-6-22 / 4-8-22
Boring Location: 596,993.111 N; 12,788,464.6804 E
GS Elev.: 723.49' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	722.89'	NA

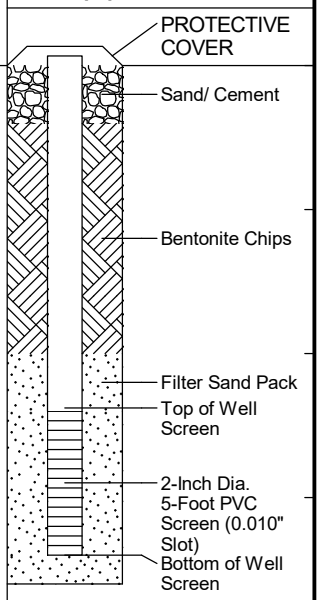
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
4/6/22	1315	8.7'	Augers 9'	10 min

Surveyed By: EXXEL **Survey Date:** 5/20/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–3							TOPSOIL	
4–8	1	24/12	4-6	1-1 1-1		Very loose, dark brown, TOPSOIL. Changing at 4.2 feet to: Very loose, brown, fine to coarse SAND, trace Gravel, moist.	4.2' SAND	1
9–13	2	24/18	9-11	1-1 2-3		Very loose, brown, fine to coarse SAND, trace Gravel, wet. Changing at 9.5 feet to: Very loose, brown, fine to medium SAND, trace Gravel, wet.		2 3
14–18	3	24/20	14-16	1-7 15-13		Medium dense, brown, fine to medium SAND, trace Gravel, wet. Changing at 15.0 feet to: Medium dense, brown, fine to coarse SAND and Gravel, wet.		
19–23	4	24/2	19-21	2-2 3-6		Loose, brown, fine to coarse SAND and Gravel, wet.		
24–28	5	24/12	24-26	2-1 7-3		Loose, medium dense, brown, fine to medium SAND, wet.		
29–33	6	24/24	29-31	3-5 5-8		Medium dense, brown, fine to medium SAND, wet.		4
34–38	7	24/24	34-36	1-1 2-1		Very loose, brown, fine to medium SAND, wet.		
39	8	24/16	39-41	8-12		Medium, brown, fine to medium SAND, wet.		5

Equipment Installed



REMARKS

1. Cobble noted at 7.0 feet below ground surface.
2. Groundwater was encountered at approximately 9.0 feet below ground surface.
3. VAP groundwater sample was collected from approximately 9.0 to 14.0 feet below ground surface and submitted for analytical laboratory testing.
4. VAP groundwater sample was collected from approximately 29.0 to 34.0 feet below ground surface and submitted for analytical laboratory testing.
5. VAP groundwater sample was collected from approximately 39.0 to 44.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 10/28/22

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Rockford, Michigan

Boring No.: WVNW-MW-201A
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
41				12-13			SAND		
42									
43									
44	9	24/20	44-46	3-3		Loose, brown, fine to medium SAND, wet.			
45				4-6					
46									
47									
48									
49	10	24/18	49-51	10-11		Medium dense, brown, fine to medium SAND, wet. Changing at 50.0 feet to: Medium dense, brown, fine to coarse SAND, some Gravel, wet.		6	
50				16-20					
51									
52									
53									
54	11	24/18	54-56	7-15		Hard, gray and brown, CLAY & SILT, trace fine to medium Sand, trace Gravel, moist.	54' CLAY & SILT 56'		
55				29-36					
56						Bottom of Borehole at 56.0 Feet		7	
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84									
85									
86									

REMARKS

6. VAP groundwater sample was collected from approximately 49.0 to 54.0 feet below ground surface and submitted for analytical laboratory testing.
7. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 12.0 to 17.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 10/28/22

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Boring No.: WVNW-MW-201B
Page: 1 **of** 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: Daryll
Logged by: N. Kampfschulte
Date Start/Finish: 7-1-22 / 7-1-22
Boring Location: 596,993.1506 N; 12,788,469.1734 E
GS Elev.: 723.44' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	723.09'	NA

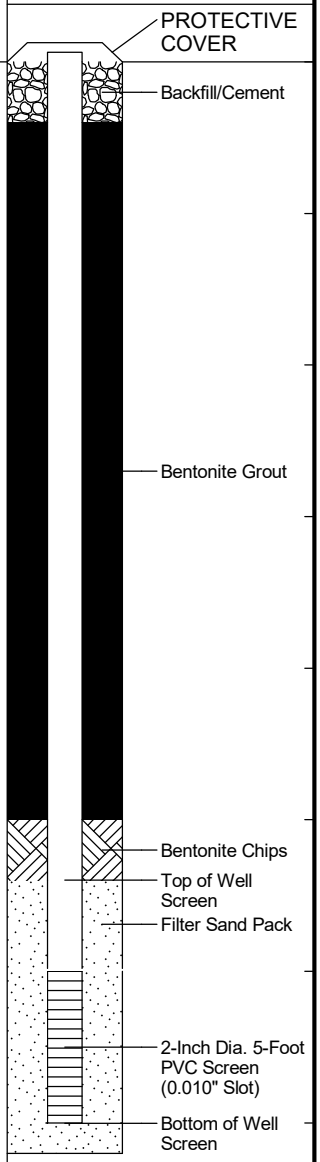
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 8/25/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–35						See WVNW-MW-201A for soil and stratum descriptions.		
36						Bottom of Borehole at 36.0 Feet		1
37								

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 30.0 to 35.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/9/23

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Rockford, Michigan

Boring No.: WVNW-MW-201C
Page: 1 of 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: Bryan
Logged by: N. Kampfschulte
Date Start/Finish: 7-6-22 / 7-6-22
Boring Location: 596,989.1015 N; 12,788,467.2068 E
GS Elev.: 723.49' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	723.08'	NA

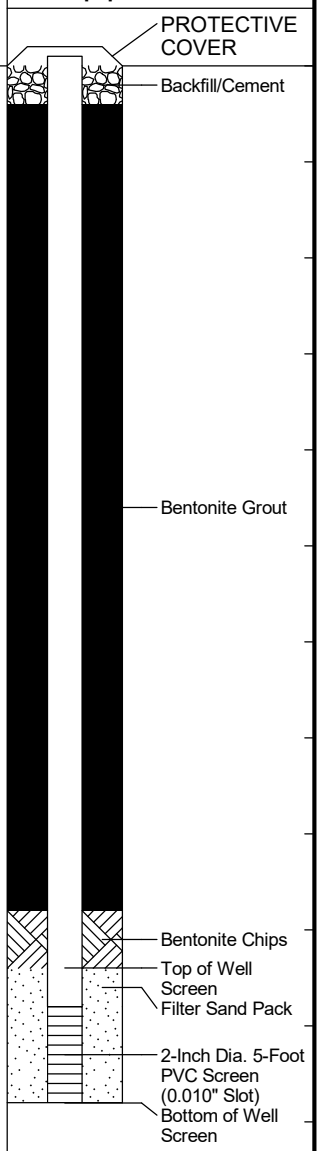
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 8/25/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–59						See WVNW-MW-201A for soil and stratum descriptions.		
55						Bottom of Borehole at 54.3 Feet		1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 49.0 to 54.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 11/7/22

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Engineers and Scientists

Wolverine World Wide, Inc.
RAP GSI
Rockford, Michigan

Boring No.: WVNW-MW-202 VAP
Page: 1 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: Daryll
Logged by: N. Kampfschulte
Date Start/Finish: 9-6-22 / 9-8-22
Boring Location: 598,115.0000 N; 12,788,800.8890 E
GS Elev.: 722.06' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 7/10/2023

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–37									None
4–5	1	24/18	4-6	3-2 3-3		Loose, light brown, medium SAND, dry.	SAND		
9–11	2	24/18	9-11	2-3 3-3		Loose, light brown, medium SAND, moist. Changing at 9.5 feet to: Loose, light brown, medium SAND, wet.		1 2	
14–15	3	24/12	14-16	3-4 5-8		Loose, light brown, medium SAND, wet.			
19–20	4	24/12	19-21	4-5 5-7		Loose, light brown, medium SAND, wet.		3	
24–25	5	24/12	24-26	3-4 8-8		Medium dense, light brown, medium SAND, little fine Gravel, wet.			
29–30	6	24/8	29-31	2-2 3-3		Loose, light brown, medium SAND, little fine to medium Gravel, wet.		4	
34–35	7	24/18	34-36	4-7 10-10		Medium dense, light brown, fine to medium SAND, some fine to medium Gravel, trace Clay, wet.			

REMARKS

1. Groundwater was encountered at approximately 9.5 feet below ground surface.
2. VAP groundwater sample was collected from approximately 10.0 to 15.0 feet below ground surface and submitted for analytical laboratory testing.
3. VAP groundwater sample was collected from approximately 20.0 to 25.0 feet below ground surface and submitted for analytical laboratory testing.
4. VAP groundwater sample was collected from approximately 30.0 to 35.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/17/24

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide, Inc.
RAP GSI
Rockford, Michigan

Boring No.: WVNW-MW-202 VAP
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							SAND		
39–40	8	24/18	39-41	3-4 5-4		Loose, light brown, fine to medium SAND, little fine to medium Gravel, wet.		5	
44–45	9	24/18	44-46	2-3 4-9		Loose, light brown, fine to medium SAND, little fine to medium Gravel, wet.			
49–50	10	24/20	49-51	5-9 13-11		Medium dense, light brown, medium SAND, some fine to medium Gravel, trace Clay, wet.		6	
54–55	11	24/18	54-56	6-9 13-10		Medium dense, light brown, medium SAND, some fine to coarse Gravel, wet.			
59–60	12	24/14	59-61	4-5 7-8		Medium dense, light brown, medium SAND, some fine Gravel, wet.		7	
64–65	13	24/12	64-66	3-7 10-11		Medium dense, light brown, fine to medium SAND, some fine Gravel, wet.			
69–70	14	24/18	69-71	2-2 3-3		Loose, light brown, fine to medium SAND, some fine Gravel, wet.		8	
74–75	15	24/18	74-76	6-10 12-11		Medium dense, light brown, fine to medium SAND, some fine to medium Gravel, wet.	76'		
76						Bottom of Borehole at 76.0 Feet		9	

REMARKS

5. VAP groundwater sample was collected from approximately 40.0 to 45.0 feet below ground surface and submitted for analytical laboratory testing.
6. VAP groundwater sample was collected from approximately 50.0 to 55.0 feet below ground surface and submitted for analytical laboratory testing.
7. VAP groundwater sample was collected from approximately 60.0 to 65.0 feet below ground surface and submitted for analytical laboratory testing.
8. VAP groundwater sample was collected from approximately 70.0 to 75.0 feet below ground surface and submitted for analytical laboratory testing.
9. Borehole was backfilled with drill cuttings and bentonite grout upon completion.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/17/24

GZA
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RAP GSI
Rockford, Michigan

Boring No.: WVNW-MW-202A
Page: 1 **of** 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: D. Krause
Logged by: N. Kampfschulte
Date Start/Finish: 1-31-23 / 1-31-23
Boring Location: 598,120.5637 N; 12,788,806.0907 E
GS Elev.: 721.93' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	724.40'	NA

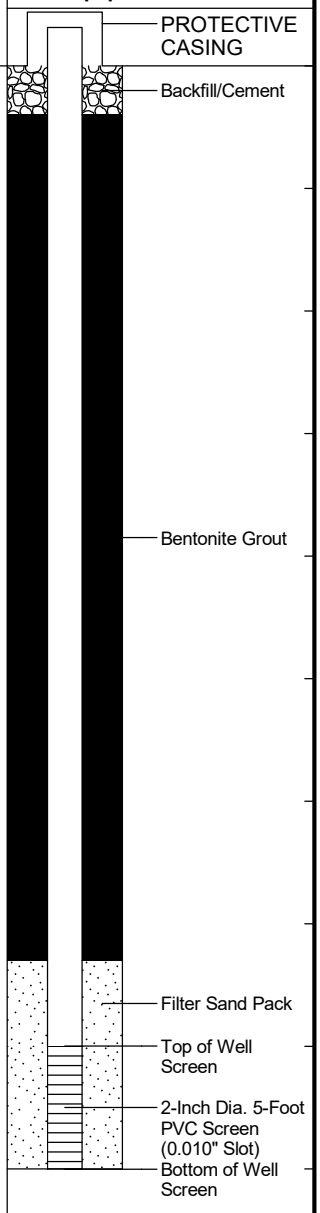
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 7/10/2023

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–46						See WVNW-MW-202 VAP for soil and stratum descriptions.		
45–46						Bottom of Borehole at 45.0 Feet		1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 40.0 to 45.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 2/16/24

GZA
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Engineers and Scientists

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RAP GSI
Rockford, Michigan

Boring No.: WVNW-MW-202B
Page: 1 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: D. Krause
Logged by: N. Kampfschulte
Date Start/Finish: 1-30-23 / 1-31-23
Boring Location: 598,115.0000 N; 12,788,800.8890 E
GS Elev.: 722.06' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	724.57'	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: EXXEL **Survey Date:** 7/10/2023

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–54						See WVNW-MW-202 VAP for soil and stratum descriptions.			PROTECTIVE CASING; Backfill/Cement; Bentonite Grout

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_62961.52 GSI.GPJ GZA_CORP.GDT 1/17/24

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RAP GSI
Rockford, Michigan

Boring No.: WVNW-MW-202B
Page: 2 **of** 2
File No.: 16.0062961.52
Check: J. Groenleer

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
65						Bottom of Borehole at 65.0 Feet		1	Filter Sand Pack; Top of Well Screen; 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot); Bottom of Well Screen

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 60.0 to 65.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL 62961.52 GSI.GPJ GZA_CORP.GDT 1/17/24

GZA
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RAP GSI

Rockford, Michigan

Boring No.: WVNW-MW-203
Page: 1 of 1
File No.: 16.0062961.52
Check: J. Groenleer

Contractor: Stearns Drilling Company
Foreman: J. Gryska
Logged by: C. Martin
Date Start/Finish: 2-2-22 / 2-2-22
Boring Location: 597,341.413 N; 12,788,600.3613 E
GS Elev.: 729.32' **Datum:** NAD83/NAVD88

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30.0"	NA
TOC Elev.:	728.91'	NA

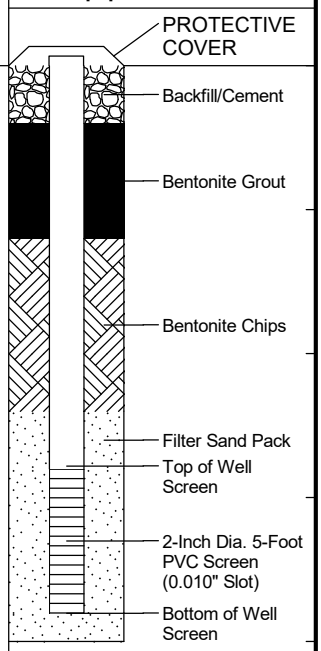
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
2/2/22	1225	16.2'	Augers	10 min
2/2/22	1610	16.2'	Augers	2 hrs

Surveyed By: EXXEL **Survey Date:** 3/30/2022

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–3							SAND	
4–7	1	48/48	4-8			Light brown, SAND, trace Silt, trace Gravel, dry.		1
8–11	2	48/48	8-12			Light brown, SAND, trace Silt, trace Gravel, dry.		
12–15	3	48/48	12-16			Light brown, SAND, trace Silt, trace Gravel, dry.		
16–19	4	48/48	16-20			Light brown, SAND, trace Silt, trace Gravel, wet.		2
20							20'	
21–39						Bottom of Borehole at 20.0 Feet		3

Equipment Installed



REMARKS

1. Soil descriptions based on auger cuttings.
2. Groundwater was encountered at approximately 16.2 feet below ground surface.
3. Monitoring well was installed in borehole upon completion. Well screen was set from approximately 14.0 to 19.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING_WELL_62961.52 GSI.GPJ GZA_CORP.GDT 5/9/22

APPENDIX E

GROUNDWATER SAMPLING WORKSHEETS

Well Sampling Worksheet
WWW RAP Field Data
2020-Q4 - AREA19-GSI-1
Kent County, MI

Well	AREA19-GSI-1 / 1.25 in Diameter Steel
Sample Quarter	2020-Q4
Date	12/08/2020
Weather	Cloudy, High 40s
Sampler Initials	MKM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: GZA-Peri-B, Centrifugal-Pump: NA
Meters Used	YSI: 09H100958, Turbidimeter: Agile Rental (0803C028700), Water-Level-Meter: NR
Reference Measuring Point	Top of Steel Riser
Well Screen (ft bmp)	7.8 - 11.8
Measured Bottom Depth (ft bmp)	NR
Sample Comment	
Initial Water Level Date/Time	12/08/2020 09:50
Initial Water Level Depth (ft bmp)	5.43
Pump/Tubing Intake Depth (ft bmp)	10
Tubing Length (ft)	14
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	12/08/2020 09:50
Total Purge Volume (gal)	4.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 12/08/2020 10:45:00, Bottling-Stop: 12/08/2020 10:50:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
09:55	5.43	0.00	300	8 +	218	6.5	7.7	60 +	123
10:05	5.43	0.00	300	9 +	376	6.1	7.0	66 +	39
10:15	5.43	0.00	300	9 +	373	6.0	6.9	71 +	19
10:20	5.43	0.00	300	9 +	372	6.0	6.9	73 +	9
10:25	5.43	0.00	300	9 +	372	6.0	6.9	80 +	6
10:30	5.43	0.00	300	9 +	372	6.0	6.9	83 +	<5
10:35	5.43	0.00	300	9 +	372	6.0	6.9	84 +	<5
10:40	5.43	0.00	300	9 +	371	6.0	6.9	85 +	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.57
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
2020-Q4 - AREA19-GSI-2
Kent County, MI

Well	AREA19-GSI-2 / 1.25 in Diameter Steel
Sample Quarter	2020-Q4
Date	12/08/2020
Weather	Cloudy, High 30s
Sampler Initials	MKM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: GZA-Peri-B, Centrifugal-Pump: NA
Meters Used	YSI: 09H100958, Turbidimeter: Agile Rental (0803C028700), Water-Level-Meter: NR
Reference Measuring Point	Top of Steel Riser
Well Screen (ft bmp)	7.9 - 11.9
Measured Bottom Depth (ft bmp)	11.8
Sample Comment	Turbidity did not stabilize. Last 3 readings are not 5 minutes apart per the Standard Operating Procedure (SOP); GZA does not believe this impacts data quality.
Initial Water Level Date/Time	12/08/2020 12:55
Initial Water Level Depth (ft bmp)	4.85
Pump/Tubing Intake Depth (ft bmp)	10
Tubing Length (ft)	14
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	12/08/2020 12:55
Total Purge Volume (gal)	4
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 12/08/2020 13:45:00, Bottling-Stop: 12/08/2020 13:50:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:05	5.10	0.25	300	8 +	441	0.6	7.1	-107 +	61 +
13:15	5.12	0.27	290	8 +	433	<0.5	7.1	-112 +	20 +
13:25	5.12	0.27	290	9 +	432	<0.5	7.1	-113 +	12 +
13:30	5.12	0.27	290	9 +	432	<0.5	7.1	-102 +	7 +
13:35	5.14	0.29	290	9 +	432	<0.5	7.0	-98 +	5 +
13:38	5.14	0.29	290	9 +	432	<0.5	7.0	-97 +	<5 +
13:41	5.14	0.29	290	9 +	432	<0.5	7.0	-96 +	<5 +

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? No
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.15
   - Total Drawdown (ft) 0.29
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
2020-Q4 - AREA19-GSI-3
Kent County, MI

Well	AREA19-GSI-3 / 1.25 in Diameter Steel
Sample Quarter	2020-Q4
Date	12/08/2020
Weather	Cloudy, Windy, Mid-30s
Sampler Initials	MKM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: GZA-PERI-B, Centrifugal-Pump: NA
Meters Used	YSI: 09H100958, Turbidimeter: Agile Rental (0803C028700), Water-Level-Meter: NR
Reference Measuring Point	Top of Steel Riser
Well Screen (ft bmp)	8.0 - 12.0
Measured Bottom Depth (ft bmp)	11.95
Sample Comment	pH did not stabilize. Last three readings are not 5 minutes apart per the Standard Operating Procedure (SOP); GZA does not believe that this impacts data quality.
Initial Water Level Date/Time	12/08/2020 14:05
Initial Water Level Depth (ft bmp)	4.67
Pump/Tubing Intake Depth (ft bmp)	10
Tubing Length (ft)	14
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	12/08/2020 14:05
Total Purge Volume (gal)	4.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 12/08/2020 14:45:00, Bottling-Stop: 12/08/2020 14:50:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:15	4.93	0.26	200	8 +	182	1.0	9.1 +	-282 +	61
14:25	4.90	0.23	200	9 +	300	1.9	8.6 +	-294 +	14
14:35	4.90	0.23	200	9 +	350	1.6	7.8 +	-162 +	<5
14:40	4.90	0.23	200	9 +	356	1.6	7.6 +	-171 +	<5
14:43	4.90	0.23	200	9 +	359	1.6	7.5 +	-166 +	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? No
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.33
   - Total Drawdown (ft) 0.23
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
2020-Q4 - WV-DEQ-MW9-57
Kent County, MI

Well	WV-DEQ-MW9-57 / 2 in Diameter PVC
Sample Quarter	2020-Q4
Date	12/09/2020
Weather	Cloudy, 40s
Sampler Initials	MKM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: GZA-PER-3, Centrifugal-Pump: NA
Meters Used	YSI: 09H100958, Turbidimeter: Agile Rental (0803C028700), Water-Level-Meter: NR
Reference Measuring Point	PVC
Well Screen (ft bmp)	51.4 - 56.4
Measured Bottom Depth (ft bmp)	56.7
Sample Comment	Bubble noted on DO probe at 12:03. Last 3 readings are not 5 minutes apart per the Standard Operating Procedure (SOP); GZA does not believe this impacts data quality.
Initial Water Level Date/Time	12/09/2020 11:00
Initial Water Level Depth (ft bmp)	10.85
Pump/Tubing Intake Depth (ft bmp)	54.5
Tubing Length (ft)	58
Tubing Inner Diameter (in)	0.375
Purging Initiation Date/Time	12/09/2020 11:00
Total Purge Volume (gal)	6
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 12/09/2020 12:15:00, Bottling-Stop: 12/09/2020 12:20:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:15	10.95	0.10	275	10 +	842 +	1.4	7.5	-38 +	87
11:25	10.95	0.10	275	10 +	842 +	1.2	7.5	-82 +	44
11:40	10.95	0.10	275	11 +	846 +	1.5	7.5	-96 +	13
11:55	10.95	0.10	275	11 +	845 +	1.9	7.5	-109 +	9
12:00	10.95	0.10	275	11 +	843 +	2.1	7.5	-93 +	6
12:03	10.95	0.10	275	10 +	844 +	0.7	7.5	-107 +	5
12:06	10.95	0.10	275	10 +	846 +	<0.5	7.5	-113 +	<5
12:09	10.95	0.10	275	10 +	850 +	<0.5	7.5	-115 +	<5
12:12	10.95	0.10	275	10 +	851 +	<0.5	7.5	-116 +	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 43.65
   - Total Drawdown (ft) 0.10
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
2020-Q4 - HS-MW-19S
Kent County, MI

Well	HS-MW-19S / 2 in Diameter PVC
Sample Quarter	2020-Q4
Date	12/09/2020
Weather	Partly Sunny, 40s
Sampler Initials	MKM
Purging Device	Bladder-Pump: GZA-BPC-2, Peristaltic-Pump: NA, Centrifugal-Pump: NA
Meters Used	YSI: 09H100958, Turbidimeter: Agile Rental (0803C028700), Water-Level-Meter: NR
Reference Measuring Point	PVC
Well Screen (ft bmp)	61.4 - 64.4
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Pump shut off between 14:15 and 14:20. Bubble on DO probe noted at 14:25. Depth to water and DO did not stabilize. Last 3 readings are not 5 minutes apart per the Standard Operating Procedure (SOP); GZA does not believe this impacts data quality.
Initial Water Level Date/Time	12/09/2020 13:45
Initial Water Level Depth (ft bmp)	30.01
Pump/Tubing Intake Depth (ft bmp)	63.9
Tubing Length (ft)	67
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	12/09/2020 13:45
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 12/09/2020 14:40:00, Bottling-Stop: 12/09/2020 14:45:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:00	37.35 +	7.34	300	10 +	762 +	1.9 +	7.7	-41 +	128
14:15	38.10 +	8.09	150	10 +	759 +	1.7 +	7.7	-54 +	88
14:20	38.43 +	8.42	200	10 +	756 +	1.0 +	7.7	-68 +	81
14:25	38.50 +	8.49	200	10 +	753 +	0.7 +	7.7	-78 +	67
14:35	38.45 +	8.44	150	10 +	751 +	0.7 +	7.6	-90 +	47
14:45	38.29 +	8.28	150	10 +	749 +	0.8 +	7.6	-93 +	35
14:50	38.28 +	8.27	150	10 +	748 +	0.6 +	7.6	-99 +	33
14:53	38.49 +	8.48	150	10 +	747 +	0.6 +	7.6	-103 +	31
14:56	38.50 +	8.49	150	10 +	747 +	<0.5 +	7.6	-105 +	30

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? No
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 33.89
   - Total Drawdown (ft) 8.49
   - Calculated Final Purge Volume (gal) 1.53
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? Yes

Well Sampling Worksheet
WWW RAP Field Data
2020-Q4 - HS-MW-19D
Kent County, MI

Well	HS-MW-19D / 2 in Diameter PVC
Sample Quarter	2020-Q4
Date	12/09/2020
Weather	Partly sunny, 40s
Sampler Initials	MKM
Purging Device	Bladder-Pump: GZA-BPC-2, Peristaltic-Pump: NA, Centrifugal-Pump: NA
Meters Used	YSI: 09H100958, Turbidimeter: Agile Rental (0803C028700), Water-Level-Meter: NR
Reference Measuring Point	PVC
Well Screen (ft bmp)	89.0 - 99.0
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Last 3 readings are not 5 minutes apart per the Standard Operating Procedure (SOP). GZA does not believe this impacts data quality.
Initial Water Level Date/Time	12/09/2020 15:10
Initial Water Level Depth (ft bmp)	32.80
Pump/Tubing Intake Depth (ft bmp)	91.5
Tubing Length (ft)	101
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	12/09/2020 15:10
Total Purge Volume (gal)	7
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 12/09/2020 16:15:00, Bottling-Stop: 12/09/2020 16:20:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
15:30	32.60	-0.20	400	10 +	2,468 +	<0.5	7.4	-93 +	246
15:35	32.60	-0.20	400	10 +	2,499 +	<0.5	7.4	-98 +	105
15:45	32.60	-0.20	400	10 +	2,508 +	0.6	7.4	-100 +	69
15:50	32.60	-0.20	400	10 +	2,512 +	<0.5	7.4	-103 +	39
16:00	32.50	-0.30	400	10 +	2,509 +	<0.5	7.3	-105 +	25
16:03	32.50	-0.30	400	10 +	2,505 +	<0.5	7.3	-106 +	22
16:06	32.50	-0.30	400	10 +	2,509 +	<0.5	7.3	-106 +	22
16:09	32.50	-0.30	400	10 +	2,510 +	<0.5	7.3	-106 +	20

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 58.70
   - Total Drawdown (ft) -0.30
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2020-Q4 - HS-MW-29A
Kent County, MI

Well	HS-MW-29A / 2 in Diameter PVC
Sample Quarter	2020-Q4
Date	12/09/2020
Weather	Cloudy, 40
Sampler Initials	MKM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: GZA-PERI-03, Centrifugal-Pump: NA
Meters Used	YSI: 09H100958, Turbidimeter: Agile Rental (0803C028700), Water-Level-Meter: NR
Reference Measuring Point	PVC
Well Screen (ft bmp)	6.3 - 16.3
Measured Bottom Depth (ft bmp)	17
Sample Comment	Turbidity did not stabilize. Last 3 readings are not 5 minutes apart per the Standard Operating Procedure (SOP); GZA does not believe this impacts data quality.
Initial Water Level Date/Time	12/09/2020 09:20
Initial Water Level Depth (ft bmp)	6.22
Pump/Tubing Intake Depth (ft bmp)	14.8
Tubing Length (ft)	19
Tubing Inner Diameter (in)	0.375
Purging Initiation Date/Time	12/09/2020 09:20
Total Purge Volume (gal)	5.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 12/09/2020 10:20:00, Bottling-Stop: 12/09/2020 10:25:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
09:30	6.25	0.03	350	10 +	814 +	<0.5	7.3	-85 +	59 +
09:40	6.25	0.03	350	10 +	836 +	<0.5	7.0	-67 +	42 +
09:45	6.25	0.03	350	10 +	845 +	<0.5	7.0	-59 +	32 +
09:48	6.25	0.03	350	10 +	852 +	<0.5	7.0	-62 +	23 +
09:52	6.25	0.03	350	10 +	850 +	<0.5	7.0	-65 +	18 +
10:00	6.25	0.03	350	10 +	855 +	<0.5	7.0	-70 +	12 +
10:05	6.25	0.03	350	10 +	857 +	<0.5	7.0	-72 +	8 +
10:08	6.25	0.03	350	10 +	854 +	<0.5	7.0	-69 +	6 +
10:11	6.25	0.03	350	10 +	863 +	<0.5	7.0	-75 +	6 +
10:14	6.25	0.03	350	10 +	863 +	<0.5	7.0	-77 +	<5 +

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? No
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 8.58
   - Total Drawdown (ft) 0.03
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WVNW-MW-200A
Kent County, MI

Well	WVNW-MW-200A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/22/2023
Weather	Partly Cloudy
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	23.7 - 28.7
Measured Bottom Depth (ft bmp)	28.73
Sample Comment	14:50: YSI connected.
Initial Water Level Date/Time	05/22/2023 14:15
Initial Water Level Depth (ft bmp)	15.69
Pump/Tubing Intake Depth (ft bmp)	26.23
Tubing Length (ft)	32
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/22/2023 14:20
Total Purge Volume (gal)	4
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/22/2023 15:25:00, Bottling-Stop: 05/22/2023 15:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:30	15.69	0.00	150	NR	NR	NR	NR	NR	NR
14:40	15.69	0.00	150	NR	NR	NR	NR	NR	17
14:50	15.69	0.00	150	12 +	783 +	8.0	7.5	251	13
14:55	15.69	0.00	150	12 +	783 +	8.2	7.6	247	10
15:00	15.69	0.00	150	12 +	781 +	8.3	7.6	244	10
15:05	15.69	0.00	150	12 +	779 +	8.2	7.6	242	6
15:10	15.69	0.00	150	12 +	776 +	8.0	7.6	240	<5
15:15	15.69	0.00	150	12 +	776 +	8.1	7.6	237	<5
15:20	15.69	0.00	150	12 +	774 +	8.5	7.6	235	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 10.54
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WVNW-MW-200B
Kent County, MI

Well	WVNW-MW-200B / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/22/2023
Weather	Sunny Mid 70s
Sampler Initials	AW
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	54.8 - 59.8
Measured Bottom Depth (ft bmp)	59.75
Sample Comment	Static water level did not change from 14:24 reading. YSI connected at 14:40.
Initial Water Level Date/Time	05/22/2023 14:10
Initial Water Level Depth (ft bmp)	15.91
Pump/Tubing Intake Depth (ft bmp)	57.25
Tubing Length (ft)	60
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/22/2023 14:14
Total Purge Volume (gal)	2.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/22/2023 15:00:00, Bottling-Stop: 05/22/2023 15:05:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:24	15.90	-0.01	180	NR	NR	NR	NR	NR	NR
14:40	15.90	-0.01	180	12 +	831 +	4.7	7.3	51	<5
14:45	15.90	-0.01	180	12 +	830 +	4.7	7.3	56	<5
14:50	15.90	-0.01	180	12 +	827 +	4.7	7.3	59	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft): 41.34
   - Total Drawdown (ft): -0.01
   - Calculated Final Purge Volume (gal): NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WVNW-MW-201A
Kent County, MI

Well	WVNW-MW-201A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/22/2023
Weather	Sunny, mid 60s
Sampler Initials	AW
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	11.9 - 16.9
Measured Bottom Depth (ft bmp)	16.9
Sample Comment	10:43: SWL = 9.95 ft, reduced pump speed to 140 ml/min; 10:50: SWL = 9.91 ft; 10:57: SWL = 9.92 ft, remained stable. 11:05: YSI connected.
Initial Water Level Date/Time	05/22/2023 10:15
Initial Water Level Depth (ft bmp)	9.90
Pump/Tubing Intake Depth (ft bmp)	14.4
Tubing Length (ft)	16.5
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/22/2023 10:37
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/22/2023 11:40:00, Bottling-Stop: 05/22/2023 11:44:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:43	9.95	0.05	140	NR	NR	NR	NR	NR	NR
10:50	9.91	0.01	140	NR	NR	NR	NR	NR	NR
10:57	9.92	0.02	140	NR	NR	NR	NR	NR	NR
11:05	9.92	0.02	140	10 +	974 +	1.5	7.3	162	<5
11:10	9.92	0.02	140	10 +	979 +	1.6	7.3	166	<5
11:15	9.92	0.02	140	10 +	976 +	1.6	7.3	168	<5
11:20	9.92	0.02	140	10 +	980 +	1.8	7.3	171	<5
11:25	9.92	0.02	140	10 +	976 +	1.7	7.3	173	<5
11:30	9.92	0.02	140	10 +	975 +	1.7	7.3	174	<5
11:35	9.92	0.02	140	11 +	975 +	1.8	7.3	176	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.50
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WVNW-MW-201B
Kent County, MI

Well	WVNW-MW-201B / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/22/2023
Weather	Partly Cloudy
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	29.6 - 34.6
Measured Bottom Depth (ft bmp)	34.55
Sample Comment	12:00: YSI connected.
Initial Water Level Date/Time	05/22/2023 11:35
Initial Water Level Depth (ft bmp)	10.13
Pump/Tubing Intake Depth (ft bmp)	32
Tubing Length (ft)	35
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/22/2023 11:35
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/22/2023 12:25:00, Bottling-Stop: 05/22/2023 12:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:45	10.15	0.02	200	NR	NR	NR	NR	NR	NR
11:55	10.15	0.02	200	NR	NR	NR	NR	NR	11
12:00	10.16	0.03	200	11 +	864 +	<0.5	7.4	73	7
12:05	10.16	0.03	200	11 +	867 +	<0.5	7.4	71	7
12:10	10.16	0.03	200	11 +	868 +	<0.5	7.3	68	<5
12:15	10.16	0.03	200	11 +	870 +	<0.5	7.4	65	<5
12:20	10.16	0.03	200	11 +	872 +	<0.5	7.4	64	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 21.87
   - Total Drawdown (ft) 0.03
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WVNW-MW-201C
Kent County, MI

Well	WVNW-MW-201C / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/22/2023
Weather	Partly Cloudy
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	49.1 - 54.1
Measured Bottom Depth (ft bmp)	54.1
Sample Comment	11:00: YSI connected.
Initial Water Level Date/Time	05/22/2023 10:25
Initial Water Level Depth (ft bmp)	10.14
Pump/Tubing Intake Depth (ft bmp)	51.5
Tubing Length (ft)	55
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/22/2023 10:30
Total Purge Volume (gal)	2.8
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/22/2023 11:30:00, Bottling-Stop: 05/22/2023 11:35:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:40	10.17	0.03	175	NR	NR	NR	NR	NR	NR
10:50	10.18	0.04	175	NR	NR	NR	NR	NR	11
11:00	10.18	0.04	175	11 +	868 +	1.8	7.5	86	<5
11:05	10.18	0.04	175	11 +	867 +	1.9	7.4	86	<5
11:10	10.18	0.04	175	11 +	865 +	1.8	7.4	84	<5
11:15	10.18	0.04	175	11 +	867 +	1.9	7.4	84	<5
11:20	10.18	0.04	175	11 +	869 +	1.9	7.4	84	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 41.36
   - Total Drawdown (ft) 0.04
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WVNW-MW-202A
Kent County, MI

Well	WVNW-MW-202A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/24/2023
Weather	Sunny 65
Sampler Initials	RCP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	42.6 - 47.6
Measured Bottom Depth (ft bmp)	47.6
Sample Comment	10:26: SWL = 11.39 ft, remained stable. 10:35: YSI connected. Turbidity did not stabilize.
Initial Water Level Date/Time	05/24/2023 10:20
Initial Water Level Depth (ft bmp)	11.38
Pump/Tubing Intake Depth (ft bmp)	45.1
Tubing Length (ft)	47.1
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/24/2023 10:20
Total Purge Volume (gal)	1.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/24/2023 11:05:00, Bottling-Stop: 05/24/2023 11:10:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:26	11.39	0.01	200	NR	NR	NR	NR	NR	NR
10:40	11.39	0.01	200	11 +	683	7.7	7.4	57	10 +
10:45	11.39	0.01	200	11 +	681	7.5	7.3	63	7 +
10:50	11.39	0.01	200	11 +	680	7.7	7.3	66	5 +
10:55	11.39	0.01	200	11 +	677	7.5	7.3	67	<5 +
11:00	11.39	0.01	200	11 +	677	7.5	7.3	70	<5 +

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? No
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 33.72
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WVNW-MW-202B
Kent County, MI

Well	WVNW-MW-202B / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/24/2023
Weather	Sunny, Mid 60s
Sampler Initials	RCP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	62.3 - 67.3
Measured Bottom Depth (ft bmp)	67.3
Sample Comment	11:25: SWL =11.54 ft, remained stable. 11:30: YSI connected.
Initial Water Level Date/Time	05/24/2023 11:20
Initial Water Level Depth (ft bmp)	11.53
Pump/Tubing Intake Depth (ft bmp)	64.8
Tubing Length (ft)	66.8
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/24/2023 11:20
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/24/2023 12:00:00, Bottling-Stop: 05/24/2023 12:07:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:25	11.54	0.01	220	NR	NR	NR	NR	NR	NR
11:35	11.54	0.01	220	10 +	662	2.2	7.3	55	<5
11:45	11.54	0.01	220	10 +	692	4.3	7.3	56	<5
11:50	11.54	0.01	220	10 +	692	4.5	7.3	55	<5
11:55	11.54	0.01	220	10 +	694	4.6	7.3	55	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 53.27
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WVNW-MW-203
Kent County, MI

Well	WVNW-MW-203 / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/24/2023
Weather	Sunny
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	13.9 - 18.9
Measured Bottom Depth (ft bmp)	18.9
Sample Comment	10:30: SWL = 15.46 ft; 10:35: SWL = 15.49 ft, remained stable. 10:40: YSI connected
Initial Water Level Date/Time	05/24/2023 10:30
Initial Water Level Depth (ft bmp)	15.46
Pump/Tubing Intake Depth (ft bmp)	16.9
Tubing Length (ft)	18.3
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/24/2023 10:30
Total Purge Volume (gal)	1
Modified Sample	Yes
If Modified, Reasoning	Static water level was below the top of the well screen. Pump intake depth was placed between the static water level and the bottom of the well.
Sample Collection Information	Bottling-Start: 05/24/2023 11:00:00, Bottling-Stop: 05/24/2023 11:10:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:35	15.49	0.03	140	NR	NR	NR	NR	NR	<5
10:40	15.49	0.03	140	11 +	95 +	9.4	7.7	186	<5
10:45	15.49	0.03	140	11 +	96 +	9.6	7.7	186	<5
10:50	15.49	0.03	140	11 +	96 +	9.7	7.7	187	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 1.44
   - Total Drawdown (ft) 0.03
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - AREA19-MW-7A
Kent County, MI

Well	AREA19-MW-7A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/24/2023
Weather	Sunny
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	8.7 - 13.7
Measured Bottom Depth (ft bmp)	13.74
Sample Comment	1145: SWL = 4.35 ft; 12:05: SWL = 4.36 ft, remained constant for duration of purge. 12:20: YSI connected.
Initial Water Level Date/Time	05/24/2023 11:40
Initial Water Level Depth (ft bmp)	4.35
Pump/Tubing Intake Depth (ft bmp)	11.2
Tubing Length (ft)	13
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/24/2023 11:40
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/24/2023 12:50:00, Bottling-Stop: 05/24/2023 12:55:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:45	4.35	0.00	200	NR	NR	NR	NR	NR	289
11:55	4.35	0.00	200	NR	NR	NR	NR	NR	231
12:05	4.36	0.01	200	NR	NR	NR	NR	NR	91
12:15	4.36	0.01	200	NR	NR	NR	NR	NR	20
12:20	4.36	0.01	200	11 +	866 +	4.9	7.4	223	16
12:25	4.36	0.01	200	11 +	864 +	4.7	7.4	221	11
12:30	4.36	0.01	200	11 +	867 +	4.7	7.4	221	11

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - AREA19-MW-7A
Kent County, MI

Well	AREA19-MW-7A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/24/2023
Weather	Sunny
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	8.7 - 13.7
Measured Bottom Depth (ft bmp)	13.74
Sample Comment	1145: SWL = 4.35 ft; 12:05: SWL = 4.36 ft, remained constant for duration of purge. 12:20: YSI connected.
Initial Water Level Date/Time	05/24/2023 11:40
Initial Water Level Depth (ft bmp)	4.35
Pump/Tubing Intake Depth (ft bmp)	11.2
Tubing Length (ft)	13
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/24/2023 11:40
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/24/2023 12:50:00, Bottling-Stop: 05/24/2023 12:55:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:35	4.36	0.01	200	11 +	867 +	4.6	7.4	220	<5
12:40	4.36	0.01	200	11 +	864 +	4.5	7.4	220	<5
12:45	4.36	0.01	200	11 +	863 +	4.6	7.4	220	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 6.85
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - AREA19-MW-221A
Kent County, MI

Well	AREA19-MW-221A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/24/2023
Weather	65F Sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	15.5 - 20.5
Measured Bottom Depth (ft bmp)	NR
Sample Comment	15:50 YSI Connected.
Initial Water Level Date/Time	05/24/2023 15:10
Initial Water Level Depth (ft bmp)	12.80
Pump/Tubing Intake Depth (ft bmp)	18
Tubing Length (ft)	20
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/24/2023 15:10
Total Purge Volume (gal)	4
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/24/2023 16:25:00, Bottling-Stop: 05/24/2023 16:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
15:15	12.95	0.15	250	NR	NR	NR	NR	NR	179
15:25	12.93	0.13	200	NR	NR	NR	NR	NR	43
15:35	12.93	0.13	200	NR	NR	NR	NR	NR	12
15:50	12.93	0.13	200	10 +	626	8.6	7.3	56	6
16:00	12.93	0.13	200	10 +	622	8.5	7.3	60	<5
16:10	12.93	0.13	200	10 +	614	8.4	7.3	61	<5
16:15	12.93	0.13	200	10 +	611	8.5	7.3	63	<5
16:20	12.93	0.13	200	10 +	611	8.4	7.3	64	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.20
   - Total Drawdown (ft) 0.13
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - AREA19-MW-221B
Kent County, MI

Well	AREA19-MW-221B / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/24/2023
Weather	65F Sunny
Sampler Initials	RCP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	44.5 - 49.5
Measured Bottom Depth (ft bmp)	49.5
Sample Comment	15:15: SWL = 12.42 ft, remained stable. 15:30 YSI connected.
Initial Water Level Date/Time	05/24/2023 15:15
Initial Water Level Depth (ft bmp)	12.39
Pump/Tubing Intake Depth (ft bmp)	47
Tubing Length (ft)	50
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/24/2023 15:20
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/24/2023 16:10:00, Bottling-Stop: 05/24/2023 16:12:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
15:15	12.42	0.03	200	NR	NR	NR	NR	NR	NR
15:30	12.42	0.03	200	11 +	400	7.4	7.1	352	6
15:35	12.42	0.03	200	11 +	400	7.2	7.3	350	6
15:40	12.44	0.05	200	11 +	411	7.1	7.5	332	<5
15:45	12.44	0.05	200	11 +	444	6.9	7.7	323	<5
15:50	12.44	0.05	200	11 +	487	7.8	7.7	323	<5
15:55	12.44	0.05	200	12 +	491	7.8	7.6	327	<5
16:00	12.44	0.05	200	11 +	490	7.8	7.6	330	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 34.61
   - Total Drawdown (ft) 0.05
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - AREA19-MW-222
Kent County, MI

Well	AREA19-MW-222 / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/31/2023
Weather	78F Sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	9.3 - 14.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 11:40.
Initial Water Level Date/Time	05/31/2023 11:00
Initial Water Level Depth (ft bmp)	7.81
Pump/Tubing Intake Depth (ft bmp)	11.4
Tubing Length (ft)	13.9
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/31/2023 11:05
Total Purge Volume (gal)	2.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/31/2023 11:55:00, Bottling-Stop: 05/31/2023 12:00:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:10	7.95	0.14	150	NR	NR	NR	NR	NR	NR
11:20	7.92	0.11	150	NR	NR	NR	NR	NR	7
11:30	7.92	0.11	150	NR	NR	NR	NR	NR	<5
11:40	7.92	0.11	150	12 +	544 +	<0.5	7.4	-59	<5
11:45	7.92	0.11	150	12 +	542 +	<0.5	7.3	-61	<5
11:50	7.92	0.11	150	12 +	542 +	<0.5	7.3	-65	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 3.59
   - Total Drawdown (ft) 0.11
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - AREA19-MW-223
Kent County, MI

Well	AREA19-MW-223 / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/31/2023
Weather	78F Sunny
Sampler Initials	RCP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.9 - 12.9
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 10:45.
Initial Water Level Date/Time	05/31/2023 10:10
Initial Water Level Depth (ft bmp)	5.00
Pump/Tubing Intake Depth (ft bmp)	10.5
Tubing Length (ft)	13
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/31/2023 10:10
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/31/2023 11:20:00, Bottling-Stop: 05/31/2023 11:26:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:15	5.04	0.04	160	NR	NR	NR	NR	NR	<5
10:45	5.04	0.04	160	14 +	523 +	6.0	6.9	-110	<5
10:55	5.04	0.04	160	13 +	522 +	<0.5	7.0	-166	<5
11:00	5.04	0.04	160	13 +	522 +	<0.5	7.0	-170	<5
11:05	5.04	0.04	160	13 +	523 +	<0.5	7.0	-173	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.50
   - Total Drawdown (ft) 0.04
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - AREA19-MW-224
Kent County, MI

Well	AREA19-MW-224 / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/24/2023
Weather	Partly Sunny
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.1 - 12.1
Measured Bottom Depth (ft bmp)	12.12
Sample Comment	14:35: SWL = 4.97 ft; 14:40: = 5.70 ft, lowered pump speed; 14:45: SWL = 5.76 ft; 14:50: SWL = 5.80 ft; 14:55: SWL = 5.76 ft; 15:10: SWL = 5.77 ft, stabilized. Collected duplicate sample; 15:25: Collected Field Blank. Last 3 water level readings were not the same per Standard Operating Procedure. Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	05/24/2023 14:35
Initial Water Level Depth (ft bmp)	4.97
Pump/Tubing Intake Depth (ft bmp)	9.6
Tubing Length (ft)	14
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/24/2023 14:35
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/24/2023 15:20:00, Bottling-Stop: 05/24/2023 15:35:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:40	5.70	0.73	230	14.1 +	1,280 +	<0.5	7.3	206	8
14:45	5.76	0.79	150	13.9 +	1,291 +	0.8	7.4	171	<5
14:50	5.80	0.83	120	13.9 +	1,290 +	0.8	7.4	156	<5
14:55	5.76	0.79	120	13.9 +	1,291 +	0.6	7.4	145	<5
15:00	5.76	0.79	120	13.6 +	1,287 +	<0.5	7.4	134	<5
15:05	5.76	0.79	120	13.7 +	1,283 +	<0.5	7.4	125	<5
15:10	5.77	0.80	120	13.6 +	1,284 +	<0.5	7.3	121	<5
15:15	5.77	0.80	120	13.5 +	1,277 +	<0.5	7.3	116	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.63
   - Total Drawdown (ft) 0.80
   - Calculated Final Purge Volume (gal) 0.14
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? Yes

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - AREA19-MW-225A
Kent County, MI

Well	AREA19-MW-225A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/26/2023
Weather	61F Sunny
Sampler Initials	WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.6 - 12.6
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Collected MS/MSD, 11:45: YSI connected.
Initial Water Level Date/Time	05/26/2023 11:15
Initial Water Level Depth (ft bmp)	6.15
Pump/Tubing Intake Depth (ft bmp)	10.1
Tubing Length (ft)	12
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/26/2023 11:15
Total Purge Volume (gal)	6
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/26/2023 13:20:00, Bottling-Stop: 05/26/2023 13:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:25	6.17	0.02	180	NR	NR	NR	NR	NR	NR
11:35	6.16	0.01	180	NR	NR	NR	NR	NR	NR
11:45	6.16	0.01	180	9.6 +	790 +	1.9	7.2	323	<5
11:50	6.16	0.01	180	9.5 +	789 +	0.6	7.1	263	<5
11:55	6.16	0.01	180	9.5 +	790 +	<0.5	7.0	218	<5
12:00	6.16	0.01	180	9.4 +	790 +	<0.5	7.1	181	<5
12:05	6.16	0.01	180	9.5 +	789 +	<0.5	7.2	157	<5
12:10	6.16	0.01	180	9.4 +	790 +	<0.5	7.2	138	<5
12:15	6.16	0.01	180	9.5 +	790 +	<0.5	7.2	119	<5
12:20	6.16	0.01	180	9.5 +	790 +	<0.5	7.2	105	<5
12:25	6.16	0.01	180	9.5 +	789 +	<0.5	7.2	95	<5
12:30	6.16	0.01	180	9.5 +	790 +	<0.5	7.2	83	<5
12:35	6.16	0.01	180	9.5 +	790 +	<0.5	7.2	73	<5
12:40	6.16	0.01	180	9.5 +	790 +	<0.5	7.2	61	<5
12:45	6.16	0.01	180	9.5 +	789 +	<0.5	7.2	53	<5
12:50	6.16	0.01	180	9.4 +	789 +	<0.5	7.2	44	<5
12:55	6.16	0.01	180	9.5 +	788 +	<0.5	7.2	37	<5
13:00	6.16	0.01	180	9.5 +	788 +	<0.5	7.2	29	<5

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - AREA19-MW-225A
Kent County, MI

Well	AREA19-MW-225A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/26/2023
Weather	61F Sunny
Sampler Initials	WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.6 - 12.6
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Collected MS/MSD, 11:45: YSI connected.
Initial Water Level Date/Time	05/26/2023 11:15
Initial Water Level Depth (ft bmp)	6.15
Pump/Tubing Intake Depth (ft bmp)	10.1
Tubing Length (ft)	12
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/26/2023 11:15
Total Purge Volume (gal)	6
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/26/2023 13:20:00, Bottling-Stop: 05/26/2023 13:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:05	6.16	0.01	180	9.5 +	788 +	<0.5	7.2	21	<5
13:10	6.16	0.01	180	9.5 +	787 +	<0.5	7.2	16	<5
13:15	6.16	0.01	180	9.5 +	788 +	<0.5	7.2	10	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? Yes
5) Calculations:
   - Head Above Pump Intake (ft) 3.95
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - AREA19-MW-225B
Kent County, MI

Well	AREA19-MW-225B / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/26/2023
Weather	61F sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	32.9 - 37.9
Measured Bottom Depth (ft bmp)	37.8
Sample Comment	YSI connected at 12:20. Recommend using bladder pump for this well; lowest pump speed possible was 125 ml/min. Turbidity did not stabilize.
Initial Water Level Date/Time	05/26/2023 11:10
Initial Water Level Depth (ft bmp)	5.52
Pump/Tubing Intake Depth (ft bmp)	35.3
Tubing Length (ft)	36
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/26/2023 11:10
Total Purge Volume (gal)	3.6
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/26/2023 13:00:00, Bottling-Stop: 05/26/2023 13:10:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:20	6.64	1.12	200	NR	NR	NR	NR	NR	NR
11:25	6.60	1.08	150	NR	NR	NR	NR	NR	NR
11:30	6.57	1.05	150	NR	NR	NR	NR	NR	11 +
11:40	6.70	1.18	150	NR	NR	NR	NR	NR	7 +
12:00	6.70	1.18	125	NR	NR	NR	NR	NR	7 +
12:10	6.73	1.21	125	NR	NR	NR	NR	NR	6 +
12:20	6.80	1.28	125	10 +	1,808 +	<0.5	7.5	-75	6 +
12:30	6.85	1.33	125	10 +	1,809 +	<0.5	7.4	-77	6 +

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - AREA19-MW-225B
Kent County, MI

Well	AREA19-MW-225B / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/26/2023
Weather	61F sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	32.9 - 37.9
Measured Bottom Depth (ft bmp)	37.8
Sample Comment	YSI connected at 12:20. Recommend using bladder pump for this well; lowest pump speed possible was 125 ml/min. Turbidity did not stabilize.
Initial Water Level Date/Time	05/26/2023 11:10
Initial Water Level Depth (ft bmp)	5.52
Pump/Tubing Intake Depth (ft bmp)	35.3
Tubing Length (ft)	36
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/26/2023 11:10
Total Purge Volume (gal)	3.6
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/26/2023 13:00:00, Bottling-Stop: 05/26/2023 13:10:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:40	6.90	1.38	125	10 +	1,811 +	<0.5	7.5	-78	5 +
12:45	6.90	1.38	125	10 +	1,810 +	<0.5	7.5	-79	<5 +
12:50	6.90	1.38	125	10 +	1,812 +	<0.5	7.5	-79	<5 +

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? No
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 29.78
   - Total Drawdown (ft) 1.38
   - Calculated Final Purge Volume (gal) 0.26
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? Yes

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - AREA19-MW-226A
Kent County, MI

Well	AREA19-MW-226A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/30/2023
Weather	Sunny, Humid 80
Sampler Initials	MKM/WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	6.3 - 11.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Re-sampled later in the day because only one bottle was filled during initial sampling. Only field readings from the sample that was analyzed are reported. YSI connected at 14:45. Pump could not maintain 50 ml/min.
Initial Water Level Date/Time	05/30/2023 14:35
Initial Water Level Depth (ft bmp)	6.39
Pump/Tubing Intake Depth (ft bmp)	8.83
Tubing Length (ft)	10
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/30/2023 14:40
Total Purge Volume (gal)	1
Modified Sample	Yes
If Modified, Reasoning	Static water level below top of screen.
Sample Collection Information	Bottling-Start: 5/30/2023 15:05:00 PM, Bottling-Stop: 5/30/2023 15:10:00 PM, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:43	6.41	0.02	100	NR	NR	NR	NR	NR	NR
14:45	6.41	0.02	100	12 +	666 +	2.3	7.2	46	6
14:50	6.41	0.02	100	12 +	662 +	2.1	7.1	47	<5
14:55	6.41	0.02	100	12 +	659 +	2.0	7.1	47	<5
15:00	6.41	0.02	100	12 +	660 +	1.8	7.1	45	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 2.44
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - AREA19-MW-226B
Kent County, MI

Well	AREA19-MW-226B / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/30/2023
Weather	Sunny, Humid, 85
Sampler Initials	WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	12.8 - 17.8
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 12:30.
Initial Water Level Date/Time	05/30/2023 12:00
Initial Water Level Depth (ft bmp)	5.91
Pump/Tubing Intake Depth (ft bmp)	15.3
Tubing Length (ft)	18
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/30/2023 12:13
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/30/2023 13:20:00, Bottling-Stop: 05/30/2023 13:23:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:17	5.94	0.03	100	NR	NR	NR	NR	NR	NR
12:30	5.96	0.05	100	11 +	648 +	1.4	7.3	48	12
12:35	5.95	0.04	100	11 +	645 +	1.5	7.3	48	7
12:40	5.95	0.04	100	12 +	645 +	1.4	7.3	47	8
12:45	5.95	0.04	100	11 +	643 +	1.5	7.3	47	7
12:50	5.95	0.04	100	11 +	645 +	1.5	7.3	47	7
12:55	5.95	0.04	100	12 +	640 +	1.5	7.3	47	6
13:00	5.95	0.04	100	12 +	641 +	1.6	7.3	47	5

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - AREA19-MW-226B
Kent County, MI

Well	AREA19-MW-226B / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/30/2023
Weather	Sunny, Humid, 85
Sampler Initials	WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	12.8 - 17.8
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 12:30.
Initial Water Level Date/Time	05/30/2023 12:00
Initial Water Level Depth (ft bmp)	5.91
Pump/Tubing Intake Depth (ft bmp)	15.3
Tubing Length (ft)	18
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/30/2023 12:13
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/30/2023 13:20:00, Bottling-Stop: 05/30/2023 13:23:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:05	5.95	0.04	100	12 +	642 +	1.5	7.3	47	<5
13:10	5.95	0.04	100	12 +	640 +	1.5	7.3	47	<5
13:15	5.95	0.04	100	12 +	640 +	1.5	7.3	47	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 9.39
   - Total Drawdown (ft) 0.04
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WV/CH-MW-240
Kent County, MI

Well	WV/CH-MW-240 / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	06/01/2023
Weather	74F Sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: BP-10, Peristaltic-Pump: NA, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	63.0 - 68.0
Measured Bottom Depth (ft bmp)	NR
Sample Comment	10:05: SWL = 30.91 ft; 10:20: SWL = 30.82 ft, remained stable. YSI Connected at 11:20.
Initial Water Level Date/Time	06/01/2023 10:00
Initial Water Level Depth (ft bmp)	30.73
Pump/Tubing Intake Depth (ft bmp)	65.5
Tubing Length (ft)	67
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	06/22/2023 10:00
Total Purge Volume (gal)	3.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 06/01/2023 11:45:00, Bottling-Stop: 06/01/2023 11:50:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:05	30.91	0.18	300	NR	NR	NR	NR	NR	NR
10:20	30.82	0.09	150	NR	NR	NR	NR	NR	NR
10:30	30.82	0.09	150	NR	NR	NR	NR	NR	19
10:40	30.82	0.09	150	NR	NR	NR	NR	NR	16
10:50	30.86	0.13	150	NR	NR	NR	NR	NR	13
11:00	30.84	0.11	150	NR	NR	NR	NR	NR	8
11:10	30.82	0.09	150	NR	NR	NR	NR	NR	6
11:20	30.82	0.09	150	14 +	779 +	4.2	7.2	54	5

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WV/CH-MW-240
Kent County, MI

Well	WV/CH-MW-240 / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	06/01/2023
Weather	74F Sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: BP-10, Peristaltic-Pump: NA, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	63.0 - 68.0
Measured Bottom Depth (ft bmp)	NR
Sample Comment	10:05: SWL = 30.91 ft; 10:20: SWL = 30.82 ft, remained stable. YSI Connected at 11:20.
Initial Water Level Date/Time	06/01/2023 10:00
Initial Water Level Depth (ft bmp)	30.73
Pump/Tubing Intake Depth (ft bmp)	65.5
Tubing Length (ft)	67
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	06/22/2023 10:00
Total Purge Volume (gal)	3.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 06/01/2023 11:45:00, Bottling-Stop: 06/01/2023 11:50:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:30	30.82	0.09	150	14 +	778 +	3.9	7.1	57	<5
11:35	30.82	0.09	150	14 +	779 +	3.9	7.1	56	<5
11:40	30.82	0.09	150	14 +	780 +	3.9	7.1	57	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft): 34.77
   - Total Drawdown (ft): 0.09
   - Calculated Final Purge Volume (gal): NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WV/CH-MW-241A
Kent County, MI

Well	WV/CH-MW-241A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/23/2023
Weather	Sunny
Sampler Initials	RCP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	23.7 - 28.7
Measured Bottom Depth (ft bmp)	28.7
Sample Comment	14:06: SWL = 18.61 ft, remained stable. 14:22: YSI connected. Bubble was noted on DO probe at 14:30.
Initial Water Level Date/Time	05/23/2023 13:55
Initial Water Level Depth (ft bmp)	18.56
Pump/Tubing Intake Depth (ft bmp)	26.2
Tubing Length (ft)	27.7
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/23/2023 14:06
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/23/2023 14:55:00, Bottling-Stop: 05/23/2023 15:03:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:06	18.61	0.05	50	NR	NR	NR	NR	NR	NR
14:22	18.61	0.05	50	13 +	681 +	8.6	7.4	239	8
14:30	18.61	0.05	50	13 +	673 +	9.4	7.4	241	<5
14:35	18.61	0.05	50	13 +	672 +	8.5	7.4	244	<5
14:40	18.61	0.05	50	13 +	670 +	8.2	7.4	246	<5
14:45	18.61	0.05	50	13 +	668 +	8.3	7.5	248	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 7.64
   - Total Drawdown (ft) 0.05
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WV/CH-MW-241B
Kent County, MI

Well	WV/CH-MW-241B / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/23/2023
Weather	Sunny
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	55.9 - 60.9
Measured Bottom Depth (ft bmp)	60.9
Sample Comment	14:00: SWL = 19.17 ft; 14:05: Purge start, SWL = 19.19 ft, remained stable. 14:20 YSI connected.
Initial Water Level Date/Time	05/23/2023 14:00
Initial Water Level Depth (ft bmp)	19.17
Pump/Tubing Intake Depth (ft bmp)	58.4
Tubing Length (ft)	60
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/23/2023 14:05
Total Purge Volume (gal)	1.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/23/2023 14:40:00, Bottling-Stop: 05/23/2023 14:50:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:15	19.19	0.02	140	NR	NR	NR	NR	NR	7
14:20	19.19	0.02	140	13 +	758 +	6.0	7.5	23	<5
14:25	19.19	0.02	140	12 +	752 +	5.3	7.3	29	<5
14:30	19.19	0.02	140	12 +	751 +	5.1	7.2	34	<5
14:35	19.19	0.02	140	12 +	751 +	5.1	7.2	36	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 39.23
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WV/CH-MW-242A
Kent County, MI

Well	WV/CH-MW-242A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/23/2023
Weather	Sunny
Sampler Initials	BPT
Purging Device	Bladder-Pump: BP-12, Peristaltic-Pump: NA, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	40.0 - 45.0
Measured Bottom Depth (ft bmp)	45
Sample Comment	10:15: SWL = 35.9 ft, remained stable. 10:45: YSI connected.
Initial Water Level Date/Time	05/23/2023 10:10
Initial Water Level Depth (ft bmp)	35.90
Pump/Tubing Intake Depth (ft bmp)	42.5
Tubing Length (ft)	45
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	05/23/2023 10:15
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/23/2023 11:25:00, Bottling-Stop: 05/23/2023 11:35:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:25	35.90	0.00	90	NR	NR	NR	NR	NR	7
10:45	35.90	0.00	90	14 +	781 +	0.9	7.4	-83	9
10:50	35.90	0.00	90	14 +	777 +	0.6	7.3	-84	8
10:55	35.90	0.00	90	15 +	778 +	<0.5	7.3	-85	6
11:00	35.90	0.00	90	15 +	775 +	<0.5	7.3	-85	8
11:05	35.90	0.00	90	15 +	774 +	<0.5	7.3	-86	5
11:10	35.90	0.00	90	15 +	776 +	<0.5	7.3	-83	4
11:15	35.90	0.00	90	15 +	776 +	<0.5	7.3	-83	4

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 6.60
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WV/CH-MW-242B
Kent County, MI

Well	WV/CH-MW-242B / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/23/2023
Weather	Sunny, Mid 60s
Sampler Initials	MKM
Purging Device	Bladder-Pump: BP-10, Peristaltic-Pump: NA, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	64.4 - 69.4
Measured Bottom Depth (ft bmp)	NR
Sample Comment	9:58: SWL = 16.65 ft, water level continued to drop even with constant discharge and fill adjustments; 10:00: turned pump off to allow well to recharge; 10:10 restarted pump, SWL = 16.43 ft; 10:25: water to surface, SWL = 16.60 ft; 10:42: SWL = 16.62 ft. 10:51: YSI connected. Last 3 water level readings were not the same per Standard Operating Procedure. Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	05/23/2023 09:48
Initial Water Level Depth (ft bmp)	16.43
Pump/Tubing Intake Depth (ft bmp)	66.9
Tubing Length (ft)	69
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	05/23/2023 09:53
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/23/2023 11:27:00, Bottling-Stop: 05/23/2023 11:37:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
09:58	16.65	0.22	NR	NR	NR	NR	NR	NR	NR
10:10	16.43	0.00	50	NR	NR	NR	NR	NR	NR
10:27	16.60	0.17	50	NR	NR	NR	NR	NR	NR
10:42	16.62	0.19	90	NR	NR	NR	NR	NR	NR
10:53	16.66	0.23	50	16 +	841 +	1.1	7.4	-12	NR
11:03	16.66	0.23	50	16 +	832 +	0.7	7.4	-75	18
11:07	16.70	0.27	50	17 +	830 +	0.6	7.4	-78	15

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - WV/CH-MW-242B
Kent County, MI

Well	WV/CH-MW-242B / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/23/2023
Weather	Sunny, Mid 60s
Sampler Initials	MKM
Purging Device	Bladder-Pump: BP-10, Peristaltic-Pump: NA, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	64.4 - 69.4
Measured Bottom Depth (ft bmp)	NR
Sample Comment	9:58: SWL = 16.65 ft, water level continued to drop even with constant discharge and fill adjustments; 10:00: turned pump off to allow well to recharge; 10:10 restarted pump, SWL = 16.43 ft; 10:25: water to surface, SWL = 16.60 ft; 10:42: SWL = 16.62 ft. 10:51: YSI connected. Last 3 water level readings were not the same per Standard Operating Procedure. Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	05/23/2023 09:48
Initial Water Level Depth (ft bmp)	16.43
Pump/Tubing Intake Depth (ft bmp)	66.9
Tubing Length (ft)	69
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	05/23/2023 09:53
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/23/2023 11:27:00, Bottling-Stop: 05/23/2023 11:37:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:12	16.69	0.26	50	17 +	832 +	0.5	7.4	-77	15
11:17	16.69	0.26	50	17 +	828 +	0.5	7.4	-77	14
11:22	16.70	0.27	50	17 +	829 +	0.5	7.4	-79	14

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 50.47
   - Total Drawdown (ft) 0.27
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - HS-MW-29A
Kent County, MI

Well	HS-MW-29A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/25/2023
Weather	Sunny
Sampler Initials	AW
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	6.3 - 16.3
Measured Bottom Depth (ft bmp)	16.3
Sample Comment	10:55: SWL = 6.3 ft; 11:22: SWL = 6.31 ft, remained constant for duration of purge. 11:22: YSI connected.
Initial Water Level Date/Time	05/25/2023 10:55
Initial Water Level Depth (ft bmp)	6.30
Pump/Tubing Intake Depth (ft bmp)	11.3
Tubing Length (ft)	13
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/25/2023 10:55
Total Purge Volume (gal)	4
Modified Sample	Yes
If Modified, Reasoning	Initial static water level was at the same depth as the top of the well screen.
Sample Collection Information	Bottling-Start: 05/25/2023 12:15:00, Bottling-Stop: 05/25/2023 12:17:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:00	6.30	0.00	150	NR	NR	NR	NR	NR	66
11:22	6.31	0.01	150	9 +	628	<0.5	6.9	131	13
11:27	6.31	0.01	150	9 +	630	<0.5	7.0	89	11
11:32	6.31	0.01	150	9 +	634	<0.5	7.0	68	8
11:45	6.31	0.01	150	9 +	638	<0.5	7.1	33	<5
11:50	6.31	0.01	150	9 +	640	<0.5	7.1	25	<5
11:55	6.31	0.01	150	9 +	640	<0.5	7.1	13	<5
12:00	6.31	0.01	150	9 +	642	<0.5	7.1	5	<5
12:05	6.31	0.01	150	9 +	643	<0.5	7.1	-1	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.00
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - HS-MW-260
Kent County, MI

Well	HS-MW-260 / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/25/2023
Weather	Sunny
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	8.1 - 13.1
Measured Bottom Depth (ft bmp)	13.1
Sample Comment	11:30: YSI connected.
Initial Water Level Date/Time	05/25/2023 10:55
Initial Water Level Depth (ft bmp)	6.23
Pump/Tubing Intake Depth (ft bmp)	10.6
Tubing Length (ft)	12.6
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/25/2023 11:00
Total Purge Volume (gal)	2.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/25/2023 12:05:00 , Bottling-Stop: 05/25/2023 12:10:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:20	6.27	0.04	220	NR	NR	NR	NR	NR	29
11:30	6.28	0.05	220	9 +	644	0.6	7.2	69	14
11:35	6.28	0.05	220	9 +	627	<0.5	7.2	25	8
11:40	6.28	0.05	220	9 +	632	<0.5	7.2	16	<5
11:45	6.28	0.05	220	9 +	609	<0.5	7.1	7	<5
11:50	6.28	0.05	220	10 +	617	<0.5	7.1	2	<5
11:55	6.28	0.05	220	10 +	615	<0.5	7.1	-2	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.37
   - Total Drawdown (ft) 0.05
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - HS-MW-261
Kent County, MI

Well	HS-MW-261 / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/25/2023
Weather	64F Sunny
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.2 - 12.2
Measured Bottom Depth (ft bmp)	12.21
Sample Comment	14:55: SWL = 4.38 ft; 15:00: SWL = 4.39 ft, remained constant for duration of purge. 15:00: YSI connected.
Initial Water Level Date/Time	05/25/2023 14:40
Initial Water Level Depth (ft bmp)	4.31
Pump/Tubing Intake Depth (ft bmp)	9.7
Tubing Length (ft)	11.7
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/25/2023 14:45
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/25/2023 15:35:00, Bottling-Stop: 05/25/2023 15:40:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:55	4.38	0.07	60	NR	NR	NR	NR	NR	20
15:00	4.39	0.08	60	12 +	668	0.6	7.4	-84	12
15:05	4.39	0.08	60	12 +	665	<0.5	7.2	-91	13
15:10	4.39	0.08	60	12 +	661	<0.5	7.2	-90	10
15:15	4.39	0.08	60	12 +	657	<0.5	7.1	-89	9
15:20	4.39	0.08	60	12 +	657	<0.5	7.1	-90	<5
15:25	4.39	0.08	60	13 +	656	<0.5	7.1	-89	<5
15:30	4.39	0.08	60	12 +	653	<0.5	7.1	-88	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.39
   - Total Drawdown (ft) 0.08
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - HS-MW-262
Kent County, MI

Well	HS-MW-262 / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/25/2023
Weather	64F Sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.1 - 12.1
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 15:05.
Initial Water Level Date/Time	05/25/2023 14:50
Initial Water Level Depth (ft bmp)	5.43
Pump/Tubing Intake Depth (ft bmp)	9.6
Tubing Length (ft)	11
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/25/2023 14:50
Total Purge Volume (gal)	2.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/25/2023 15:20:00, Bottling-Stop: 05/25/2023 15:25:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:55	5.46	0.03	200	NR	NR	NR	NR	NR	<5
15:00	5.46	0.03	200	NR	NR	NR	NR	NR	<5
15:05	5.46	0.03	200	12 +	759	<0.5	7.3	266	<5
15:10	5.46	0.03	200	12 +	759	<0.5	7.3	262	<5
15:15	5.46	0.03	200	12 +	759	<0.5	7.3	258	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.17
   - Total Drawdown (ft) 0.03
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - HS-MW-263A
Kent County, MI

Well	HS-MW-263A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/30/2023
Weather	80F Sunny
Sampler Initials	RCP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	8.2 - 13.2
Measured Bottom Depth (ft bmp)	13.2
Sample Comment	YSI Connected at 12:25.
Initial Water Level Date/Time	05/30/2023 11:05
Initial Water Level Depth (ft bmp)	7.76
Pump/Tubing Intake Depth (ft bmp)	12.7
Tubing Length (ft)	14.7
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/30/2023 11:05
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/30/2023 12:50:00, Bottling-Stop: 05/30/2023 12:55:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:10	7.81	0.05	160	NR	NR	NR	NR	NR	NR
11:20	7.81	0.05	160	NR	NR	NR	NR	NR	31
11:30	7.81	0.05	160	NR	NR	NR	NR	NR	11
11:40	7.81	0.05	160	NR	NR	NR	NR	NR	6
11:50	7.81	0.05	160	NR	NR	NR	NR	NR	<5
12:10	7.81	0.05	160	NR	NR	NR	NR	NR	<5
12:25	7.81	0.05	180	13 +	790 +	<0.5	7.3	-28	<5
12:30	7.81	0.05	180	13 +	791 +	<0.5	7.3	-108	<5

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - HS-MW-263A
Kent County, MI

Well	HS-MW-263A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/30/2023
Weather	80F Sunny
Sampler Initials	RCP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	8.2 - 13.2
Measured Bottom Depth (ft bmp)	13.2
Sample Comment	YSI Connected at 12:25.
Initial Water Level Date/Time	05/30/2023 11:05
Initial Water Level Depth (ft bmp)	7.76
Pump/Tubing Intake Depth (ft bmp)	12.7
Tubing Length (ft)	14.7
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/30/2023 11:05
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/30/2023 12:50:00, Bottling-Stop: 05/30/2023 12:55:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:35	7.81	0.05	180	13 +	791 +	<0.5	7.3	-130	<5
12:40	7.81	0.05	180	13 +	791 +	<0.5	7.3	-130	<5
12:45	7.81	0.05	180	13 +	791 +	<0.5	7.3	-138	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.94
   - Total Drawdown (ft) 0.05
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - HS-MW-263B
Kent County, MI

Well	HS-MW-263B / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/30/2023
Weather	80F Sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	44.3 - 49.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 11:40.
Initial Water Level Date/Time	05/30/2023 11:10
Initial Water Level Depth (ft bmp)	6.39
Pump/Tubing Intake Depth (ft bmp)	46.8
Tubing Length (ft)	48
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/30/2023 11:10
Total Purge Volume (gal)	2.8
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/30/2023 12:25:00, Bottling-Stop: 05/30/2023 12:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:20	6.41	0.02	150	NR	NR	NR	NR	NR	NR
11:30	6.41	0.02	150	NR	NR	NR	NR	NR	<5
11:40	6.41	0.02	150	12 +	735 +	1.2	7.4	187	<5
11:50	6.41	0.02	150	12 +	732 +	1.1	7.3	183	<5
12:00	6.41	0.02	150	12 +	730 +	1.4	7.3	180	<5
12:05	6.41	0.02	150	12 +	730 +	1.6	7.3	177	<5
12:10	6.41	0.02	150	12 +	728 +	1.8	7.3	178	<5
12:15	6.41	0.02	150	12 +	728 +	1.8	7.3	177	<5
12:20	6.41	0.02	150	12 +	727 +	1.8	7.3	177	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 40.41
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - HS-MW-264
Kent County, MI

Well	HS-MW-264 / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/23/2023
Weather	Sunny, 86
Sampler Initials	AW
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	25.0 - 30.0
Measured Bottom Depth (ft bmp)	30
Sample Comment	15:40: SWL = 21.75 ft; 15:55: SWL = 21.76 ft, remained constant for duration of purge. 15:55: YSI connected.
Initial Water Level Date/Time	05/23/2023 15:35
Initial Water Level Depth (ft bmp)	21.75
Pump/Tubing Intake Depth (ft bmp)	27.5
Tubing Length (ft)	30
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/23/2023 15:40
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/23/2023 16:20:00, Bottling-Stop: 05/23/2023 16:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
15:45	21.76	0.01	140	NR	NR	NR	NR	NR	17
15:55	21.76	0.01	140	11 +	623 +	7.1	7.2	45	6
16:00	21.76	0.01	140	12 +	629 +	7.2	7.1	56	5
16:05	21.76	0.01	140	12 +	635 +	7.1	7.1	60	<5
16:10	21.76	0.01	140	12 +	640 +	7.0	7.1	64	<5
16:15	21.76	0.01	140	12 +	641 +	7.0	7.1	66	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft): 5.75
   - Total Drawdown (ft): 0.01
   - Calculated Final Purge Volume (gal): NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - HS-MW-265
Kent County, MI

Well	HS-MW-265 / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/30/2023
Weather	89F Sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	13.3 - 18.3
Measured Bottom Depth (ft bmp)	18.3
Sample Comment	YSI Connected at 15:50.
Initial Water Level Date/Time	05/30/2023 15:10
Initial Water Level Depth (ft bmp)	9.07
Pump/Tubing Intake Depth (ft bmp)	15.8
Tubing Length (ft)	17
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/30/2023 15:10
Total Purge Volume (gal)	2.7
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/30/2023 16:15:00, Bottling-Stop: 05/30/2023 16:20:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
15:20	9.08	0.01	200	NR	NR	NR	NR	NR	NR
15:40	9.08	0.01	200	NR	NR	NR	NR	NR	7
15:50	9.08	0.01	200	NR	NR	NR	NR	NR	<5
16:00	9.08	0.01	200	12 +	838 +	2.5	7.2	164	<5
16:05	9.08	0.01	200	12 +	839 +	2.4	7.3	162	<5
16:10	9.08	0.01	200	13 +	840 +	2.4	7.3	162	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 6.73
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - HS-MW-266A
Kent County, MI

Well	HS-MW-266A / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/25/2023
Weather	56F Sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	13.2 - 18.2
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 1215.
Initial Water Level Date/Time	05/25/2023 12:05
Initial Water Level Depth (ft bmp)	4.08
Pump/Tubing Intake Depth (ft bmp)	15.7
Tubing Length (ft)	17
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/25/2023 12:05
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/25/2023 12:35:00, Bottling-Stop: 05/25/2023 12:40:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:10	4.09	0.01	220	NR	NR	NR	NR	NR	<5
12:15	4.09	0.01	220	10 +	792	2.5	7.5	45	<5
12:20	4.09	0.01	220	10 +	791	2.5	7.4	46	<5
12:25	4.09	0.01	220	10 +	792	2.5	7.4	46	<5
12:30	4.09	0.01	220	10 +	791	2.5	7.4	46	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 11.62
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q2 - HS-MW-266B
Kent County, MI

Well	HS-MW-266B / 2 in Diameter PVC
Sample Quarter	2023-Q2
Date	05/25/2023
Weather	56F Sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	53.0 - 58.0
Measured Bottom Depth (ft bmp)	58
Sample Comment	Connected YSI at 11:25.
Initial Water Level Date/Time	05/25/2023 11:00
Initial Water Level Depth (ft bmp)	4.00
Pump/Tubing Intake Depth (ft bmp)	55.5
Tubing Length (ft)	58.5
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	05/25/2023 11:00
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 05/25/2023 11:40:00, Bottling-Stop: 05/25/2023 11:45:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:10	4.01	0.01	240	NR	NR	NR	NR	NR	<5
11:20	4.01	0.01	240	NR	NR	NR	NR	NR	<5
11:25	4.01	0.01	240	10 +	858	1.0	7.4	44	<5
11:30	4.01	0.01	240	10 +	860	0.9	7.4	44	<5
11:35	4.01	0.01	240	10 +	861	0.9	7.4	43	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 51.50
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WVNW-MW-200A
Kent County, MI

Well	WVNW-MW-200A / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/08/2023
Weather	79F sunny
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	23.7 - 28.7
Measured Bottom Depth (ft bmp)	NR
Sample Comment	14:35: YSI connected; Collected DUP
Initial Water Level Date/Time	08/08/2023 14:15
Initial Water Level Depth (ft bmp)	16.74
Pump/Tubing Intake Depth (ft bmp)	26.2
Tubing Length (ft)	29
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/08/2023 14:20
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/08/2023 15:00:00, Bottling-Stop: 08/08/2023 15:05:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:30	16.74	0.00	190	NR	NR	NR	NR	NR	<5
14:35	16.74	0.00	190	14	720 +	7.5	7.4	171	<5
14:40	16.74	0.00	190	13	710 +	7.7	7.4	168	<5
14:45	16.74	0.00	190	13	706 +	8.0	7.5	165	<5
14:50	16.74	0.00	190	13	700 +	8.0	7.4	163	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 9.46
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WVNW-MW-200B
Kent County, MI

Well	WVNW-MW-200B / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/08/2023
Weather	79F Sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	54.8 - 59.8
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 14:40. Collected MS/MSD.
Initial Water Level Date/Time	08/08/2023 14:15
Initial Water Level Depth (ft bmp)	16.87
Pump/Tubing Intake Depth (ft bmp)	57.3
Tubing Length (ft)	59.3
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/08/2023 14:15
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/08/2023 14:55:00, Bottling-Stop: 08/08/2023 15:00:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:30	16.87	0.00	250	NR	NR	NR	NR	NR	NR
14:35	16.87	0.00	250	NR	NR	NR	NR	NR	<5
14:40	16.87	0.00	250	12	731 +	8.3	7.0	126	<5
14:45	16.87	0.00	250	12	732 +	8.3	7.0	121	<5
14:50	16.87	0.00	250	12	728 +	8.3	7.0	123	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 40.43
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WVNW-MW-201A
Kent County, MI

Well	WVNW-MW-201A / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/09/2023
Weather	76F Sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	11.9 - 16.9
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 11:15.
Initial Water Level Date/Time	08/09/2023 10:50
Initial Water Level Depth (ft bmp)	10.30
Pump/Tubing Intake Depth (ft bmp)	14.4
Tubing Length (ft)	18
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/09/2023 10:50
Total Purge Volume (gal)	4
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/09/2023 12:15:00, Bottling-Stop: 08/09/2023 12:20:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:00	10.30	0.00	200	NR	NR	NR	NR	NR	<5
11:15	10.30	0.00	200	12	742	10.2	7.3	335	<5
11:25	10.30	0.00	200	12	742	9.4	7.2	296	<5
11:35	10.30	0.00	200	13	747	8.9	7.3	262	<5
12:00	10.30	0.00	200	14	742	8.0	7.2	233	<5
12:05	10.30	0.00	200	14	742	8.0	7.2	230	<5
12:10	10.30	0.00	200	14	742	8.0	7.2	228	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.10
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WVNW-MW-201B
Kent County, MI

Well	WVNW-MW-201B / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/09/2023
Weather	76F Sunny
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	29.6 - 34.6
Measured Bottom Depth (ft bmp)	NR
Sample Comment	11:20: YSI connected
Initial Water Level Date/Time	08/09/2023 10:50
Initial Water Level Depth (ft bmp)	10.50
Pump/Tubing Intake Depth (ft bmp)	32.1
Tubing Length (ft)	35
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/09/2023 10:55
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/09/2023 11:45:00, Bottling-Stop: 08/09/2023 11:55:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:10	10.50	0.00	150	NR	NR	NR	NR	NR	<5
11:20	10.50	0.00	150	12	846	7.1	7.0	159	<5
11:25	10.50	0.00	150	12	846	6.8	7.0	161	<5
11:30	10.50	0.00	150	12	846	6.5	7.0	161	<5
11:35	10.50	0.00	150	12	842	6.3	7.0	160	<5
11:40	10.50	0.00	150	12	847	6.4	7.0	159	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 21.60
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WVNW-MW-201C
Kent County, MI

Well	WVNW-MW-201C / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/09/2023
Weather	76F Sunny
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	49.1 - 54.1
Measured Bottom Depth (ft bmp)	NR
Sample Comment	12:00: YSI Connected
Initial Water Level Date/Time	08/09/2023 10:55
Initial Water Level Depth (ft bmp)	10.50
Pump/Tubing Intake Depth (ft bmp)	51.6
Tubing Length (ft)	55
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/09/2023 11:00
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/09/2023 12:35:00, Bottling-Stop: 08/09/2023 12:40:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:20	10.53	0.03	120	NR	NR	NR	NR	NR	<5
11:40	10.54	0.04	120	NR	NR	NR	NR	NR	<5
12:00	10.55	0.05	120	13	589	1.4	7.0	150	<5
12:05	10.55	0.05	120	13	625	1.1	7.0	144	<5
12:10	10.55	0.05	120	13	661	1.0	7.0	140	<5
12:15	10.55	0.05	120	13	691	1.0	7.0	136	<5
12:20	10.55	0.05	120	13	707	1.0	7.0	132	<5
12:25	10.55	0.05	120	13	715	0.9	7.1	130	<5
12:30	10.55	0.05	120	13	715	1.0	7.1	128	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 41.10
   - Total Drawdown (ft) 0.05
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WVNW-MW-202A
Kent County, MI

Well	WVNW-MW-202A / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/09/2023
Weather	81F cloudy
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	42.6 - 47.6
Measured Bottom Depth (ft bmp)	47.7
Sample Comment	15:20: YSI connected
Initial Water Level Date/Time	08/09/2023 14:45
Initial Water Level Depth (ft bmp)	12.06
Pump/Tubing Intake Depth (ft bmp)	45.2
Tubing Length (ft)	50
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/09/2023 14:45
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/09/2023 15:40:00, Bottling-Stop: 08/09/2023 15:45:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
15:15	12.07	0.01	190	NR	NR	NR	NR	NR	<5
15:20	12.07	0.01	190	11	581	12.8	7.2	141	<5
15:25	12.07	0.01	190	11	581	7.5	7.0	149	<5
15:30	12.07	0.01	190	11	582	7.5	7.0	151	<5
15:35	12.07	0.01	190	11	582	7.5	7.0	153	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 33.14
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WVNW-MW-202B
Kent County, MI

Well	WVNW-MW-202B / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/09/2023
Weather	81F Cloudy
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	62.3 - 67.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	
Initial Water Level Date/Time	08/09/2023 14:35
Initial Water Level Depth (ft bmp)	12.18
Pump/Tubing Intake Depth (ft bmp)	64.8
Tubing Length (ft)	68
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/09/2023 14:40
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/09/2023 15:30:00, Bottling-Stop: 08/09/2023 15:35:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
15:05	12.18	0.00	160	12	558	5.5	7.2	317	<5
15:10	12.18	0.00	160	12	560	5.5	7.2	314	<5
15:15	12.18	0.00	160	12	558	5.6	7.2	313	<5
15:20	12.18	0.00	160	12	558	5.4	7.2	311	<5
15:25	12.18	0.00	160	12	559	5.6	7.2	308	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 52.62
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WVNW-MW-203
Kent County, MI

Well	WVNW-MW-203 / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/10/2023
Weather	Clear, 80s
Sampler Initials	AJG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-LAV
Reference Measuring Point	PVC
Well Screen (ft bmp)	13.9 - 18.9
Measured Bottom Depth (ft bmp)	18.94
Sample Comment	Initial SWL was below top of screen interval, set tubing at midpoint of SWL and bottom of well. YSI Connected at 10:45.
Initial Water Level Date/Time	08/10/2023 10:30
Initial Water Level Depth (ft bmp)	16.20
Pump/Tubing Intake Depth (ft bmp)	17.5
Tubing Length (ft)	19
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/10/2023 10:30
Total Purge Volume (gal)	1.75
Modified Sample	Yes
If Modified, Reasoning	Water below top of screen
Sample Collection Information	Bottling-Start: 08/10/2023 11:10:00, Bottling-Stop: 08/10/2023 11:15:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:40	16.22	0.02	140	NR	NR	NR	NR	NR	9 +
10:45	16.22	0.02	140	12	163 +	10.0	6.8	170	8 +
10:50	16.22	0.02	140	12	164 +	9.9	6.9	169	7 +
10:55	16.22	0.02	140	12	165 +	9.7	6.9	164	5 +
11:00	16.22	0.02	140	12	166 +	9.9	6.9	162	5 +
11:05	16.22	0.02	140	12	170 +	9.8	7.0	161	4 +

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 1.30
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - AREA19-MW-7A
Kent County, MI

Well	AREA19-MW-7A / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/10/2023
Weather	Sunny 70
Sampler Initials	WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	8.7 - 13.7
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Purge water observed to be clear. 10:55: YSI connected.
Initial Water Level Date/Time	08/10/2023 10:25
Initial Water Level Depth (ft bmp)	4.85
Pump/Tubing Intake Depth (ft bmp)	11.2
Tubing Length (ft)	15
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/10/2023 10:25
Total Purge Volume (gal)	4
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/10/2023 11:25:00, Bottling-Stop: 08/10/2023 11:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:35	4.85	0.00	250	NR	NR	NR	NR	NR	<5
10:45	4.85	0.00	250	NR	NR	NR	NR	NR	<5
10:55	4.85	0.00	250	14	882 +	4.5	7.3	353	<5
11:05	4.85	0.00	250	14	878 +	4.3	7.2	349	<5
11:15	4.85	0.00	250	14	880 +	4.3	7.2	343	<5
11:20	4.85	0.00	250	14	879 +	4.4	7.2	340	<5
11:25	4.85	0.00	250	14	881 +	4.4	7.2	338	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 6.35
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - AREA19-MW-221A
Kent County, MI

Well	AREA19-MW-221A / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/08/2023
Weather	Clear 80s
Sampler Initials	AJG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 4, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-LAV
Reference Measuring Point	PVC
Well Screen (ft bmp)	15.5 - 20.5
Measured Bottom Depth (ft bmp)	20.5
Sample Comment	Connected YSI at 11:05. Removed bubbles from dissolved oxygen probe at 11:50.
Initial Water Level Date/Time	08/08/2023 10:50
Initial Water Level Depth (ft bmp)	13.33
Pump/Tubing Intake Depth (ft bmp)	18.0
Tubing Length (ft)	20
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/08/2023 10:50
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/08/2023 12:10:00, Bottling-Stop: 08/08/2023 12:15:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:00	13.41	0.08	200	NR	NR	NR	NR	NR	14
11:05	13.44	0.11	200	12	603 +	6.3	7.3	217	9
11:10	13.43	0.10	200	13	601 +	6.0	7.3	228	<5
11:15	13.42	0.09	200	13	604 +	6.1	7.3	233	<5
11:20	13.42	0.09	200	13	600 +	6.2	7.3	243	<5
11:25	13.42	0.09	200	13	596 +	6.4	7.3	257	<5
11:30	13.42	0.09	200	13	594 +	6.5	7.3	263	<5
11:35	13.42	0.09	200	13	589 +	6.8	7.4	269	<5
11:40	13.42	0.09	200	13	569 +	6.7	7.4	271	<5
11:45	13.42	0.09	200	13	553 +	6.8	7.4	275	<5
11:50	13.42	0.09	200	13	585 +	6.8	7.4	275	<5

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - AREA19-MW-221A
Kent County, MI

Well	AREA19-MW-221A / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/08/2023
Weather	Clear 80s
Sampler Initials	AJG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 4, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-LAV
Reference Measuring Point	PVC
Well Screen (ft bmp)	15.5 - 20.5
Measured Bottom Depth (ft bmp)	20.5
Sample Comment	Connected YSI at 11:05. Removed bubbles from dissolved oxygen probe at 11:50.
Initial Water Level Date/Time	08/08/2023 10:50
Initial Water Level Depth (ft bmp)	13.33
Pump/Tubing Intake Depth (ft bmp)	18.0
Tubing Length (ft)	20
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/08/2023 10:50
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/08/2023 12:10:00, Bottling-Stop: 08/08/2023 12:15:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:55	13.42	0.09	200	13	583 +	7.1	7.4	275	<5
12:00	13.42	0.09	200	13	582 +	7.1	7.4	277	<5
12:05	13.42	0.09	200	13	583 +	7.1	7.4	280	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.67
   - Total Drawdown (ft) 0.09
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - AREA19-MW-221B
Kent County, MI

Well	AREA19-MW-221B / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/08/2023
Weather	Sunny 70
Sampler Initials	WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	44.5 - 49.5
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Purge water observed to be very clear. 11:20: YSI connected.
Initial Water Level Date/Time	08/08/2023 10:50
Initial Water Level Depth (ft bmp)	12.75
Pump/Tubing Intake Depth (ft bmp)	47.0
Tubing Length (ft)	51.5
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/08/2023 10:50
Total Purge Volume (gal)	2.2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/08/2023 11:35:00, Bottling-Stop: 08/08/2023 11:40:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:00	12.75	0.00	175	NR	NR	NR	NR	NR	13
11:10	12.75	0.00	200	NR	NR	NR	NR	NR	7
11:20	12.75	0.00	200	11	471 +	7.0	7.1	359	<5
11:25	12.75	0.00	200	11	472 +	6.8	7.1	357	<5
11:30	12.75	0.00	200	11	472 +	6.6	7.1	354	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 34.25
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - AREA19-MW-222
Kent County, MI

Well	AREA19-MW-222 / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/11/2023
Weather	Sunny 70
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: Livonia, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	9.3 - 14.3
Measured Bottom Depth (ft bmp)	14.24
Sample Comment	YSI Connected at 11:25.
Initial Water Level Date/Time	08/11/2023 10:30
Initial Water Level Depth (ft bmp)	7.71
Pump/Tubing Intake Depth (ft bmp)	11.4
Tubing Length (ft)	13
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/11/2023 11:05
Total Purge Volume (gal)	2.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/11/2023 11:55:00, Bottling-Stop: 08/11/2023 12:00:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:15	7.83	0.12	250	NR	NR	NR	NR	NR	NR
11:25	7.83	0.12	250	13	517	<0.5	7.3	29	9
11:35	7.83	0.12	250	13	509	<0.5	7.4	-20	<5
11:45	7.83	0.12	250	13	503	<0.5	7.3	-40	<5
11:50	7.83	0.12	250	13	501	<0.5	7.3	-45	<5
11:55	7.83	0.12	250	13	501	<0.5	7.3	-49	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 3.69
   - Total Drawdown (ft) 0.12
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - AREA19-MW-223
Kent County, MI

Well	AREA19-MW-223 / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/11/2023
Weather	Cloudy 70
Sampler Initials	WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 4, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.9 - 12.9
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 10:30.
Initial Water Level Date/Time	08/11/2023 09:55
Initial Water Level Depth (ft bmp)	5.00
Pump/Tubing Intake Depth (ft bmp)	11.5
Tubing Length (ft)	14
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/11/2023 10:00
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/11/2023 10:55:00, Bottling-Stop: 08/11/2023 11:00:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:10	5.04	0.04	250	NR	NR	NR	NR	NR	125
10:20	5.04	0.04	250	NR	NR	NR	NR	NR	13
10:30	5.04	0.04	250	13	620 +	<0.5	6.8	-108	<5
10:40	5.04	0.04	250	13	614 +	<0.5	6.9	-117	<5
10:45	5.04	0.04	250	13	614 +	<0.5	6.9	-119	<5
10:50	5.04	0.04	250	13	612 +	<0.5	6.9	-120	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 6.50
   - Total Drawdown (ft) 0.04
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - AREA19-MW-224
Kent County, MI

Well	AREA19-MW-224 / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/10/2023
Weather	Clear, 80s
Sampler Initials	AJG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-LAV
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.1 - 12.1
Measured Bottom Depth (ft bmp)	12.1
Sample Comment	Lowered purge rate after 13:55 reading to control drawdown. YSI Connected at 14:00.
Initial Water Level Date/Time	08/10/2023 13:45
Initial Water Level Depth (ft bmp)	4.92
Pump/Tubing Intake Depth (ft bmp)	9.6
Tubing Length (ft)	11
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/10/2023 13:45
Total Purge Volume (gal)	1.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/10/2023 14:25:00, Bottling-Stop: 08/10/2023 14:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:55	5.89	0.97	120	NR	NR	NR	NR	NR	6 +
14:00	5.84	0.92	100	20	1,284 +	0.5	7.0	64	<5 +
14:05	5.83	0.91	100	20	1,286 +	<0.5	7.0	61	<5 +
14:10	5.79	0.87	100	20	1,293 +	<0.5	7.0	58	<5 +
14:15	5.79	0.87	100	20	1,289 +	<0.5	7.0	56	<5 +
14:20	5.79	0.87	100	20	1,292 +	<0.5	7.0	53	<5 +

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.68
   - Total Drawdown (ft) 0.87
   - Calculated Final Purge Volume (gal) 0.15
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? Yes

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - AREA19-MW-225A
Kent County, MI

Well	AREA19-MW-225A / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/09/2023
Weather	Cloudy 80
Sampler Initials	WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: Livonia, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 4, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-LAV
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.6 - 12.6
Measured Bottom Depth (ft bmp)	NR
Sample Comment	15:30: YSI connected
Initial Water Level Date/Time	08/09/2023 14:35
Initial Water Level Depth (ft bmp)	6.20
Pump/Tubing Intake Depth (ft bmp)	10.1
Tubing Length (ft)	15
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/09/2023 14:35
Total Purge Volume (gal)	5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/09/2023 16:25:00, Bottling-Stop: 08/09/2023 16:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:50	6.20	0.00	225	NR	NR	NR	NR	NR	<5
15:05	6.20	0.00	225	NR	NR	NR	NR	NR	<5
15:20	6.20	0.00	225	NR	NR	NR	NR	NR	<5
15:30	6.20	0.00	225	14	820 +	<0.5	7.2	53	<5
15:40	6.20	0.00	225	14	819 +	<0.5	7.2	26	<5
15:50	6.20	0.00	225	14	819 +	<0.5	7.2	10	<5
16:00	6.20	0.00	225	14	817 +	<0.5	7.2	-2	<5
16:10	6.20	0.00	225	14	814 +	<0.5	7.2	-10	<5
16:15	6.20	0.00	225	14	813 +	<0.5	7.2	-14	<5
16:20	6.20	0.00	225	14	813 +	<0.5	7.2	-17	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 3.90
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - AREA19-MW-225B
Kent County, MI

Well	AREA19-MW-225B / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/09/2023
Weather	Clear, 80s
Sampler Initials	AJG
Purging Device	Bladder-Pump: BP-12, Peristaltic-Pump: NA, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-LAV
Reference Measuring Point	PVC
Well Screen (ft bmp)	32.9 - 37.9
Measured Bottom Depth (ft bmp)	37.8
Sample Comment	15:43: YSI batteries replaced
Initial Water Level Date/Time	08/09/2023 14:45
Initial Water Level Depth (ft bmp)	5.86
Pump/Tubing Intake Depth (ft bmp)	35.3
Tubing Length (ft)	37
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	08/09/2023 14:45
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/09/2023 16:50:00, Bottling-Stop: 08/09/2023 16:55:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:55	5.93	0.07	50	NR	NR	NR	NR	NR	>999
15:05	6.03	0.17	50	NR	NR	NR	NR	NR	>999
15:15	6.06	0.20	50	NR	NR	NR	NR	NR	628
15:25	6.07	0.21	50	NR	NR	NR	NR	NR	273
15:35	6.07	0.21	50	NR	NR	NR	NR	NR	180
15:45	6.07	0.21	50	NR	NR	NR	NR	NR	144
15:55	6.07	0.21	50	18	1,514	0.5	7.4	-79	101
16:05	6.07	0.21	50	17	1,518	<0.5	7.4	-84	87
16:15	6.07	0.21	50	18	1,514	<0.5	7.4	-87	67
16:25	6.07	0.21	50	18	1,515	<0.5	7.4	-89	53

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - AREA19-MW-225B
Kent County, MI

Well	AREA19-MW-225B / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/09/2023
Weather	Clear, 80s
Sampler Initials	AJG
Purging Device	Bladder-Pump: BP-12, Peristaltic-Pump: NA, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-LAV
Reference Measuring Point	PVC
Well Screen (ft bmp)	32.9 - 37.9
Measured Bottom Depth (ft bmp)	37.8
Sample Comment	15:43: YSI batteries replaced
Initial Water Level Date/Time	08/09/2023 14:45
Initial Water Level Depth (ft bmp)	5.86
Pump/Tubing Intake Depth (ft bmp)	35.3
Tubing Length (ft)	37
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	08/09/2023 14:45
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/09/2023 16:50:00, Bottling-Stop: 08/09/2023 16:55:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
16:35	6.07	0.21	50	18	1,516	<0.5	7.4	-89	52
16:40	6.07	0.21	50	18	1,515	<0.5	7.4	-90	49
16:45	6.07	0.21	50	18	1,514	<0.5	7.4	-90	47

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? Yes
5) Calculations:
   - Head Above Pump Intake (ft) 29.44
   - Total Drawdown (ft) 0.21
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - AREA19-MW-226A
Kent County, MI

Well	AREA19-MW-226A / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/07/2023
Weather	Clear, 80s
Sampler Initials	AJG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-LAV
Reference Measuring Point	PVC
Well Screen (ft bmp)	6.3 - 11.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 14:40.
Initial Water Level Date/Time	08/07/2023 14:25
Initial Water Level Depth (ft bmp)	6.14
Pump/Tubing Intake Depth (ft bmp)	8.7
Tubing Length (ft)	9.57
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/07/2023 14:25
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/07/2023 15:15:00, Bottling-Stop: 08/07/2023 15:20:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:35	6.15	0.01	50	NR	NR	NR	NR	NR	42
14:40	6.15	0.01	50	18	429 +	0.9	7.1	226 +	22
14:45	6.15	0.01	50	18	428 +	0.7	7.0	223 +	42
14:50	6.15	0.01	50	18	429 +	0.6	7.0	221 +	10
14:55	6.15	0.01	50	18	431 +	0.6	7.0	219 +	12
15:00	6.15	0.01	50	18	430 +	0.5	7.0	218 +	10
15:05	6.15	0.01	50	19	429 +	0.5	7.0	216 +	9
15:10	6.15	0.01	50	19	429 +	0.4	7.0	213 +	8

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 2.56
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - AREA19-MW-226B
Kent County, MI

Well	AREA19-MW-226B / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/07/2023
Weather	Sunny 75
Sampler Initials	WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	12.8 - 17.8
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 14:45.
Initial Water Level Date/Time	08/07/2023 14:25
Initial Water Level Depth (ft bmp)	5.69
Pump/Tubing Intake Depth (ft bmp)	15.3
Tubing Length (ft)	19
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/07/2023 14:25
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/07/2023 15:00:00, Bottling-Stop: 08/07/2023 15:05:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:35	5.75	0.06	200	NR	NR	NR	NR	NR	NR
14:45	5.75	0.06	200	14	434 +	3.0	7.3	345	<5
14:50	5.75	0.06	200	14	434 +	3.1	7.3	345	<5
14:55	5.75	0.06	200	14	434 +	3.0	7.2	343	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 9.61
   - Total Drawdown (ft) 0.06
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WV/CH-MW-240
Kent County, MI

Well	WV/CH-MW-240 / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/11/2023
Weather	Cloudy, 70s
Sampler Initials	AJG
Purging Device	Bladder-Pump: BP-11, Peristaltic-Pump: NA, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-LAV
Reference Measuring Point	PVC
Well Screen (ft bmp)	63.0 - 68.0
Measured Bottom Depth (ft bmp)	68
Sample Comment	YSI Connected at 13:30.
Initial Water Level Date/Time	08/11/2023 12:00
Initial Water Level Depth (ft bmp)	30.02
Pump/Tubing Intake Depth (ft bmp)	65.5
Tubing Length (ft)	67
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	08/11/2023 12:00
Total Purge Volume (gal)	5.25
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/11/2023 14:00:00, Bottling-Stop: 08/11/2023 14:05:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:10	30.03	0.01	150	NR	NR	NR	NR	NR	>999
12:20	30.03	0.01	150	NR	NR	NR	NR	NR	>999
12:30	30.03	0.01	150	NR	NR	NR	NR	NR	760
12:40	30.03	0.01	150	NR	NR	NR	NR	NR	365
12:50	30.03	0.01	150	NR	NR	NR	NR	NR	217
13:00	30.03	0.01	150	12	808 +	6.9	7.1	374	135
13:10	30.03	0.01	150	12	806 +	6.8	7.1	364	81
13:20	30.03	0.01	150	12	802 +	6.8	7.1	358	76
13:30	30.03	0.01	150	12	809 +	6.7	7.2	353	53
13:40	30.03	0.01	150	12	808 +	6.7	7.2	351	47

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WV/CH-MW-240
Kent County, MI

Well	WV/CH-MW-240 / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/11/2023
Weather	Cloudy, 70s
Sampler Initials	AJG
Purging Device	Bladder-Pump: BP-11, Peristaltic-Pump: NA, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-LAV
Reference Measuring Point	PVC
Well Screen (ft bmp)	63.0 - 68.0
Measured Bottom Depth (ft bmp)	68
Sample Comment	YSI Connected at 13:30.
Initial Water Level Date/Time	08/11/2023 12:00
Initial Water Level Depth (ft bmp)	30.02
Pump/Tubing Intake Depth (ft bmp)	65.5
Tubing Length (ft)	67
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	08/11/2023 12:00
Total Purge Volume (gal)	5.25
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/11/2023 14:00:00, Bottling-Stop: 08/11/2023 14:05:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:45	30.03	0.01	150	12	808 +	6.7	7.2	350	42
13:50	30.03	0.01	150	12	808 +	6.7	7.2	349	42
13:55	30.03	0.01	150	12	807 +	6.7	7.2	348	41

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? Yes
5) Calculations:
   - Head Above Pump Intake (ft) 35.48
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WV/CH-MW-241A
Kent County, MI

Well	WV/CH-MW-241A / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/08/2023
Weather	72F Sunny
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	23.7 - 28.7
Measured Bottom Depth (ft bmp)	NR
Sample Comment	11:35: YSI connected
Initial Water Level Date/Time	08/08/2023 10:55
Initial Water Level Depth (ft bmp)	19.91
Pump/Tubing Intake Depth (ft bmp)	26.2
Tubing Length (ft)	29
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/08/2023 11:00
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/08/2023 12:10:00, Bottling-Stop: 08/08/2023 12:15:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:25	19.96	0.05	190	NR	NR	NR	NR	NR	7
11:35	19.97	0.06	190	13	624 +	7.6	7.0	121	<5
11:45	19.97	0.06	190	12	625 +	5.3	6.8	141	<5
11:50	19.97	0.06	190	12	625 +	9.9	6.8	148	<5
11:55	19.97	0.06	190	12	624 +	9.8	6.8	150	<5
12:00	19.97	0.06	190	12	625 +	9.7	6.8	151	<5
12:05	19.97	0.06	190	12	623 +	9.5	6.9	156	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 6.29
   - Total Drawdown (ft) 0.06
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WV/CH-MW-241B
Kent County, MI

Well	WV/CH-MW-241B / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/08/2023
Weather	72F Sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	55.9 - 60.9
Measured Bottom Depth (ft bmp)	60.9
Sample Comment	11:40: YSI Connected
Initial Water Level Date/Time	08/08/2023 11:00
Initial Water Level Depth (ft bmp)	20.26
Pump/Tubing Intake Depth (ft bmp)	58.4
Tubing Length (ft)	62
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/08/2023 11:00
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/08/2023 12:05:00, Bottling-Stop: 08/08/2023 12:10:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:20	20.29	0.03	190	NR	NR	NR	NR	NR	<5
11:40	20.29	0.03	190	13	620 +	4.8	7.3	153	<5
11:50	20.29	0.03	190	13	617 +	4.8	7.3	150	<5
11:55	20.29	0.03	190	13	615 +	4.8	7.3	150	<5
12:00	20.29	0.03	190	13	615 +	4.8	7.3	150	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 38.14
   - Total Drawdown (ft) 0.03
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WV/CH-MW-242A
Kent County, MI

Well	WV/CH-MW-242A / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/09/2023
Weather	Clear, 80s
Sampler Initials	AJG
Purging Device	Bladder-Pump: BP-11, Peristaltic-Pump: NA, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 4, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-LAV
Reference Measuring Point	PVC
Well Screen (ft bmp)	40.0 - 45.0
Measured Bottom Depth (ft bmp)	45
Sample Comment	YSI Connected at 12:00.
Initial Water Level Date/Time	08/09/2023 11:40
Initial Water Level Depth (ft bmp)	36.55
Pump/Tubing Intake Depth (ft bmp)	42.5
Tubing Length (ft)	44
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	08/09/2023 11:40
Total Purge Volume (gal)	1.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/09/2023 12:35:00, Bottling-Stop: 08/09/2023 12:40:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:50	36.56	0.01	90	NR	NR	NR	NR	NR	41
12:00	36.56	0.01	90	16	537 +	0.7	7.4	-13	13
12:10	36.56	0.01	90	16	537 +	<0.5	7.4	-32	7
12:15	36.56	0.01	90	16	538 +	<0.5	7.4	-35	5
12:20	36.56	0.01	90	16	535 +	<0.5	7.4	-43	5
12:25	36.56	0.01	90	16	536 +	<0.5	7.4	-45	4
12:30	36.56	0.01	90	16	538 +	<0.5	7.4	-48	4

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.95
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WV/CH-MW-242B
Kent County, MI

Well	WV/CH-MW-242B / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/09/2023
Weather	Sunny 80
Sampler Initials	WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: Livonia, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	64.4 - 69.4
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Water observed to be clear. 11:40: YSI connected.
Initial Water Level Date/Time	08/09/2023 10:50
Initial Water Level Depth (ft bmp)	17.60
Pump/Tubing Intake Depth (ft bmp)	66.9
Tubing Length (ft)	70
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/09/2023 10:50
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/09/2023 12:55:00, Bottling-Stop: 08/09/2023 13:00:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:00	17.80	0.20	50	NR	NR	NR	NR	NR	<5
11:10	17.85	0.25	50	NR	NR	NR	NR	NR	<5
11:20	17.95	0.35	50	NR	NR	NR	NR	NR	<5
11:30	17.95	0.35	50	NR	NR	NR	NR	NR	<5
11:40	17.92	0.32	50	17	683	1.3	7.3	164	<5
11:50	17.90	0.30	50	17	687	1.2	7.3	156	<5
12:00	17.90	0.30	50	16	686	1.3	7.3	132	<5
12:10	17.98	0.38	50	16	684	0.8	7.3	75	<5
12:20	18.00	0.40	50	16	686	<0.5	7.3	-11	<5
12:30	18.00	0.40	50	16	686	<0.5	7.3	-39	<5

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - WV/CH-MW-242B
Kent County, MI

Well	WV/CH-MW-242B / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/09/2023
Weather	Sunny 80
Sampler Initials	WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: Livonia, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	64.4 - 69.4
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Water observed to be clear. 11:40: YSI connected.
Initial Water Level Date/Time	08/09/2023 10:50
Initial Water Level Depth (ft bmp)	17.60
Pump/Tubing Intake Depth (ft bmp)	66.9
Tubing Length (ft)	70
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/09/2023 10:50
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/09/2023 12:55:00, Bottling-Stop: 08/09/2023 13:00:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:40	18.00	0.40	50	16	685	<0.5	7.3	-53	<5
12:45	18.00	0.40	50	16	686	<0.5	7.3	-56	<5
12:50	18.00	0.40	50	16	686	<0.5	7.3	-60	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? Yes
5) Calculations:
   - Head Above Pump Intake (ft) 49.30
   - Total Drawdown (ft) 0.40
   - Calculated Final Purge Volume (gal) 0.15
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? Yes

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - HS-MW-29A
Kent County, MI

Well	HS-MW-29A / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/10/2023
Weather	72F Sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	6.3 - 16.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 11:20.
Initial Water Level Date/Time	08/10/2023 10:45
Initial Water Level Depth (ft bmp)	6.18
Pump/Tubing Intake Depth (ft bmp)	12.3
Tubing Length (ft)	18
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/10/2023 10:45
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/10/2023 11:55:00, Bottling-Stop: 08/10/2023 12:00:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:05	6.20	0.02	250	NR	NR	NR	NR	NR	5 +
11:20	6.20	0.02	250	14	419 +	0.6	7.0	101	<5 +
11:25	6.20	0.02	250	13	419 +	0.6	7.0	83	<5 +
11:40	6.20	0.02	250	14	418 +	0.6	7.0	25	<5 +
11:45	6.20	0.02	250	14	415 +	0.6	7.0	19	<5 +
11:50	6.20	0.02	250	14	416 +	0.6	7.0	21	<5 +

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 6.12
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - HS-MW-260
Kent County, MI

Well	HS-MW-260 / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/10/2023
Weather	72F Sunny
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	8.1 - 13.1
Measured Bottom Depth (ft bmp)	NR
Sample Comment	11:30 YSI connected. Last 3 water level readings were not the same per Standard Operating Procedure. Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	08/10/2023 11:05
Initial Water Level Depth (ft bmp)	6.23
Pump/Tubing Intake Depth (ft bmp)	10.6
Tubing Length (ft)	13
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/10/2023 11:10
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/10/2023 12:10:00, Bottling-Stop: 08/10/2023 12:15:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:25	6.23	0.00	160	NR	NR	NR	NR	NR	9 +
11:30	6.23	0.00	160	15	512 +	0.9	7.0	191	6 +
11:35	6.23	0.00	160	14	415 +	<0.5	7.1	192	<5 +
11:40	6.23	0.00	160	14	413 +	<0.5	7.2	179	<5 +
11:45	6.23	0.00	160	14	414 +	<0.5	7.2	163	<5 +
11:50	6.23	0.00	160	14	414 +	<0.5	7.2	148	<5 +
11:55	6.24	0.01	160	14	413 +	<0.5	7.2	134	<5 +
12:00	6.24	0.01	160	14	414 +	<0.5	7.2	130	<5 +
12:05	6.25	0.02	160	14	414 +	<0.5	7.2	127	<5 +

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.37
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - HS-MW-261
Kent County, MI

Well	HS-MW-261 / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/10/2023
Weather	80F Sunny
Sampler Initials	JET
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.2 - 12.2
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 14:40
Initial Water Level Date/Time	08/10/2023 13:55
Initial Water Level Depth (ft bmp)	4.28
Pump/Tubing Intake Depth (ft bmp)	9.7
Tubing Length (ft)	13
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/10/2023 13:55
Total Purge Volume (gal)	4
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/10/2023 15:10:00, Bottling-Stop: 08/10/2023 15:15:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:30	4.42	0.14	250	NR	NR	NR	NR	NR	<5 +
14:40	4.42	0.14	250	15	418 +	<0.5	7.1	28	<5 +
14:55	4.42	0.14	250	15	416 +	<0.5	7.2	-37	<5 +
15:00	4.42	0.14	250	15	416 +	<0.5	7.2	-41	<5 +
15:05	4.42	0.14	250	15	416 +	<0.5	7.2	-38	<5 +

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.42
   - Total Drawdown (ft) 0.14
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - HS-MW-262
Kent County, MI

Well	HS-MW-262 / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/10/2023
Weather	Partly Cloudy
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.1 - 12.1
Measured Bottom Depth (ft bmp)	NR
Sample Comment	14:45: YSI Connected
Initial Water Level Date/Time	08/10/2023 14:00
Initial Water Level Depth (ft bmp)	5.32
Pump/Tubing Intake Depth (ft bmp)	9.6
Tubing Length (ft)	12
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/10/2023 14:05
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/10/2023 15:20:00, Bottling-Stop: 08/10/2023 15:25:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:25	5.37	0.05	180	NR	NR	NR	NR	NR	NR
14:40	5.37	0.05	180	NR	NR	NR	NR	NR	<5 +
14:45	5.37	0.05	180	17	649 +	<0.5	7.3	294	<5 +
14:50	5.37	0.05	180	17	648 +	<0.5	7.4	273	<5 +
14:55	5.37	0.05	180	17	648 +	<0.5	7.4	262	<5 +
15:00	5.37	0.05	180	17	647 +	<0.5	7.4	252	<5 +
15:05	5.37	0.05	180	17	647 +	<0.5	7.4	244	<5 +
15:10	5.37	0.05	180	17	647 +	<0.5	7.4	237	<5 +
15:15	5.37	0.05	180	17	646 +	<0.5	7.4	235	<5 +

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.28
   - Total Drawdown (ft) 0.05
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - HS-MW-263A
Kent County, MI

Well	HS-MW-263A / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/08/2023
Weather	Sunny 80
Sampler Initials	WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 4, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	8.2 - 13.2
Measured Bottom Depth (ft bmp)	NR
Sample Comment	14:30: YSI Connected. Purge water observed to be very clear.
Initial Water Level Date/Time	08/08/2023 14:00
Initial Water Level Depth (ft bmp)	7.85
Pump/Tubing Intake Depth (ft bmp)	10.7
Tubing Length (ft)	17
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/08/2023 14:00
Total Purge Volume (gal)	5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/08/2023 15:15:00, Bottling-Stop: 08/08/2023 15:20:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:10	7.85	0.00	250	NR	NR	NR	NR	NR	<5
14:20	7.85	0.00	250	NR	NR	NR	NR	NR	<5
14:30	7.85	0.00	250	19	792 +	<0.5	7.3	-80	<5
14:40	7.85	0.00	250	19	792 +	<0.5	7.3	-89	<5
14:50	7.85	0.00	250	19	792 +	<0.5	7.3	-97	<5
15:00	7.85	0.00	250	19	792 +	<0.5	7.3	-100	<5
15:05	7.85	0.00	250	19	792 +	<0.5	7.3	-101	<5
15:10	7.85	0.00	250	19	792 +	<0.5	7.3	-102	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 2.85
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - HS-MW-263B
Kent County, MI

Well	HS-MW-263B / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/08/2023
Weather	Clear, 80s
Sampler Initials	AJG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-LAV
Reference Measuring Point	PVC
Well Screen (ft bmp)	44.3 - 49.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 14:10.
Initial Water Level Date/Time	08/08/2023 13:55
Initial Water Level Depth (ft bmp)	6.59
Pump/Tubing Intake Depth (ft bmp)	47.8
Tubing Length (ft)	50.3
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/08/2023 13:55
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/08/2023 15:00:00, Bottling-Stop: 08/08/2023 15:05:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:05	6.61	0.02	150	NR	NR	NR	NR	NR	9
14:10	6.61	0.02	150	17	651 +	6.0	7.3	327	6
14:15	6.61	0.02	150	16	650 +	4.2	7.3	320	<5
14:20	6.61	0.02	150	16	647 +	3.1	7.3	316	<5
14:25	6.61	0.02	150	16	647 +	2.6	7.2	303	<5
14:30	6.61	0.02	150	16	646 +	2.6	7.2	294	<5
14:35	6.61	0.02	150	16	639 +	2.7	7.2	282	<5
14:40	6.61	0.02	150	17	636 +	2.8	7.3	273	<5

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - HS-MW-263B
Kent County, MI

Well	HS-MW-263B / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/08/2023
Weather	Clear, 80s
Sampler Initials	AJG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-LAV
Reference Measuring Point	PVC
Well Screen (ft bmp)	44.3 - 49.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 14:10.
Initial Water Level Date/Time	08/08/2023 13:55
Initial Water Level Depth (ft bmp)	6.59
Pump/Tubing Intake Depth (ft bmp)	47.8
Tubing Length (ft)	50.3
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/08/2023 13:55
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/08/2023 15:00:00, Bottling-Stop: 08/08/2023 15:05:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:45	6.61	0.02	150	17	637 +	2.6	7.3	269	<5
14:50	6.61	0.02	150	16	638 +	2.7	7.3	265	<5
14:55	6.61	0.02	150	16	638 +	2.8	7.3	263	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 41.21
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - HS-MW-264
Kent County, MI

Well	HS-MW-264 / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/11/2023
Weather	Cloudy
Sampler Initials	BPT
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	25.0 - 30.0
Measured Bottom Depth (ft bmp)	NR
Sample Comment	
Initial Water Level Date/Time	08/11/2023 10:35
Initial Water Level Depth (ft bmp)	22.06
Pump/Tubing Intake Depth (ft bmp)	29
Tubing Length (ft)	34
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/11/2023 10:40
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/11/2023 11:25:00, Bottling-Stop: 08/11/2023 11:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:55	22.07	0.01	190	12	687 +	7.4	6.8	157	<5
11:00	22.07	0.01	190	12	690 +	1.3	6.7	161	<5
11:05	22.07	0.01	190	12	689 +	3.6	6.7	160	<5
11:10	22.07	0.01	190	12	691 +	3.5	6.7	158	<5
11:15	22.07	0.01	190	12	691 +	3.5	6.7	160	<5
11:20	22.07	0.01	190	12	692 +	3.5	6.7	157	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 6.94
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - HS-MW-265
Kent County, MI

Well	HS-MW-265 / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/10/2023
Weather	Sunny 80
Sampler Initials	WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	13.3 - 18.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 15:05.
Initial Water Level Date/Time	08/10/2023 14:35
Initial Water Level Depth (ft bmp)	8.92
Pump/Tubing Intake Depth (ft bmp)	15.8
Tubing Length (ft)	19
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/10/2023 14:35
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/10/2023 15:30:00, Bottling-Stop: 08/10/2023 15:35:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:45	8.92	0.00	200	NR	NR	NR	NR	NR	<5
14:55	8.92	0.00	200	NR	NR	NR	NR	NR	<5
15:05	8.92	0.00	200	14	855 +	3.3	7.1	360	<5
15:15	8.92	0.00	200	14	854 +	3.2	7.1	353	<5
15:20	8.92	0.00	200	14	851 +	3.1	7.1	347	<5
15:25	8.92	0.00	200	14	853 +	3.1	7.1	345	<5
15:30	8.92	0.00	200	14	852 +	3.1	7.1	344	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 6.88
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - HS-MW-266A
Kent County, MI

Well	HS-MW-266A / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/07/2023
Weather	Sunny 75
Sampler Initials	WVK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	13.2 - 18.2
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 12:00.
Initial Water Level Date/Time	08/07/2023 11:40
Initial Water Level Depth (ft bmp)	4.01
Pump/Tubing Intake Depth (ft bmp)	15.7
Tubing Length (ft)	19
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/07/2023 11:40
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/07/2023 12:25:00, Bottling-Stop: 08/07/2023 12:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:50	4.04	0.03	225	NR	NR	NR	NR	NR	NR
12:00	4.04	0.03	225	12	585 +	3.2	7.3	303	<5
12:05	4.04	0.03	225	12	586 +	2.9	7.3	303	<5
12:10	4.04	0.03	225	12	581 +	2.6	7.3	300	<5
12:15	4.04	0.03	225	12	580 +	2.5	7.3	302	<5
12:20	4.04	0.03	225	12	580 +	2.5	7.3	303	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 11.69
   - Total Drawdown (ft) 0.03
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q3 - HS-MW-266B
Kent County, MI

Well	HS-MW-266B / 2 in Diameter PVC
Sample Quarter	2023-Q3
Date	08/07/2023
Weather	Mostly clear, 70s
Sampler Initials	AJG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-LAV
Reference Measuring Point	PVC
Well Screen (ft bmp)	53.0 - 58.0
Measured Bottom Depth (ft bmp)	58
Sample Comment	Connected YSI at 11:45.
Initial Water Level Date/Time	08/07/2023 11:25
Initial Water Level Depth (ft bmp)	3.93
Pump/Tubing Intake Depth (ft bmp)	55.5
Tubing Length (ft)	58
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	08/07/2023 11:25
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 08/07/2023 12:05:00, Bottling-Stop: 08/07/2023 12:10:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:35	3.94	0.01	240	NR	NR	NR	NR	NR	<5
11:45	3.94	0.01	240	12	607 +	1.6	7.3	207 +	<5
11:50	3.94	0.01	240	12	605 +	1.1	7.4	201 +	<5
11:55	3.94	0.01	240	12	606 +	1.0	7.4	199 +	<5
12:00	3.94	0.01	240	12	605 +	1.0	7.4	198 +	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 51.57
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - WVNW-MW-200A
Kent County, MI

Well	WVNW-MW-200A / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/16/2023
Weather	Overcast, 50s
Sampler Initials	VG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	23.7 - 28.7
Measured Bottom Depth (ft bmp)	28.7
Sample Comment	NR
Initial Water Level Date/Time	10/16/2023 14:30
Initial Water Level Depth (ft bmp)	16.94
Pump/Tubing Intake Depth (ft bmp)	26.2
Tubing Length (ft)	28.2
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/16/2023 14:30
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/16/2023 15:16:00, Bottling-Stop: 10/16/2023 15:20:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:40	16.94	0.00	200	11	NR	7.1	7.1	280	<5
14:45	16.94	0.00	200	11	768	7.2	7.1	280	<5
14:50	16.94	0.00	200	11	767	7.6	7.1	286	<5
14:55	16.94	0.00	200	10	767	7.8	7.1	292	<5
15:05	16.94	0.00	200	10	768	7.9	7.1	301	<5
15:10	16.94	0.00	200	10	768	7.9	7.1	305	<5
15:15	16.94	0.00	200	10	768	7.9	7.1	307	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft): 9.26
   - Total Drawdown (ft): 0.00
   - Calculated Final Purge Volume (gal): NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - WVNW-MW-200B
Kent County, MI

Well	WVNW-MW-200B / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/16/2023
Weather	Overcast, 50
Sampler Initials	JVP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	54.8 - 59.8
Measured Bottom Depth (ft bmp)	59.8
Sample Comment	Last 3 water level readings were not the same per Standard Operating Procedure (SOP). Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	10/16/2023 14:30
Initial Water Level Depth (ft bmp)	17.08
Pump/Tubing Intake Depth (ft bmp)	57.3
Tubing Length (ft)	59.3
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/16/2023 14:30
Total Purge Volume (gal)	1.27
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/16/2023 15:05:00, Bottling-Stop: 10/16/2023 15:08:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:35	17.08	0.00	120	11	764	4.3	7.3	70	<5
14:40	17.08	0.00	120	11	764	4.7	7.3	69	<5
14:45	17.08	0.00	120	11	764	4.8	7.3	70	<5
14:50	17.08	0.00	120	11	765	4.9	7.3	71	<5
14:55	17.08	0.00	120	11	764	4.7	7.3	71	<5
15:00	17.08	0.00	120	11	764	5.2	7.3	72	<5
15:05	17.09	0.01	120	11	764	5.2	7.3	73	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 40.22
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - WVNW-MW-201A
Kent County, MI

Well	WVNW-MW-201A / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/16/2023
Weather	Cloudy, 50
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: Agile Rental 1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	11.9 - 16.9
Measured Bottom Depth (ft bmp)	16.9
Sample Comment	Connected YSI at 12:45.
Initial Water Level Date/Time	10/16/2023 12:30
Initial Water Level Depth (ft bmp)	9.80
Pump/Tubing Intake Depth (ft bmp)	14.4
Tubing Length (ft)	16.4
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/16/2023 12:30
Total Purge Volume (gal)	3.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/16/2023 13:10:00, Bottling-Stop: 10/16/2023 13:15:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:40	9.82	0.02	275	NR	NR	NR	NR	NR	NR
12:45	9.82	0.02	275	NR	NR	NR	NR	NR	NR
13:00	9.82	0.02	275	11	748	3.3	7.3	190 +	<5
13:05	9.82	0.02	275	11	748	3.1	7.4	191 +	<5
13:10	9.82	0.02	275	11	748	3.2	7.4	192 +	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.60
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - WVNW-MW-201B
Kent County, MI

Well	WVNW-MW-201B / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/16/2023
Weather	Overcast
Sampler Initials	JVP/VG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: Agile Rental 2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	29.6 - 34.6
Measured Bottom Depth (ft bmp)	34.6
Sample Comment	YSI Connected at 12:55. Last 3 water level readings were not the same per Standard Operating Procedure (SOP). Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	10/16/2023 12:30
Initial Water Level Depth (ft bmp)	10.02
Pump/Tubing Intake Depth (ft bmp)	32.1
Tubing Length (ft)	34.1
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/16/2023 12:30
Total Purge Volume (gal)	1.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/16/2023 13:45:00, Bottling-Stop: 10/16/2023 13:50:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:40	10.02	0.00	75	NR	NR	NR	NR	NR	NR
12:55	10.02	0.00	75	11	827	2.8	7.4	-6	<5
13:05	10.02	0.00	75	11	830	2.5	7.4	4	<5
13:15	10.02	0.00	75	11	831	2.3	7.4	12	<5
13:35	10.03	0.01	75	11	831	2.1	7.3	20	<5
13:40	10.03	0.01	75	10	832	2.0	7.3	22	<5
13:45	10.02	0.00	75	10	832	2.0	7.4	25	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 22.08
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - WVNW-MW-201C
Kent County, MI

Well	WVNW-MW-201C / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/16/2023
Weather	Overcast, 49F
Sampler Initials	CRB
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	49.1 - 54.1
Measured Bottom Depth (ft bmp)	54.1
Sample Comment	YSI Connected at 12:50. Last 3 water level readings were not the same per Standard Operating Procedure (SOP). Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	10/16/2023 12:30
Initial Water Level Depth (ft bmp)	10.02
Pump/Tubing Intake Depth (ft bmp)	51.6
Tubing Length (ft)	53.6
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/16/2023 12:30
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/16/2023 13:23:00, Bottling-Stop: 10/16/2023 13:28:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:35	10.08	0.06	250	NR	NR	NR	NR	NR	NR
12:40	10.08	0.06	250	NR	NR	NR	NR	NR	NR
12:45	10.08	0.06	250	NR	NR	NR	NR	NR	NR
12:50	10.09	0.07	250	10	863	2.2	7.1	219	<5
12:55	10.09	0.07	250	10	864	2.3	7.1	226	<5
13:00	10.10	0.08	250	10	864	2.4	7.1	232	<5
13:10	10.10	0.08	250	10	864	2.4	7.1	239	<5
13:15	10.10	0.08	250	10	863	2.5	7.1	243	<5
13:20	10.11	0.09	250	10	869	2.4	7.1	246	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 41.58
   - Total Drawdown (ft) 0.09
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - WVNW-MW-202A
Kent County, MI

Well	WVNW-MW-202A / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/17/2023
Weather	Cloudy 50
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	42.6 - 47.6
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 14:40.
Initial Water Level Date/Time	10/17/2023 10:25
Initial Water Level Depth (ft bmp)	11.98
Pump/Tubing Intake Depth (ft bmp)	45.1
Tubing Length (ft)	48
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/17/2023 10:25
Total Purge Volume (gal)	4
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/17/2023 11:05:00, Bottling-Stop: 10/17/2023 11:10:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:30	12.01	0.03	475	NR	NR	NR	NR	NR	NR
10:35	12.01	0.03	475	NR	NR	NR	NR	NR	NR
10:40	12.01	0.03	475	10	691	8.6	7.3	162	<5
10:45	12.01	0.03	475	10	690	9.4	7.3	180	<5
10:50	12.01	0.03	475	10	690	9.1	7.3	189	<5
10:55	12.01	0.03	475	10	688	9.6	7.3	197	<5
11:00	12.01	0.03	475	10	688	9.6	7.3	205	<5
11:05	12.01	0.03	475	10	688	9.6	7.3	207	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft): 33.12
   - Total Drawdown (ft): 0.03
   - Calculated Final Purge Volume (gal): NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - WVNW-MW-202B
Kent County, MI

Well	WVNW-MW-202B / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/17/2023
Weather	Cloudy 50F
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	62.3 - 67.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 11:30.
Initial Water Level Date/Time	10/17/2023 11:15
Initial Water Level Depth (ft bmp)	12.13
Pump/Tubing Intake Depth (ft bmp)	64.8
Tubing Length (ft)	66
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/17/2023 11:15
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/17/2023 11:45:00, Bottling-Stop: 10/17/2023 11:50:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:20	12.15	0.02	500	NR	NR	NR	NR	NR	NR
11:25	12.15	0.02	500	NR	NR	NR	NR	NR	NR
11:30	12.15	0.02	500	10	686	7.7	7.4	197	8
11:35	12.15	0.02	500	10	688	7.6	7.4	199	<5
11:40	12.15	0.02	500	10	686	7.5	7.4	201	<5
11:45	12.15	0.02	500	10	687	7.4	7.4	204	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 52.67
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - WVNW-MW-203
Kent County, MI

Well	WVNW-MW-203 / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/19/2023
Weather	50s, rainy (cloudy)
Sampler Initials	JVP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	13.9 - 18.9
Measured Bottom Depth (ft bmp)	18.9
Sample Comment	Connected YSI at 14:40. Pump was set at slowest speed at 14:40.
Initial Water Level Date/Time	10/19/2023 14:25
Initial Water Level Depth (ft bmp)	16.14
Pump/Tubing Intake Depth (ft bmp)	17.4
Tubing Length (ft)	19.4
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/19/2023 14:25
Total Purge Volume (gal)	1.1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/19/2023 14:57:00, Bottling-Stop: 10/19/2023 15:00:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:25	16.15	0.01	160	NR	NR	NR	NR	NR	NR
14:40	16.16	0.02	120	12	292	9.0	6.9	240	<5
14:45	16.17	0.03	120	12	293	8.7	6.9	250	<5
14:50	16.17	0.03	120	12	291	8.6	6.9	257	<5
14:55	16.17	0.03	120	12	293	8.8	7.0	259	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 1.26
   - Total Drawdown (ft) 0.03
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - AREA19-MW-7A
Kent County, MI

Well	AREA19-MW-7A / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/18/2023
Weather	Sunny 60s
Sampler Initials	VG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	8.7 - 13.7
Measured Bottom Depth (ft bmp)	13.7
Sample Comment	
Initial Water Level Date/Time	10/18/2023 16:30
Initial Water Level Depth (ft bmp)	5.01
Pump/Tubing Intake Depth (ft bmp)	11.2
Tubing Length (ft)	13.2
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/18/2023 16:30
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/18/2023 17:11:00, Bottling-Stop: 10/18/2023 17:15:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
16:40	5.02	0.01	100	14	802 +	3.6	7.2	112 +	14
16:50	5.02	0.01	100	14	802 +	3.8	7.2	111 +	8
16:55	5.02	0.01	100	14	801 +	3.8	7.3	111 +	6
17:00	5.02	0.01	100	14	803 +	3.7	7.3	112 +	<5
17:05	5.02	0.01	100	14	802 +	3.8	7.3	112 +	<5
17:10	5.02	0.01	100	14	802 +	3.8	7.3	113 +	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 6.19
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - AREA19-MW-221A
Kent County, MI

Well	AREA19-MW-221A / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/18/2023
Weather	Sunny 50s
Sampler Initials	JVP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	15.5 - 20.5
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 11:15.
Initial Water Level Date/Time	10/18/2023 11:10
Initial Water Level Depth (ft bmp)	13.52
Pump/Tubing Intake Depth (ft bmp)	18.0
Tubing Length (ft)	20
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/18/2023 11:10
Total Purge Volume (gal)	0.8
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/18/2023 11:42:00, Bottling-Stop: 10/18/2023 11:48:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:10	13.58	0.06	100	NR	NR	NR	NR	NR	NR
11:15	13.59	0.07	100	12	582 +	5.2	7.1	210	<5
11:20	13.59	0.07	100	12	582 +	4.3	7.0	224	<5
11:30	13.59	0.07	100	12	580 +	4.3	7.0	236	<5
11:35	13.59	0.07	100	12	580 +	4.4	7.0	243	<5
11:40	13.59	0.07	100	12	578 +	4.4	7.0	249	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.48
   - Total Drawdown (ft) 0.07
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - AREA19-MW-221B
Kent County, MI

Well	AREA19-MW-221B / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/18/2023
Weather	Sunny 50s
Sampler Initials	VG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	44.5 - 49.5
Measured Bottom Depth (ft bmp)	49.5
Sample Comment	
Initial Water Level Date/Time	10/18/2023 11:15
Initial Water Level Depth (ft bmp)	13.83
Pump/Tubing Intake Depth (ft bmp)	47.0
Tubing Length (ft)	49
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/18/2023 11:15
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/18/2023 11:52:00, Bottling-Stop: 10/18/2023 11:56:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:20	13.87	0.04	100	12	558 +	9.5	7.3	187 +	6
11:30	13.87	0.04	100	12	556 +	7.0	7.3	188 +	4
11:35	13.87	0.04	100	12	555 +	6.7	7.3	189 +	5
11:40	13.87	0.04	100	12	555 +	6.7	7.3	188 +	5
11:45	13.87	0.04	100	12	554 +	6.9	7.3	188 +	5
11:50	13.87	0.04	100	12	555 +	7.2	7.3	187 +	5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft): 33.17
   - Total Drawdown (ft): 0.04
   - Calculated Final Purge Volume (gal): NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - AREA19-MW-222
Kent County, MI

Well	AREA19-MW-222 / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/18/2023
Weather	Sunny 50s
Sampler Initials	VG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	9.3 - 14.3
Measured Bottom Depth (ft bmp)	14.3
Sample Comment	Last 3 water level readings were not the same per Standard Operating Procedure (SOP). Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	10/18/2023 14:55
Initial Water Level Depth (ft bmp)	7.33
Pump/Tubing Intake Depth (ft bmp)	11.8
Tubing Length (ft)	13.8
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/18/2023 14:55
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/18/2023 15:32:00, Bottling-Stop: 10/18/2023 15:36:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
15:05	7.41	0.08	140	14	584 +	<0.5	7.2	-38 +	5
15:20	7.42	0.09	140	14	580 +	<0.5	7.2	-69 +	<5
15:25	7.43	0.10	140	14	581 +	<0.5	7.2	-74 +	<5
15:30	7.43	0.10	140	14	582 +	<0.5	7.2	-78 +	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.47
   - Total Drawdown (ft) 0.10
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - AREA19-MW-223
Kent County, MI

Well	AREA19-MW-223 / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/18/2023
Weather	Sunny 50s
Sampler Initials	JVP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.9 - 12.9
Measured Bottom Depth (ft bmp)	12.9
Sample Comment	Dissolved Oxygen did not stabilize.
Initial Water Level Date/Time	10/18/2023 13:30
Initial Water Level Depth (ft bmp)	4.92
Pump/Tubing Intake Depth (ft bmp)	10.4
Tubing Length (ft)	12.9
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/18/2023 13:30
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/18/2023 13:57:00, Bottling-Stop: 10/18/2023 14:01:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:40	4.95	0.03	140	13	656 +	3.9 +	6.6	-89 +	7
13:45	4.94	0.02	140	13	653 +	0.9 +	6.7	-96 +	<5
13:50	4.94	0.02	140	13	650 +	0.7 +	6.7	-100 +	<5
13:55	4.94	0.02	140	13	648 +	0.6 +	6.7	-103 +	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? No
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.48
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - AREA19-MW-224
Kent County, MI

Well	AREA19-MW-224 / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/18/2023
Weather	Sunny, some clouds, 50s
Sampler Initials	JVP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.1 - 12.1
Measured Bottom Depth (ft bmp)	12.1
Sample Comment	Last 3 water level readings were not the same per the Standard Operating Procedure (SOP). pH did not stabilize.
Initial Water Level Date/Time	10/18/2023 09:40
Initial Water Level Depth (ft bmp)	4.80
Pump/Tubing Intake Depth (ft bmp)	9.6
Tubing Length (ft)	11.6
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/18/2023 09:40
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/18/2023 10:26:00, Bottling-Stop: 10/18/2023 10:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
09:50	5.70 +	0.90	210	13	1,321 +	1.1	7.0 +	171	<5
09:55	5.71 +	0.91	210	13	1,322 +	0.8	7.0 +	89	<5
10:05	5.80 +	1.00	210	13	1,318 +	0.5	7.0 +	58	<5
10:10	5.83 +	1.03	210	14	1,316 +	<0.5	7.0 +	45	<5
10:15	5.87 +	1.07	210	14	1,312 +	<0.5	7.0 +	40	<5
10:20	5.90 +	1.10	210	14	1,308 +	<0.5	7.0 +	33	<5
10:25	5.92 +	1.12	210	14	1,305 +	<0.5	7.0 +	30	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? No
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.80
   - Total Drawdown (ft) 1.12
   - Calculated Final Purge Volume (gal) 0.19
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? Yes

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - AREA19-MW-225A
Kent County, MI

Well	AREA19-MW-225A / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/19/2023
Weather	Overcast 53
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: Rental, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.6 - 12.6
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 11:00. Collected MS/MSD and DUP. AECOM Collected Split Sample.
Initial Water Level Date/Time	10/19/2023 10:15
Initial Water Level Depth (ft bmp)	6.19
Pump/Tubing Intake Depth (ft bmp)	10.1
Tubing Length (ft)	12
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/19/2023 10:15
Total Purge Volume (gal)	8
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/19/2023 11:25:00, Bottling-Stop: 10/19/2023 11:35:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:25	6.22	0.03	500	NR	NR	NR	NR	NR	NR
10:30	6.22	0.03	500	NR	NR	NR	NR	NR	NR
10:45	6.22	0.03	500	NR	NR	NR	NR	NR	NR
10:55	6.22	0.03	500	NR	NR	NR	NR	NR	NR
11:00	6.22	0.03	500	13	1,069 +	<0.5	7.2	138	<5
11:05	6.22	0.03	500	13	1,069 +	<0.5	7.2	130	<5
11:15	6.22	0.03	500	13	1,068 +	<0.5	7.2	115	<5
11:20	6.22	0.03	500	13	1,069 +	<0.5	7.2	110	<5
11:25	6.22	0.03	500	13	1,068 +	<0.5	7.2	106	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 3.91
   - Total Drawdown (ft) 0.03
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - AREA19-MW-225B
Kent County, MI

Well	AREA19-MW-225B / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/19/2023
Weather	Rain 50
Sampler Initials	NCK
Purging Device	Bladder-Pump: BP-10, Peristaltic-Pump: NA, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	32.9 - 37.9
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 13:45. AECOM Collected Split Sample.
Initial Water Level Date/Time	10/19/2023 12:00
Initial Water Level Depth (ft bmp)	5.63
Pump/Tubing Intake Depth (ft bmp)	35.4
Tubing Length (ft)	37
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	10/19/2023 12:15
Total Purge Volume (gal)	1.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/19/2023 14:15:00, Bottling-Stop: 10/19/2023 14:25:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:20	5.94	0.31	50	NR	NR	NR	NR	NR	NR
12:40	5.94	0.31	50	NR	NR	NR	NR	NR	NR
13:00	5.94	0.31	50	NR	NR	NR	NR	NR	NR
13:45	5.98	0.35	50	12	1,867 +	<0.5	7.5	67	49
13:55	5.98	0.35	50	12	1,867 +	<0.5	7.5	65	37
14:05	5.98	0.35	50	12	1,868 +	<0.5	7.5	63	38
14:10	5.98	0.35	50	12	1,868 +	<0.5	7.5	61	39
14:15	5.98	0.35	50	12	1,870 +	<0.5	7.5	61	36

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? Yes
5) Calculations:
   - Head Above Pump Intake (ft) 29.77
   - Total Drawdown (ft) 0.35
   - Calculated Final Purge Volume (gal) 0.15
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? Yes

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - AREA19-MW-226A
Kent County, MI

Well	AREA19-MW-226A / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/19/2023
Weather	Overcast, 50s
Sampler Initials	VG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	6.3 - 11.3
Measured Bottom Depth (ft bmp)	11.3
Sample Comment	Water level meter was moved and dissolved oxygen values may have been impacted. Dissolved Oxygen did not stabilize. Last 3 water level readings were not the same per Standard Operating Procedure (SOP). Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range; GZA does not believe this impacts data quality.
Initial Water Level Date/Time	10/19/2023 10:10
Initial Water Level Depth (ft bmp)	6.05
Pump/Tubing Intake Depth (ft bmp)	10.8
Tubing Length (ft)	12.8
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/19/2023 10:10
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/19/2023 10:40:00, Bottling-Stop: 10/19/2023 10:44:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:25	6.17	0.12	120	13	705	3.5 +	6.9	-73	<5
10:30	6.17	0.12	120	13	703	3.7 +	6.8	-79	<5
10:35	6.18	0.13	120	13	703	3.1 +	6.8	-82	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? No
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.75
   - Total Drawdown (ft) 0.13
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - AREA19-MW-226B
Kent County, MI

Well	AREA19-MW-226B / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/19/2023
Weather	Cloudy, 50s
Sampler Initials	JVP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: Rental Geo-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	12.8 - 17.8
Measured Bottom Depth (ft bmp)	17.8
Sample Comment	Connected YSI at 10:30. Last 3 water level readings were not the same per Standard Operating Procedure (SOP). Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	10/19/2023 10:15
Initial Water Level Depth (ft bmp)	5.70
Pump/Tubing Intake Depth (ft bmp)	15.3
Tubing Length (ft)	17.3
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/19/2023 10:15
Total Purge Volume (gal)	0.8
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/19/2023 10:48:00, Bottling-Stop: 10/19/2023 10:52:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:15	5.68	-0.02	100	NR	NR	NR	NR	NR	NR
10:30	5.72	0.02	100	13	618 +	7.4	7.4	192 +	<5
10:35	5.73	0.03	100	13	617 +	2.4	7.4	194 +	<5
10:40	5.73	0.03	100	13	616 +	2.4	7.3	196 +	<5
10:45	5.72	0.02	100	13	616 +	2.4	7.3	198 +	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 9.60
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - WV/CH-MW-240
Kent County, MI

Well	WV/CH-MW-240 / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/20/2023
Weather	50 cloudy, heavy rain around 10:40
Sampler Initials	NCK
Purging Device	Bladder-Pump: BP-12, Peristaltic-Pump: NA, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	63.0 - 68.0
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 13:25.
Initial Water Level Date/Time	10/20/2023 09:55
Initial Water Level Depth (ft bmp)	31.32
Pump/Tubing Intake Depth (ft bmp)	65.5
Tubing Length (ft)	68
Tubing Inner Diameter (in)	0.25
Purging Initiation Date/Time	10/20/2023 09:55
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/20/2023 11:25:00, Bottling-Stop: 10/20/2023 11:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:05	31.39	0.07	150	NR	NR	NR	NR	NR	NR
10:20	31.39	0.07	150	NR	NR	NR	NR	NR	NR
10:35	31.39	0.07	150	11	805 +	6.5	6.9	227	135
10:40	31.39	0.07	150	11	805 +	7.2	6.9	231	100
11:15	31.39	0.07	150	11	806 +	6.4	6.9	248	35
11:20	31.39	0.07	150	11	806 +	6.4	6.9	250	34
11:25	31.39	0.07	150	11	804 +	6.4	6.9	251	32

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 34.18
   - Total Drawdown (ft) 0.07
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - WV/CH-MW-241A
Kent County, MI

Well	WV/CH-MW-241A / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/19/2023
Weather	50s, rainy
Sampler Initials	JVP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	23.7 - 28.7
Measured Bottom Depth (ft bmp)	28.7
Sample Comment	Connected YSI at 13:10.
Initial Water Level Date/Time	10/19/2023 13:00
Initial Water Level Depth (ft bmp)	21.25
Pump/Tubing Intake Depth (ft bmp)	26.2
Tubing Length (ft)	28.2
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/19/2023 13:00
Total Purge Volume (gal)	0.6
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/19/2023 13:23:00, Bottling-Stop: 10/19/2023 13:25:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:00	21.25	0.00	120	NR	NR	NR	NR	NR	NR
13:10	21.32	0.07	120	12	640	8.0	7.1	213	<5
13:15	21.32	0.07	120	12	644	8.0	7.1	222	<5
13:20	21.32	0.07	120	12	648	8.1	7.1	227	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.95
   - Total Drawdown (ft) 0.07
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - WV/CH-MW-241B
Kent County, MI

Well	WV/CH-MW-241B / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/19/2023
Weather	Rain, 50s
Sampler Initials	VG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	55.9 - 60.9
Measured Bottom Depth (ft bmp)	60.9
Sample Comment	
Initial Water Level Date/Time	10/19/2023 12:55
Initial Water Level Depth (ft bmp)	21.35
Pump/Tubing Intake Depth (ft bmp)	58.4
Tubing Length (ft)	60.4
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/19/2023 12:55
Total Purge Volume (gal)	1.2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/19/2023 13:22:00, Bottling-Stop: 10/19/2023 13:26:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:10	21.37	0.02	180	12	740 +	4.9	7.3	221 +	<5
13:15	21.37	0.02	180	12	740 +	4.6	7.3	222 +	<5
13:20	21.37	0.02	180	12	740 +	4.8	7.3	223 +	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft): 37.05
   - Total Drawdown (ft): 0.02
   - Calculated Final Purge Volume (gal): NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - WV/CH-MW-242A
Kent County, MI

Well	WV/CH-MW-242A / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/18/2023
Weather	Partly overcast 50
Sampler Initials	CRB
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: NA, Centrifugal-Pump: Mega Monsoon #2
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	40.0 - 45.0
Measured Bottom Depth (ft bmp)	
Sample Comment	Connected YSI at 11:10. Last 3 water level readings were not the same per Standard Operating Procedure (SOP). Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	10/18/2023 10:45
Initial Water Level Depth (ft bmp)	36.74
Pump/Tubing Intake Depth (ft bmp)	42.5
Tubing Length (ft)	45
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/18/2023 10:45
Total Purge Volume (gal)	8
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/18/2023 11:55:00, Bottling-Stop: 10/18/2023 12:00:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:30	36.86	0.12	300	NR	NR	NR	NR	NR	NR
10:45	36.89	0.15	300	NR	NR	NR	NR	NR	NR
10:55	36.89	0.15	300	NR	NR	NR	NR	NR	NR
11:10	36.88	0.14	300	13	801 +	<0.5	7.4	69	<5
11:25	36.87	0.13	300	13	803 +	<0.5	7.4	-20	<5
11:35	36.87	0.13	300	13	802 +	<0.5	7.4	-46	<5
11:45	36.86	0.12	300	13	806 +	<0.5	7.4	-60	<5
11:50	36.86	0.12	300	13	804 +	<0.5	7.4	-63	<5
11:55	36.87	0.13	300	13	802 +	<0.5	7.4	-67	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.76
   - Total Drawdown (ft) 0.13
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - WV/CH-MW-242B
Kent County, MI

Well	WV/CH-MW-242B / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/18/2023
Weather	Partly cloudy 50
Sampler Initials	CRB
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: NA, Centrifugal-Pump: Mega Monsoon #2
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	64.4 - 69.4
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 13:25.
Initial Water Level Date/Time	10/18/2023 12:40
Initial Water Level Depth (ft bmp)	17.51
Pump/Tubing Intake Depth (ft bmp)	66.9
Tubing Length (ft)	70
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/18/2023 12:40
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/18/2023 14:15:00, Bottling-Stop: 10/18/2023 14:25:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:55	17.80	0.29	50	NR	NR	NR	NR	NR	NR
13:05	17.86	0.35	50	NR	NR	NR	NR	NR	NR
13:20	17.84	0.33	50	NR	NR	NR	NR	NR	NR
13:25	17.86	0.35	50	14	822 +	<0.5	7.3	-50	45
13:40	17.83	0.32	50	14	820 +	<0.5	7.3	-61	23
14:00	17.83	0.32	50	13	822 +	<0.5	7.3	-65	21
14:05	17.83	0.32	50	14	819 +	<0.5	7.4	-67	16
14:10	17.83	0.32	50	14	823 +	<0.5	7.4	-64	15
14:15	17.83	0.32	50	14	827 +	<0.5	7.4	-58	16

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 49.39
   - Total Drawdown (ft) 0.32
   - Calculated Final Purge Volume (gal) 0.14
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? Yes

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - HS-MW-29A
Kent County, MI

Well	HS-MW-29A / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/19/2023
Weather	Rain 52
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: Rental, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	6.3 - 16.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	14:40: Collected Field Blank. Connected YSI at 16:10.
Initial Water Level Date/Time	10/19/2023 15:30
Initial Water Level Depth (ft bmp)	6.27
Pump/Tubing Intake Depth (ft bmp)	11.3
Tubing Length (ft)	13
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/19/2023 15:30
Total Purge Volume (gal)	5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/19/2023 16:35:00, Bottling-Stop: 10/19/2023 16:40:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
15:30	6.29	0.02	300	NR	NR	NR	NR	NR	NR
15:45	6.29	0.02	300	NR	NR	NR	NR	NR	NR
16:10	6.29	0.02	300	13	660 +	<0.5	7.2	175	<5
16:15	6.29	0.02	300	13	659 +	<0.5	7.2	168	<5
16:20	6.29	0.02	300	13	659 +	<0.5	7.2	157	<5
16:25	6.29	0.02	300	13	658 +	<0.5	7.2	148	<5
16:30	6.29	0.02	300	13	660 +	<0.5	7.2	140	<5
16:35	6.29	0.02	300	13	655 +	<0.5	7.2	138	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.03
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - HS-MW-260
Kent County, MI

Well	HS-MW-260 / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/17/2023
Weather	Cloudy 55
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	8.1 - 13.1
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 15:55.
Initial Water Level Date/Time	10/17/2023 15:40
Initial Water Level Depth (ft bmp)	6.07
Pump/Tubing Intake Depth (ft bmp)	10.6
Tubing Length (ft)	12
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/17/2023 15:45
Total Purge Volume (gal)	5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/17/2023 16:55:00, Bottling-Stop: 10/17/2023 17:00:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
15:50	6.14	0.07	300	NR	NR	NR	NR	NR	NR
15:55	6.14	0.07	300	13	583	<0.5	7.1	186	<5
16:00	6.14	0.07	300	13	583	<0.5	7.1	173	<5
16:10	6.14	0.07	300	13	579	<0.5	7.1	140	<5
16:20	6.14	0.07	300	13	576	<0.5	7.1	111	<5
16:30	6.14	0.07	300	13	572	<0.5	7.1	86	<5
16:45	6.15	0.08	300	13	568	<0.5	7.1	59	<5
16:50	6.15	0.08	300	13	568	<0.5	7.1	54	<5
16:55	6.15	0.08	300	13	567	<0.5	7.1	49	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.53
   - Total Drawdown (ft) 0.08
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - HS-MW-261
Kent County, MI

Well	HS-MW-261 / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/17/2023
Weather	Cloudy 55
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.2 - 12.2
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 14:15
Initial Water Level Date/Time	10/17/2023 13:40
Initial Water Level Depth (ft bmp)	4.19
Pump/Tubing Intake Depth (ft bmp)	9.7
Tubing Length (ft)	12
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/17/2023 13:45
Total Purge Volume (gal)	4
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/17/2023 14:35:00, Bottling-Stop: 10/17/2023 14:40:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:55	4.35	0.16	325	NR	NR	NR	NR	NR	NR
14:05	4.35	0.16	325	NR	NR	NR	NR	NR	NR
14:15	4.36	0.17	325	14	747	<0.5	7.2	-52	9
14:25	4.36	0.17	325	14	751	<0.5	7.2	-58	<5
14:30	4.36	0.17	325	14	751	<0.5	7.2	-59	<5
14:35	4.36	0.17	325	14	753	<0.5	7.2	-59	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.51
   - Total Drawdown (ft) 0.17
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - HS-MW-262
Kent County, MI

Well	HS-MW-262 / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/17/2023
Weather	Cloudy 55
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.1 - 12.1
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 15:10.
Initial Water Level Date/Time	10/17/2023 14:45
Initial Water Level Depth (ft bmp)	5.39
Pump/Tubing Intake Depth (ft bmp)	9.6
Tubing Length (ft)	12
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/17/2023 14:50
Total Purge Volume (gal)	2.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/17/2023 15:20:00, Bottling-Stop: 10/17/2023 15:25:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:55	5.44	0.05	300	NR	NR	NR	NR	NR	NR
15:05	5.44	0.05	300	NR	NR	NR	NR	NR	NR
15:10	5.44	0.05	300	14	842	<0.5	7.4	82	<5
15:15	5.44	0.05	300	14	841	<0.5	7.4	77	<5
15:20	5.44	0.05	300	14	841	<0.5	7.4	73	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.21
   - Total Drawdown (ft) 0.05
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - HS-MW-263A
Kent County, MI

Well	HS-MW-263A / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/20/2023
Weather	50s, rainy
Sampler Initials	JVP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	8.2 - 13.2
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Connected YSI at 10:15. Last 3 water level readings were not the same per Standard Operating Procedure (SOP). Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	10/20/2023 10:05
Initial Water Level Depth (ft bmp)	7.74
Pump/Tubing Intake Depth (ft bmp)	10.7
Tubing Length (ft)	12.7
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/20/2023 10:05
Total Purge Volume (gal)	2.7
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/20/2023 10:51:00, Bottling-Stop: 10/20/2023 10:53:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:10	7.76	0.02	230	NR	NR	NR	NR	NR	NR
10:15	7.77	0.03	230	15	881 +	<0.5	7.2	102 +	22
10:35	7.77	0.03	230	15	862 +	<0.5	7.3	-6 +	6
10:40	7.76	0.02	230	15	860 +	<0.5	7.3	-15 +	<5
10:45	7.77	0.03	230	15	858 +	<0.5	7.3	-20 +	<5
10:50	7.77	0.03	230	15	859 +	<0.5	7.3	-24 +	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 2.96
   - Total Drawdown (ft) 0.03
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - HS-MW-263B
Kent County, MI

Well	HS-MW-263B / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/20/2023
Weather	Overcast/drizzle, 50s
Sampler Initials	VG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	44.3 - 49.3
Measured Bottom Depth (ft bmp)	49.3
Sample Comment	Pump struggling and air was noted in the tubing. DO readings may be elevated and should not be used for other purposes. Water level was rising after initial drawdown; GZA does not believe this impacts data quality.
Initial Water Level Date/Time	10/20/2023 10:05
Initial Water Level Depth (ft bmp)	6.50
Pump/Tubing Intake Depth (ft bmp)	47
Tubing Length (ft)	49
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/20/2023 10:05
Total Purge Volume (gal)	0.8
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/20/2023 10:37:00, Bottling-Stop: 10/20/2023 10:43:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:20	6.51	0.01	100	15	753 +	9.3 +	7.6	148	8
10:25	6.51	0.01	100	15	752 +	9.2 +	7.6	150	5
10:30	6.52	0.02	100	15	752 +	9.1 +	7.6	153	5
10:35	6.50	0.00	100	15	752 +	9.1 +	7.6	155	5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 40.50
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - HS-MW-264
Kent County, MI

Well	HS-MW-264 / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/17/2023
Weather	Cloudy, 50F
Sampler Initials	JVP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	25.0 - 30.0
Measured Bottom Depth (ft bmp)	NR
Sample Comment	
Initial Water Level Date/Time	10/17/2023 10:30
Initial Water Level Depth (ft bmp)	22.00
Pump/Tubing Intake Depth (ft bmp)	27.5
Tubing Length (ft)	29.5
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/17/2023 10:30
Total Purge Volume (gal)	1.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/17/2023 11:16:00, Bottling-Stop: 10/17/2023 11:21:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:45	21.99	-0.01	120	11	656	7.7	6.9	238	<5 +
10:55	21.99	-0.01	120	11	663	7.7	6.8	247	<5 +
11:00	22.00	0.00	120	11	664	7.6	6.9	242	<5 +
11:05	22.00	0.00	120	11	665	7.7	6.8	257	<5 +
11:10	22.00	0.00	120	11	666	7.6	6.8	263	<5 +
11:15	22.00	0.00	120	11	667	7.4	6.8	267	<5 +

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft): 5.50
   - Total Drawdown (ft): 0.00
   - Calculated Final Purge Volume (gal): NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - HS-MW-265
Kent County, MI

Well	HS-MW-265 / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/20/2023
Weather	Cloudy 50
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-3
Reference Measuring Point	PVC
Well Screen (ft bmp)	13.3 - 18.3
Measured Bottom Depth (ft bmp)	18.3
Sample Comment	14:30: Collected Field Blank. Connected YSI at 14:15.
Initial Water Level Date/Time	10/20/2023 13:29
Initial Water Level Depth (ft bmp)	8.65
Pump/Tubing Intake Depth (ft bmp)	15.8
Tubing Length (ft)	18
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/20/2023 13:30
Total Purge Volume (gal)	4
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/20/2023 14:25:00, Bottling-Stop: 10/20/2023 14:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:45	8.68	0.03	300	NR	NR	NR	NR	NR	NR
14:00	8.68	0.03	300	NR	NR	NR	NR	NR	NR
14:15	8.68	0.03	300	13	823 +	3.0	7.0	252	<5
14:20	8.68	0.03	300	13	824 +	3.0	7.0	253	<5
14:25	8.68	0.03	300	13	825 +	3.0	7.0	254	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 7.15
   - Total Drawdown (ft) 0.03
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - HS-MW-266A
Kent County, MI

Well	HS-MW-266A / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/17/2023
Weather	Cloudy, 50F
Sampler Initials	JVP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	13.2 - 18.2
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Last 3 water level readings were not the same per Standard Operating Procedure (SOP). Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	10/17/2023 13:45
Initial Water Level Depth (ft bmp)	4.41
Pump/Tubing Intake Depth (ft bmp)	15.7
Tubing Length (ft)	17.7
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/17/2023 13:45
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/17/2023 14:16:00, Bottling-Stop: 10/17/2023 14:20:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:50	4.42	0.01	100	11	799	2.9	7.1	213	<5 +
14:05	4.43	0.02	100	11	804	2.5	7.1	222	<5 +
14:10	4.42	0.01	100	11	806	2.4	7.1	224	<5 +
14:15	4.42	0.01	100	11	808	2.4	7.1	227	<5 +

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 11.29
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2023-Q4 - HS-MW-266B
Kent County, MI

Well	HS-MW-266B / 2 in Diameter PVC
Sample Quarter	2023-Q4
Date	10/17/2023
Weather	Overcast 50s
Sampler Initials	VG
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	53.0 - 58.0
Measured Bottom Depth (ft bmp)	58
Sample Comment	Last 3 water level readings were not the same per Standard Operating Procedure (SOP). Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	10/17/2023 13:40
Initial Water Level Depth (ft bmp)	4.35
Pump/Tubing Intake Depth (ft bmp)	55.5
Tubing Length (ft)	57.5
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	10/17/2023 13:40
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 10/17/2023 14:07:00, Bottling-Stop: 10/17/2023 14:12:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:45	4.35	0.00	130	12	870 +	6.5	7.2	156 +	31 +
13:55	4.35	0.00	130	11	870 +	1.1	7.3	154 +	<5 +
14:00	4.36	0.01	130	11	869 +	1.1	7.3	153 +	<5 +
14:05	4.36	0.01	130	11	867 +	1.1	7.3	152 +	<5 +

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 51.15
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - WVNW-MW-200A
Kent County, MI

Well	WVNW-MW-200A / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/09/2024
Weather	Snow 30
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	23.7 - 28.7
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 13:15.
Initial Water Level Date/Time	01/09/2024 12:40
Initial Water Level Depth (ft bmp)	16.84
Pump/Tubing Intake Depth (ft bmp)	26.2
Tubing Length (ft)	30
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/09/2024 12:45
Total Purge Volume (gal)	2.3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/09/2024 13:30:00, Bottling-Stop: 01/09/2024 13:35:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:50	16.84	0.00	200	NR	NR	NR	NR	NR	NR
13:00	16.84	0.00	200	NR	NR	NR	NR	NR	NR
13:10	16.84	0.00	200	NR	NR	NR	NR	NR	NR
13:15	16.84	0.00	200	9	789	8.3	7.4	188	<5
13:20	16.84	0.00	200	9	789	8.2	7.4	187	<5
13:25	16.84	0.00	200	9	795	8.4	7.4	186	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 9.36
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - WVNW-MW-200B
Kent County, MI

Well	WVNW-MW-200B / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/09/2024
Weather	Snow 30
Sampler Initials	JN
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	54.8 - 59.8
Measured Bottom Depth (ft bmp)	59.8
Sample Comment	YSI Connected at 14:00. Dissolved Oxygen was recorded in %, not mg/L; therefore, stabilization for dissolved oxygen cannot be calculated as outlined in the Standard Operating Procedure (SOP). Other indicator parameters were stable.
Initial Water Level Date/Time	01/09/2024 13:30
Initial Water Level Depth (ft bmp)	17.00
Pump/Tubing Intake Depth (ft bmp)	57.3
Tubing Length (ft)	60.3
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/09/2024 13:35
Total Purge Volume (gal)	2.3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/09/2024 14:20:00, Bottling-Stop: 01/09/2024 14:25:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (%)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:40	17.01	0.01	200	NR	NR	NR	NR	NR	NR
13:50	17.01	0.01	200	NR	NR	NR	NR	NR	NR
14:00	17.01	0.01	200	9	823	32.5 +	7.3	179	<5
14:10	17.01	0.01	200	9	824	32.7 +	7.3	179	<5
14:15	17.01	0.01	200	9	825	32.3 +	7.3	178	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? No
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 40.30
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - WVNW-MW-201A
Kent County, MI

Well	WVNW-MW-201A / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/10/2024
Weather	Snow 30
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: Rental, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	11.9 - 16.9
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 11:15.11:35: Collected DUP and MS/MSD
Initial Water Level Date/Time	01/10/2024 10:50
Initial Water Level Depth (ft bmp)	9.93
Pump/Tubing Intake Depth (ft bmp)	14.4
Tubing Length (ft)	18
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/10/2024 10:55
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/10/2024 11:35:00, Bottling-Stop: 01/10/2024 11:45:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:00	9.94	0.01	200	NR	NR	NR	NR	NR	NR
11:05	9.94	0.01	200	NR	NR	NR	NR	NR	NR
11:15	9.94	0.01	200	10	868 +	2.3	7.4	116	<5
11:20	9.94	0.01	200	10	858 +	1.2	7.4	115	<5
11:25	9.94	0.01	200	10	850 +	1.3	7.4	113	<5
11:30	9.94	0.01	200	10	846 +	1.3	7.4	112	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.47
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - WVNW-MW-201B
Kent County, MI

Well	WVNW-MW-201B / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/10/2024
Weather	Snow 30
Sampler Initials	JN
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	29.6 - 34.6
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 10:15.
Initial Water Level Date/Time	01/10/2024 09:50
Initial Water Level Depth (ft bmp)	10.18
Pump/Tubing Intake Depth (ft bmp)	32.1
Tubing Length (ft)	35.1
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/10/2024 09:55
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/10/2024 10:50:00, Bottling-Stop: 01/10/2024 11:00:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:00	10.18	0.00	225	NR	NR	NR	NR	NR	NR
10:15	10.18	0.00	225	10	946 +	0.7	7.4	245	<5
10:20	10.18	0.00	225	10	947 +	<0.5	7.3	250	<5
10:30	10.18	0.00	225	10	945 +	<0.5	7.3	251	<5
10:35	10.18	0.00	225	10	945 +	<0.5	7.3	251	<5
10:40	10.18	0.00	225	10	945 +	<0.5	7.3	250	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 21.92
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - WVNW-MW-201C
Kent County, MI

Well	WVNW-MW-201C / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/10/2024
Weather	Snow 30
Sampler Initials	JB
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	49.1 - 54.1
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 10:20.
Initial Water Level Date/Time	01/10/2024 09:50
Initial Water Level Depth (ft bmp)	10.15
Pump/Tubing Intake Depth (ft bmp)	51.6
Tubing Length (ft)	54.6
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/10/2024 09:55
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/10/2024 10:45:00, Bottling-Stop: 01/10/2024 10:50:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:05	10.21	0.06	250	NR	NR	NR	NR	NR	NR
10:15	10.21	0.06	250	NR	NR	NR	NR	NR	NR
10:20	10.23	0.08	250	10	888 +	3.3	7.4	131	<5
10:30	10.23	0.08	250	10	888 +	3.6	7.4	129	<5
10:35	10.23	0.08	250	10	888 +	3.6	7.4	128	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 41.45
   - Total Drawdown (ft) 0.08
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - WVNW-MW-202A
Kent County, MI

Well	WVNW-MW-202A / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/11/2024
Weather	30, Snow
Sampler Initials	JB
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	42.6 - 47.6
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 14:55. Last 3 water level readings were not the same per Standard Operating Procedure (SOP). Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	01/11/2024 14:15
Initial Water Level Depth (ft bmp)	11.84
Pump/Tubing Intake Depth (ft bmp)	45.1
Tubing Length (ft)	48.1
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/11/2024 14:20
Total Purge Volume (gal)	5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/11/2024 15:10:00, Bottling-Stop: 01/11/2024 15:15:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:30	11.88	0.04	400	NR	NR	NR	NR	NR	NR
14:40	11.88	0.04	400	NR	NR	NR	NR	NR	NR
14:55	11.88	0.04	400	9	682 +	7.3	7.5	322	<5
15:00	11.89	0.05	400	9	682 +	7.2	7.5	324	<5
15:05	11.89	0.05	400	9	683 +	7.2	7.5	326	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 33.26
   - Total Drawdown (ft) 0.05
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - WVNW-MW-202B
Kent County, MI

Well	WVNW-MW-202B / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/11/2024
Weather	30, snow
Sampler Initials	JN
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	62.3 - 67.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 14:50.
Initial Water Level Date/Time	01/11/2024 14:30
Initial Water Level Depth (ft bmp)	12.02
Pump/Tubing Intake Depth (ft bmp)	64.8
Tubing Length (ft)	67.8
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/11/2024 14:35
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/11/2024 15:20:00, Bottling-Stop: 01/11/2024 15:25:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:40	12.04	0.02	325	NR	NR	NR	NR	NR	NR
14:50	12.05	0.03	325	10	664	6.0	7.4	204	<5
14:55	12.05	0.03	325	10	663	5.8	7.4	205	<5
15:05	12.06	0.04	325	10	663	5.5	7.4	213	<5
15:10	12.06	0.04	325	10	663	5.5	7.4	215	<5
15:15	12.06	0.04	325	10	663	5.5	7.4	218	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 52.78
   - Total Drawdown (ft) 0.04
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - WVNW-MW-203
Kent County, MI

Well	WVNW-MW-203 / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/10/2024
Weather	Snow 30
Sampler Initials	JB
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	13.9 - 18.9
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Pump stalled when attempted to purge under 150 mL/min. YSI Connected at 11:40. Last 3 readings are not 5 minutes apart per the Standard Operating Procedure (SOP). GZA does not believe this impacts data quality.
Initial Water Level Date/Time	01/10/2024 11:10
Initial Water Level Depth (ft bmp)	16.01
Pump/Tubing Intake Depth (ft bmp)	17.45
Tubing Length (ft)	20.45
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/10/2024 11:15
Total Purge Volume (gal)	1
Modified Sample	Yes
If Modified, Reasoning	Static water level was below the top of the well screen.
Sample Collection Information	Bottling-Start: 01/10/2024 12:10:00, Bottling-Stop: 01/10/2024 12:15:00, Parameters-Sampled: PFAS

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Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:20	16.01	0.00	150	NR	NR	NR	NR	NR	NR
11:30	16.01	0.00	150	NR	NR	NR	NR	NR	NR
11:35	16.01	0.00	150	NR	NR	NR	NR	NR	NR
11:40	16.01	0.00	150	9	318 +	7.6	7.1	292	<5
11:50	16.01	0.00	150	9	326 +	7.7	7.2	291	<5
11:55	16.01	0.00	150	9	328 +	7.7	7.2	293	<5
12:05	16.01	0.00	150	10	330 +	7.7	7.3	290	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 1.44
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - AREA19-MW-7A
Kent County, MI

Well	AREA19-MW-7A / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/09/2024
Weather	Snow, 34
Sampler Initials	JB
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	8.7 - 13.7
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 15:15.
Initial Water Level Date/Time	01/09/2024 14:40
Initial Water Level Depth (ft bmp)	4.89
Pump/Tubing Intake Depth (ft bmp)	11.2
Tubing Length (ft)	14.2
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/09/2024 14:45
Total Purge Volume (gal)	2.64
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/09/2024 15:35:00, Bottling-Stop: 01/09/2024 15:40:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:55	4.89	0.00	200	NR	NR	NR	NR	NR	NR
15:05	4.89	0.00	200	NR	NR	NR	NR	NR	NR
15:15	4.89	0.00	200	9	850	3.5	7.4	175	<5
15:20	4.89	0.00	200	9	848	3.5	7.3	175	<5
15:30	4.89	0.00	200	9	851	3.6	7.4	174	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 6.31
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - AREA19-MW-221A
Kent County, MI

Well	AREA19-MW-221A / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/25/2024
Weather	Foggy, 39F
Sampler Initials	RCP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: Rental, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 4, Turbidimeter: Agile Rental 4, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	15.5 - 20.5
Measured Bottom Depth (ft bmp)	NR
Sample Comment	14:20: Water level stablized and YSI connected.
Initial Water Level Date/Time	01/25/2024 14:05
Initial Water Level Depth (ft bmp)	13.06
Pump/Tubing Intake Depth (ft bmp)	18
Tubing Length (ft)	20
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/25/2024 14:10
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/25/2024 14:50:00, Bottling-Stop: 01/25/2024 14:55:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:20	13.13	0.07	120	NR	NR	NR	NR	NR	<5
14:35	13.13	0.07	120	9	611 +	3.7	7.2	132	<5
14:40	13.13	0.07	120	9	610 +	3.8	7.3	125	<5
14:45	13.13	0.07	120	9	610 +	3.8	7.3	123	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.94
   - Total Drawdown (ft) 0.07
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - AREA19-MW-221B
Kent County, MI

Well	AREA19-MW-221B / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/25/2024
Weather	39 Cloudy
Sampler Initials	JMS
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	44.5 - 49.5
Measured Bottom Depth (ft bmp)	NR
Sample Comment	
Initial Water Level Date/Time	01/25/2024 14:05
Initial Water Level Depth (ft bmp)	12.51
Pump/Tubing Intake Depth (ft bmp)	47
Tubing Length (ft)	52
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/25/2024 14:10
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/25/2024 14:55:00, Bottling-Stop: 01/25/2024 15:00:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:30	12.51	0.00	100	9	603 +	6.1	7.2	247	<5
14:35	12.51	0.00	100	9	602 +	5.9	7.2	257	<5
14:40	12.51	0.00	100	9	602 +	5.9	7.2	266	<5
14:45	12.51	0.00	100	9	602 +	5.8	7.2	269	<5
14:50	12.51	0.00	100	9	602 +	5.9	7.2	274	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 34.49
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - AREA19-MW-222
Kent County, MI

Well	AREA19-MW-222 / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/25/2024
Weather	Cloudy, mid 30s
Sampler Initials	CBM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	9.3 - 14.3
Measured Bottom Depth (ft bmp)	14.3
Sample Comment	
Initial Water Level Date/Time	01/25/2024 13:15
Initial Water Level Depth (ft bmp)	6.76
Pump/Tubing Intake Depth (ft bmp)	11.8
Tubing Length (ft)	14
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/25/2024 13:20
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/25/2024 14:15:00, Bottling-Stop: 01/25/2024 14:20:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:45	6.83	0.07	125	7	641 +	0.7	7.3	-3	11
13:50	6.84	0.08	125	7	639 +	0.7	7.3	-7	7
13:55	6.84	0.08	125	8	640 +	0.6	7.3	-13	8
14:00	6.84	0.08	125	7	640 +	0.7	7.3	-22	6
14:05	6.84	0.08	125	8	638 +	0.6	7.3	-27	6
14:10	6.84	0.08	125	8	639 +	0.6	7.3	-31	6

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft): 5.04
   - Total Drawdown (ft): 0.08
   - Calculated Final Purge Volume (gal): NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - AREA19-MW-223
Kent County, MI

Well	AREA19-MW-223 / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/24/2024
Weather	Rain, 30s
Sampler Initials	CBM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.9 - 12.9
Measured Bottom Depth (ft bmp)	12.9
Sample Comment	Collected AECOM split sample. Last 3 water level readings were not the same per Standard Operating Procedure (SOP). Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	01/24/2024 15:35
Initial Water Level Depth (ft bmp)	4.65
Pump/Tubing Intake Depth (ft bmp)	10.4
Tubing Length (ft)	13
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/24/2024 15:40
Total Purge Volume (gal)	2.3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/24/2024 16:20:00, Bottling-Stop: 01/24/2024 16:25:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
16:05	4.68	0.03	250	7	879 +	0.9	6.8	-118	<5
16:10	4.69	0.04	250	7	878 +	0.9	6.8	-119	<5
16:15	4.68	0.03	250	7	876 +	0.9	6.7	-121	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.75
   - Total Drawdown (ft) 0.03
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - AREA19-MW-224
Kent County, MI

Well	AREA19-MW-224 / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/25/2024
Weather	Cloudy, mid 30s
Sampler Initials	CBM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.1 - 12.1
Measured Bottom Depth (ft bmp)	12.1
Sample Comment	Water level initially dropped at lowest pump setting.
Initial Water Level Date/Time	01/25/2024 15:00
Initial Water Level Depth (ft bmp)	3.35
Pump/Tubing Intake Depth (ft bmp)	9.6
Tubing Length (ft)	12
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/25/2024 15:05
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/25/2024 16:00:00, Bottling-Stop: 01/25/2024 16:10:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
15:45	3.80	0.45	60	6	1,340 +	1.4	7.3	77	5
15:50	3.80	0.45	60	6	1,341 +	1.3	7.3	76	5
15:55	3.80	0.45	60	6	1,348 +	1.3	7.3	74	5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 6.25
   - Total Drawdown (ft) 0.45
   - Calculated Final Purge Volume (gal) 0.09
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? Yes

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - AREA19-MW-225A
Kent County, MI

Well	AREA19-MW-225A / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/25/2024
Weather	36 Cloudy
Sampler Initials	JMS
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 4, Turbidimeter: Agile Rental 4, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.6 - 12.6
Measured Bottom Depth (ft bmp)	NR
Sample Comment	
Initial Water Level Date/Time	01/25/2024 10:55
Initial Water Level Depth (ft bmp)	5.67
Pump/Tubing Intake Depth (ft bmp)	10.1
Tubing Length (ft)	15.1
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/25/2024 11:00
Total Purge Volume (gal)	5.25
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/25/2024 11:55:00, Bottling-Stop: 01/25/2024 12:00:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:10	5.69	0.02	400	7	1,136 +	<0.5	7.0	48	<5
11:15	5.69	0.02	400	7	1,134 +	<0.5	7.0	40	<5
11:20	5.69	0.02	400	7	1,131 +	<0.5	7.0	26	<5
11:25	5.69	0.02	400	7	1,132 +	<0.5	7.1	16	<5
11:30	5.69	0.02	400	7	1,131 +	<0.5	7.1	3	<5
11:35	5.69	0.02	400	7	1,131 +	<0.5	7.1	-5	<5
11:40	5.69	0.02	400	7	1,129 +	<0.5	7.1	-12	<5
11:45	5.69	0.02	400	7	1,127 +	<0.5	7.1	-17	<5
11:50	5.69	0.02	400	7	1,128 +	<0.5	7.1	-22	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 4.43
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - AREA19-MW-225B
Kent County, MI

Well	AREA19-MW-225B / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/25/2024
Weather	Foggy, 35F
Sampler Initials	RCP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: Rental, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	32.9 - 37.9
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Water level stabilized at 11:35.
Initial Water Level Date/Time	01/25/2024 10:50
Initial Water Level Depth (ft bmp)	5.13
Pump/Tubing Intake Depth (ft bmp)	35.4
Tubing Length (ft)	38
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/25/2024 10:55
Total Purge Volume (gal)	1.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/25/2024 12:25:00, Bottling-Stop: 01/25/2024 12:35:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:05	5.64	0.51	50	NR	NR	NR	NR	NR	NR
11:10	5.76	0.63	50	NR	NR	NR	NR	NR	NR
11:25	5.93	0.80	50	NR	NR	NR	NR	NR	NR
11:30	5.96	0.83	50	NR	NR	NR	NR	NR	NR
11:35	5.98	0.85	50	NR	NR	NR	NR	NR	NR
11:50	5.98	0.85	50	7	1,904 +	1.0	7.3	14	7
12:05	5.98	0.85	50	7	1,905 +	0.7	7.4	-69	5
12:10	5.98	0.85	50	7	1,907 +	0.6	7.4	-79	5
12:15	5.98	0.85	50	8	1,902 +	0.6	7.4	-85	5
12:20	5.98	0.85	50	8	1,905 +	0.6	7.4	-88	5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 30.27
   - Total Drawdown (ft) 0.85
   - Calculated Final Purge Volume (gal) 0.18
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? Yes

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - AREA19-MW-226A
Kent County, MI

Well	AREA19-MW-226A / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/11/2024
Weather	Snow 30
Sampler Initials	JN
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-2, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	6.3 - 11.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 12:05.
Initial Water Level Date/Time	01/11/2024 11:40
Initial Water Level Depth (ft bmp)	5.92
Pump/Tubing Intake Depth (ft bmp)	9.1
Tubing Length (ft)	13.1
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/11/2024 11:45
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/11/2024 12:35:00, Bottling-Stop: 01/11/2024 12:40:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:50	5.94	0.02	100	NR	NR	NR	NR	NR	NR
12:05	5.95	0.03	100	7	805	<0.5	6.8	-35	<5
12:15	5.95	0.03	100	7	799	<0.5	6.8	-48	<5
12:20	5.95	0.03	100	7	787	<0.5	6.8	-54	<5
12:25	5.95	0.03	100	7	780	<0.5	6.8	-56	<5
12:30	5.95	0.03	100	7	773	<0.5	6.8	-57	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 3.18
   - Total Drawdown (ft) 0.03
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - AREA19-MW-226B
Kent County, MI

Well	AREA19-MW-226B / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/11/2024
Weather	Snowy 30
Sampler Initials	JB
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	12.8 - 17.8
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 12:05. Last 3 readings were not 5 minutes apart per the Standard Operating Procedure (SOP). GZA does not believe this impacts data quality.
Initial Water Level Date/Time	01/11/2024 11:30
Initial Water Level Depth (ft bmp)	5.49
Pump/Tubing Intake Depth (ft bmp)	15.3
Tubing Length (ft)	18.3
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/11/2024 11:35
Total Purge Volume (gal)	3
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/11/2024 12:35:00, Bottling-Stop: 01/11/2024 12:40:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:45	5.54	0.05	200	NR	NR	NR	NR	NR	NR
11:55	5.54	0.05	200	NR	NR	NR	NR	NR	NR
12:05	5.54	0.05	200	8	631 +	3.1	7.2	261	<5
12:15	5.54	0.05	200	8	629 +	2.5	7.3	263	<5
12:25	5.54	0.05	200	8	629 +	2.5	7.3	264	<5
12:30	5.54	0.05	200	8	629 +	2.5	7.3	265	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 9.81
   - Total Drawdown (ft) 0.05
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - WV/CH-MW-240
Kent County, MI

Well	WV/CH-MW-240 / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/11/2024
Weather	Snow 30
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: NA, Centrifugal-Pump: Mega Monsoon #1
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: GeoTech Rental
Reference Measuring Point	PVC
Well Screen (ft bmp)	63.0 - 68.0
Measured Bottom Depth (ft bmp)	NR
Sample Comment	Water was observed to be very turbid and out of range of the turbidimeter at the beginning of the purge. Connected YSI at 15:10.
Initial Water Level Date/Time	01/11/2024 14:10
Initial Water Level Depth (ft bmp)	31.55
Pump/Tubing Intake Depth (ft bmp)	65.5
Tubing Length (ft)	68
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/11/2024 14:20
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/11/2024 15:25:00, Bottling-Stop: 01/11/2024 15:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:25	31.70	0.15	200	NR	NR	NR	NR	NR	>999
14:30	31.75	0.20	200	NR	NR	NR	NR	NR	>999
14:35	31.70	0.15	150	NR	NR	NR	NR	NR	>999
15:10	31.70	0.15	150	11	802	5.1	7.3	238	<5
15:15	31.70	0.15	150	11	801	4.9	7.3	234	<5
15:20	31.70	0.15	150	11	805	4.8	7.3	231	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 33.95
   - Total Drawdown (ft) 0.15
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - WV/CH-MW-241A
Kent County, MI

Well	WV/CH-MW-241A / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/17/2024
Weather	12 Snow
Sampler Initials	JMS
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	23.7 - 28.7
Measured Bottom Depth (ft bmp)	NR
Sample Comment	
Initial Water Level Date/Time	01/17/2024 11:35
Initial Water Level Depth (ft bmp)	22.31
Pump/Tubing Intake Depth (ft bmp)	26.2
Tubing Length (ft)	31.2
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/17/2024 11:40
Total Purge Volume (gal)	1.1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/17/2024 12:20:00, Bottling-Stop: 01/17/2024 12:25:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
11:50	22.32	0.01	120	11	1,126 +	7.0	7.1	220	<5
11:55	22.32	0.01	120	11	1,127 +	6.7	7.3	235	<5
12:00	22.32	0.01	120	11	1,121 +	6.7	7.3	246	<5
12:05	22.32	0.01	120	11	1,112 +	6.7	7.3	253	<5
12:10	22.32	0.01	120	11	1,111 +	6.8	7.4	257	<5
12:15	22.32	0.01	120	10	1,098 +	6.7	7.4	262	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 3.89
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - WV/CH-MW-241B
Kent County, MI

Well	WV/CH-MW-241B / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/17/2024
Weather	12F, Snowy, Windy
Sampler Initials	RCP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: Rental, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	55.9 - 60.9
Measured Bottom Depth (ft bmp)	60.9
Sample Comment	12:25: YSI connected
Initial Water Level Date/Time	01/17/2024 11:45
Initial Water Level Depth (ft bmp)	22.30
Pump/Tubing Intake Depth (ft bmp)	58.4
Tubing Length (ft)	60
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/17/2024 11:55
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/17/2024 12:45:00, Bottling-Stop: 01/17/2024 12:50:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:00	22.30	0.00	120	NR	NR	NR	NR	NR	35
12:20	22.30	0.00	120	NR	NR	NR	NR	NR	17
12:25	22.30	0.00	120	7	758	6.6	7.3	274	10
12:30	22.30	0.00	120	7	758	6.1	7.3	283	<5
12:35	22.30	0.00	120	7	754	5.7	7.2	291	<5
12:40	22.30	0.00	120	7	755	5.6	7.2	292	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 36.10
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - WV/CH-MW-242A
Kent County, MI

Well	WV/CH-MW-242A / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/10/2024
Weather	Snow 30
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: NA, Centrifugal-Pump: Mega Monsoon #1
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	40.0 - 45.0
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 13:55. 14:30: Collected Field Blank (JB); 14:40: Collected Field Blank (JN).
Initial Water Level Date/Time	01/10/2024 13:25
Initial Water Level Depth (ft bmp)	36.78
Pump/Tubing Intake Depth (ft bmp)	42.5
Tubing Length (ft)	45
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/10/2024 13:30
Total Purge Volume (gal)	4
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/10/2024 14:30:00, Bottling-Stop: 01/10/2024 14:35:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:40	36.95	0.17	250	NR	NR	NR	NR	NR	NR
13:45	36.95	0.17	250	NR	NR	NR	NR	NR	NR
13:55	36.95	0.17	250	13	766 +	0.6	7.3	-50	27
14:10	36.95	0.17	250	13	756 +	<0.5	7.3	-66	9
14:15	36.95	0.17	250	13	757 +	<0.5	7.3	-69	<5
14:20	36.95	0.17	250	13	754 +	<0.5	7.3	-70	<5
14:25	36.95	0.17	250	13	756 +	<0.5	7.3	-72	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.72
   - Total Drawdown (ft) 0.17
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - WV/CH-MW-242B
Kent County, MI

Well	WV/CH-MW-242B / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/10/2024
Weather	Snow 30
Sampler Initials	JN
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	64.4 - 69.4
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 13:55.
Initial Water Level Date/Time	01/10/2024 13:25
Initial Water Level Depth (ft bmp)	17.41
Pump/Tubing Intake Depth (ft bmp)	66.9
Tubing Length (ft)	70
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/10/2024 13:30
Total Purge Volume (gal)	1.6
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/10/2024 15:30:00, Bottling-Stop: 01/10/2024 15:35:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:40	17.78	0.37	50	NR	NR	NR	NR	NR	NR
13:50	17.89	0.48	50	NR	NR	NR	NR	NR	NR
13:55	17.89	0.48	50	10	819 +	3.0	7.4	21	<5
14:05	17.97	0.56	50	10	818 +	2.9	7.4	-28	<5
14:15	18.00	0.59	50	10	818 +	3.0	7.4	-28	<5
14:25	18.01	0.60	50	10	817 +	0.7	7.4	-54	<5
14:35	18.09	0.68	50	10	818 +	0.7	7.4	-63	<5
14:45	18.11	0.70	50	10	817 +	1.9	7.4	-65	<5
14:50	18.12	0.71	50	10	818 +	1.8	7.4	-68	<5
14:55	18.14	0.73	50	10	817 +	1.4	7.4	-71	<5
15:00	18.14	0.73	50	10	818 +	1.6	7.4	-74	<5

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - WV/CH-MW-242B
Kent County, MI

Well	WV/CH-MW-242B / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/10/2024
Weather	Snow 30
Sampler Initials	JN
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	64.4 - 69.4
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 13:55.
Initial Water Level Date/Time	01/10/2024 13:25
Initial Water Level Depth (ft bmp)	17.41
Pump/Tubing Intake Depth (ft bmp)	66.9
Tubing Length (ft)	70
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/10/2024 13:30
Total Purge Volume (gal)	1.6
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/10/2024 15:30:00, Bottling-Stop: 01/10/2024 15:35:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
15:10	18.16	0.75	50	10	817 +	0.5	7.4	-77	<5
15:20	18.18	0.77	50	10	817 +	<0.5	7.4	-76	<5
15:30	18.18	0.75	50	10	817 +	<0.5	7.4	-76	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? No
4) Was the two hour time limit reached? Yes
5) Calculations:
   - Head Above Pump Intake (ft) 49.49
   - Total Drawdown (ft) 0.77
   - Calculated Final Purge Volume (gal) 0.21
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? Yes

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - HS-MW-29A
Kent County, MI

Well	HS-MW-29A / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/11/2024
Weather	Cloudy, 30s
Sampler Initials	CBM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	6.3 - 16.3
Measured Bottom Depth (ft bmp)	16.3
Sample Comment	NR
Initial Water Level Date/Time	01/11/2024 14:35
Initial Water Level Depth (ft bmp)	6.14
Pump/Tubing Intake Depth (ft bmp)	11.3
Tubing Length (ft)	16
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/11/2024 14:40
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/11/2024 15:25:00, Bottling-Stop: 01/11/2024 15:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
15:05	6.14	0.00	175	8	589 +	2.3	7.0	38 +	42
15:10	6.14	0.00	175	8	592 +	2.3	7.0	38 +	33
15:15	6.14	0.00	175	8	599 +	2.2	7.0	37 +	31
15:20	6.14	0.00	175	8	604 +	2.2	7.0	35 +	32

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.16
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - HS-MW-260
Kent County, MI

Well	HS-MW-260 / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/11/2024
Weather	Cloudy, 30s
Sampler Initials	CBM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	8.1 - 13.1
Measured Bottom Depth (ft bmp)	13.1
Sample Comment	Turbidity readings were not collected between 13:35 and 14:00 due to a broken vial.
Initial Water Level Date/Time	01/11/2024 13:20
Initial Water Level Depth (ft bmp)	6.05
Pump/Tubing Intake Depth (ft bmp)	10.6
Tubing Length (ft)	15
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/11/2024 13:25
Total Purge Volume (gal)	2.75
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/11/2024 14:25:00, Bottling-Stop: 01/11/2024 14:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:35	6.10	0.05	175	7	731 +	0.8	7.0	36 +	NR
13:40	6.10	0.05	175	8	721 +	0.7	7.0	6 +	NR
13:45	6.10	0.05	175	8	718 +	0.7	7.0	2 +	NR
13:50	6.10	0.05	175	8	712 +	0.8	7.0	-5 +	NR
13:55	6.10	0.05	175	8	703 +	0.8	7.0	-12 +	NR
14:00	6.10	0.05	175	8	698 +	0.9	7.0	-15 +	NR
14:05	6.10	0.05	175	7	680 +	0.9	7.0	-18 +	8
14:10	6.10	0.05	175	8	668 +	0.9	7.0	-21 +	6
14:15	6.10	0.05	175	8	665 +	0.8	7.0	-22 +	6
14:20	6.10	0.05	175	8	660 +	0.8	7.0	-23 +	6

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft): 4.55
   - Total Drawdown (ft): 0.05
   - Calculated Final Purge Volume (gal): NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - HS-MW-261
Kent County, MI

Well	HS-MW-261 / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/22/2024
Weather	Cloudy, 25°
Sampler Initials	CBM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 4, Turbidimeter: Agile Rental 4, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.2 - 12.2
Measured Bottom Depth (ft bmp)	12.2
Sample Comment	Last 3 water level readings were not the same per the Standard Operating Procedure (SOP). Other indicator parameters were stable.
Initial Water Level Date/Time	01/22/2024 14:00
Initial Water Level Depth (ft bmp)	4.11
Pump/Tubing Intake Depth (ft bmp)	9.7
Tubing Length (ft)	12
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/22/2024 14:05
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/22/2024 15:20:00, Bottling-Stop: 01/22/2024 15:25:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
14:35	4.20 +	0.09	100	8	720	<0.5	7.1	8	46
14:40	4.20 +	0.09	100	8	717	<0.5	7.1	-7	38
14:45	4.21 +	0.10	100	8	717	<0.5	7.1	-21	27
14:50	4.21 +	0.10	100	8	714	<0.5	7.1	-30	21
15:00	4.22 +	0.11	100	8	711	<0.5	7.1	-45	22
15:05	4.22 +	0.11	100	8	710	<0.5	7.1	-49	12
15:10	4.23 +	0.12	100	8	710	<0.5	7.1	-51	13
15:15	4.24 +	0.13	100	8	710	<0.5	7.1	-53	12

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? No
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 5.59
   - Total Drawdown (ft) 0.13
   - Calculated Final Purge Volume (gal) 0.04
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? Yes

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - HS-MW-262
Kent County, MI

Well	HS-MW-262 / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/22/2024
Weather	Cloudy, 22°
Sampler Initials	CBM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 4, Turbidimeter: Agile Rental 4, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	7.1 - 12.1
Measured Bottom Depth (ft bmp)	12.1
Sample Comment	Last 3 water level readings were not the same per Standard Operating Procedure (SOP). Water level meters are considered accurate to +/- 0.01 feet and last 3 readings were within this range. GZA does not believe this impacts data quality.
Initial Water Level Date/Time	01/22/2024 15:40
Initial Water Level Depth (ft bmp)	5.21
Pump/Tubing Intake Depth (ft bmp)	9.6
Tubing Length (ft)	12
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/22/2024 15:45
Total Purge Volume (gal)	1
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/22/2024 16:15:00, Bottling-Stop: 01/22/2024 16:20:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
15:55	5.31	0.10	125	7	754	<0.5	7.4	79	<5
16:00	5.31	0.10	125	7	755	<0.5	7.4	72	<5
16:05	5.31	0.10	125	7	756	<0.5	7.4	67	<5
16:10	5.32	0.11	125	7	754	<0.5	7.4	62	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft): 4.39
   - Total Drawdown (ft): 0.11
   - Calculated Final Purge Volume (gal): NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - HS-MW-263A
Kent County, MI

Well	HS-MW-263A / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/24/2024
Weather	30F, rainy
Sampler Initials	RCP
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: Rental, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 4, Turbidimeter: Agile Rental 4, Water-Level-Meter: WLM-4
Reference Measuring Point	PVC
Well Screen (ft bmp)	8.2 - 13.2
Measured Bottom Depth (ft bmp)	13.2
Sample Comment	
Initial Water Level Date/Time	01/24/2024 15:40
Initial Water Level Depth (ft bmp)	7.59
Pump/Tubing Intake Depth (ft bmp)	10.7
Tubing Length (ft)	11
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/24/2024 15:45
Total Purge Volume (gal)	2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/24/2024 16:25:00, Bottling-Stop: 01/24/2024 16:30:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
16:00	7.63	0.04	120	6	900 +	<0.5	7.0	-27	8
16:05	7.63	0.04	120	6	899 +	<0.5	7.0	-29	9
16:10	7.63	0.04	120	6	898 +	<0.5	7.1	-48	5
16:15	7.63	0.04	120	6	897 +	<0.5	7.1	-56	5
16:20	7.63	0.04	120	6	895 +	<0.5	7.1	-58	5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 3.11
   - Total Drawdown (ft) 0.04
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - HS-MW-263B
Kent County, MI

Well	HS-MW-263B / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/24/2024
Weather	35 Rain
Sampler Initials	JMS
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-3, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 2, Turbidimeter: Agile Rental 2, Water-Level-Meter: WLM-1
Reference Measuring Point	PVC
Well Screen (ft bmp)	44.3 - 49.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	
Initial Water Level Date/Time	01/24/2024 15:45
Initial Water Level Depth (ft bmp)	6.33
Pump/Tubing Intake Depth (ft bmp)	46.8
Tubing Length (ft)	51.8
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/24/2024 15:50
Total Purge Volume (gal)	2.25
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/24/2024 16:40:00, Bottling-Stop: 01/24/2024 16:45:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
16:25	6.35	0.02	200	9	800 +	1.8	7.2	333	<5
16:30	6.35	0.02	200	9	801 +	1.8	7.2	335	<5
16:35	6.35	0.02	200	9	799 +	1.8	7.2	334	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 40.47
   - Total Drawdown (ft) 0.02
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - HS-MW-264
Kent County, MI

Well	HS-MW-264 / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/25/2024
Weather	Cloudy, Mid 30s
Sampler Initials	CBM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 1, Turbidimeter: Agile Rental 1, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	25.0 - 30.0
Measured Bottom Depth (ft bmp)	30
Sample Comment	11:00: Collected DUP
Initial Water Level Date/Time	01/25/2024 10:20
Initial Water Level Depth (ft bmp)	21.13
Pump/Tubing Intake Depth (ft bmp)	27.5
Tubing Length (ft)	30
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/25/2024 10:25
Total Purge Volume (gal)	2.75
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/25/2024 11:00:00, Bottling-Stop: 01/25/2024 11:05:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
10:45	21.14	0.01	300	10	762 +	6.2	7.1	144	<5
10:50	21.14	0.01	300	10	765 +	6.0	7.1	144	<5
10:55	21.14	0.01	300	10	768 +	5.9	7.1	144	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 6.37
   - Total Drawdown (ft) 0.01
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - HS-MW-265
Kent County, MI

Well	HS-MW-265 / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/11/2024
Weather	Snow 30
Sampler Initials	NCK
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: NA, Centrifugal-Pump: Mega Monsoon #1
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: GeoTech Rental
Reference Measuring Point	PVC
Well Screen (ft bmp)	13.3 - 18.3
Measured Bottom Depth (ft bmp)	NR
Sample Comment	YSI Connected at 12:30.
Initial Water Level Date/Time	01/11/2024 11:40
Initial Water Level Depth (ft bmp)	7.76
Pump/Tubing Intake Depth (ft bmp)	15.8
Tubing Length (ft)	19
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/11/2024 11:50
Total Purge Volume (gal)	6
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/11/2024 13:00:00, Bottling-Stop: 01/11/2024 13:05:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:00	7.78	0.02	400	NR	NR	NR	NR	NR	NR
12:15	7.78	0.02	400	NR	NR	NR	NR	NR	NR
12:30	7.78	0.02	400	11	839	3.7	7.3	214	<5
12:35	7.78	0.02	400	11	839	3.6	7.3	226	<5
12:45	7.78	0.02	400	11	839	3.4	7.3	236	<5
12:50	7.78	0.02	400	11	839	3.4	7.3	235	<5
12:55	7.78	0.02	400	11	839	3.4	7.3	237	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; and "us/cm" indicates microsiemens per centimeter
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft): 8.04
   - Total Drawdown (ft): 0.02
   - Calculated Final Purge Volume (gal): NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - HS-MW-266A
Kent County, MI

Well	HS-MW-266A / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/23/2024
Weather	Cloudy, 32°, rain off and on
Sampler Initials	CBM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	13.2 - 18.2
Expected Well Bottom Depth (ft bmp)	18.2
Sample Comment	NR
Initial Water Level Date/Time	01/23/2024 12:05
Initial Water Level Depth (ft bmp)	4.23
Pump/Tubing Intake Depth (ft bmp)	15.7
Tubing Length (ft)	18
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/23/2024 12:15
Total Purge Volume (gal)	1.5
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/23/2024 12:55:00, Bottling-Stop: 01/23/2024 13:00:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
12:40	4.23	0.00	135	11	731 +	3.6 +	7.4	113	<5
12:45	4.23	0.00	135	11	732 +	3.4 +	7.4	116	<5
12:50	4.23	0.00	135	11	736 +	3.3 +	7.4	119	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft): 11.47
   - Total Drawdown (ft): 0.00
   - Calculated Final Purge Volume (gal): NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

Well Sampling Worksheet
WWW RAP Field Data
GSI 2024-Q1 - HS-MW-266B
Kent County, MI

Well	HS-MW-266B / 2 in Diameter PVC
Sample Quarter	2024-Q1
Date	01/23/2024
Weather	Cloudy, 33°, rain.
Sampler Initials	CBM
Purging Device	Bladder-Pump: NA, Peristaltic-Pump: PER-1, Centrifugal-Pump: NA
Meters Used	YSI: Agile Rental 3, Turbidimeter: Agile Rental 3, Water-Level-Meter: WLM-2
Reference Measuring Point	PVC
Well Screen (ft bmp)	53.0 - 58.0
Measured Bottom Depth (ft bmp)	58
Sample Comment	NR
Initial Water Level Date/Time	01/23/2024 13:00
Initial Water Level Depth (ft bmp)	4.17
Pump/Tubing Intake Depth (ft bmp)	55.5
Tubing Length (ft)	58.5
Tubing Inner Diameter (in)	0.17
Purging Initiation Date/Time	01/23/2024 13:05
Total Purge Volume (gal)	2.2
Modified Sample	No
If Modified, Reasoning	
Sample Collection Information	Bottling-Start: 01/23/2024 13:45:00, Bottling-Stop: 01/23/2024 13:50:00, Parameters-Sampled: PFAS

Reading Time	Depth To Water (ft)	Cumulative Drawdown (ft)	Purge Rate (ml/min)	Temperature (deg c)	Specific Conductivity (us/cm)	Dissolved Oxygen (mg/l)	pH (su)	Oxidation-Reduction Potential (mV)	Turbidity (ntu)
13:30	4.17	0.00	150	11	779 +	2.3 +	7.4	-28	<5
13:35	4.17	0.00	150	11	780 +	2.2 +	7.4	-28	<5
13:40	4.17	0.00	150	11	782 +	2.2 +	7.4	-28	<5

Notes:

1) Abbreviations include: "deg c" indicates degrees Celsius; "ft" indicates feet; "ft bmp" indicates feet below reference measuring point; "gal" indicates gallons; "in" indicates inches; "mg/l" indicates milligrams per liter; "ml/min" indicates milliliters per minute; "mV" indicates millivolts; "NA" indicates not applicable; "NR" indicates not recorded; "ntu" indicates Nephelometric Turbidity units; "su" indicates standard units; "us/cm" indicates microsiemens per centimeter; and "+" indicates the parameter(s) may be used for stabilization calculations but cannot be used for other purposes.
2) Weather temperature units are in degrees Fahrenheit, unless otherwise noted.
3) Did indicator parameters reach stabilization? Yes
4) Was the two hour time limit reached? No
5) Calculations:
   - Head Above Pump Intake (ft) 51.33
   - Total Drawdown (ft) 0.00
   - Calculated Final Purge Volume (gal) NA
6) If Drawdown Did Not Stabilize or Stabilized Drawdown >0.3 ft, is Total Purge Volume > Calculated Final Purge Volume? NA

APPENDIX F

STAGE 4 DATA VALIDATION MEMORANDUMS

ENVIRONMENTAL® STANDARDS

Setting the Standards for Innovative Environmental Solutions

Stage 4 Data Validation Report
Groundwater Surface Water Interface Area
Per- and Polyfluoroalkyl Substances Investigation Program
Sample Delivery Group: WA28027

Introduction

This quality assurance (QA) review is based upon an examination of the data generated from the analyses of the samples collected as part of the Per- and Polyfluoroalkyl Substances (PFAS) Investigation Program at the Wolverine World Wide, Inc.'s (Wolverine's) Groundwater Surface Water Interface Area in Rockford, Michigan, in accordance with the Quality Assurance Project Plan Former Wolverine Tannery, House Street Property, and Wolven/Jewell Area (QAPP; GZA GeoEnvironmental, Inc. [GZA], November 1, 2018; Revision June 2021). The samples were analyzed for select PFAS by Pace Analytical Services, LLC (Pace) of West Columbia, South Carolina. Data were examined to determine compliance relative to Pace's standard operating procedure (SOP) "Determination of Per- and Polyfluoroalkyl Substances (PFAS) by LC/MS/MS (Isotope Dilution) QSM 5.1 Table B-15 (EPA 537 MOD ID)" (Pace Document Number: ME00213-14) and the usability of the analytical results in accordance with the Data Validation SOP for PFAS data for samples generated by this Pace SOP.

The analytical results for the organic target analytes are presented on the validated data summary tables in Section 2 of this report. These validated data summary tables were generated from the GZA database. The "Validation Result," "Validation LOQ" (*i.e.*, the limit of quantitation [LOQ]), and "Validation Detect Flag" fields on the validated data summary tables have been updated to reflect all final data validation qualifiers and results. Validation qualifier codes have been placed in the "Validation Qualifiers" fields on the data tables to enable the data user to quickly assess the qualitative and/or quantitative reliability of a result based on the criteria evaluated during this QA review. Finally, the "Validation Reason Code" field has been populated with codes that indicate the reason for the validation qualifiers. Definitions of the validation qualifiers and reason codes are presented with the validated data summary tables in Section 2.

The data reviewer has included copies of validation forms, quality control (QC) summary forms, and other documentation needed to support the findings in this QA review in the Data Support Documentation (Section 3). The cover sheet for this section is a checklist of the QA procedures required by the protocol and examined in this data review. The Case Narrative and Chain-of-Custody (COC) Record are included in Section 4. Project Correspondence is presented in Section 5.

The nine samples that have undergone a QA review for PFAS are on Table 1.

TABLE 1 – SUMMARY OF SAMPLES REVIEWED

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-PW-2.5 (A)	WA28027-001	Aqueous	1/26/21
HS-PW-2.5 (B)	WA28027-002	Aqueous	1/26/21
HS-PW-3 (A)	WA28027-003	Aqueous	1/26/21
HS-PW-3 (A) DUP (Field Duplicate of HS-PW-3 (A))	WA28027-004	Aqueous	1/26/21
HS-PW-3.5 (A)	WA28027-005	Aqueous	1/26/21
HS-PW-3.5 (A)MS (Matrix Spike)	WA28027-005MS	Aqueous	1/26/21
HS-PW-3.5 (A)MSD (Matrix Spike Duplicate)	WA28027-005MSD	Aqueous	1/26/21
FB-1/26 (Field Blank)	WA28027-006	Aqueous	1/26/21
EB-HT (Equipment Blank)	WA28027-007	Aqueous	1/26/21

Section 1 Quality Assurance Review

The findings offered in this report for analyses that underwent a Stage 4 QA review are based upon a rigorous review of the tabulated summary forms and raw data, including the following checks and QC measures as applicable to this data set:

- Data completeness
- COC Record and sample condition upon laboratory receipt
- Sample preparation and analysis holding times
- Field and laboratory blank analysis results
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses
- Matrix spike/matrix spike duplicate (MS/MSD) analyses
- Surrogate/labeled pre-extraction internal standard recoveries
- Field duplicate precision
- Mass spectrometer tune checks
- Instrument calibration and verification
- Internal standard responses
- Quantitation and qualitative identification

Data were examined to determine compliance and usability of the analytical results relative to the QAPP and SOPs referenced above. Any findings are identified in the sections below.

Data Completeness

The Level 4 data deliverables were prepared by the laboratory and were reviewed by Environmental Standards, Inc. (Environmental Standards). The analytical data package was checked for completeness to ensure that all data requested were actually present in the data deliverables (refer to completeness forms in the Data Support Documentation [Section 3]). The data package was complete with any exceptions noted on the completeness forms.

Chain-of-Custody Record and Sample Condition upon Laboratory Receipt

All sample identifications (IDs) were consistent with the COC Record.

The sample reports were consistent with the analytical request designated on the COC Record.

The samples for PFAS analysis were received in good condition and within the acceptance criterion of ≤ 10°C.

Sample Preparation and Analysis Holding Times

All samples were extracted and analyzed within the QAPP-specified holding times.

Field and Laboratory Blank Analyses

Laboratory blank analyses were performed at the required frequencies. A summary of any positive results observed in the blanks associated with the samples is included in Section 3.

Instrument blanks were analyzed daily, at a minimum, and were evaluated to the LOQ. Qualification of data due to instrument blank contamination was not warranted.

Laboratory method blanks were evaluated to the LOQ for samples prepared within the same preparation batch. Qualification of data due to method blank contamination was not warranted.

Two aqueous field and equipment blanks (samples FB-1/26 and EB-HT) were evaluated to the LOQ for the aqueous samples included in this Sample Delivery Group (SDG). Qualification of aqueous sample data due to field and equipment blank contamination was not warranted.

Laboratory Control Sample/Laboratory Control Sample Duplicate Analyses

An LCS was included in each extraction batch as required.

All LCS percent recoveries (%Rs) were within QC acceptance limits.

In this SDG, the reported 50-150% LCS percent recovery QC acceptance limits were inconsistent with historically reported LCS percent recovery QC acceptance limits of 70-150%. The data reviewer evaluated the data to the historically reported acceptance limits.

Matrix Spike/Matrix Spike Duplicate Analyses

An MS (as well as a laboratory duplicate) was included in the extraction batch associated with samples HS-PW-2.5 (A), HS-PW-2.5 (B), HS-PW-3 (A), and HS-PW-3 (A) DUP; however, it was not evaluated, as it was performed on a sample that was not included in this data set.

An MS/MSD pair was included in the second extraction batch associated with sample HS-PW-3.5 (A). However, according to the Case Narrative, the pre-extraction internal standard (surrogate mix) was double spiked, and insufficient volume was available for a re-extraction, the data was reported as is. Theoretically, the MS/MSD results were approximately half of what they should have been, but due to possibly slight variations in spike volumes, the data reviewer did not assume an extract correction factor of 2 to be applied to the results. Based on professional judgment, the data reviewer did not use this erroneously spiked MS/MSD pair to qualify data. The data reviewer was unable to evaluate potential matrix interference within the extraction batches due to this issue.

In this SDG, the reported 50-150% MS/MSD percent recovery QC acceptance limits were inconsistent with historically reported MS/MSD percent recovery QC acceptance limits of 70-150%. The data reviewer evaluated the data to the historically reported acceptance limits.

Surrogate/Labeled Pre-extraction Internal Standard Recoveries

Surrogates were spiked prior to extraction and used as internal standards for the quantitation of target PFAS results. All surrogate (labeled pre-extraction internal standard) %Rs were within the QAPP acceptance criterion.

In this SDG, the reported 25-150% (10-150% for PFOSA) surrogate percent recovery acceptance limits were inconsistent with historically reported surrogate percent recovery acceptance limits of 50-150%. The data reviewer evaluated the data to the historically reported acceptance limits.

Field Duplicate Analyses

One field duplicate pair was collected and analyzed for PFAS with the aqueous samples in this data set (refer to Table 1). All field duplicate analyses were within QC acceptance limits (relative percent difference was < 30% when both of the results were > 5× the LOQ, or the difference was < 1× the LOQ when at least one result was ≤ 5× the LOQ).

Mass Spectrometer Tune Checks

The liquid chromatography/tandem mass spectrometry (LC/MS/MS) tune check was performed at the required frequency and met acceptance criteria.

Instrument Calibration and Verification

Instrument calibration, second-source initial calibration verification (ICV), and continuing calibration verification (CCV) analyses were performed at the required frequency and met acceptance criteria (“not-detected” results associated with high recoveries are excluded).

Pre-injection Internal Standard Responses

Pre-injection internal standards were spiked prior to injection. All pre-injection internal standard responses were within QC acceptance criteria (50-150% of the response in the associated mid-point of the initial calibration or associated CCV on days when the initial calibration was not performed).

Quantitation and Qualitative Identification

The laboratory-reported values (*e.g.*, sample results, instrument calibration results) were verified by recalculating the values using the raw instrument data provided by the laboratory. In addition, the raw data chromatograms were checked to ensure that the laboratory-reported analytes were correctly identified and quantitated. These checks were performed on a fraction of the results. Additional results were verified and/or recalculated if any issues were noted with the initial checks. Issues were not noted, with the exception of the following.

Samples HS-PW-2.5 (A), HS-PW-3 (A), and HS-PW-3 (A) DUP were reported from initial dilutions (5×) due to the high levels of PFAS present, with no undiluted analyses provided. As the laboratory raised the LOQs accordingly, qualification of the data was not warranted.

The reported positive results for the analyte in the following samples should be considered estimated. In the chromatograms for these samples, the composition of the linear and branched isomer peaks included in the response for the analyte in the sample was significantly different than the composition of the calibration standard.

Samples	Analyte	Qualifier	Validation Reason Code
HS-PW-2.5 (A), HS-PW-2.5 (B), HS-PW-3 (A), HS-PW-3 (A) DUP, and HS-PW-3.5 (A)	PFOS	J	LB

The compounds on the table below were reported by the laboratory with LOQs inconsistent with historically reported data. The data reviewer evaluated the raw data and determined that the change in LOQ was not impactful, as the compounds were “not-detected” to the historic LOQs; or were greater than the reported elevated LOQs.

Analyte(s)	Reported LOQ (ng/L)	Historically Reported LOQ (ng/L)
6:2 FTS and 8:2 FTS	8	4
PFOA	4	2

Conclusions

This QA review has identified a few aspects of the data that required qualification. The analytical data should be considered acceptable for use unless otherwise indicated in the QA review. Positive results that demonstrate a combination of low bias ("J-"), high bias ("J+"), and/or bias of unknown direction ("J") have been flagged "J" (unknown direction of bias) on the data tables as the direction of bias could not be assigned. In order to use any of the data, the data user should understand the qualifications and limitations specified in this QA review.

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Date: 11/23/21

SECTION 2

ANALYTICAL RESULTS

Lab Sample ID	WA28027-001
Sample Name	HS-PW-2.5 (A)
Sample Type	N
Sample Date	1/26/2021 11:30:00 AM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-	763051-92-9	Initial	5		35	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	Initial	5		35	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	Initial	5		35	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	Initial	5		35	ng/l	U	U	N	
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	Initial	5		35	ng/l	U	U	N	
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-	756426-58-1	Initial	5		35	ng/l	U	U	N	
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	Initial	5		35	ng/l	U	U	N	
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	Initial	5		35	ng/l	U	U	N	
	N-methylperfluoro-1-octanesulfonamidoacetic acid	2355-31-9	Initial	5		35	ng/l	U	U	N	
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	Initial	5		18	ng/l	U	U	N	
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	Initial	5		18	ng/l	U	U	N	
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	Initial	5		18	ng/l	U	U	N	
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	Initial	5		18	ng/l	U	U	N	
	Perfluorobutanoic Acid (PFBA)	375-22-4	Initial	5	21	18	ng/l			Y	
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	Initial	5		18	ng/l	U	U	N	
	Perfluorodecanoic acid (PFDA)	335-76-2	Initial	5		18	ng/l	U	U	N	
	Perfluorododecanoic acid (PFDoA)	307-55-1	Initial	5		18	ng/l	U	U	N	
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	Initial	5		18	ng/l	U	U	N	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	Initial	5		18	ng/l	U	U	N	
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	Initial	5	25	18	ng/l			Y	
	Perfluorohexanoic acid (PFHxA)	307-24-4	Initial	5	33	18	ng/l			Y	
	Perfluorononanoic acid (PFNA)	375-95-1	Initial	5		18	ng/l	U	U	N	
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Initial	5	820	18	ng/l		J	Y	LB
	Perfluorooctanoic acid (PFOA)	335-67-1	Initial	5	54	18	ng/l			Y	
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	Initial	5	27	18	ng/l			Y	

Lab Sample ID	WA28027-001
Sample Name	HS-PW-2.5 (A)
Sample Type	N
Sample Date	1/26/2021 11:30:00 AM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	Initial	5		18	ng/l	U	U	N	
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	Initial	5		18	ng/l	U	U	N	
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	Initial	5		18	ng/l	U	U	N	

Lab Sample ID	WA28027-002
Sample Name	HS-PW-2.5 (B)
Sample Type	N
Sample Date	1/26/2021 12:15:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-	763051-92-9	Initial	1		7.1	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	Initial	1		7.1	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	Initial	1		7.1	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	Initial	1		7.1	ng/l	U	U	N	
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	Initial	1		7.1	ng/l	U	U	N	
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-	756426-58-1	Initial	1		7.1	ng/l	U	U	N	
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	Initial	1		7.1	ng/l	U	U	N	
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	Initial	1		7.1	ng/l	U	U	N	
	N-methylperfluoro-1-octanesulfonamidoacetic acid	2355-31-9	Initial	1		7.1	ng/l	U	U	N	
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	Initial	1		3.5	ng/l	U	U	N	
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	Initial	1		3.5	ng/l	U	U	N	
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	Initial	1	5.6	3.5	ng/l			Y	
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	Initial	1	7.5	3.5	ng/l			Y	
	Perfluorobutanoic Acid (PFBA)	375-22-4	Initial	1	9.1	3.5	ng/l			Y	
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	Initial	1		3.5	ng/l	U	U	N	
	Perfluorodecanoic acid (PFDA)	335-76-2	Initial	1		3.5	ng/l	U	U	N	
	Perfluorododecanoic acid (PFDoA)	307-55-1	Initial	1		3.5	ng/l	U	U	N	
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	Initial	1	7.4	3.5	ng/l			Y	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	Initial	1	5.6	3.5	ng/l			Y	
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	Initial	1	20	3.5	ng/l			Y	
	Perfluorohexanoic acid (PFHxA)	307-24-4	Initial	1	15	3.5	ng/l			Y	
	Perfluorononanoic acid (PFNA)	375-95-1	Initial	1		3.5	ng/l	U	U	N	
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Initial	1	560	3.5	ng/l		J	Y	LB
	Perfluorooctanoic acid (PFOA)	335-67-1	Initial	1	25	3.5	ng/l			Y	
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	Initial	1	11	3.5	ng/l			Y	

Lab Sample ID	WA28027-002
Sample Name	HS-PW-2.5 (B)
Sample Type	N
Sample Date	1/26/2021 12:15:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	Initial	1		3.5	ng/l	U	U	N	
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	Initial	1		3.5	ng/l	U	U	N	
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	Initial	1		3.5	ng/l	U	U	N	

Lab Sample ID	WA28027-003
Sample Name	HS-PW-3 (A)
Sample Type	N
Sample Date	1/26/2021 2:30:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-	763051-92-9	Initial	5		37	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	Initial	5		37	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	Initial	5		37	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	Initial	5		37	ng/l	U	U	N	
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	Initial	5		37	ng/l	U	U	N	
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-	756426-58-1	Initial	5		37	ng/l	U	U	N	
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	Initial	5		37	ng/l	U	U	N	
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	Initial	5		37	ng/l	U	U	N	
	N-methylperfluoro-1-octanesulfonamidoacetic acid	2355-31-9	Initial	5		37	ng/l	U	U	N	
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	Initial	5		19	ng/l	U	U	N	
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	Initial	5		19	ng/l	U	U	N	
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	Initial	5		19	ng/l	U	U	N	
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	Initial	5		19	ng/l	U	U	N	
	Perfluorobutanoic Acid (PFBA)	375-22-4	Initial	5	21	19	ng/l			Y	
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	Initial	5		19	ng/l	U	U	N	
	Perfluorodecanoic acid (PFDA)	335-76-2	Initial	5		19	ng/l	U	U	N	
	Perfluorododecanoic acid (PFDoA)	307-55-1	Initial	5		19	ng/l	U	U	N	
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	Initial	5	19	19	ng/l			Y	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	Initial	5		19	ng/l	U	U	N	
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	Initial	5	28	19	ng/l			Y	
	Perfluorohexanoic acid (PFHxA)	307-24-4	Initial	5	41	19	ng/l			Y	
	Perfluorononanoic acid (PFNA)	375-95-1	Initial	5		19	ng/l	U	U	N	
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Initial	5	900	19	ng/l		J	Y	LB
	Perfluorooctanoic acid (PFOA)	335-67-1	Initial	5	77	19	ng/l			Y	
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	Initial	5	23	19	ng/l			Y	

Lab Sample ID	WA28027-003
Sample Name	HS-PW-3 (A)
Sample Type	N
Sample Date	1/26/2021 2:30:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	Initial	5		19	ng/l	U	U	N	
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	Initial	5		19	ng/l	U	U	N	
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	Initial	5		19	ng/l	U	U	N	

Lab Sample ID	WA28027-004
Sample Name	HS-PW-3 (A) DUP
Sample Type	N
Sample Date	1/26/2021 2:30:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-	763051-92-9	Initial	5		35	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	Initial	5		35	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	Initial	5		35	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	Initial	5		35	ng/l	U	U	N	
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	Initial	5		35	ng/l	U	U	N	
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-	756426-58-1	Initial	5		35	ng/l	U	U	N	
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	Initial	5		35	ng/l	U	U	N	
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	Initial	5		35	ng/l	U	U	N	
	N-methylperfluoro-1-octanesulfonamidoacetic acid	2355-31-9	Initial	5		35	ng/l	U	U	N	
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	Initial	5		17	ng/l	U	U	N	
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	Initial	5		17	ng/l	U	U	N	
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	Initial	5		17	ng/l	U	U	N	
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	Initial	5		17	ng/l	U	U	N	
	Perfluorobutanoic Acid (PFBA)	375-22-4	Initial	5	20	17	ng/l			Y	
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	Initial	5		17	ng/l	U	U	N	
	Perfluorodecanoic acid (PFDA)	335-76-2	Initial	5		17	ng/l	U	U	N	
	Perfluorododecanoic acid (PFDoA)	307-55-1	Initial	5		17	ng/l	U	U	N	
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	Initial	5	18	17	ng/l			Y	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	Initial	5		17	ng/l	U	U	N	
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	Initial	5	26	17	ng/l			Y	
	Perfluorohexanoic acid (PFHxA)	307-24-4	Initial	5	38	17	ng/l			Y	
	Perfluorononanoic acid (PFNA)	375-95-1	Initial	5		17	ng/l	U	U	N	
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Initial	5	900	17	ng/l		J	Y	LB
	Perfluorooctanoic acid (PFOA)	335-67-1	Initial	5	71	17	ng/l			Y	
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	Initial	5	22	17	ng/l			Y	

Lab Sample ID	WA28027-004
Sample Name	HS-PW-3 (A) DUP
Sample Type	N
Sample Date	1/26/2021 2:30:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	Initial	5		17	ng/l	U	U	N	
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	Initial	5		17	ng/l	U	U	N	
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	Initial	5		17	ng/l	U	U	N	

Lab Sample ID	WA28027-005
Sample Name	HS-PW-3.5 (A)
Sample Type	N
Sample Date	1/26/2021 3:40:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-	763051-92-9	Initial	1		7.2	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	Initial	1		7.2	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	Initial	1		7.2	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	Initial	1		7.2	ng/l	U	U	N	
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	Initial	1		7.2	ng/l	U	U	N	
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-	756426-58-1	Initial	1		7.2	ng/l	U	U	N	
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	Initial	1		7.2	ng/l	U	U	N	
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	Initial	1		7.2	ng/l	U	U	N	
	N-methylperfluoro-1-octanesulfonamidoacetic acid	2355-31-9	Initial	1		7.2	ng/l	U	U	N	
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	Initial	1		3.6	ng/l	U	U	N	
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	Initial	1		3.6	ng/l	U	U	N	
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	Initial	1	17	3.6	ng/l			Y	
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	Initial	1	32	3.6	ng/l			Y	
	Perfluorobutanoic Acid (PFBA)	375-22-4	Initial	1	9.5	3.6	ng/l			Y	
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	Initial	1		3.6	ng/l	U	U	N	
	Perfluorodecanoic acid (PFDA)	335-76-2	Initial	1		3.6	ng/l	U	U	N	
	Perfluorododecanoic acid (PFDoA)	307-55-1	Initial	1		3.6	ng/l	U	U	N	
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	Initial	1		3.6	ng/l	U	U	N	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	Initial	1	7.2	3.6	ng/l			Y	
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	Initial	1	19	3.6	ng/l			Y	
	Perfluorohexanoic acid (PFHxA)	307-24-4	Initial	1	12	3.6	ng/l			Y	
	Perfluorononanoic acid (PFNA)	375-95-1	Initial	1		3.6	ng/l	U	U	N	
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Initial	1	92	3.6	ng/l		J	Y	LB
	Perfluorooctanoic acid (PFOA)	335-67-1	Initial	1	21	3.6	ng/l			Y	
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	Initial	1	6	3.6	ng/l			Y	

Lab Sample ID	WA28027-005
Sample Name	HS-PW-3.5 (A)
Sample Type	N
Sample Date	1/26/2021 3:40:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	Initial	1		3.6	ng/l	U	U	N	
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	Initial	1		3.6	ng/l	U	U	N	
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	Initial	1		3.6	ng/l	U	U	N	

Lab Sample ID	WA28027-006
Sample Name	FB-1/26
Sample Type	FB
Sample Date	1/26/2021 3:50:00 PM
Sample Matrix	WQ
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-	763051-92-9	Initial	1		7.4	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	Initial	1		7.4	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	Initial	1		7.4	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	Initial	1		7.4	ng/l	U	U	N	
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	Initial	1		7.4	ng/l	U	U	N	
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-	756426-58-1	Initial	1		7.4	ng/l	U	U	N	
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	Initial	1		7.4	ng/l	U	U	N	
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	Initial	1		7.4	ng/l	U	U	N	
	N-methylperfluoro-1-octanesulfonamidoacetic acid	2355-31-9	Initial	1		7.4	ng/l	U	U	N	
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	Initial	1		3.7	ng/l	U	U	N	
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	Initial	1		3.7	ng/l	U	U	N	
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	Initial	1		3.7	ng/l	U	U	N	
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	Initial	1		3.7	ng/l	U	U	N	
	Perfluorobutanoic Acid (PFBA)	375-22-4	Initial	1		3.7	ng/l	U	U	N	
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	Initial	1		3.7	ng/l	U	U	N	
	Perfluorodecanoic acid (PFDA)	335-76-2	Initial	1		3.7	ng/l	U	U	N	
	Perfluorododecanoic acid (PFDoA)	307-55-1	Initial	1		3.7	ng/l	U	U	N	
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	Initial	1		3.7	ng/l	U	U	N	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	Initial	1		3.7	ng/l	U	U	N	
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	Initial	1		3.7	ng/l	U	U	N	
	Perfluorohexanoic acid (PFHxA)	307-24-4	Initial	1		3.7	ng/l	U	U	N	
	Perfluorononanoic acid (PFNA)	375-95-1	Initial	1		3.7	ng/l	U	U	N	
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Initial	1		3.7	ng/l	U	U	N	
	Perfluorooctanoic acid (PFOA)	335-67-1	Initial	1		3.7	ng/l	U	U	N	
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	Initial	1		3.7	ng/l	U	U	N	

Lab Sample ID	WA28027-006
Sample Name	FB-1/26
Sample Type	FB
Sample Date	1/26/2021 3:50:00 PM
Sample Matrix	WQ
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	Initial	1		3.7	ng/l	U	U	N	
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	Initial	1		3.7	ng/l	U	U	N	
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	Initial	1		3.7	ng/l	U	U	N	

Lab Sample ID	WA28027-007
Sample Name	EB-HT
Sample Type	EB
Sample Date	1/26/2021 5:05:00 PM
Sample Matrix	WH
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-	763051-92-9	Initial	1		8.1	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	Initial	1		8.1	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	Initial	1		8.1	ng/l	U	U	N	
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	Initial	1		8.1	ng/l	U	U	N	
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	Initial	1		8.1	ng/l	U	U	N	
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-	756426-58-1	Initial	1		8.1	ng/l	U	U	N	
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	Initial	1		8.1	ng/l	U	U	N	
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	Initial	1		8.1	ng/l	U	U	N	
	N-methylperfluoro-1-octanesulfonamidoacetic acid	2355-31-9	Initial	1		8.1	ng/l	U	U	N	
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	Initial	1		4	ng/l	U	U	N	
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	Initial	1		4	ng/l	U	U	N	
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	Initial	1		4	ng/l	U	U	N	
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	Initial	1		4	ng/l	U	U	N	
	Perfluorobutanoic Acid (PFBA)	375-22-4	Initial	1		4	ng/l	U	U	N	
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	Initial	1		4	ng/l	U	U	N	
	Perfluorodecanoic acid (PFDA)	335-76-2	Initial	1		4	ng/l	U	U	N	
	Perfluorododecanoic acid (PFDoA)	307-55-1	Initial	1		4	ng/l	U	U	N	
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	Initial	1		4	ng/l	U	U	N	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	Initial	1		4	ng/l	U	U	N	
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	Initial	1		4	ng/l	U	U	N	
	Perfluorohexanoic acid (PFHxA)	307-24-4	Initial	1		4	ng/l	U	U	N	
	Perfluorononanoic acid (PFNA)	375-95-1	Initial	1		4	ng/l	U	U	N	
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Initial	1		4	ng/l	U	U	N	
	Perfluorooctanoic acid (PFOA)	335-67-1	Initial	1		4	ng/l	U	U	N	
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	Initial	1		4	ng/l	U	U	N	

Lab Sample ID	WA28027-007
Sample Name	EB-HT
Sample Type	EB
Sample Date	1/26/2021 5:05:00 PM
Sample Matrix	WH
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	Initial	1		4	ng/l	U	U	N	
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	Initial	1		4	ng/l	U	U	N	
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	Initial	1		4	ng/l	U	U	N	

SECTION 3

DATA SUPPORT DOCUMENTATION

ENVIRONMENTAL STANDARDS

HI-RES AND PFAS ORGANIC ANALYSIS SUPPORT DOCUMENTATION

Client Name:	WWW	EnvStd Project Manager:	Jared A
Site/Project Name:	Groundwater Surface Water Interface Area	Reviewed by:	Jared A
Job Number/Task/Subtask:	20219475.A000/00007/01	Approved by:	Meg M
Laboratory/Location:	Pace SC	Completion Date:	5/2021
SDG:	WA28027	Validation Level:	L4
Sample Collection Dates:	1/26/21		

The following table indicates criteria that were examined, the identified problems, and support documentation attachments.

	Criteria Examined in Detail **Note:** All items examined have been included in the Support Document unless otherwise noted.							Problems Identified						
	Check (√) if Yes or Footnote Letter for Comments Below													
Parameter/ Method	PFAS							PFAS						
Condition Upon Receipt	X													
Sample Preservation	X													
Holding Times	X													
Blank Analysis Results	X													
Laboratory Control Sample/Laboratory Fortified Blank/ On-going Precision and Recovery Standard	X													
Surrogates														
PFAS Pre-Extraction Internal Standards	X													
Laboratory Duplicate														
Field Duplicate	X													
Matrix Spike/Matrix Spike Duplicate	X													
Sample Preparation	X													
Mass Tuning	X													
Initial Calibration	X													
Second-Source Calibration Verification	X													
PFAS Signal Suppression Check	X													
Peak Asymmetry	X													
Continuing Calibrations	X													
Resolution Check Standards	X													
Detection Limit/Sensitivity	X													
Post-Extraction Internal Standards														
Quantitation of Results	X													
Linear/Branched Identification/Quantitation	X							X						
Qualitative Identification	X													
2,3,7,8-TCDD – 2nd column confirmation														
PFAS Ion Transition Ratio/Hi-Res Ion Ratio	X													
Hi-Res Lock Mass Monitoring														
Dioxin/Furan Chlorodiphenyl Ethers Monitoring														
Analytical Sequence	X													
Percent Solids														
Deliverable was Complete	X													
Others:														

Comments: Qualitative Identification and Quantitation of Results are not included in the Support Documentation unless a problem was identified.

WWW Data Package Deliverable Checklist
Pace SC EPA 537 MOD ID

Reviewer: JKA	Laboratory:			Project: Groundwater Surface Water Interface Area
Date of Review: 5/2021	Pace SC			SDG#: WA28027
Items	**YES**	**NO**	**N/A**	**Comments**
1. Laboratory Case Narrative	X			
2. Chain-of-Custody	X			
3. Sample Receipt Checklist	X			
4. Sample Results Summary (Form 1)	X			
A. Sample Raw Data	X			
B. Correct Reporting Limits?		X		Evaluated to historically reported LOQs
C. All analytes requested are reported?	X			
5. Surrogate (Pre-Extraction Internal Standard) Summary (Form 2)	X			
A. Correct Recovery Limits?		X		Evaluated to historically reported recovery limits
6. MS/MSD Summary (Form 3A)	X			
A. MS/MSD Raw Data	X			
B. Correct MS/MSD Recovery and RPD Limits?		X		Evaluated to historically reported recovery limits
4. LCS/LCSD Summary (Form 3B)	X			
A. LCS/LCSD Raw Data	X			
B. Correct LCS/LCSD Recovery and RPD Limits?		X		Evaluated to historically reported recovery limits
5. Blank Summary and Association (Form 4)	X			
A. Blank Raw Data	X			
6. Internal Standard Summary (Form 8)			X	Laboratory no longer provides (see Case Narrative)
A. Correct Internal Standard Limits?			X	
7. Initial Calibration Summary - Target Analytes	X			
A. Initial Calibration Summary - Surrogates	X			
B. Initial Calibration Raw Data	X			
C. Qualitative Linear/Branched PFOA Standard Raw Data	X			
8. Initial Calibration Verification Summary	X			
A. Initial Calibration Verification Raw Data	X			
9. Continuing Calibration Verification Summary	X			
A. Daily Instrument Sensitivity Check	X			
B. Continuing Calibration Verification Raw Data	X			
10. Tune Data	X			
11. Instrument Blank Raw Data	X			
12. Analytical Sequence Logs	X			
13. Extraction Logs	X			
14. Percent Solids Raw Data			X	
15. Standard Preparation Sheets	X			
16. Certificates of Analysis	X			
17. Other				

BLANK ANALYSIS RESULTS FOR ORGANIC PARAMETERS

Fraction	Matrix (Aq., S)	Blank Type (1)	Blank Sample ID	Contaminant	Concentration ng/L	Qualification limit	
						5×	10×
PFAS			all WA28027 blanks	none			

1 - MB = Method Blank; TB = Trip Blank; EB = Equipment Blank; FB = Field Blank; IB = Instrument Blank; RB = Rinse Blank

Notes: _____

** Columns G and H contains formulas

ENVIRONMENTAL STANDARDS, INC.
EVALUATION OF DUPLICATE RESULTS

Matrix: (•) Aqueous ( ) Non-aq.
Reporting Level: (•) MDL ( ) QL
Units: ng/L

PRECISION OBJECTIVES:
If Both Results ≥ 5 × Their QL, RPD ≤: 30
If Either Result < 5 × Its QL, Dif. ≤: 1.0 **× Highest QL**

Sample ID:	HS-PW-3 (A)				**Duplicate Sample ID:**	HS-PW-3 (A) DUP					
Analyte	**Sample Concentration**	**Qual**	**QL**	**MDL**	**Duplicate Concentration**	**Qual**	**QL**	**MDL**	**Difference**	**RPD**	**Flag**
PFHpS	19		19	NA	18		17	NA	1	NA	
PFHxS	28		19	NA	26		17	NA	2	NA	
PFBA	21		19	NA	20		17	NA	1	NA	
PFHxA	41		19	NA	38		17	NA	3	NA	
PFOA	77		19	NA	71		17	NA	6	NA	
PFPeA	23		19	NA	22		17	NA	1	NA	
PFOS	900		19	NA	900		17	NA	NA	0%	

NOTES:

Qual: Qualifier(s) based on evaluation(s) other than Total/ vs. Dissolved comparison, if applicable (J, U, U* or B)
RPD: Relative Percent Difference
QL: Quantitation Limit
MDL: Method Detection Limit
RL: Reporting Limit. RL = QL for QL reporting and MDL for MDL reporting
J: The analyte concentration should be considered estimated
U: The analyte was not detected in the sample at or above the RL indicated. The RL will be used for comparison purposes.
UJ: The analyte was not detected in the sample at or above the Reporting Limit Indicated. The RL is approximate.
R: The analyte was analyzed for and detected, but sample results are unreliable. The presence or absence of the analyte cannot be verified.
UR: The analyte was analyzed for and not detected, but the determination that the analyte was not present in the sample is unreliable. The presence or absence of the analyte cannot be verified.
U* The result was blank qualified. The RL will be used for comparison purposes.
NA: The MDL (for QL reporting), RPD or Difference is not applicable

Comments:

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-001
Description: HS-PW-2.5 (A)
Matrix: Aqueous
Date Sampled: 01/26/2021 1130
Date Received: 01/28/2021

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	5	02/08/2021 2027	JJG	02/04/2021 1209	81803

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		35	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		35	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		35	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		35	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		35	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		35	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		35	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		35	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		35	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		18	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	25	✓	18	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	21	✓	18	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	33		18	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	54		18	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	27		18	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		18	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		18	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	820	J LB	18	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		97	25-150
13C2_6:2FTS		90	25-150
13C2_8:2FTS		102	25-150
13C2_PFDoA		94	25-150
13C2_PFTeDA		91	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		100	25-150
13C3-HFPO-DA		101	25-150
13C4_PFBA		99	25-150
13C4_PFHpA		98	25-150
13C5_PFHxA		97	25-150
13C5_PFPeA		98	25-150
13C6_PFDA		92	25-150
13C7_PFUdA		97	25-150

all "surrogate" results evaluated 50-150 as historically reported. all acceptable

6:2 FTS, 8:2 FTS, and PFOA LOQs are twice that of historically reported LOQs. The data reviewer confirmed in the raw data that this increase of LOQ had no impact, as the samples had no positive results for the compounds, or the result of the compound was greater than the LOQ.

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-001
Description: HS-PW-2.5 (A)
Matrix: Aqueous
Date Sampled: 01/26/2021 1130
Date Received: 01/28/2021

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		103	25-150
13C8_PFOS		92	25-150
13C8_PFOSA		97	10-150
13C9_PFNA		93	25-150
d5-EtFOSAA		96	25-150
d3-MeFOSAA		100	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File:	\\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821053.d		
Injection Date:	08-Feb-2021 20:27:25	Injection Vol:	10.0 uL
Sample Type:	Client	Auto Sampler:	46
Lab Sample ID:	WA28027-001	Lab Prep. Batch:	81803
Client ID:	HS-PW-2.5 (A)	Sample Group:	WA28027
Sample Info:	WA28027-001,5	Misc. Info:	
Inst. ID:	LCMSMS02	Operator:	Stephen E. Somerville
Method Name:	LCMSMS02_PFAS-ID	Version:	2020-09-22 16:12:14
Calib Method:	PFAS-ID	Lock State:	Unlocked
Quant Method:	IsoDil	Integrator:	picker
Final Conc.:	Amt * DF * CF	Matrix/Level:	Aqueous

Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0354610

Name	Value	Units	Description
DF	5		Dilution Factor
VF	10000	ul	Final Volume
VI	282	ml	Initial Sample Volume
AlsDf	1		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.731	1.742	0	625857	24	>100:1			1100.00	937.72	99.4	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													
212.9 > 168.9	46	1.737	1.742	0/0	69617	23	31:1			119.21	21.137		
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.120	2.119	1	595561	17	>100:1			1100.00	940.18	98.4	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													
262.9 > 218.9	50	2.130	2.119	1/0	83471	17	26:1			150.07	26.608		
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.183	2.182	1	186325	20	>100:1			1100.00	973.90	95.8	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													J
298.9 > 80	44	2.183	2.182	1/0	11609	19	56:1	Target = 3.82	✓	57.595	10.212		
298.9 > 99	44	2.172	2.182		4155	19	15:1	2.79 (1.91-5.73)					
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													J
349 > 80	44	2.505	2.513	0/-1	4873	24	30:1	Target = 3.03	✓	34.244	6.0716		
349 > 99	44	2.496	2.513		1771	13	9.5:1	2.75 (1.51-4.54)					
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.442	2.441	1	103793	20	>100:1			5500.00	4664.51	96.8	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.441		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.478	2.477	1	671099	19	>100:1			1100.00	973.61	96.9	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													
313 > 269	49	2.478	2.477	1/0	114049	20	>100:1	Target = 18.18	✓	186.71	33.105		
313 > 119	49	2.478	2.477		5692	18	56:1	20.03 (9.09-27.28)					
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.583	2.590	0	1211721	21	>100:1			5500.00	5024.88	101	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.590		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.837	2.845	0	519891	20	>100:1			1100.00	987.03	97.7	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													J
363 > 319	47	2.837	2.836	1/1	39181	19	39:1	Target = 3.91		76.773	13.612		
363 > 169	47	2.837	2.836		9371	16	31:1	4.18 (1.95-5.86)					
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.855	2.863	0	135808	21	>100:1			1100.00	1025.02	99.8	
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													
399 > 80	45	2.855	2.854	1/1	19354	30	>100:1	Target = 3.01	0.11	140.15	24.849		
399 > 99	45	2.855	2.854		5650	27	38:1	3.42 (1.50-4.52)	0.05				
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.880		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													J
449 > 80	45	3.223	3.229	0/0	7505	22	19:1	Target = 3.08		63.332	11.229		
449 > 99	45	3.216	3.229		2194	14	14:1	3.42 (1.54-4.63)					
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.189	3.202	0	77330	24	>100:1			5500.00	4607.76	90.3	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.195		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.216	3.222	0	540156	24	>100:1			1100.00	1047.72	103	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.216	3.222	0/0	157384	35	60:1	Target = 3.13	0.12	303.69	53.846		M
413 > 169	53	3.209	3.222		53137	39	>100:1	2.96 (1.56-4.70)	0.14				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.592	3.599	0	112188	23	>100:1			1100.00	972.02	91.7	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													
499 > 80	54	3.592	3.599	0/0	614297	59	>100:1	Target = 3.63	0.89	4608.18	817.05		M
499 > 99	54	3.592	3.599		171660	38	>100:1	3.57 (1.81-5.45)	0.29				
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.817		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.939		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.257		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.405		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.600	3.607	0	633967	21	>100:1			1100.00	982.13	93.1	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.599		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.915	3.922	0	270964	19	>100:1			1100.00	1079.66	97.1	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.931		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.948	3.939	1	79976	19	>100:1			5500.00	4887.96	102	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.931		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		3.948	3.956	0	583644	19	>100:1			1100.00	970.46	91.7	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		3.956		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.109	4.108	1	678801	21	>100:1			5500.00	5231.71	99.8	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.108		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.258	4.267	0	539875	17				1100.00	998.97	96.6	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.267		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.258	4.257	1	580597	20	>100:1			5500.00	5320.28	96.2	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.267		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.528	4.528	1	555819	18				1100.00	1063.87	94.2	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.528		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.771		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		4.990	4.989	1	679105	21	>100:1			1100.00	924.62	90.8	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		4.989		ND								
*** 37 13C2_PFDA**													
515 > 470		3.948	3.956	0	709495	20	>100:1					106	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.478	2.477	1	748785	19	>100:1					113	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.216	3.222	0	635804	24	>100:1					115	
*** 43 13C3_PFBA**													
216 > 172		1.731	1.742	0	686550	24	>100:1					117	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.592	3.599	0	157227	20	>100:1					117	

Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

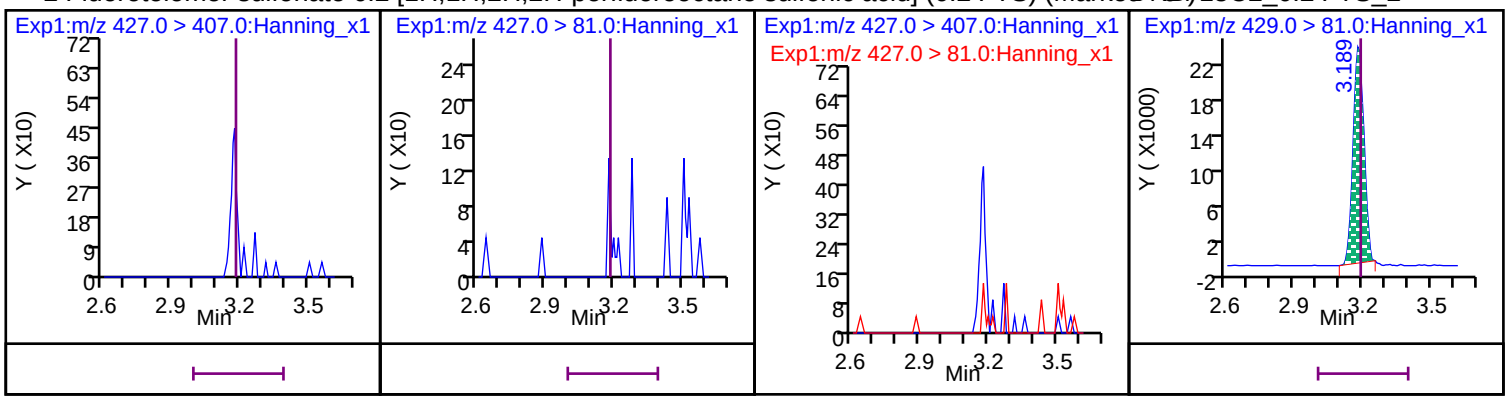
QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
M - Compound Hit/Peak Manually Integrated

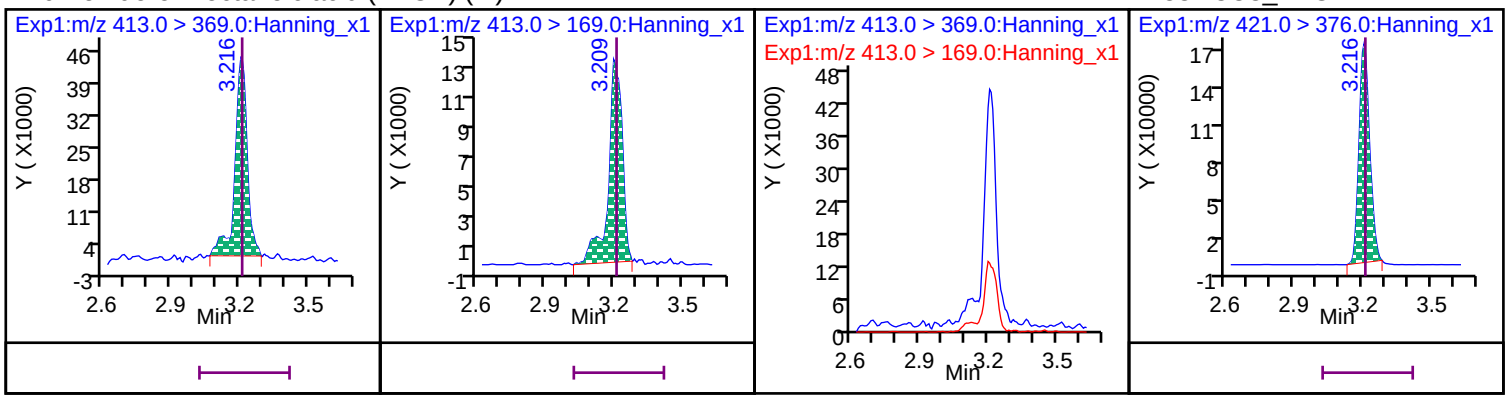
pre-injection IS summaries no longer provided (see Project Correspondence)

raw data is evaluated for project samples

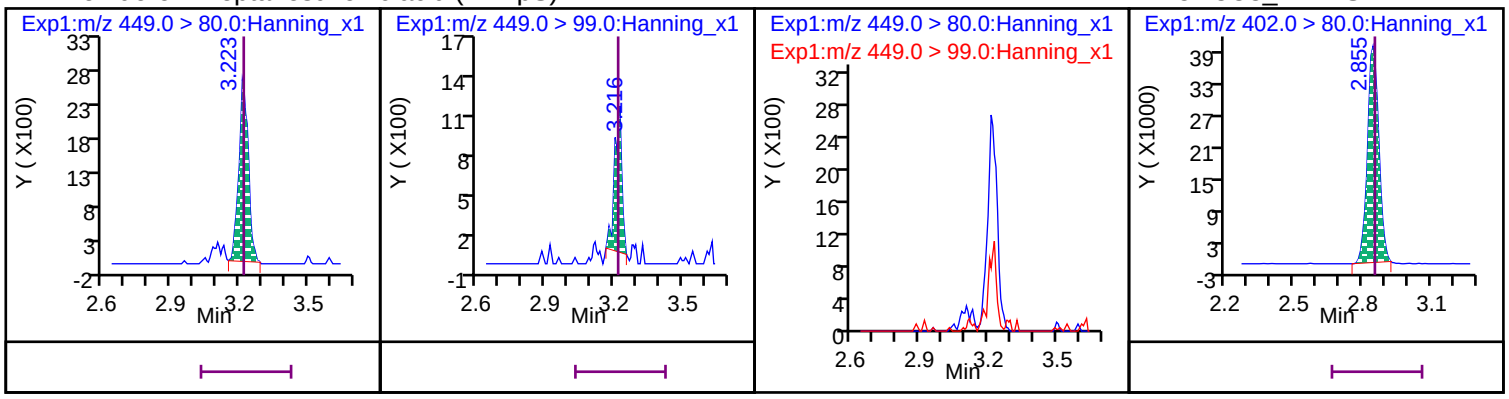
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) (Marked: M) D 64 13C2_6:2 FTS_2



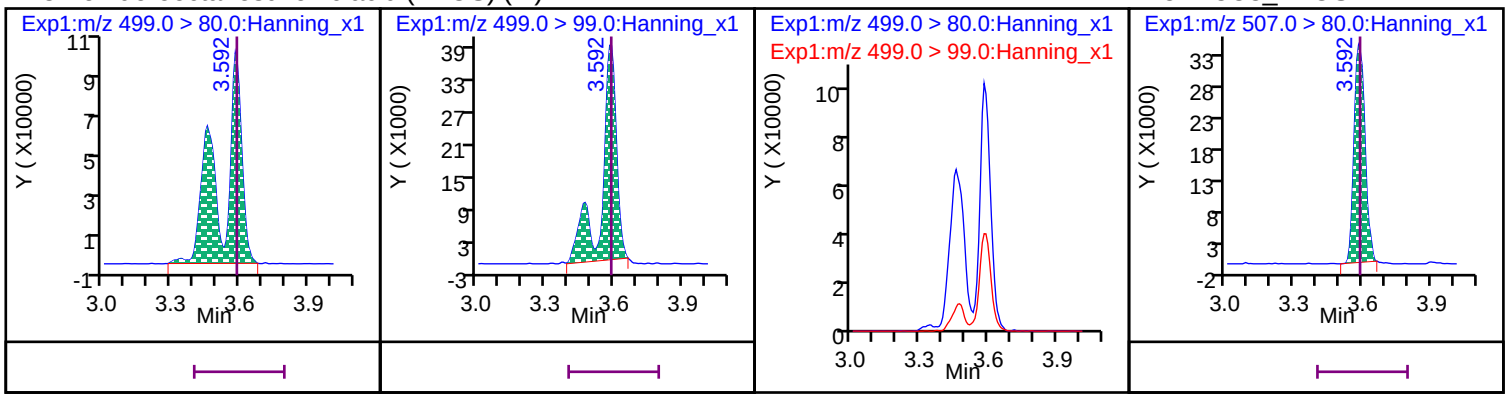
20 Perfluoro-n-octanoic acid (PFOA) (M) D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS) D 45 13C3_PFHxS



18 Perfluorooctanesulfonic acid (PFOS) (M) D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-002
Description: HS-PW-2.5 (B)
Matrix: Aqueous
Date Sampled: 01/26/2021 1215
Date Received: 01/28/2021

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	02/08/2021 2016	JJG	02/04/2021 1209	81803

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.1	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.1	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.1	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.1	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.1	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	7.5		3.5	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	7.4		3.5	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	5.6		3.5	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	20		3.5	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	9.1		3.5	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	5.6		3.5	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	15		3.5	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	25		3.5	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	11		3.5	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	560	J LB	3.5	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		107	25-150
13C2_6:2FTS		103	25-150
13C2_8:2FTS		110	25-150
13C2_PFDoA		97	25-150
13C2_PFTeDA		87	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		95	25-150
13C3-HFPO-DA		101	25-150
13C4_PFBA		96	25-150
13C4_PFHpA		105	25-150
13C5_PFHxA		101	25-150
13C5_PFPeA		105	25-150
13C6_PFDA		96	25-150
13C7_PFUdA		96	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
ND = Not detected at or above the LOQ
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
W = Reported on wet weight basis

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-002
Description: HS-PW-2.5 (B)
Matrix: Aqueous
Date Sampled: 01/26/2021 1215
Date Received: 01/28/2021

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		105	25-150
13C8_PFOS		85	25-150
13C8_PFOSA		94	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		92	25-150
d3-MeFOSAA		101	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

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Pace Environmental Services, LLC
Analyte Quantitation Report

Data File:	\\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821052.d		
Injection Date:	08-Feb-2021 20:16:48	Injection Vol:	10.0 uL
Sample Type:	Client	Auto Sampler:	45
Lab Sample ID:	WA28027-002	Lab Prep. Batch:	81803
Client ID:	HS-PW-2.5 (B)	Sample Group:	WA28027
Sample Info:	WA28027-002	Misc. Info:	
Inst. ID:	LCMSMS02	Operator:	Stephen E. Somerville
Method Name:	LCMSMS02_PFAS-ID	Version:	2020-09-22 16:12:14
Calib Method:	PFAS-ID	Lock State:	Unlocked
Quant Method:	IsoDil	Integrator:	picker
Final Conc.:	Amt * DF * CF	Matrix/Level:	Aqueous

Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0388304

Name	Value	Units	Description
DF	1		Dilution Factor
VF	10000	ul	Final Volume
VI	283	ml	Initial Sample Volume
AlsDf	0.91		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.731	1.742	0	604858	22	>100:1			1001.00	906.25	96.1	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													
212.9 > 168.9	46	1.737	1.742	0/0	145854	20	75:1			235.17	9.1318		
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.130	2.119	1	633294	16	>100:1			1001.00	999.74	105	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													
262.9 > 218.9	50	2.130	2.119	1/0	178881	13	33:1			275.22	10.687		M
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.183	2.182	1	186835	16	>100:1			1001.00	976.56	96.1	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													
298.9 > 80	44	2.183	2.182	1/0	42670	16	>100:1	Target = 3.82		192.12	7.4600		
298.9 > 99	44	2.183	2.182		11784	17	36:1	3.62 (1.91-5.73)					
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													
349 > 80	44	2.514	2.513	1/0	22516	17	>100:1	Target = 3.03		143.59	5.5758		
349 > 99	44	2.514	2.513		7936	19	30:1	2.83 (1.51-4.54)					
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.442	2.441	1	114433	17	>100:1			5005.00	5142.68	107	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.441		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.478	2.477	1	699216	18	>100:1			1001.00	1014.40	101	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													
313 > 269	49	2.478	2.477	1/0	269369	15	>100:1	Target = 18.18		385.17	14.956		M
313 > 119	49	2.478	2.477		12743	23	>100:1	21.13 (9.09-27.28)					
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.591	2.590	1	1212456	19	>100:1			5005.00	5027.93	101	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.590		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.837	2.845	0	560484	17	>100:1			1001.00	1064.09	105	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													
363 > 319	47	2.846	2.836	1/1	87267	16	66:1	Target = 3.91		144.34	5.6046		M
363 > 169	47	2.846	2.836		23305	22	>100:1	3.74 (1.95-5.86)					
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.855	2.863	0	128984	17	>100:1			1001.00	973.51	94.8	
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													
399 > 80	45	2.864	2.854	1/1	73781	24	>100:1	Target = 3.01	0.12	511.92	19.878		
399 > 99	45	2.855	2.854		23247	28	98:1	3.17 (1.50-4.52)	0.05				
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.880		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													
449 > 80	45	3.230	3.229	1/1	23539	29	22:1	Target = 3.08		190.32	7.3903		
449 > 99	45	3.237	3.229		8211	25	23:1	2.86 (1.54-4.63)					
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.196	3.202	0	88448	24	>100:1			5005.00	5270.24	103	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.195		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.223	3.222	1	550278	23	>100:1			1001.00	1067.35	105	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.223	3.222	1/0	367797	34	>100:1	Target = 3.13	0.16	633.96	24.617		
413 > 169	53	3.223	3.222		124056	35	>100:1	2.96 (1.56-4.70)	0.20				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.600	3.599	1	103997	20	>100:1			1001.00	901.05	85	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													
499 > 80	54	3.600	3.599	1/0	1941274	60	>100:1	Target = 3.63	0.69	14296	555.11		M
499 > 99	54	3.600	3.599		526293	39	>100:1	3.68 (1.81-5.45)	0.27				
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.817		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.939		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.257		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.405		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.608	3.607	1	639758	20	>100:1			1001.00	991.10	93.9	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.599		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.915	3.922	0	261798	20				1001.00	1043.14	93.8	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.931		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.948	3.939	1	86488	26	>100:1			5005.00	5285.96	110	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.931		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		3.948	3.956	0	609958	18	>100:1			1001.00	1014.21	95.9	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		3.956		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.109	4.108	1	689653	18	>100:1			5005.00	5315.35	101	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.108		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.268	4.267	1	538850	17	>100:1			1001.00	997.08	96.4	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.267		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.268	4.257	1	552777	18	>100:1			5005.00	5065.35	91.6	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.267		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.537	4.528	1	569438	17	>100:1			1001.00	1089.93	96.5	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.528		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.771		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		4.990	4.989	1	649333	22	>100:1			1001.00	884.09	86.8	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		4.989		ND								
*** 37 13C2_PFDA**													
515 > 470		3.957	3.956	1	791307	19						119	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.478	2.477	1	787851	17	>100:1					119	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.223	3.222	1	674946	24	>100:1					122	
*** 43 13C3_PFBA**													
216 > 172		1.737	1.742	0	687052	22	>100:1					117	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.600	3.599	1	150399	21	>100:1					112	

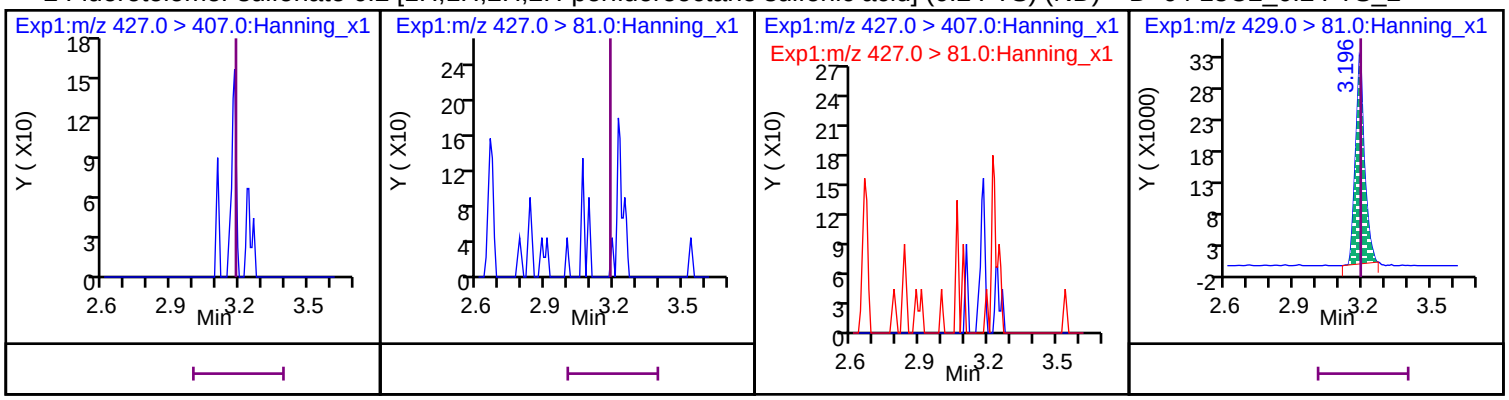
Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

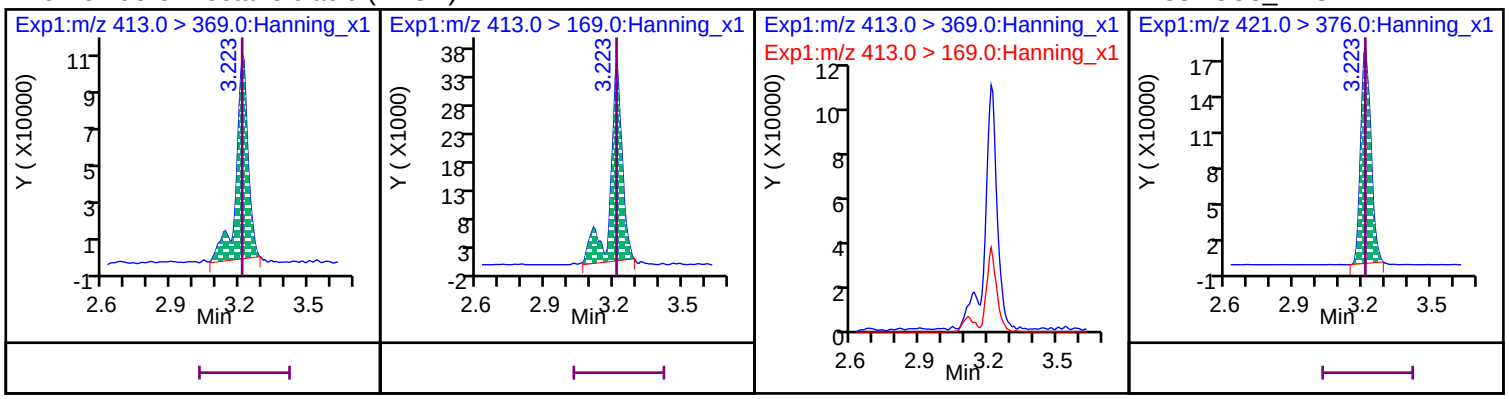
QC Flag Legend

U - Result Less Than Method Detection Limit
M - Compound Hit/Peak Manually Integrated

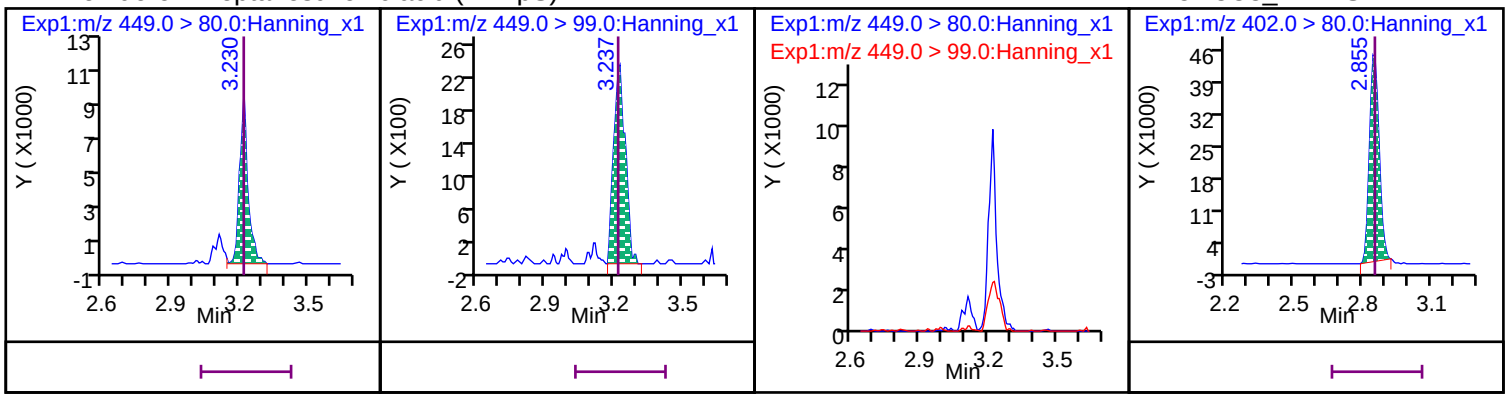
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) (ND) D 64 13C2_6:2 FTS_2



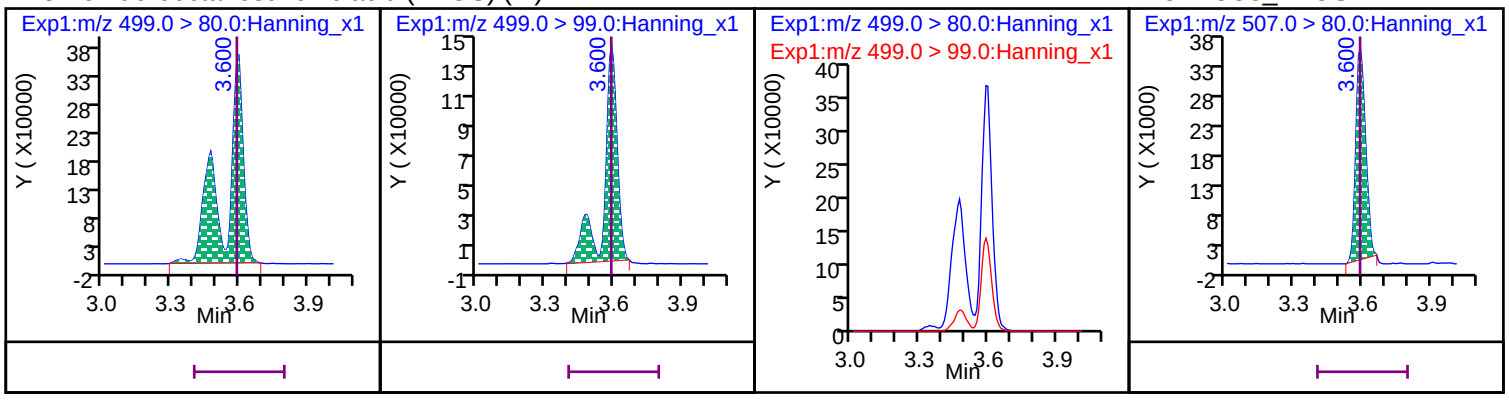
20 Perfluoro-n-octanoic acid (PFOA) D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS) D 45 13C3_PFHxS



18 Perfluorooctanesulfonic acid (PFOS) (M) D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-003
Description: HS-PW-3 (A)
Matrix: Aqueous
Date Sampled: 01/26/2021 1430
Date Received: 01/28/2021

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	5	02/08/2021 2038	JJG	02/04/2021 1209	81803

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		37	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		37	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		37	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		37	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		37	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		37	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		37	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		37	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		37	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	19		19	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		19	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	28		19	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	21		19	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	41		19	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	77		19	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	23		19	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		19	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		19	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	900	J LB	19	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		110	25-150
13C2_6:2FTS		108	25-150
13C2_8:2FTS		108	25-150
13C2_PFDoA		101	25-150
13C2_PFTeDA		97	25-150
13C3_PFBS		109	25-150
13C3_PFHxS		103	25-150
13C3-HFPO-DA		107	25-150
13C4_PFBA		108	25-150
13C4_PFHpA		106	25-150
13C5_PFHxA		103	25-150
13C5_PFPeA		112	25-150
13C6_PFDA		100	25-150
13C7_PFUdA		103	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-003
Description: HS-PW-3 (A)
Matrix: Aqueous
Date Sampled: 01/26/2021 1430
Date Received: 01/28/2021

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		109	25-150
13C8_PFOS		102	25-150
13C8_PFOSA		103	10-150
13C9_PFNA		104	25-150
d5-EtFOSAA		105	25-150
d3-MeFOSAA		110	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File:	\\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821054.d		
Injection Date:	08-Feb-2021 20:38:06	Injection Vol:	10.0 uL
Sample Type:	Client	Auto Sampler:	47
Lab Sample ID:	WA28027-003	Lab Prep. Batch:	81803
Client ID:	HS-PW-3 (A)	Sample Group:	WA28027
Sample Info:	WA28027-003,5	Misc. Info:	
Inst. ID:	LCMSMS02	Operator:	Stephen E. Somerville
Method Name:	LCMSMS02_PFAS-ID	Version:	2020-09-22 16:12:14
Calib Method:	PFAS-ID	Lock State:	Unlocked
Quant Method:	IsoDil	Integrator:	picker
Final Conc.:	Amt * DF * CF	Matrix/Level:	Aqueous

Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0370370

Name	Value	Units	Description
DF	5		Dilution Factor
VF	10000	ul	Final Volume
VI	270	ml	Initial Sample Volume
AlsDf	1		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.731	1.742	0	677291	23	>100:1			1100.00	1014.78	108	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													
212.9 > 168.9	46	1.737	1.742	0/0	70922	27	25:1			112.22	20.782		
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.120	2.119	1	680303	17	>100:1			1100.00	1073.95	112	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													
262.9 > 218.9	50	2.130	2.119	1/0	78484	14	22:1			123.52	22.875		M
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.183	2.182	1	211505	18	>100:1			1100.00	1105.51	109	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													J
298.9 > 80	44	2.183	2.182	1/0	13427	21	58:1	Target = 3.82	✓	58.684	10.867		
298.9 > 99	44	2.194	2.182		2999	18	9.2:1	4.47 (1.91-5.73)					
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													J
349 > 80	44	2.514	2.513	1/0	4610	17	33:1	Target = 3.03	✓	28.539	5.2850		
349 > 99	44	2.505	2.513		1641	22	14:1	2.80 (1.51-4.54)					
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.442	2.441	1	118054	20	>100:1			5500.00	5305.41	110	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.441		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.478	2.477	1	713634	19	>100:1			1100.00	1035.32	103	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													
313 > 269	49	2.478	2.477	1/0	144586	17	92:1	Target = 18.18	✓	222.60	41.222		M
313 > 119	49	2.469	2.477		7247	24	25:1	19.95 (9.09-27.28)					
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.591	2.590	1	1282864	22	>100:1			5500.00	5319.90	107	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.590		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.837	2.845	0	565823	21	>100:1			1100.00	1074.23	106	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													J
363 > 319	47	2.837	2.836	1/1	41208	17	60:1	Target = 3.91	✓	74.190	13.739		
363 > 169	47	2.846	2.836		13095	18	72:1	3.14 (1.95-5.86)					
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.855	2.863	0	139851	21	>100:1			1100.00	1055.53	103	
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													
399 > 80	45	2.855	2.854	1/1	21631	22	>100:1	Target = 3.01	✓	152.11	28.169		
399 > 99	45	2.855	2.854		7285	26	61:1	2.96 (1.50-4.52)					
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.880		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													
449 > 80	45	3.230	3.229	1/1	12339	23	28:1	Target = 3.08	✓	101.11	18.725		
449 > 99	45	3.223	3.229		4459	15	16:1	2.76 (1.54-4.63)					
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.196	3.202	0	92742	23	>100:1			5500.00	5526.10	108	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.195		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.216	3.222	0	566627	23	>100:1			1100.00	1099.06	109	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.216	3.222	0/0	226855	36	>100:1	Target = 3.13	✓ 0.10	417.30	77.277		M
413 > 169	53	3.216	3.222		73175	35	>100:1	3.10 (1.56-4.70)	0.17				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.592	3.599	0	124784	22	>100:1			1100.00	1081.15	102	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													
499 > 80	54	3.592	3.599	0/0	723126	57	>100:1	Target = 3.63	✓ 05	4877.00	903.15		M
499 > 99	54	3.600	3.599		195192	38	>100:1	3.70 (1.81-5.45)	0.36				
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.817		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.939		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.257		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.405		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.600	3.607	0	705862	24	>100:1			1100.00	1093.51	104	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.599		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.915	3.922	0	286844	21	>100:1			1100.00	1142.94	103	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.931		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.940	3.939	1	84824	20	>100:1			5500.00	5184.26	108	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.931		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		3.948	3.956	0	638022	20	>100:1			1100.00	1060.87	100	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		3.956		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.109	4.108	1	746072	18	>100:1			5500.00	5750.18	110	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.108		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.268	4.267	1	573353	16	>100:1			1100.00	1060.92	103	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.267		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.268	4.257	1	634293	18	>100:1			5500.00	5812.32	105	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.267		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.537	4.528	1	596598	18				1100.00	1141.92	101	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.528		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.771		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		4.990	4.989	1	723127	23	>100:1			1100.00	984.56	96.7	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		4.989		ND								
*** 37 13C2_PFDA**													
515 > 470		3.948	3.956	0	694456	20						104	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.478	2.477	1	703057	20	>100:1					106	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.216	3.222	0	594613	23	>100:1					107	
*** 43 13C3_PFBA**													
216 > 172		1.737	1.742	0	661527	23	>100:1					113	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.600	3.599	1	148662	22	>100:1					110	

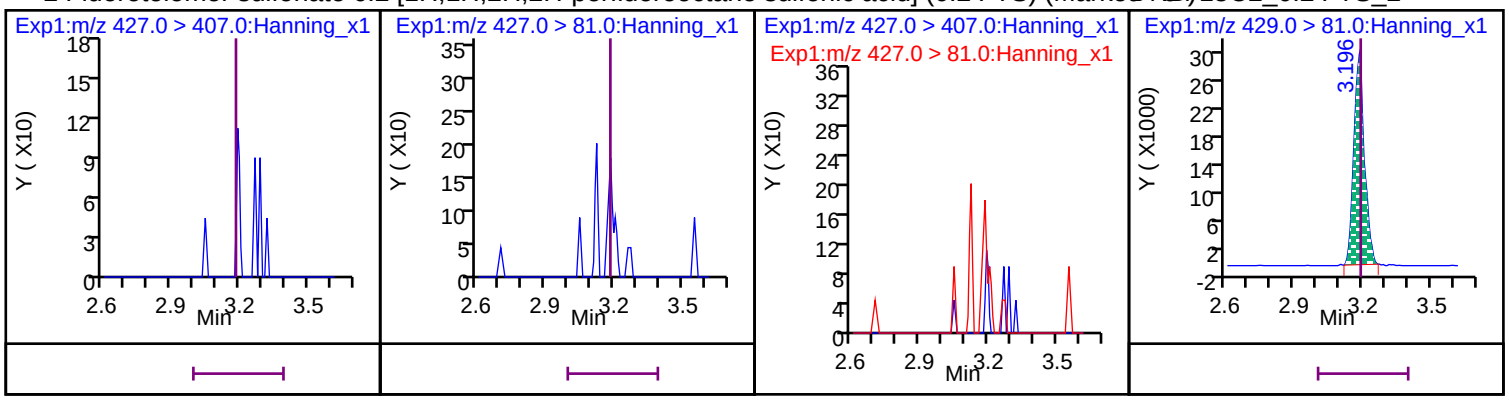
Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

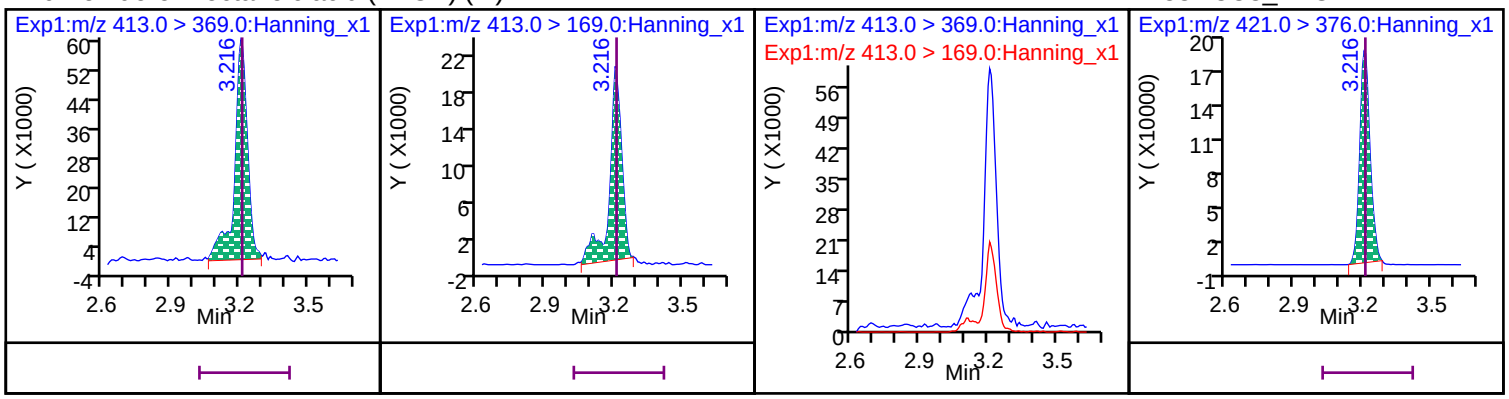
QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
M - Compound Hit/Peak Manually Integrated

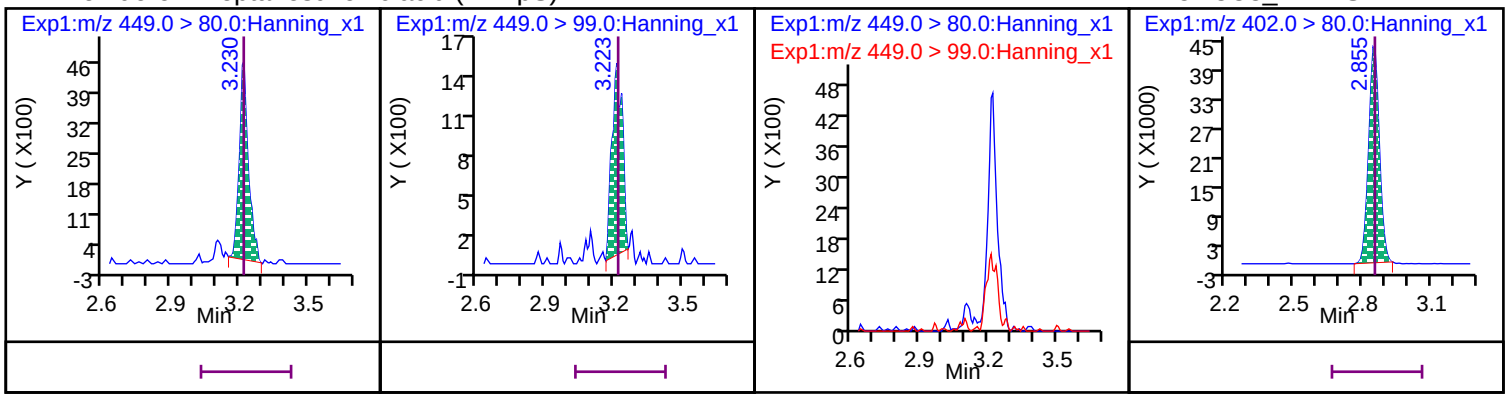
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) (Marked) D 52 13C2_6:2 FTS_2



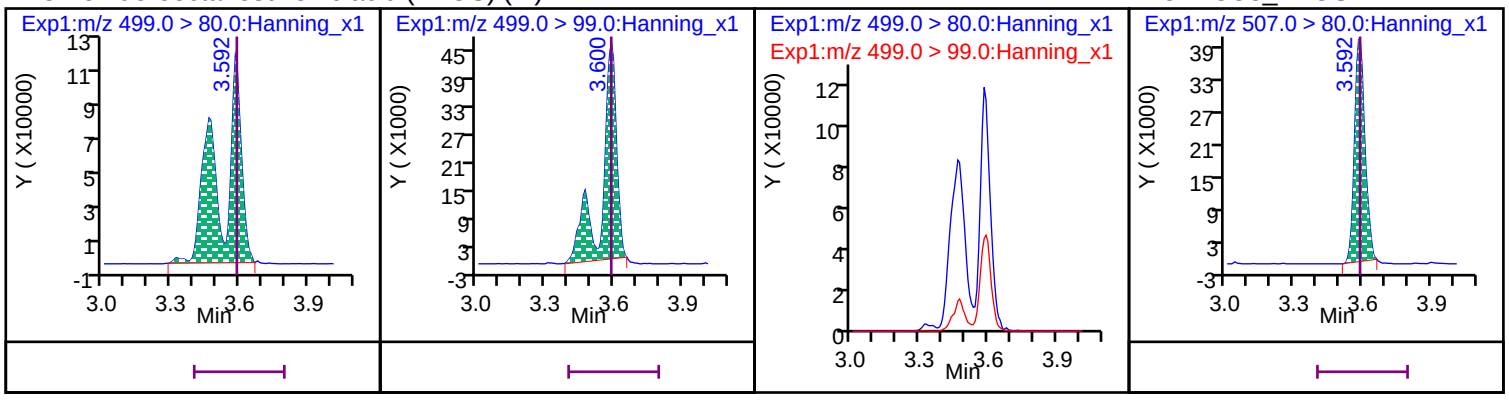
20 Perfluoro-n-octanoic acid (PFOA) (M) D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS) D 45 13C3_PFHxS



18 Perfluorooctanesulfonic acid (PFOS) (M) D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-004
Description: HS-PW-3 (A) DUP
Matrix: Aqueous
Date Sampled: 01/26/2021 1430
Date Received: 01/28/2021

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	5	02/08/2021 2048	JJG	02/04/2021 1209	81803

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		35	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		35	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		35	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		35	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		35	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		35	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		35	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		35	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		35	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	18		17	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		17	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	26		17	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	20		17	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	38		17	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	71		17	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	22		17	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		17	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		17	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	900	J LB	17	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		105	25-150
13C2_6:2FTS		92	25-150
13C2_8:2FTS		106	25-150
13C2_PFDoA		93	25-150
13C2_PFTeDA		95	25-150
13C3_PFBS		105	25-150
13C3_PFHxS		102	25-150
13C3-HFPO-DA		101	25-150
13C4_PFBA		104	25-150
13C4_PFHpA		99	25-150
13C5_PFHxA		96	25-150
13C5_PFPeA		103	25-150
13C6_PFDA		103	25-150
13C7_PFUdA		98	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
L = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

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PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-004
Description: HS-PW-3 (A) DUP
Matrix: Aqueous
Date Sampled: 01/26/2021 1430
Date Received: 01/28/2021

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		101	25-150
13C8_PFOS		95	25-150
13C8_PFOSA		97	10-150
13C9_PFNA		96	25-150
d5-EtFOSAA		91	25-150
d3-MeFOSAA		101	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

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Pace Environmental Services, LLC
Analyte Quantitation Report

Data File:	\\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821055.d		
Injection Date:	08-Feb-2021 20:48:46	Injection Vol:	10.0 uL
Sample Type:	Client	Auto Sampler:	48
Lab Sample ID:	WA28027-004	Lab Prep. Batch:	81803
Client ID:	HS-PW-3 (A) DUP	Sample Group:	WA28027
Sample Info:	WA28027-004,5	Misc. Info:	
Inst. ID:	LCMSMS02	Operator:	Stephen E. Somerville
Method Name:	LCMSMS02_PFAS-ID	Version:	2020-09-22 16:12:14
Calib Method:	PFAS-ID	Lock State:	Unlocked
Quant Method:	IsoDil	Integrator:	picker
Final Conc.:	Amt * DF * CF	Matrix/Level:	Aqueous

Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0347222

Name	Value	Units	Description
DF	5		Dilution Factor
VF	10000	ul	Final Volume
VI	288	ml	Initial Sample Volume
AlsDf	1		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.737	1.742	0	652617	23	>100:1			1100.00	977.81	104	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													
212.9 > 168.9	46	1.737	1.742	0/0	71773	24	30:1			117.86	20.462		
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.130	2.119	1	622135	17	>100:1			1100.00	982.13	103	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													
262.9 > 218.9	50	2.130	2.119	1/0	75278	14	21:1			129.56	22.492		M
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.183	2.182	1	203475	19	>100:1			1100.00	1063.54	105	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													J
298.9 > 80	44	2.183	2.182	1/0	12679	17	94:1	Target = 3.82	✓	57.602	10.000		
298.9 > 99	44	2.183	2.182		3965	18	12:1	3.19 (1.91-5.73)					
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													J
349 > 80	44	2.514	2.513	1/0	4225	13	32:1	Target = 3.03	✓	27.188	4.7201		M
349 > 99	44	2.505	2.513		1483	20	12:1	2.84 (1.51-4.54)					
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.442	2.441	1	112201	19	>100:1			5500.00	5042.37	105	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.441		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.478	2.477	1	664229	19	>100:1			1100.00	963.64	95.9	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													
313 > 269	49	2.478	2.477	1/0	133047	15	>100:1	Target = 18.18	✓	220.07	38.207		M
313 > 119	49	2.478	2.477		7280	18	55:1	18.27 (9.09-27.28)					
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.591	2.590	1	1213578	21	>100:1			5500.00	5032.58	101	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.590		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.837	2.845	0	526879	21	>100:1			1100.00	1000.29	99	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													J
363 > 319	47	2.846	2.836	1/1	37818	19	40:1	Target = 3.91	✓	73.119	12.694		
363 > 169	47	2.837	2.836		11394	21	73:1	3.31 (1.95-5.86)					
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.855	2.863	0	138245	20	>100:1			1100.00	1043.41	102	
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													
399 > 80	45	2.864	2.854	1/1	21028	23	>100:1	Target = 3.01	✓	149.59	25.970		M
399 > 99	45	2.864	2.854		6121	19	43:1	3.43 (1.50-4.52)	0.09				
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.880		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													
449 > 80	45	3.230	3.229	1/1	12656	21	21:1	Target = 3.08	✓	104.92	18.215		
449 > 99	45	3.223	3.229		3931	19	9.1:1	3.21 (1.54-4.63)					
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.196	3.202	0	79120	24	>100:1			5500.00	4714.42	92.4	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.195		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.216	3.222	0	528311	23	>100:1			1100.00	1024.74	101	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.216	3.222	0/0	207342	32	>100:1	Target = 3.13	✓ 0.12	409.06	71.018		M
413 > 169	53	3.216	3.222		72278	34	>100:1	2.86 (1.56-4.70)	0.12				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.600	3.599	1	115662	22	>100:1			1100.00	1002.11	94.6	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													
499 > 80	54	3.600	3.599	1/0	710170	58	>100:1	Target = 3.63	✓ 1.05	5167.37	897.11		M
499 > 99	54	3.600	3.599		187442	40	>100:1	3.78 (1.81-5.45)	0.40				
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.817		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.939		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.257		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.405		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.600	3.607	0	654017	23	>100:1			1100.00	1013.19	96	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.599		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.915	3.922	0	271734	19				1100.00	1082.73	97.4	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.931		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.949	3.939	1	83106	19	>100:1			5500.00	5079.26	106	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.931		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		3.957	3.956	1	654947	19	>100:1			1100.00	1089.02	103	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		3.956		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.109	4.108	1	686920	20	>100:1			5500.00	5294.28	101	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.108		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.268	4.267	1	546218	18	>100:1			1100.00	1010.71	97.7	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.267		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.268	4.257	1	545886	17	>100:1			5500.00	5002.20	90.5	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.267		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.538	4.528	1	550221	18	>100:1			1100.00	1053.15	93.3	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.528		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.771		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		4.990	4.989	1	711851	23	>100:1			1100.00	969.21	95.2	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		4.989		ND								
*** 37 13C2_PFDA**													
515 > 470		3.957	3.956	1	741192	19	>100:1					111	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.478	2.477	1	723710	21	>100:1					109	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.216	3.222	0	618574	24	>100:1					111	
*** 43 13C3_PFBA**													
216 > 172		1.737	1.742	0	676918	23	>100:1					115	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.600	3.599	1	144610	22	>100:1					107	

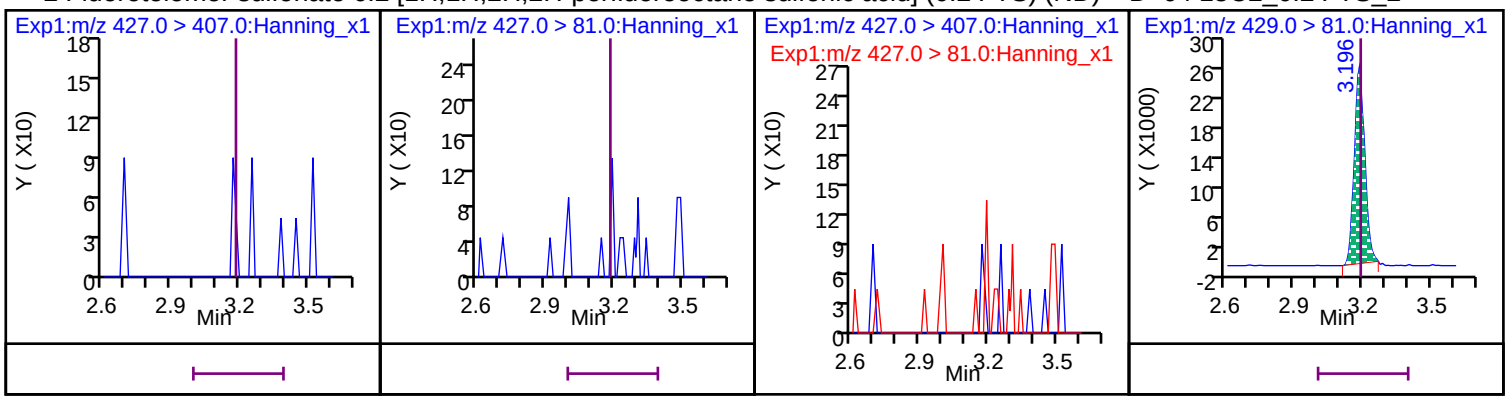
Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

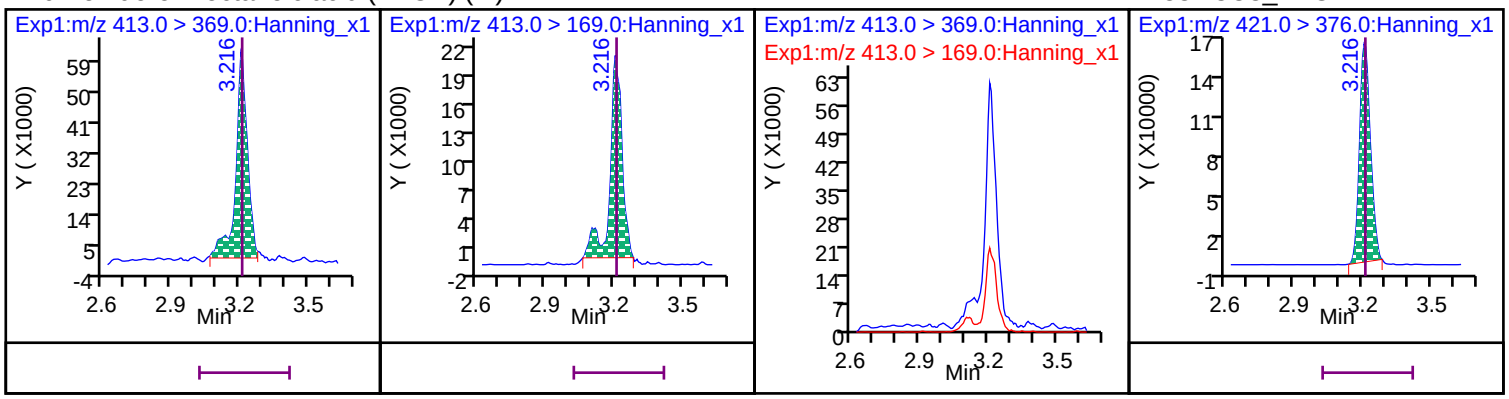
QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
M - Compound Hit/Peak Manually Integrated

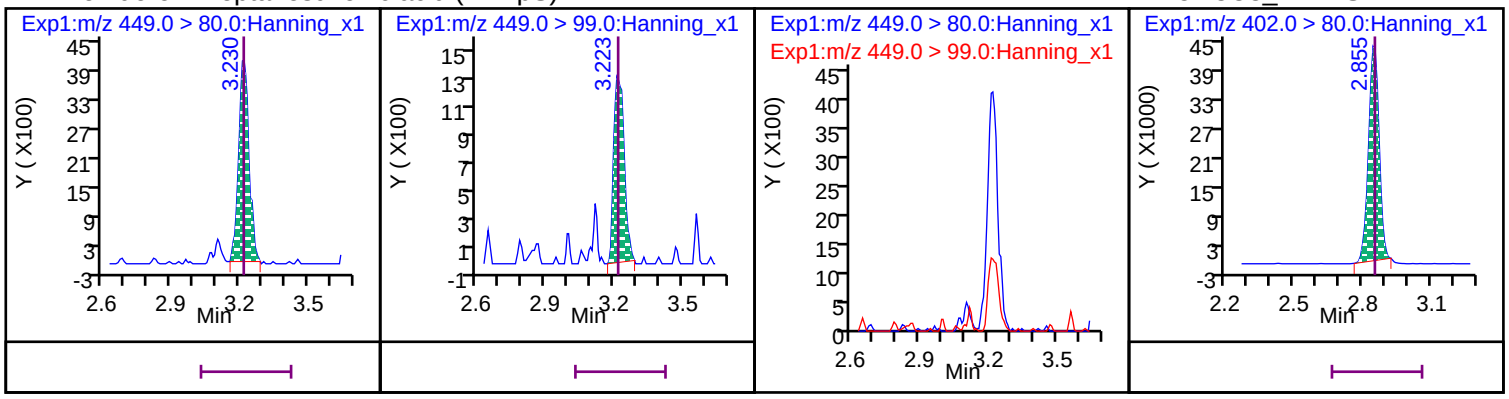
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) (ND) D 64 13C2_6:2 FTS_2



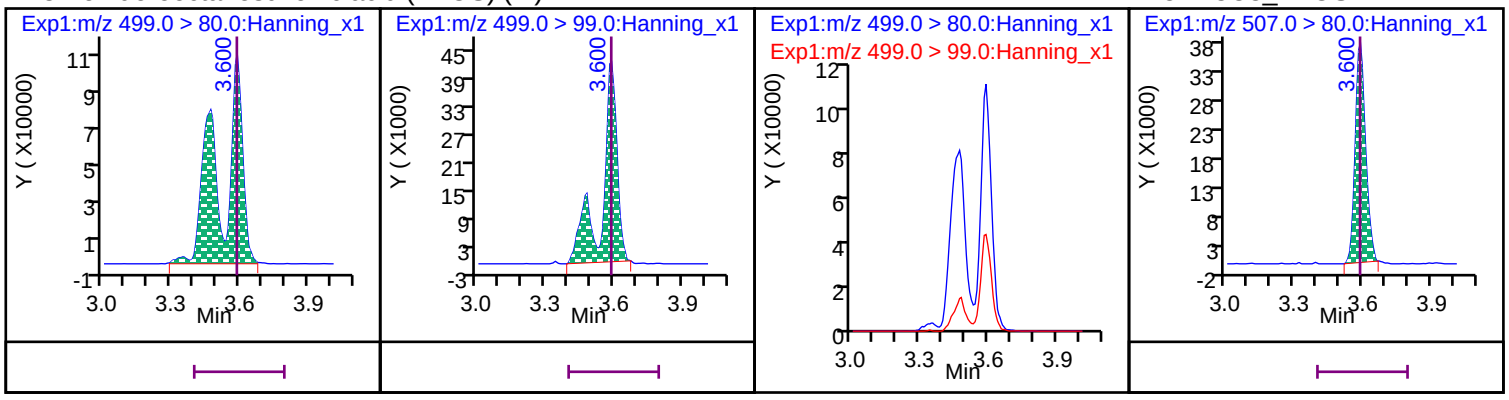
20 Perfluoro-n-octanoic acid (PFOA) (M) D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS) D 45 13C3_PFHxS



18 Perfluorooctanesulfonic acid (PFOS) (M) D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-005
Description: HS-PW-3.5 (A)
Matrix: Aqueous
Date Sampled: 01/26/2021 1540
Date Received: 01/28/2021

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	02/08/2021 1726	MMM	02/05/2021 1201	81968

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.2	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.2	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.2	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.2	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	32		3.6	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	17		3.6	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	19		3.6	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	9.5		3.6	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	7.2		3.6	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	12		3.6	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	21		3.6	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	6.0		3.6	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	92	J LB	3.6	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		97	25-150
13C2_6:2FTS		92	25-150
13C2_8:2FTS		100	25-150
13C2_PFDoA		81	25-150
13C2_PFTeDA		77	25-150
13C3_PFBS		88	25-150
13C3_PFHxS		89	25-150
13C3-HFPO-DA		97	25-150
13C4_PFBA		91	25-150
13C4_PFHpA		95	25-150
13C5_PFHxA		102	25-150
13C5_PFPeA		95	25-150
13C6_PFDA		92	25-150
13C7_PFUdA		94	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
ND = Not detected at or above the LOQ
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
W = Reported on wet weight basis

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-005
Description: HS-PW-3.5 (A)
Matrix: Aqueous
Date Sampled: 01/26/2021 1540
Date Received: 01/28/2021

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		93	25-150
13C8_PFOS		79	25-150
13C8_PFOSA		96	10-150
13C9_PFNA		95	25-150
d5-EtFOSAA		78	25-150
d3-MeFOSAA		100	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File:	\\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821047.d		
Injection Date:	08-Feb-2021 17:26:20	Injection Vol:	10.0 uL
Sample Type:	Client	Auto Sampler:	32
Lab Sample ID:	WA28027-005	Lab Prep. Batch:	81968
Client ID:	HS-PW-3.5 (A)	Sample Group:	WA28027
Sample Info:	WA28027-005	Misc. Info:	
Inst. ID:	LCMSMS01	Operator:	Matthew M. Miller
Method Name:	LCMSMS01_PFAS-ID	Version:	2020-09-23 10:00:21
Calib Method:	PFAS-ID	Lock State:	Unlocked
Quant Method:	IsoDil	Integrator:	picker
Final Conc.:	Amt * DF * CF	Matrix/Level:	Aqueous

Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0396715

Name	Value	Units	Description
DF	1		Dilution Factor
VF	10000	ul	Final Volume
VI	277	ml	Initial Sample Volume
AlsDf	0.91		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.719	1.721	0	924386	17	>100:1			1001.00	1013.98	90.8	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													
212.9 > 168.9	46	1.726	1.728	0/0	245506	17	>100:1			238.83	9.4749		
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.109	2.110	0	974730	12	>100:1			1001.00	1050.73	94.9	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													
262.9 > 218.9	50	2.109	2.110	0/0	149411	12	24:1			151.74	6.0198		M
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.172	2.162	1	307648	14	>100:1			1001.00	981.56	87.9	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													
298.9 > 80	44	2.172	2.162	1/0	298945	16	>100:1	Target = 3.46	✓	808.23	32.064		
298.9 > 99	44	2.172	2.162		81330	16	>100:1	3.67 (1.73-5.20)					
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													
349 > 80	44	2.520	2.520	0/-1	114933	14	85:1	Target = 3.26	✓	422.07	16.744		M
349 > 99	44	2.520	2.520		40573	15	>100:1	2.83 (1.63-4.89)					M
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.441	2.442	0	271040	16	>100:1			5005.00	5442.50	97.1	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.442		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.485	2.485	0	890786	15	>100:1			1001.00	1042.25	102	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													
313 > 269	49	2.493	2.477	2/2	261336	12	>100:1	Target = 17.17	✓	302.26	11.991		
313 > 119	49	2.485	2.477		14473	15	57:1	18.05 (8.58-25.76)					
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.610	2.602	1	728063	17	>100:1			5005.00	4993.36	97.1	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.602		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.874	2.865	1	805518	17	>100:1			1001.00	1034.44	94.5	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													
363 > 319	47	2.874	2.873	1/0	135380	13	>100:1	Target = 3.04	✓	181.81	7.2126		
363 > 169	47	2.874	2.873		40474	14	>100:1	3.34 (1.52-4.57)					
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.891	2.891	1	234522	17	>100:1			1001.00	1019.24	89.4	
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													
399 > 80	45	2.891	2.891	1/0	124865	27	>100:1	Target = 3.66	✓ 0.34	483.28	19.172		
399 > 99	45	2.891	2.891		36706	25	>100:1	3.40 (1.83-5.50)	0.22				
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.922		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													J
449 > 80	45	3.292	3.277	1/0	12408	20	83:1	Target = 3.56	✓	49.987	1.9831		
449 > 99	45	3.278	3.277		3362	19	13:1	3.69 (1.78-5.34)					
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.246	3.244	1	242262	20	>100:1			5005.00	6007.46	91.9	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.244		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.278	3.270	1	743918	20	>100:1			1001.00	1009.19	92.9	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.272	3.270	1/0	393695	34	62:1	Target = 2.38	✓ 0.57	525.45	20.845		
413 > 169	53	3.278	3.270		190746	34	>100:1	2.06 (1.19-3.57)	0.76				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.657	3.648	1	178436	19	>100:1			1001.00	853.78	78.8	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													
499 > 80	54	3.649	3.656	0/-1	486306	57	>100:1	Target = 4.00	✓ 0.85	2319.75	92.028		
499 > 99	54	3.657	3.656		111111	38	>100:1	4.37 (2.00-6.01)	0.30				
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.863		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.991		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.280		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.449		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.657	3.656	1	751786	19	>100:1			1001.00	1053.49	95.1	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.656		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.964	3.955	1	446786	17	>100:1			1001.00	1044.23	96.2	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.964		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.991	3.991	1	200438	17	>100:1			5005.00	6315.67	99.5	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.991		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.001	4.000	1	639261	17	>100:1			1001.00	1086.08	91.8	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.000		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.150	4.158	0	773564	19	>100:1			5005.00	4992.18	100	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.158		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.299	4.308	0	678751	17	>100:1			5005.00	4844.04	78.1	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.308		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.299	4.308	0	578867	16	>100:1			1001.00	1072.58	94	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.308		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.563	4.570	0	538739	17	>100:1			1001.00	870.70	81	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.570		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.813		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.017	5.029	0	582380	19	>100:1			1001.00	881.52	77.2	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.029		ND								
*** 37 13C2_PFDA**													
515 > 470		4.001	4.000	1	565182	16	>100:1					88.6	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.485	2.485	0	723398	15	>100:1					93.6	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.278	3.277	1	719318	21	>100:1					82.3	
*** 43 13C3_PFBA**													
216 > 172		1.726	1.721	1	764117	18	>100:1					85.5	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.657	3.656	1	211391	18	>100:1					86.3	

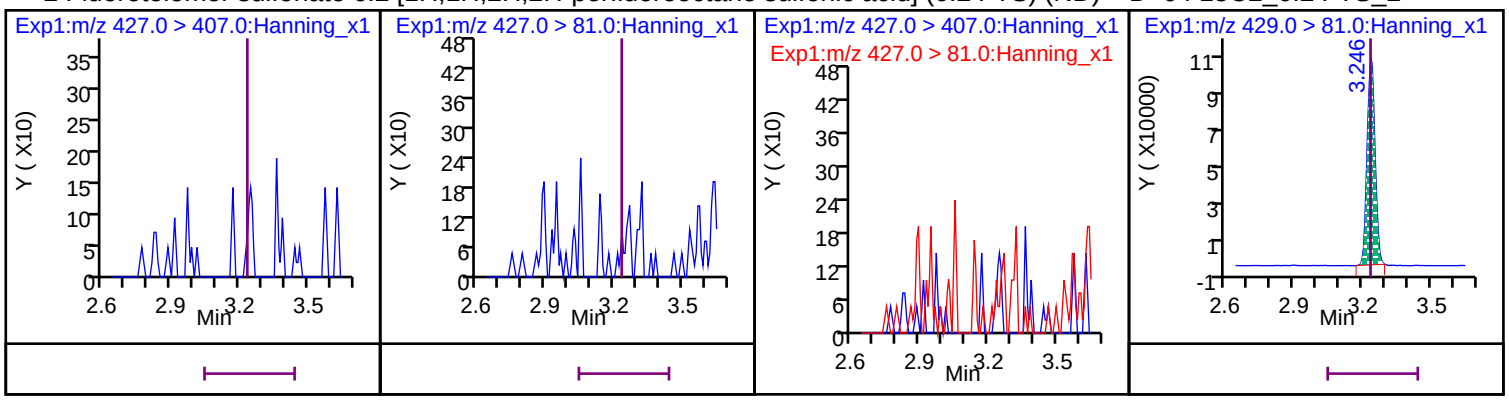
Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

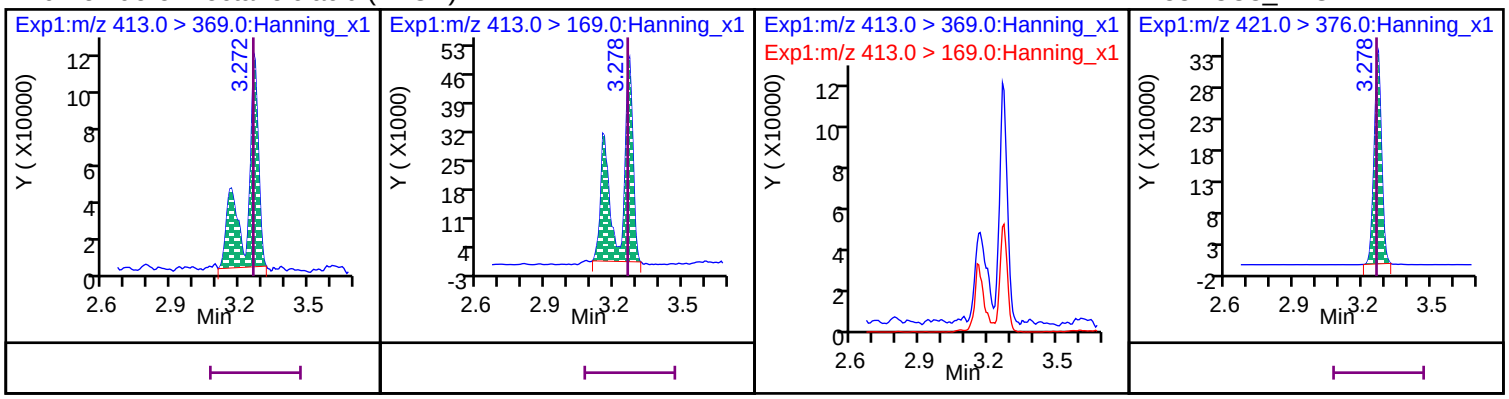
QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
M - Compound Hit/Peak Manually Integrated

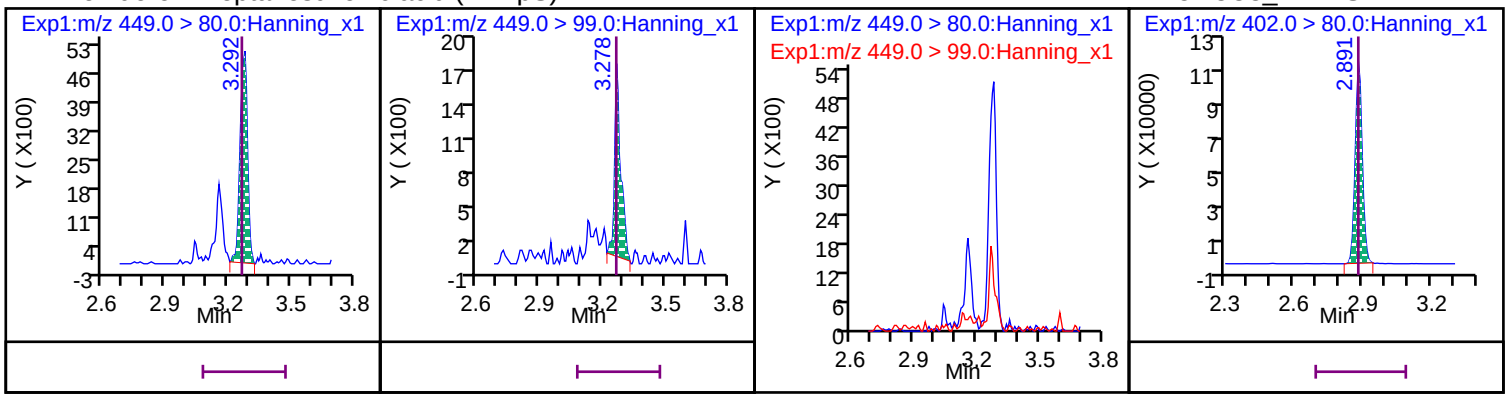
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) (ND) D 64 13C2_6:2 FTS_2



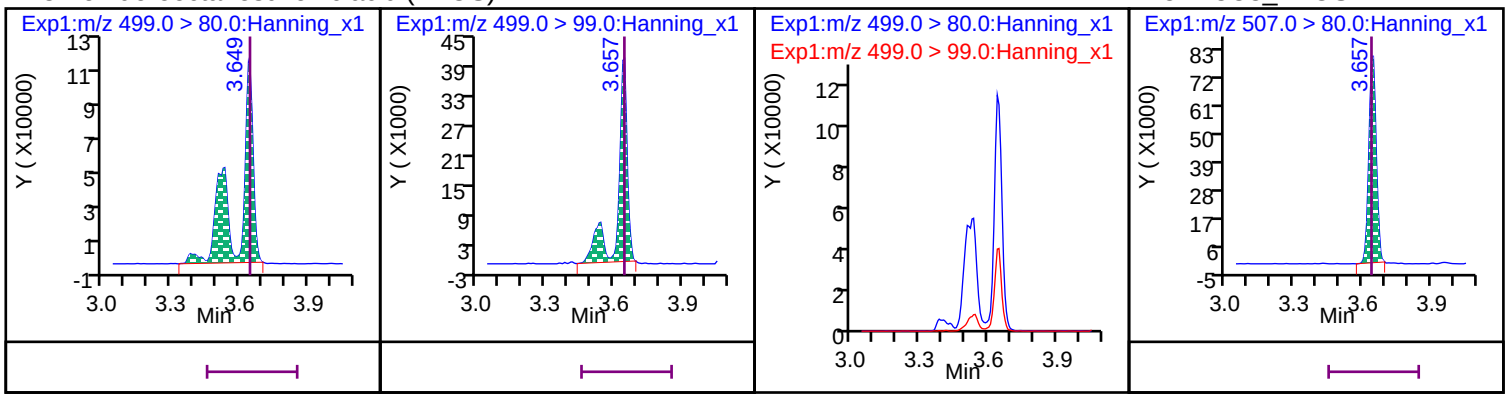
20 Perfluoro-n-octanoic acid (PFOA) D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS) D 45 13C3_PFHxS



18 Perfluorooctanesulfonic acid (PFOS) D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-006
Description: FB-1/26
Matrix: Aqueous
Date Sampled: 01/26/2021 1550
Date Received: 01/28/2021

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	02/08/2021 1758	MMM	02/05/2021 1201	81968

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.4	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.4	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		98	25-150
13C2_6:2FTS		85	25-150
13C2_8:2FTS		91	25-150
13C2_PFDoA		106	25-150
13C2_PFTeDA		85	25-150
13C3_PFBS		93	25-150
13C3_PFHxS		92	25-150
13C3-HFPO-DA		106	25-150
13C4_PFBA		93	25-150
13C4_PFHpA		98	25-150
13C5_PFHxA		103	25-150
13C5_PFPeA		97	25-150
13C6_PFDA		84	25-150
13C7_PFUdA		90	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
= Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-006
Description: FB-1/26
Matrix: Aqueous
Date Sampled: 01/26/2021 1550
Date Received: 01/28/2021

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		101	25-150
13C8_PFOS		90	25-150
13C8_PFOSA		95	10-150
13C9_PFNA		101	25-150
d5-EtFOSAA		93	25-150
d3-MeFOSAA		112	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File:	\\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821050.d		
Injection Date:	08-Feb-2021 17:58:02	Injection Vol:	10.0 uL
Sample Type:	Client	Auto Sampler:	35
Lab Sample ID:	WA28027-006	Lab Prep. Batch:	81968
Client ID:	FB-1/26	Sample Group:	WA28027
Sample Info:	WA28027-006	Misc. Info:	
Inst. ID:	LCMSMS01	Operator:	Matthew M. Miller
Method Name:	LCMSMS01_PFAS-ID	Version:	2020-09-23 10:00:21
Calib Method:	PFAS-ID	Lock State:	Unlocked
Quant Method:	IsoDil	Integrator:	picker
Final Conc.:	Amt * DF * CF	Matrix/Level:	Aqueous

Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0407000

Name	Value	Units	Description
DF	1		Dilution Factor
VF	10000	ul	Final Volume
VI	270	ml	Initial Sample Volume
AlsDf	0.91		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.726	1.721	1	944822	17	>100:1			1001.00	1036.40	92.8	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													Js
212.9 > 168.9	46		1.728		ND								
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.109	2.110	0	996260	13	>100:1			1001.00	1073.94	97	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													U
262.9 > 218.9	50		2.110		ND								
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.172	2.162	1	323963	15	>100:1			1001.00	1033.61	92.6	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													U
298.9 > 80	44		2.162		ND								
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													U
349 > 80	44		2.520		ND								
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.441	2.442	0	274844	17	>100:1			5005.00	5518.89	98.4	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.442		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.485	2.485	0	896678	15	>100:1			1001.00	1049.15	103	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													U
313 > 269	49		2.477		ND								
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.602	2.602	0	798471	17	>100:1			5005.00	5476.25	106	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.602		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.874	2.865	1	833860	17	>100:1			1001.00	1070.83	97.8	
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													U
363 > 319	47		2.873		ND								
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.891	2.891	1	240545	17	>100:1			1001.00	1045.41	91.7	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													U
399 > 80	45		2.891		ND								
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.922		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													U
449 > 80	45		3.277		ND								
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.245	3.244	1	223814	20	>100:1			5005.00	5550.00	84.9	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.244		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.278	3.270	1	808569	21	>100:1			1001.00	1096.90	101	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													U
413 > 369	53		3.270		ND								
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.649	3.648	1	204115	18	>100:1			1001.00	976.65	90.1	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													U
499 > 80	54		3.656		ND								
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.863		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.991		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.280		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.449		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.656	3.656	1	795522	19	>100:1			1001.00	1114.78	101	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.656		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.964	3.955	1	438851	16	>100:1			1001.00	1025.69	94.5	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.964		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.991	3.991	1	183121	16	>100:1			5005.00	5770.03	90.9	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.991		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.000	4.000	1	586092	17	>100:1			1001.00	995.75	84.2	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.000		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.150	4.158	0	866635	18	>100:1			5005.00	5592.81	112	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.158		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.299	4.308	0	805361	17	>100:1			5005.00	5747.62	92.7	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.308		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.299	4.308	0	551546	16	>100:1			1001.00	1021.96	89.6	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.308		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.563	4.570	0	703381	16	>100:1			1001.00	1136.79	106	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.570		ND								

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.813		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.016	5.029	0	641269	18	>100:1			1001.00	970.66	85	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.029		ND								
*** 37 13C2_PFDA**													
515 > 470		4.000	4.000	1	720204	17	>100:1					113	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.485	2.485	0	868677	16	>100:1					112	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.278	3.277	1	824217	22	>100:1					94.3	
*** 43 13C3_PFBA**													
216 > 172		1.726	1.721	1	942726	18	>100:1					105	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.656	3.656	1	231615	18	>100:1					94.5	

Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
s - Detector Saturated or Negative Concentration

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-007
Description: EB-HT
Matrix: Aqueous
Date Sampled: 01/26/2021 1705
Date Received: 01/28/2021

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	02/08/2021 1808	MMM	02/05/2021 1201	81968

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.1	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.1	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.1	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		8.1	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		8.1	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.1	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.1	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.1	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.0	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		94	25-150
13C2_6:2FTS		103	25-150
13C2_8:2FTS		100	25-150
13C2_PFDoA		89	25-150
13C2_PFTeDA		87	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		85	25-150
13C3-HFPO-DA		109	25-150
13C4_PFBA		98	25-150
13C4_PFHpA		106	25-150
13C5_PFHxA		110	25-150
13C5_PFPeA		98	25-150
13C6_PFDA		91	25-150
13C7_PFUdA		89	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: WA28027-007
Description: EB-HT
Matrix: Aqueous
Date Sampled: 01/26/2021 1705
Date Received: 01/28/2021

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		102	25-150
13C8_PFOS		99	25-150
13C8_PFOSA		95	10-150
13C9_PFNA		108	25-150
d5-EtFOSAA		83	25-150
d3-MeFOSAA		106	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

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Pace Environmental Services, LLC
Analyte Quantitation Report

Data File:	\\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821051.d		
Injection Date:	08-Feb-2021 18:08:36	Injection Vol:	10.0 uL
Sample Type:	Client	Auto Sampler:	36
Lab Sample ID:	WA28027-007	Lab Prep. Batch:	81968
Client ID:	EB-HT	Sample Group:	WA28027
Sample Info:	WA28027-007	Misc. Info:	
Inst. ID:	LCMSMS01	Operator:	Matthew M. Miller
Method Name:	LCMSMS01_PFAS-ID	Version:	2020-09-23 10:00:21
Calib Method:	PFAS-ID	Lock State:	Unlocked
Quant Method:	IsoDil	Integrator:	picker
Final Conc.:	Amt * DF * CF	Matrix/Level:	Aqueous

Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0444899

Name	Value	Units	Description
DF	1		Dilution Factor
VF	10000	ul	Final Volume
VI	247	ml	Initial Sample Volume
AlsDf	0.91		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.719	1.721	0	996066	18	>100:1			1001.00	1092.61	97.8	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													U
212.9 > 168.9	46		1.728		ND								
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.109	2.110	0	1008728	13	>100:1			1001.00	1087.38	98.2	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													U
262.9 > 218.9	50		2.110		ND								
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.172	2.162	1	337338	17	>100:1			1001.00	1076.28	96.4	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													U
298.9 > 80	44		2.162		ND								
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													U
349 > 80	44		2.520		ND								
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.450	2.442	1	262929	17	>100:1			5005.00	5279.63	94.2	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.442		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.485	2.485	0	960530	16	>100:1			1001.00	1123.86	110	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													U
313 > 269	49		2.477		ND								
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.602	2.602	0	820263	16	>100:1			5005.00	5625.71	109	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.602		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.874	2.865	1	904478	18	>100:1			1001.00	1161.52	106	
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													U
363 > 319	47		2.873		ND								
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.891	2.891	1	223594	18	>100:1			1001.00	971.74	85.3	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													U
399 > 80	45		2.891		ND								
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.922		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													U
449 > 80	45		3.277		ND								
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.245	3.244	1	271485	21	>100:1			5005.00	6732.12	103	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.244		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.278	3.270	1	820351	21	>100:1			1001.00	1112.88	102	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													U
413 > 369	53		3.270		ND								
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.657	3.648	1	224194	20	>100:1			1001.00	1072.72	99	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													U
499 > 80	54		3.656		ND								
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.863		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.991		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.280		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.449		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.657	3.656	1	858010	18	>100:1			1001.00	1202.35	108	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.656		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.964	3.955	1	440974	18	>100:1			1001.00	1030.65	95	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.964		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.991	3.991	1	200993	16	>100:1			5005.00	6333.16	99.8	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.991		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.000	4.000	1	635685	16	>100:1			1001.00	1080.01	91.3	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.000		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.150	4.158	0	817214	18	>100:1			5005.00	5273.87	106	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.158		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.299	4.308	0	720139	18	>100:1			5005.00	5139.41	82.9	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.308		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.299	4.308	0	544460	16	>100:1			1001.00	1008.83	88.5	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.308		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.571	4.570	1	592342	17	>100:1			1001.00	957.33	89	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.570		ND								

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.813		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.017	5.029	0	659771	20	>100:1			1001.00	998.67	87.4	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.029		ND								
*** 37 13C2_PFDA**													
515 > 470		4.000	4.000	1	675641	17	>100:1					106	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.485	2.485	0	760891	16	>100:1					98.5	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.272	3.277	0	894157	21	>100:1					102	
*** 43 13C3_PFBA**													
216 > 172		1.719	1.721	0	913029	18	>100:1					102	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.657	3.656	1	254401	20	>100:1					104	

Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

QC Flag Legend

U - Result Less Than Method Detection Limit

PFAS by LC/MS/MS - MB

Sample ID: WQ81803-001
Batch: 81803
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/04/2021 1209

Parameter	Result	Q	Dil	LOQ	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	ng/L	02/05/2021 1246
11Cl-PF3OUdS	ND		1	8.0	ng/L	02/05/2021 1246
8:2 FTS	ND		1	8.0	ng/L	02/05/2021 1246
6:2 FTS	ND		1	8.0	ng/L	02/05/2021 1246
4:2 FTS	ND		1	8.0	ng/L	02/05/2021 1246
GenX	ND		1	8.0	ng/L	02/05/2021 1246
ADONA	ND		1	8.0	ng/L	02/05/2021 1246
EtFOSAA	ND		1	8.0	ng/L	02/05/2021 1246
MeFOSAA	ND		1	8.0	ng/L	02/05/2021 1246
PFBS	ND		1	4.0	ng/L	02/05/2021 1246
PFDS	ND		1	4.0	ng/L	02/05/2021 1246
PFHpS	ND		1	4.0	ng/L	02/05/2021 1246
PFNS	ND		1	4.0	ng/L	02/05/2021 1246
PFOSA	ND		1	4.0	ng/L	02/05/2021 1246
PFPeS	ND		1	4.0	ng/L	02/05/2021 1246
PFHxS	ND		1	4.0	ng/L	02/05/2021 1246
PFBA	ND		1	4.0	ng/L	02/05/2021 1246
PFDA	ND		1	4.0	ng/L	02/05/2021 1246
PFDoA	ND		1	4.0	ng/L	02/05/2021 1246
PFHpA	ND		1	4.0	ng/L	02/05/2021 1246
PFHxA	ND		1	4.0	ng/L	02/05/2021 1246
PFNA	ND		1	4.0	ng/L	02/05/2021 1246
PFOA	ND		1	4.0	ng/L	02/05/2021 1246
PFPeA	ND		1	4.0	ng/L	02/05/2021 1246
PFTeDA	ND		1	4.0	ng/L	02/05/2021 1246
PFTrDA	ND		1	4.0	ng/L	02/05/2021 1246
PFUdA	ND		1	4.0	ng/L	02/05/2021 1246
PFOS	ND	✓	1	4.0	ng/L	02/05/2021 1246

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		108	25-150
13C2_6:2FTS		105	25-150
13C2_8:2FTS		111	25-150
13C2_PFDoA		101	25-150
13C2_PFTeDA		99	25-150
13C3_PFBS		97	25-150
13C3_PFHxS		96	25-150
13C3-HFPO-DA		101	25-150
13C4_PFBA		102	25-150
13C4_PFHpA		101	25-150
13C5_PFHxA		97	25-150
13C5_PFPeA		103	25-150

✓

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
* = RSD is out of criteria
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: WQ81803-001
Batch: 81803
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/04/2021 1209

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		107	25-150
13C7_PFUdA		99	25-150
13C8_PFOA		104	25-150
13C8_PFOS		87	25-150
13C8_PFOSA		96	10-150
13C9_PFNA		104	25-150
d5-EtFOSAA		99	25-150
d3-MeFOSAA		100	25-150

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\organics\LL\LCMSMS02.i\020521-nonDOD.b\020521010.d
Injection Date: 05-Feb-2021 12:46:56 Injection Vol: 10.0 uL
Sample Type: MBlk Auto Sampler: 3
Lab Sample ID: WQ81803-001 Lab Prep. Batch: 81803
Sample Info: WQ81803-001 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Final Conc.: Amt * DF * CF Matrix/Level: Aqueous
Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0439560

Name	Value	Units	Description
DF	1		Dilution Factor
VF	10000	ul	Final Volume
VI	250	ml	Initial Sample Volume
AlsDf	0.91		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.736	1.738	0	619843	22	>100:1			1001.00	928.70	102	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													U
212.9 > 168.9	46		1.738		ND								
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.129	2.131	0	604769	16	>100:1			1001.00	954.71	103	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													U
262.9 > 218.9	50		2.131		ND								
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.182	2.184	0	178667	17	>100:1			1001.00	933.87	97.4	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													U
298.9 > 80	44		2.184		ND								
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													U
349 > 80	44		2.514		ND								
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.442	2.443	0	105361	17	>100:1			5005.00	4734.98	108	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.434		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.477	2.479	0	629302	20	>100:1			1001.00	912.97	96.7	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													U
313 > 269	49		2.479		ND								
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.590	2.583	1	1184283	20	>100:1			5005.00	4911.09	101	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.591		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.845	2.837	1	524925	18	>100:1			1001.00	996.58	101	
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													U
363 > 319	47		2.847		ND								
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.863	2.865	0	124404	19	>100:1			1001.00	938.95	95.6	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													U
399 > 80	45		2.856		ND								
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.882		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													U
449 > 80	45		3.231		ND								
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.209	3.204	1	80745	23	>100:1			5005.00	4811.25	105	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.211		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.236	3.224	1	535050	22	>100:1			1001.00	1037.81	104	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													U
413 > 369	53		3.224		ND								
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.616	3.610	1	102713	27	>100:1			1001.00	889.92	86.9	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													U
499 > 80	54		3.618		ND								
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.814		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.953		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.254		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.410		ND								
34 Perfluorododecanesulfonic acid (PFDOS) CAS: 79780-39-5													U
699 > 80	54		4.755		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.616	3.618	0	642376	22	>100:1			1001.00	995.16	104	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.618		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.932	3.927	1	245925	19	>100:1			1001.00	979.90	95.6	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.927		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.957	3.953	1	77515	20	>100:1			5005.00	4737.55	111	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.944		ND								
4 1H,1H,2H,2H-perfluorododecane sulfonic acid (10:2FTS) CAS: 120226-60-0													U
627 > 607	65		4.551		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		3.967	3.962	1	618570	17	>100:1			1001.00	1028.53	107	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		3.962		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.118	4.122	0	628349	19	>100:1			5005.00	4842.86	100	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.113		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.268	4.274	0	546526	17	>100:1			1001.00	1011.28	98.6	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.274		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.278	4.274	1	575607	18	>100:1			5005.00	5274.55	98.9	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.284		ND								

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 61 d7-MeFOSE CAS: SESI-0129													
623 > 59		4.357	4.353	1	92507	17	>100:1			1001.00	1115.32	95.9	
32 2-N-methylperfluoro-1-octanesulfonamido-ethanol (MeFOSE) CAS: 24448-09-7													U
616 > 59	61		4.363		ND								
D 57 d3-MeFOSA CAS: SESI-0109													
515 > 169		4.376	4.379	0	43891	16	>100:1			1001.00	965.96	119	
26 N-methylperfluoro-1-octanesulfonamide (MeFOSA) CAS: 31506-32-8													U
512 > 169	57		4.372		ND								
D 62 d9-EtFOSE CAS: SESI-0130													
639 > 59		4.519	4.515	1	110581	16	>100:1			1001.00	1152.43	111	
33 2-N-ethylperfluoro-1-octanesulfonamido-ethanol (EtFOSE) CAS: 1691-99-2													U
630 > 59	62		4.524		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.537	4.542	0	526214	18	>100:1			1001.00	1007.20	101	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.542		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.775		ND								
D 59 d5-EtFOSA CAS: SESI-0108													
531 > 169		4.537	4.533	1	37774	18	>100:1			1001.00	894.61	85.8	
27 N-ethylperfluoro-1-octanesulfonamide (EtFOSA) CAS: 4151-50-2													U
526 > 169	59		4.542		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		4.990	4.992	0	699924	23	>100:1			1001.00	952.97	98.8	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		4.992		ND								
D 40 13C2_PFHxDA CAS: SESI-0103													
815 > 770		5.377	5.382	0	740097	19	>100:1			1001.00	993.41	95.4	
35 Perfluoro-n-hexadecanoic acid (PFHxDA) CAS: 67905-19-5													U
813 > 769	40		5.382		ND								
36 Perfluoro-n-octadecanoic acid (PFODA) CAS: 16517-11-6													U
913 > 869	40		5.740		ND								
*** 37 13C2_PFDA**													
515 > 470		3.967	3.962	1	647080	18	>100:1					98.4	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.477	2.479	0	643874	18	>100:1					100	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.229	3.231	0	544162	21	>100:1					100	
*** 43 13C3_PFBA**													
216 > 172		1.736	1.738	0	617777	22	>100:1					106	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.608	3.610	0	125834	22	>100:1					102	

Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

QC Flag Legend

U - Result Less Than Method Detection Limit

PFAS by LC/MS/MS - MB

Sample ID: WQ81968-001
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Parameter	Result	Q	Dil	LOQ	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	ng/L	02/08/2021 1643
11Cl-PF3OUdS	ND		1	8.0	ng/L	02/08/2021 1643
8:2 FTS	ND		1	8.0	ng/L	02/08/2021 1643
6:2 FTS	ND		1	8.0	ng/L	02/08/2021 1643
4:2 FTS	ND		1	8.0	ng/L	02/08/2021 1643
GenX	ND		1	8.0	ng/L	02/08/2021 1643
ADONA	ND		1	8.0	ng/L	02/08/2021 1643
EtFOSAA	ND		1	8.0	ng/L	02/08/2021 1643
MeFOSAA	ND		1	8.0	ng/L	02/08/2021 1643
PFBS	ND		1	4.0	ng/L	02/08/2021 1643
PFDS	ND		1	4.0	ng/L	02/08/2021 1643
PFHpS	ND		1	4.0	ng/L	02/08/2021 1643
PFNS	ND		1	4.0	ng/L	02/08/2021 1643
PFOSA	ND		1	4.0	ng/L	02/08/2021 1643
PFPeS	ND		1	4.0	ng/L	02/08/2021 1643
PFHxS	ND		1	4.0	ng/L	02/08/2021 1643
PFBA	ND		1	4.0	ng/L	02/08/2021 1643
PFDA	ND		1	4.0	ng/L	02/08/2021 1643
PFDoA	ND		1	4.0	ng/L	02/08/2021 1643
PFHpA	ND		1	4.0	ng/L	02/08/2021 1643
PFHxA	ND		1	4.0	ng/L	02/08/2021 1643
PFNA	ND		1	4.0	ng/L	02/08/2021 1643
PFOA	ND		1	4.0	ng/L	02/08/2021 1643
PFPeA	ND		1	4.0	ng/L	02/08/2021 1643
PFTeDA	ND		1	4.0	ng/L	02/08/2021 1643
PFTrDA	ND		1	4.0	ng/L	02/08/2021 1643
PFUdA	ND		1	4.0	ng/L	02/08/2021 1643
PFOS	ND		1	4.0	ng/L	02/08/2021 1643

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		120	25-150
13C2_6:2FTS		109	25-150
13C2_8:2FTS		119	25-150
13C2_PFDoA		112	25-150
13C2_PFTeDA		100	25-150
13C3_PFBS		101	25-150
13C3_PFHxS		109	25-150
13C3-HFPO-DA		123	25-150
13C4_PFBA		113	25-150
13C4_PFHpA		112	25-150
13C5_PFHxA		114	25-150
13C5_PFPeA		109	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
* = RSD is out of criteria
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: WQ81968-001
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		101	25-150
13C7_PFUdA		101	25-150
13C8_PFOA		112	25-150
13C8_PFOS		102	25-150
13C8_PFOSA		103	10-150
13C9_PFNA		108	25-150
d5-EtFOSAA		98	25-150
d3-MeFOSAA		121	25-150

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821043.d
Injection Date: 08-Feb-2021 16:43:57 Injection Vol: 10.0 uL
Sample Type: MBlk Auto Sampler: 28
Lab Sample ID: WQ81968-001 Lab Prep. Batch: 81968
Sample Info: WQ81968-001 Misc. Info:
Inst. ID: LCMSMS01 Operator: Matthew M. Miller

Method Name: LCMSMS01_PFAS-ID Version: 2020-09-23 10:00:21
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Final Conc.: Amt * DF * CF Matrix/Level: Aqueous
Concentration Formula: CF = (VF/1000) * 1/VI *(1/AlsDf) = 0.0392465

Name	Value	Units	Description
DF	1		Dilution Factor
VF	10000	ul	Final Volume
VI	280	ml	Initial Sample Volume
AlsDf	0.91		Auto Sampler Dilution Factor

Reagent: Istds Conc. Level: Smp Vol. Added: 0.0100 ml
Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1100 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.719	1.721	0	1148765	18	>100:1			1001.00	1260.11	113	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													U
212.9 > 168.9	46		1.728		ND								
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.109	2.110	0	1121586	14	>100:1			1001.00	1209.04	109	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													U
262.9 > 218.9	50		2.110		ND								
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.161	2.162	0	354878	14	>100:1			1001.00	1132.25	101	
7 Perfluoro-1-butanesulfonic acid (PFBS) CAS: 375-73-5													U
298.9 > 80	44		2.162		ND								
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													U
349 > 80	44		2.520		ND								
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.441	2.442	0	336230	16	>100:1			5005.00	6751.52	120	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonic acid] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.442		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.485	2.485	0	995488	16	>100:1			1001.00	1164.76	114	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													U
313 > 269	49		2.477		ND								
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.602	2.602	0	923356	17	>100:1			5005.00	6332.76	123	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.602		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.874	2.865	1	955453	17	>100:1			1001.00	1226.98	112	
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													U
363 > 319	47		2.873		ND								
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.891	2.891	1	285457	17	>100:1			1001.00	1240.60	109	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
14 Perfluorohexanesulfonic acid (PFHxS) CAS: 355-46-4													U
399 > 80	45		2.891		ND								
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.922		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													U
449 > 80	45		3.277		ND								
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.252	3.244	1	288378	21	>100:1			5005.00	7151.02	109	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonic acid] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.244		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.272	3.270	1	896778	21	>100:1			1001.00	1216.56	112	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													U
413 > 369	53		3.270		ND								
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.649	3.648	1	229957	20	>100:1			1001.00	1100.30	102	
18 Perfluorooctanesulfonic acid (PFOS) CAS: 1763-23-1													U
499 > 80	54		3.656		ND								
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.863		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		3.991		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.280		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.449		ND								
34 Perfluorododecanesulfonic acid (PFDOS) CAS: 79780-39-5													U
699 > 80	54		4.782		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.649	3.656	0	850851	20	>100:1			1001.00	1192.32	108	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.656		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.955	3.955	1	476255	17	>100:1			1001.00	1113.11	103	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		3.964		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.982	3.991	0	239210	21	>100:1			5005.00	7537.35	119	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonic acid] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		3.991		ND								
4 1H,1H,2H,2H-perfluorododecane sulfonic acid (10:2FTS) CAS: 120226-60-0													U
627 > 607	65		4.586		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.000	4.000	1	701826	16	>100:1			1001.00	1192.38	101	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.000		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.150	4.158	0	933884	19	>100:1			5005.00	6026.80	121	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.158		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.299	4.308	0	847429	16	>100:1			5005.00	6047.84	97.6	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.308		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.299	4.308	0	624236	15	>100:1			1001.00	1156.64	101	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.308		ND								

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 61 d7-MeFOSE CAS: SESI-0129													
623 > 59		4.381	4.372	1	160538	15	>100:1			1001.00	978.94	100	
32 2-N-methylperfluoro-1-octanesulfonamido-ethanol (MeFOSE) CAS: 24448-09-7													U
616 > 59	61		4.389		ND								
D 57 d3-MeFOSA CAS: SESI-0109													
515 > 169		4.407	4.398	1	51375	15	>100:1			1001.00	848.17	77.9	
26 N-methylperfluoro-1-octanesulfonamide (MeFOSA) CAS: 31506-32-8													U
512 > 169	57		4.398		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		4.571	4.570	1	741844	17	>100:1			1001.00	1198.95	112	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		4.570		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		4.813		ND								
D 62 d9-EtFOSE CAS: SESI-0130													
639 > 59		4.547	4.538	1	158672	15	>100:1			1001.00	1026.40	92	
33 2-N-ethylperfluoro-1-octanesulfonamido-ethanol (EtFOSE) CAS: 1691-99-2													U
630 > 59	62		4.554		ND								
D 59 d5-EtFOSA CAS: SESI-0108													
531 > 169		4.563	4.563	1	55515	16	>100:1			1001.00	919.36	90.7	
27 N-ethylperfluoro-1-octanesulfonamide (EtFOSA) CAS: 4151-50-2													U
526 > 169	59		4.563		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.017	5.029	0	754703	19	>100:1			1001.00	1142.36	100	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.029		ND								
D 40 13C2_PFHxDA CAS: SESI-0103													
815 > 770		5.396	5.412	0	417157	17	>100:1			1001.00	1175.75	112	
35 Perfluoro-n-hexadecanoic acid (PFHxDA) CAS: 67905-19-5													U
813 > 769	40		5.421		ND								
36 Perfluoro-n-octadecanoic acid (PFODA) CAS: 16517-11-6													U
913 > 869	40		5.785		ND								
*** 37 13C2_PFDA**													
515 > 470		4.000	4.000	1	699650	17	>100:1					110	
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.485	2.485	0	839211	16	>100:1					109	
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.272	3.277	0	874548	20	>100:1					100	
*** 43 13C3_PFBA**													
216 > 172		1.719	1.721	0	958922	18	>100:1					107	
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.649	3.656	0	255050	20	>100:1					104	

Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

QC Flag Legend

U - Result Less Than Method Detection Limit

PFAS by LC/MS/MS - LCS

Sample ID: WQ81803-002
Batch: 81803
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/04/2021 1209

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
9Cl-PF3ONS	15	14		1	97	50-150	02/05/2021 1257
11Cl-PF3OUdS	15	14		1	95	50-150	02/05/2021 1257
8:2 FTS	15	14		1	93	50-150	02/05/2021 1257
6:2 FTS	15	16		1	109	50-150	02/05/2021 1257
4:2 FTS	15	13		1	89	50-150	02/05/2021 1257
GenX	32	32		1	100	50-150	02/05/2021 1257
ADONA	15	16		1	108	50-150	02/05/2021 1257
EtFOSAA	16	17		1	105	50-150	02/05/2021 1257
MeFOSAA	16	17		1	103	50-150	02/05/2021 1257
PFBS	14	13		1	94	50-150	02/05/2021 1257
PFDS	15	15		1	100	50-150	02/05/2021 1257
PFHpS	15	16		1	108	50-150	02/05/2021 1257
PFNS	15	16		1	103	50-150	02/05/2021 1257
PFOSA	16	16		1	98	50-150	02/05/2021 1257
PFPeS	15	15		1	101	50-150	02/05/2021 1257
PFHxS	15	15		1	103	50-150	02/05/2021 1257
PFBA	16	15		1	97	50-150	02/05/2021 1257
PFDA	16	16		1	97	50-150	02/05/2021 1257
PFDoA	16	16		1	100	50-150	02/05/2021 1257
PFHpA	16	15		1	93	50-150	02/05/2021 1257
PFHxA	16	16		1	102	50-150	02/05/2021 1257
PFNA	16	17		1	109	50-150	02/05/2021 1257
PFOA	16	16		1	101	50-150	02/05/2021 1257
PFPeA	16	15		1	95	50-150	02/05/2021 1257
PFTeDA	16	17		1	106	50-150	02/05/2021 1257
PFTrDA	16	19		1	117	50-150	02/05/2021 1257
PFUdA	16	15		1	93	50-150	02/05/2021 1257
PFOS	15	14		1	96	50-150	02/05/2021 1257

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		96	25-150
13C2_6:2FTS		99	25-150
13C2_8:2FTS		110	25-150
13C2_PFDoA		96	25-150
13C2_PFTeDA		94	25-150
13C3_PFBS		90	25-150
13C3_PFHxS		87	25-150
13C3-HFPO-DA		95	25-150
13C4_PFBA		97	25-150
13C4_PFHpA		100	25-150
13C5_PFHxA		94	25-150
13C5_PFPeA		97	25-150

LCS/MS/MSD spikes evaluated 70-150 as historically reported

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: WQ81803-002
Batch: 81803
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/04/2021 1209

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		99	25-150
13C7_PFUdA		98	25-150
13C8_PFOA		96	25-150
13C8_PFOS		87	25-150
13C8_PFOSA		94	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		88	25-150
d3-MeFOSAA		98	25-150

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: WQ81968-002
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
9Cl-PF3ONS	14	13		1	98	50-150	02/08/2021 1654
11Cl-PF3OUdS	14	13		1	95	50-150	02/08/2021 1654
8:2 FTS	14	12		1	85	50-150	02/08/2021 1654
6:2 FTS	14	14		1	99	50-150	02/08/2021 1654
4:2 FTS	14	15		1	114	50-150	02/08/2021 1654
GenX	29	31		1	107	50-150	02/08/2021 1654
ADONA	14	15		1	111	50-150	02/08/2021 1654
EtFOSAA	14	15		1	107	50-150	02/08/2021 1654
MeFOSAA	14	18		1	123	50-150	02/08/2021 1654
PFBS	13	13		1	101	50-150	02/08/2021 1654
PFDS	14	15		1	110	50-150	02/08/2021 1654
PFHpS	14	14		1	98	50-150	02/08/2021 1654
PFNS	14	14		1	101	50-150	02/08/2021 1654
PFOSA	14	15		1	101	50-150	02/08/2021 1654
PFPeS	14	14		1	100	50-150	02/08/2021 1654
PFHxS	13	12	✓	1	94	50-150	02/08/2021 1654
PFBA	14	14		1	96	50-150	02/08/2021 1654
PFDA	14	17		1	119	50-150	02/08/2021 1654
PFDoA	14	15		1	102	50-150	02/08/2021 1654
PFHpA	14	14		1	99	50-150	02/08/2021 1654
PFHxA	14	15		1	100	50-150	02/08/2021 1654
PFNA	14	15		1	102	50-150	02/08/2021 1654
PFOA	14	15	✓	1	105	50-150	02/08/2021 1654
PFPeA	14	14		1	98	50-150	02/08/2021 1654
PFTeDA	14	15		1	104	50-150	02/08/2021 1654
PFTrDA	14	15		1	102	50-150	02/08/2021 1654
PFUdA	14	15		1	102	50-150	02/08/2021 1654
PFOS	13	14		1	107	50-150	02/08/2021 1654

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		111	25-150
13C2_6:2FTS		105	25-150
13C2_8:2FTS		112	25-150
13C2_PFDoA		104	25-150
13C2_PFTeDA		98	25-150
13C3_PFBS		93	25-150
13C3_PFHxS		97	25-150
13C3-HFPO-DA		111	25-150
13C4_PFBA		105	25-150
13C4_PFHpA		109	25-150
13C5_PFHxA		120	25-150
13C5_PFPeA		110	25-150

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: WQ81968-002
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		91	25-150
13C7_PFUdA		103	25-150
13C8_PFOA		112	25-150
13C8_PFOS		92	25-150
13C8_PFOSA		105	10-150
13C9_PFNA		100	25-150
d5-EtFOSAA		98	25-150
d3-MeFOSAA		108	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
* = RSD is out of criteria
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: WA28027-005MS
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Parameter	Sample Amount (ng/L)	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
9Cl-PF3ONS	ND	13	7.2		1	55	50-150	02/08/2021 1736
11Cl-PF3OUdS	ND	13	6.6		1	50	50-150	02/08/2021 1736
8:2 FTS	ND	13	8.0		1	59	50-150	02/08/2021 1736
6:2 FTS	ND	13	8.7		1	65	50-150	02/08/2021 1736
4:2 FTS	ND	13	7.1		1	54	50-150	02/08/2021 1736
GenX	ND	28	16		1	57	50-150	02/08/2021 1736
ADONA	ND	13	7.6		1	57	50-150	02/08/2021 1736
EtFOSAA	ND	14	7.4		1	52	50-150	02/08/2021 1736
MeFOSAA	ND	14	9.0		1	64	50-150	02/08/2021 1736
PFBS	32	12	25	N	1	-56	50-150	02/08/2021 1736
PFDS	ND	14	6.6	N	1	49	50-150	02/08/2021 1736
PFHpS	ND	13	8.5		1	63	50-150	02/08/2021 1736
PFNS	ND	14	6.8		1	50	50-150	02/08/2021 1736
PFOSA	ND	14	6.7	N	1	48	50-150	02/08/2021 1736
PFPeS	17	13	17	N	1	-1.6	50-150	02/08/2021 1736
PFHxS	19	13	18	N	1	-9.3	50-150	02/08/2021 1736
PFBA	9.5	14	12	N	1	20	50-150	02/08/2021 1736
PFDA	ND	14	7.2		1	51	50-150	02/08/2021 1736
PFDoA	ND	14	8.4		1	60	50-150	02/08/2021 1736
PFHpA	7.2	14	12	N	1	34	50-150	02/08/2021 1736
PFHxA	12	14	14	N	1	11	50-150	02/08/2021 1736
PFNA	ND	14	8.2		1	58	50-150	02/08/2021 1736
PFOA	21	14	18	N	1	-22	50-150	02/08/2021 1736
PFPeA	6.0	14	11	N	1	34	50-150	02/08/2021 1736
PFTeDA	ND	14	8.0		1	57	50-150	02/08/2021 1736
PFTrDA	ND	14	8.1		1	58	50-150	02/08/2021 1736
PFUdA	ND	14	7.4		1	52	50-150	02/08/2021 1736
PFOS	92	13	59	N	1	-252	50-150	02/08/2021 1736

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	181	25-150
13C2_6:2FTS	N	159	25-150
13C2_8:2FTS	N	169	25-150
13C2_PFDoA	N	163	25-150
13C2_PFTeDA	N	156	25-150
13C3_PFBS	N	167	25-150
13C3_PFHxS	N	166	25-150
13C3-HFPO-DA	N	186	25-150
13C4_PFBA	N	175	25-150
13C4_PFHpA	N	182	25-150
13C5_PFHxA	N	212	25-150
13C5_PFPeA	N	179	25-150

"surrogate" double spiked per case narrative, results theoretically halved. not used to evaluate

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: WA28027-005MS
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA	N	174	25-150
13C7_PFUdA	N	177	25-150
13C8_PFOA	N	182	25-150
13C8_PFOS	N	157	25-150
13C8_PFOSA	N	212	10-150
13C9_PFNA	N	174	25-150
d5-EtFOSAA	N	152	25-150
d3-MeFOSAA	N	168	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
* = RSD is out of criteria
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MSD

Sample ID: WA28027-005MD
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Parameter	Sample Amount (ng/L)	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	% RPD	% Rec Limit	% RPD Limit	Analysis Date
9Cl-PF3ONS	ND	14	6.5	N	1	47	10	50-150	30	02/08/2021 1747
11Cl-PF3OUdS	ND	14	5.8	N	1	41	13	50-150	30	02/08/2021 1747
8:2 FTS	ND	14	5.7	N,+	1	40	34	50-150	30	02/08/2021 1747
6:2 FTS	ND	14	7.9		1	57	9.3	50-150	30	02/08/2021 1747
4:2 FTS	ND	14	7.8		1	57	9.7	50-150	30	02/08/2021 1747
GenX	ND	30	16		1	56	2.6	50-150	30	02/08/2021 1747
ADONA	ND	14	8.7		1	63	14	50-150	30	02/08/2021 1747
EtFOSAA	ND	15	6.8	N	1	46	7.5	50-150	30	02/08/2021 1747
MeFOSAA	ND	15	8.0		1	54	12	50-150	30	02/08/2021 1747
PFBS	32	13	25	N	1	-57	1.9	50-150	30	02/08/2021 1747
PFDS	ND	14	7.0	N	1	49	5.1	50-150	30	02/08/2021 1747
PFHpS	ND	14	9.5		1	68	12	50-150	30	02/08/2021 1747
PFNS	ND	14	7.2		1	51	5.8	50-150	30	02/08/2021 1747
PFOSA	ND	15	8.5		1	58	23	50-150	30	02/08/2021 1747
PFPeS	17	14	19	N	1	13	12	50-150	30	02/08/2021 1747
PFHxS	19	13	20	N	1	4.5	9.5	50-150	30	02/08/2021 1747
PFBA	9.5	15	13	N	1	21	2.6	50-150	30	02/08/2021 1747
PFDA	ND	15	7.3	N	1	49	1.9	50-150	30	02/08/2021 1747
PFDoA	ND	15	7.9		1	54	6.4	50-150	30	02/08/2021 1747
PFHpA	7.2	15	11	N	1	24	10	50-150	30	02/08/2021 1747
PFHxA	12	15	15	N	1	17	7.0	50-150	30	02/08/2021 1747
PFNA	ND	15	8.3		1	57	1.4	50-150	30	02/08/2021 1747
PFOA	21	15	20	N	1	-5.3	12	50-150	30	02/08/2021 1747
PFPeA	6.0	15	11	N	1	36	4.1	50-150	30	02/08/2021 1747
PFTeDA	ND	15	8.3		1	56	3.1	50-150	30	02/08/2021 1747
PFTrDA	ND	15	8.0		1	54	1.4	50-150	30	02/08/2021 1747
PFUdA	ND	15	9.1		1	61	21	50-150	30	02/08/2021 1747
PFOS	92	14	57	N	1	-259	4.4	50-150	30	02/08/2021 1747

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	209	25-150
13C2_6:2FTS	N	179	25-150
13C2_8:2FTS	N	209	25-150
13C2_PFDoA	N	172	25-150
13C2_PFTeDA	N	157	25-150
13C3_PFBS	N	159	25-150
13C3_PFHxS	N	156	25-150
13C3-HFPO-DA	N	196	25-150
13C4_PFBA	N	176	25-150
13C4_PFHpA	N	203	25-150
13C5_PFHxA	N	199	25-150
13C5_PFPeA	N	177	25-150

"surrogate" double spiked per case narrative, results theoretically halved. not used to evaluate

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MSD

Sample ID: WA28027-005MD
Batch: 81968
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 02/05/2021 1201

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA	N	170	25-150
13C7_PFUdA	N	166	25-150
13C8_PFOA	N	186	25-150
13C8_PFOS	N	162	25-150
13C8_PFOSA	N	180	10-150
13C9_PFNA	N	176	25-150
d5-EtFOSAA	N	160	25-150
d3-MeFOSAA	N	202	25-150

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

FORM 2
ISOTOPE DILUTION STANDARD RECOVERY

Lab Name: Shealy Environmental Services, Inc. Lot No.: WA28027

Project No.: 16.0062961.5

AnalyticalMethod: PFAS by ID SOP Matrix: Water

CLIENT SAMPLE ID	IDS1	IDS2	IDS3	IDS4	IDS5	IDS6	IDS7	IDS8	IDS9
HS-PW-2.5 (A)	97	90	102	94	91	96	100	101	99
HS-PW-2.5 (B)	107	103	110	97	87	96	95	101	96
HS-PW-3 (A)	110	108	108	101	97	109	103	107	108
HS-PW-3 (A) DUP	105	92	106	93	95	105	102	101	104
HS-PW-3.5 (A)	97	92	100	81	77	88	89	97	91
FB-1/26	98	85	91	106	85	93	92	106	93
EB-HT	94	103	100	89	87	96	85	109	98
WQ81803-001	108	105	111	101	99	97	96	101	102
WQ81803-002	96	99	110	96	94	90	87	95	97
WQ81968-001	120	109	119	112	100	101	109	123	113
WQ81968-002	111	105	112	104	98	93	97	111	105
HS-PW-3.5 (A)MS	181 *	159 *	169 *	163 *	156 *	167 *	166 *	186 *	175 *
HS-PW-3.5 (A)MSD	209 *	179 *	209 *	172 *	157 *	159 *	156 *	196 *	176 *

	QC LIMITS
IDS1 = 13C2_4:2FTS	25-150
IDS2 = 13C2_6:2FTS	25-150
IDS3 = 13C2_8:2FTS	25-150
IDS4 = 13C2_PFDoA	25-150
IDS5 = 13C2_PFTeDA	25-150
IDS6 = 13C3_PFBS	25-150
IDS7 = 13C3_PFHxS	25-150
IDS8 = 13C3-HFPO-DA	25-150
IDS9 = 13C4_PFBA	25-150

* Recoveries outside QC limits
D IDS Diluted Out

FORM 2
ISOTOPE DILUTION STANDARD RECOVERY

Lab Name: Shealy Environmental Services, Inc. Lot No.: WA28027

Project No.: 16.0062961.5

AnalyticalMethod: PFAS by ID SOP Matrix: Water

CLIENT SAMPLE ID	IDS10	IDS11	IDS12	IDS13	IDS14	IDS15	IDS16	IDS17	
HS-PW-2.5 (A)	98	97	98	92	97	103	92	97	
HS-PW-2.5 (B)	105	101	105	96	96	105	85	94	
HS-PW-3 (A)	106	103	112	100	103	109	102	103	
HS-PW-3 (A) DUP	99	96	103	103	98	101	95	97	
HS-PW-3.5 (A)	95	102	95	92	94	93	79	96	
FB-1/26	98	103	97	84	90	101	90	95	
EB-HT	106	110	98	91	89	102	99	95	
WQ81803-001	101	97	103	107	99	104	87	96	
WQ81803-002	100	94	97	99	98	96	87	94	
WQ81968-001	112	114	109	101	101	112	102	103	
WQ81968-002	109	120	110	91	103	112	92	105	
HS-PW-3.5 (A)MS	182 *	212 *	179 *	174 *	177 *	182 *	157 *	212 *	
HS-PW-3.5 (A)MSD	203 *	199 *	177 *	170 *	166 *	186 *	162 *	180 *	

	QC LIMITS
IDS10 = 13C4_PFHpA	25-150
IDS11 = 13C5_PFHxA	25-150
IDS12 = 13C5_PFPeA	25-150
IDS13 = 13C6_PFDA	25-150
IDS14 = 13C7_PFUdA	25-150
IDS15 = 13C8_PFOA	25-150
IDS16 = 13C8_PFOS	25-150
IDS17 = 13C8_PFOSA	10-150

* Recoveries outside QC limits
D IDS Diluted Out

FORM 2
ISOTOPE DILUTION STANDARD RECOVERY

Lab Name: Shealy Environmental Services, Inc. Lot No.: WA28027

Project No.: 16.0062961.5

AnalyticalMethod: PFAS by ID SOP Matrix: Water

CLIENT SAMPLE ID	IDS18	IDS19	IDS20						TOT OUT
HS-PW-2.5 (A)	93	96	100						0
HS-PW-2.5 (B)	94	92	101						0
HS-PW-3 (A)	104	105	110						0
HS-PW-3 (A) DUP	96	91	101						0
HS-PW-3.5 (A)	95	78	100						0
FB-1/26	101	93	112						0
EB-HT	108	83	106						0
WQ81803-001	104	99	100						0
WQ81803-002	94	88	98						0
WQ81968-001	108	98	121						0
WQ81968-002	100	98	108						0
HS-PW-3.5 (A)MS	174 *	152 *	168 *						20
HS-PW-3.5 (A)MSD	176 *	160 *	202 *						20

	QC LIMITS
IDS18 = 13C9_PFNA	25-150
IDS19 = d5-EtFOSAA	25-150
IDS20 = d3-MeFOSAA	25-150

* Recoveries outside QC limits
D IDS Diluted Out

FORM 3
MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Shealy Environmental Services, Inc. Lot No.: WA28027

Project No.: 16.0062961.5

Analytical Method: PFAS by ID SOP Matrix: Water

Client Sample ID (Matrix Spike/Matrix Spike Duplicate): HS-PW-3.5 (A)

Instrument ID: _Sciex 4500_LCMSMS1 Lab Sample ID: WA28027-005MS

Concentration Units (ug/L, mg/L, ug/kg): ng/L

ANALYTE	SPIKE ADDED	SAMPLE CONCENTRATION	MS CONCENTRATION	MS %REC	#	QC LIMITS REC.
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	13		7.2	55		50-150
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	13		6.6	50		50-150
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	13		8	59		50-150
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	13		8.7	65		50-150
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	13		7.1	54		50-150
Hexafluoropropylene oxide dimer acid (GenX)	28		16	57		50-150
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	13		7.6	57		50-150
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	14		7.4	52		50-150
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	14		9	64		50-150
Perfluoro-1-butanesulfonic acid (PFBS)	12	32	25	-56	*	50-150
Perfluoro-1-decanesulfonic acid (PFDS)	14		6.6	49	*	50-150
Perfluoro-1-heptanesulfonic acid (PFHpS)	13		8.5	63		50-150
Perfluoro-1-nonanesulfonic acid (PFNS)	14		6.8	50		50-150
Perfluoro-1-octanesulfonamide (PFOSA)	14		6.7	48	*	50-150
Perfluoro-1-pentanesulfonic acid (PFPeS)	13	17	17	-1.6	*	50-150
Perfluorohexanesulfonic acid (PFHxS)	13	19	18	-9.3	*	50-150
Perfluoro-n-butanoic acid (PFBA)	14	9.5	12	20	*	50-150
Perfluoro-n-decanoic acid (PFDA)	14		7.2	51		50-150
Perfluoro-n-dodecanoic acid (PFDoA)	14		8.4	60		50-150
Perfluoro-n-heptanoic acid (PFHpA)	14	7.2	12	34	*	50-150
Perfluoro-n-hexanoic acid (PFHxA)	14	12	14	11	*	50-150
Perfluoro-n-nonanoic acid (PFNA)	14		8.2	58		50-150
Perfluoro-n-octanoic acid (PFOA)	14	21	18	-22	*	50-150
Perfluoro-n-pentanoic acid (PFPeA)	14	6	11	34	*	50-150
Perfluoro-n-tetradecanoic acid (PFTeDA)	14		8	57		50-150
Perfluoro-n-tridecanoic acid (PFTrDA)	14		8.1	58		50-150
Perfluoro-n-undecanoic acid (PFUdA)	14		7.4	52		50-150
Perfluorooctanesulfonic acid (PFOS)	13	92	59	-252	*	50-150

"surrogate" double spiked?

* Values outside of QC Limits

FORM 3
MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Shealy Environmental Services, Inc. Lot No.: WA28027

Project No.: 16.0062961.5

Analytical Method: PFAS by ID SOP Matrix: Water

Client Sample ID (Matrix Spike/Matrix Spike Duplicate): HS-PW-3.5 (A)

Instrument ID: _Sciex 4500_LCMSMS1 Lab Sample ID: WA28027-005MS

Concentration Units (ug/L, mg/L, ug/kg): ng/L

ANALYTE	SPIKE ADDED	MSD CONCENTRATION	MSD %R	#	RPD	#	QC LIMITS RPD	QC LIMITS %R
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	14	6.5	47	*	10		0-30	50-150
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	14	5.8	41	*	13		0-30	50-150
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	14	5.7	40	*	34	*	0-30	50-150
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	14	7.9	57		9.3		0-30	50-150
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	14	7.8	57		9.7		0-30	50-150
Hexafluoropropylene oxide dimer acid (GenX)	30	16	56		2.6		0-30	50-150
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	14	8.7	63		14		0-30	50-150
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	15	6.8	46	*	7.5		0-30	50-150
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	15	8	54		12		0-30	50-150
Perfluoro-1-butanesulfonic acid (PFBS)	13	25	-57	*	1.9		0-30	50-150
Perfluoro-1-decanesulfonic acid (PFDS)	14	7	49	*	5.1		0-30	50-150
Perfluoro-1-heptanesulfonic acid (PFHpS)	14	9.5	68		12		0-30	50-150
Perfluoro-1-nonanesulfonic acid (PFNS)	14	7.2	51		5.8		0-30	50-150
Perfluoro-1-octanesulfonamide (PFOSA)	15	8.5	58		23		0-30	50-150
Perfluoro-1-pentanesulfonic acid (PFPeS)	14	19	13	*	12		0-30	50-150
Perfluorohexanesulfonic acid (PFHxS)	13	20	4.5	*	9.5		0-30	50-150
Perfluoro-n-butanoic acid (PFBA)	15	13	21	*	2.6		0-30	50-150
Perfluoro-n-decanoic acid (PFDA)	15	7.3	49	*	1.9		0-30	50-150
Perfluoro-n-dodecanoic acid (PFDoA)	15	7.9	54		6.4		0-30	50-150
Perfluoro-n-heptanoic acid (PFHpA)	15	11	24	*	10		0-30	50-150
Perfluoro-n-hexanoic acid (PFHxA)	15	15	17	*	7.0		0-30	50-150
Perfluoro-n-nonanoic acid (PFNA)	15	8.3	57		1.4		0-30	50-150
Perfluoro-n-octanoic acid (PFOA)	15	20	-5.3	*	12		0-30	50-150
Perfluoro-n-pentanoic acid (PFPeA)	15	11	36	*	4.1		0-30	50-150
Perfluoro-n-tetradecanoic acid (PFTeDA)	15	8.3	56		3.1		0-30	50-150
Perfluoro-n-tridecanoic acid (PFTrDA)	15	8	54		1.4		0-30	50-150
Perfluoro-n-undecanoic acid (PFUdA)	15	9.1	61		21		0-30	50-150
Perfluorooctanesulfonic acid (PFOS)	14	57	-259	*	4.4		0-30	50-150

"surrogate" double spiked?

* Values outside of QC Limits

FORM 3
LABORATORY CONTROL/LABORATORY CONTROL DUPLICATE SAMPLE RECOVERY

Lab Name: Shealy Environmental Services, Inc. Lot No.: WA28027

Project No.: 16.0062961.5

Analytical Method: PFAS by ID SOP Matrix: Water

Client Sample ID: WQ81803-002 Lab Sample ID: WQ81803-002

Instrument ID: Sciex_5060884 (QTRAP 4500)_LCMSMS2

Concentration Units (ug/L, mg/L, ug/kg): ng/L

ANALYTE	SPIKE ADDED	LCS CONCENTRATION	LCS %REC #	QC LIMITS REC.
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	15	14	95	50-150
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	15	14	93	50-150
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	15	16	109	50-150
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	15	13	89	50-150
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	15	16	108	50-150
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	15	14	97	50-150
Hexafluoropropylene oxide dimer acid (GenX)	32	32	100	50-150
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	16	17	105	50-150
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	16	17	103	50-150
Perfluoro-1-butanesulfonic acid (PFBS)	14	13	94	50-150
Perfluoro-1-decanesulfonic acid (PFDS)	15	15	100	50-150
Perfluoro-1-heptanesulfonic acid (PFHpS)	15	16	108	50-150
Perfluoro-1-nonanesulfonic acid (PFNS)	15	16	103	50-150
Perfluoro-1-octanesulfonamide (PFOSA)	16	16	98	50-150
Perfluoro-1-pentanesulfonic acid (PFPeS)	15	15	101	50-150
Perfluoro-n-butanoic acid (PFBA)	16	15	97	50-150
Perfluoro-n-decanoic acid (PFDA)	16	16	97	50-150
Perfluoro-n-dodecanoic acid (PFDoA)	16	16	100	50-150
Perfluoro-n-heptanoic acid (PFHpA)	16	15	93	50-150
Perfluoro-n-hexanoic acid (PFHxA)	16	16	102	50-150
Perfluoro-n-nonanoic acid (PFNA)	16	17	109	50-150
Perfluoro-n-octanoic acid (PFOA)	16	16	101	50-150
Perfluoro-n-pentanoic acid (PFPeA)	16	15	95	50-150
Perfluoro-n-tetradecanoic acid (PFTeDA)	16	17	106	50-150
Perfluoro-n-tridecanoic acid (PFTrDA)	16	19	117	50-150
Perfluoro-n-undecanoic acid (PFUdA)	16	15	93	50-150
Perfluorohexanesulfonic acid (PFHxS)	15	15	103	50-150
Perfluorooctanesulfonic acid (PFOS)	15	14	96	50-150

* Values outside of QC Limits

FORM 3
LABORATORY CONTROL/LABORATORY CONTROL DUPLICATE SAMPLE RECOVERY

Lab Name: Shealy Environmental Services, Inc. Lot No.: WA28027

Project No.: 16.0062961.5

Analytical Method: PFAS by ID SOP Matrix: Water

Client Sample ID: WQ81968-002 Lab Sample ID: WQ81968-002

Instrument ID: _Sciex 4500_LCMSMS1

Concentration Units (ug/L, mg/L, ug/kg): ng/L

ANALYTE	SPIKE ADDED	LCS CONCENTRATION	LCS %REC #	QC LIMITS REC.
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	14	13	95	50-150
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	14	12	85	50-150
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	14	14	99	50-150
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	14	15	114	50-150
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	14	15	111	50-150
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	14	13	98	50-150
Hexafluoropropylene oxide dimer acid (GenX)	29	31	107	50-150
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	14	15	107	50-150
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	14	18	123	50-150
Perfluoro-1-butanesulfonic acid (PFBS)	13	13	101	50-150
Perfluoro-1-decanesulfonic acid (PFDS)	14	15	110	50-150
Perfluoro-1-heptanesulfonic acid (PFHpS)	14	14	98	50-150
Perfluoro-1-nonanesulfonic acid (PFNS)	14	14	101	50-150
Perfluoro-1-octanesulfonamide (PFOSA)	14	15	101	50-150
Perfluoro-1-pentanesulfonic acid (PFPeS)	14	14	100	50-150
Perfluoro-n-butanoic acid (PFBA)	14	14	96	50-150
Perfluoro-n-decanoic acid (PFDA)	14	17	119	50-150
Perfluoro-n-dodecanoic acid (PFDoA)	14	15	102	50-150
Perfluoro-n-heptanoic acid (PFHpA)	14	14	99	50-150
Perfluoro-n-hexanoic acid (PFHxA)	14	15	100	50-150
Perfluoro-n-nonanoic acid (PFNA)	14	15	102	50-150
Perfluoro-n-octanoic acid (PFOA)	14	15	105	50-150
Perfluoro-n-pentanoic acid (PFPeA)	14	14	98	50-150
Perfluoro-n-tetradecanoic acid (PFTeDA)	14	15	104	50-150
Perfluoro-n-tridecanoic acid (PFTrDA)	14	15	102	50-150
Perfluoro-n-undecanoic acid (PFUdA)	14	15	102	50-150
Perfluorohexanesulfonic acid (PFHxS)	13	12	94	50-150
Perfluorooctanesulfonic acid (PFOS)	13	14	107	50-150

* Values outside of QC Limits

CLIENT SAMPLE ID

WQ81803-001

FORM 4
METHOD BLANK SUMMARY

Lab Name: Shealy Environmental Services, Inc.

Lot No.: WA28027

Project No.: 16.0062961.5

Lab Sample ID: WQ81803-001

Analytical Method: PFAS by ID SOP

Matrix: Water

Instrument ID: Sciex_5060884 (QTRAP 4500)_LCMSMS2

Lab File ID:

Extraction Type: SOP SPE

Date Extracted: 02/04/2021

LC Column: Gemini C18 ID: 2.00 (mm)

Date Analyzed: 02/05/2021

Time Analyzed: 12:46

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE/TIME ANALYZED
HS-PW-2.5 (A)	WA28027-001		20:27
HS-PW-2.5 (B)	WA28027-002		20:16
HS-PW-3 (A)	WA28027-003		20:38
HS-PW-3 (A) DUP	WA28027-004		20:48
WQ81803-002	WQ81803-002		12:57

CLIENT SAMPLE ID

WQ81968-001

FORM 4
METHOD BLANK SUMMARY

Lab Name: Shealy Environmental Services, Inc.
Lot No.: WA28027

Project No.: 16.0062961.5
Lab Sample ID: WQ81968-001

Analytical Method: PFAS by ID SOP
Matrix: Water

Instrument ID: Sciex 4500_LCMSMS1
Lab File ID:

Extraction Type: SOP SPE
Date Extracted: 02/05/2021

LC Column: Gemini C18 ID: 2.00 (mm)
Date Analyzed: 02/08/2021

Time Analyzed: 16:43

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE/TIME ANALYZED
HS-PW-3.5 (A)	WA28027-005		17:26
FB-1/26	WA28027-006		17:58
EB-HT	WA28027-007		18:08
WQ81968-002	WQ81968-002		16:54
HS-PW-3.5 (A)MS	WA28027-005MS		17:36
HS-PW-3.5 (A)MSD	WA28027-005MD		17:47

SCIEX Triple Quad™ 4500 or SCIEX Triple Quad™ 4500MD System

Planned Maintenance Procedure

GEN-IDV-08-6710-B

January 2019

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Introduction 1

Note: For regulatory and safety information for the mass spectrometer, refer to the *System User Guide*.

The planned maintenance (PM) procedure is designed to help maintain overall system performance.

The PM is not intended to take the place of an Operational Qualification (OQ) nor is it intended to verify the instrument specifications. Separate Installation Qualification (IQ) and OQ services are available. Contact a SCIEX representative.

The procedure must be performed by a trained SCIEX Field Service Employee (FSE).

The procedure has been developed for the SCIEX Triple Quad™ 4500/4500MD system with the Turbo V™ ion source. It does not apply to any other products or processes.

The procedure does not address any customer-specific analytical protocol (performance qualification) or method validation.

Note: If an issue is identified and the system requires repair, then the customer is responsible for the repair at the expense of the customer, except to the extent that the system and the required repairs are covered by a SCIEX warranty or service contract. A separate repair service call must be opened and the repair hours must not be charged against this procedure.

Planned Maintenance Tasks 2

Note: Perform all procedures using the Turbo V™ ion source, unless otherwise specified.

Pre-Planned Maintenance

Note: Guideline values are for reference only. The pre-PM test results are not required to meet or exceed these values.

Pre-PM Tasks

Task	Complete	N/A
Ask the customer about system performance since the last visit and record comments. Performance ok.	✓	—
If the customer maintains a log for the system, then review it.	○	◉
Review the work to be performed with the customer.	✓	—

Task	Complete	N/A
Inspect for front-end contamination. Refer to Inspect for Contamination.	✓	—
Check the status of the RAID 1 hard drives.	✓	—

Vacuum System Tests

<table>
<tr><th colspan="3">Task</th><th>Complete</th></tr>
<tr><td colspan="3">Record the turbo pump operational values.
<table><tr><th>Parameter</th><th>Results</th></tr><tr><td>Temperature (°C)</td><td>48</td></tr><tr><td>Current (A)</td><td>3.8</td></tr><tr><td>Voltage (V)</td><td>23</td></tr><tr><td>Power (W)</td><td>80</td></tr><tr><td>Driving frequency (Hz)</td><td>800</td></tr></table></td><td>✓</td></tr>
<tr><td rowspan="2">Inspect the vacuum gauge filament using the Analyst® Service Diagnostics (ASD) software and identify the filament position. If the mass spectrometer is using filament 2, then order a replacement vacuum gauge as a separate service call.</td><td>1</td><td>◉</td><td rowspan="2">✓</td></tr>
<tr><td>2</td><td>○</td></tr>
</table>

Pre-PM Pressure Test

Pre-PM Pressure Test is Complete	✓

Test	Guideline	Result
Vacuum chamber pressure with CAD gas off	0.4×10^{-5} torr ≤ $P_{CAD\ 0}$ ≤ 1.1×10^{-5} torr	0.5e-5
Vacuum chamber pressure with CAD gas set to Full	1.8×10^{-5} torr ≤ ($P_{CAD\ 12} - P_{CAD\ 0}$) ≤ 2.8×10^{-5} torr	1.8e-5

Pre-PM System Tests

Q1 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
175.133	≥ 8.0×10^6	2.6e7	0.6 to 0.8	0.64
500.380	≥ 8.0×10^6	2.6e7	0.6 to 0.8	0.69
906.673	≥ 2.0×10^7	4.4e7	0.6 to 0.8	0.78
1952.427	≥ 8.8×10^5	5.4e6	0.6 to 0.8	0.83

Q3 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
175.133	$\geq 8.0 \times 10^6$	3.0e7	0.6 to 0.8	0.76
500.380	$\geq 8.0 \times 10^6$	2.3e7	0.6 to 0.8	0.73
906.673	$\geq 2.0 \times 10^7$	5.3e7	0.6 to 0.8	0.80
1952.427	$\geq 8.8 \times 10^5$	1.0e7	0.6 to 0.8	1.1

Q1 Negative PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
933.636	$\geq 1.8 \times 10^7$	3.2e7	0.6 to 0.8	0.70
1863.306	$\geq 1.4 \times 10^6$	7.5e6	0.6 to 0.8	0.68

Q3 Negative PPGs Test is Complete	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
933.636	$\geq 1.8 \times 10^7$	3.8e7	0.6 to 0.8	0.75
1863.306	$\geq 2.0 \times 10^6$	5.7e6	0.6 to 0.8	0.63

Planned Maintenance Tasks

Reserpine MS/MS Test is Complete	✓

- **Test solution:** Reserpine solution 0.167 pmol/µL
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s (both MS and MS/MS)
- **Scan mode:** Product Ion (MS2)
- **Product Of:** 609.3 (or as calibrated)
- **Product Ion:** 195.1
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 609.3 and 195.1, with peak intensities, peak width, and mass shift results, complete with method file information.

Guideline	Result
Transmission efficiency $\frac{Intensity\ for\ ion\ at\ m/z\ 195.1}{Intensity\ for\ ion\ at\ m/z\ 609.3\ (or\ as\ calibrated)} \times 100 \geq 10\%$	11.6%

Planned Maintenance

Mass Spectrometer Maintenance

Task	Complete	N/A
Shut down the system and then disconnect the mains supply power cable.	✓	—
If required, replace the roughing pump oil. The recommended interval is every 3 years for long-life (ES) pumps, or every year for other pumps. **Note:** If an oil change is not required, then inspect the oil level and top up, if necessary. **CAUTION: Potential System Damage. Do not mix different types of oil. Mixing mineral oil with synthetic oil can cause pump failure.**	✓	—
If required, replace the roughing pump oil exhaust filter. The recommended interval is every 24 months.	○	◒
Clean or replace the four air filters in the base of the mass spectrometer chassis.	✓	—
(If applicable) Clean the turbo pump filter screen.	◒	○
(If applicable) Verify the operation of the SCIEX-supplied bench cooling fans.	◒	○
Inspect the mass spectrometer, components, and cabling, as required.	✓	—
Clean the curtain plate.	✓	—
Clean the orifice plate.	✓	—
Clean the QJet® ion guide and IQ0 lens.	✓	—

Planned Maintenance Tasks

Task	Complete	N/A
(If contamination is detected) Clean the Q0 region.	○	◉ —
Start up the system.	✓	—

Turbo V™ Ion Source Maintenance

Task	Complete	N/A
If necessary, replace the electrode in the TurboIonSpray® and the APCI probe.	◉	○
With the TurboIonSpray® probe installed, verify that the temperature (TEM) reaches the recommended set point of 500 °C.	✓	—
(If applicable) With the APCI probe installed, verify that the temperature (TEM) reaches the recommended set point of 400 °C.	○	◉

Post-Planned Maintenance

Task	Complete
Inspect for front-end contamination. Refer to Inspect for Contamination.	✓

Voltage Tests

Task	Complete
Inspect the RF tuning voltages at the QPS amplifier module and then, if required, tune the coil boxes.	✓
Inspect the detector voltage. Optimize, if required. Detector voltage: 1800	✓

Post-PM Pressure Test

Post-PM Pressure Test is Complete	✓

Test	Specification	Result
Vacuum chamber pressure with CAD gas off	0.4×10^{-5} torr ≤ $P_{CAD\ 0}$ ≤ 1.1×10^{-5} torr	0.7e-5
Vacuum chamber pressure with CAD gas set to Full	1.8×10^{-5} torr ≤ ($P_{CAD\ 12} - P_{CAD\ 0}$) ≤ 2.8×10^{-5} torr	2.2e-5

Post-PM System Tests

Q1 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
175.133	$\geq 8.0 \times 10^6$	2.7e7	0.6 to 0.8	0.71
500.380	$\geq 8.0 \times 10^6$	3.4e7	0.6 to 0.8	0.71
906.673	$\geq 2.0 \times 10^7$	5.0e7	0.6 to 0.8	0.74
1952.427	$\geq 8.8 \times 10^5$	5.2e6	0.6 to 0.8	0.74

Q1 Positive PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Q3 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
175.133	$\geq 8.0 \times 10^6$	3.8e7	0.6 to 0.8	0.75
500.380	$\geq 8.0 \times 10^6$	3.3e7	0.6 to 0.8	0.71
906.673	$\geq 2.0 \times 10^7$	6.3e7	0.6 to 0.8	0.77
1952.427	$\geq 8.8 \times 10^5$	1.0e7	0.6 to 0.8	0.73

Q3 Positive PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134, 1952.427	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Q1 Negative PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
933.636	$\geq 1.8 \times 10^7$	3.9e7	0.6 to 0.8	0.74
1863.306	$\geq 1.4 \times 10^6$	6.8e6	0.6 to 0.8	0.71

Q1 Negative PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Q3 Negative PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
933.636	$\geq 1.8 \times 10^7$	4.4e7	0.6 to 0.8	0.76
1863.306	$\geq 2.0 \times 10^6$	5.2e6	0.6 to 0.8	0.66

Q3 Negative PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Reserpine MS/MS Test is Complete	✓

- **Test solution:** Reserpine solution 0.167 pmol/µL
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s (both MS and MS/MS)
- **Scan mode:** Product Ion (MS2)
- **Product Of:** 609.3 (or as calibrated)
- **Product Ion:** 195.1
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 609.3 and 195.1, with peak intensities, peak width, and mass shift results, complete with method file information.

Specification	Result
Transmission efficiency $\frac{Intensity\ for\ ion\ at\ m/z\ 195.1}{Intensity\ for\ ion\ at\ m/z\ 609.3\ (or\ as\ calibrated)} \times 100 \geq 10\%$	12.4%

Post-PM Tasks

Task	Complete	N/A
(Obtain customer approval first) Install any applicable Analyst®/Analyst® MD software HotFixes.	○	◉
Delete any unnecessary files.	✓	—
Back up the Analyst Data folder.	✓	—
(If applicable) Defragment the hard drive.	○	◉
(Not applicable for MD instrument families) If the customer has a Software Support Plan, then perform the Software Health Check: • (Obtain customer approval first) Install any compatible HotFixes and updates for SCIEX add-on software.	◉	○
Discuss warranty coverage for the StatusScope® remote monitoring service. Determine whether the customer already has StatusScope® remote monitoring service installed and, if not, whether it should be installed. **Note:** The StatusScope® remote monitoring service is not applicable for MD systems. **Note:** Installation of the StatusScope® remote monitoring service is available only to warranty and eligible contract customers. Refer to https://sciex.com/services/statusscope-remote-monitoring for a list of eligible contracts.	◉	○

StatusScope® Remote Monitoring Service Tasks

Task	Complete	N/A
If the StatusScope® remote monitoring service is not installed, then perform these tasks: 1. Complete the *StatusScope® User Access* form. 2. Verify the connection to the StatusScope® server. 3. Install the StatusScope® agent.	○	◉
Log on to the StatusScope® server using the FSE user name and then verify that the assets under the customer organization are connected to the StatusScope® server.	○	◉
Perform the post-PM fault test to verify that the mass spectrometer fault generated is shown in the StatusScope® remote monitoring service.	○	◉

Review

Task	Complete
Review the work performed with the customer.	✓
Record the verification data in this document and then attach all of the performance data.	✓
Review the routine maintenance schedule and the procedures with the customer.	✓
Complete this document: • Review the verification data with the customer. • Provide the customer with the completed document and the performance data. • If an electronic copy of the document is supplied to the customer, then save a copy on the Service drive.	✓

Signoff 3

Organization	Shealy Environmental		
Mass spectrometer serial number	BJ29321608	Service request number	4336406
FSE name	Lynne Russell	Date (yyyy-mm-dd)	2019-04-10
FSE signature	Lynne Russell		

Comments and Exceptions

LV 200 oil used.

Inspect for Contamination A

1. Run the **Q1 Pos PPG** method for 10 minutes, monitoring the TIC for degradation of the signal or sensitivity drops.
2. Change the polarity to negative, and then scan for one minute.
3. Change the polarity to positive, and then make sure that the **IS** parameter returns to the original value.
4. Run the method.

   If the signal sensitivity is restored temporarily but it starts to degrade again, then the charging effect is present.

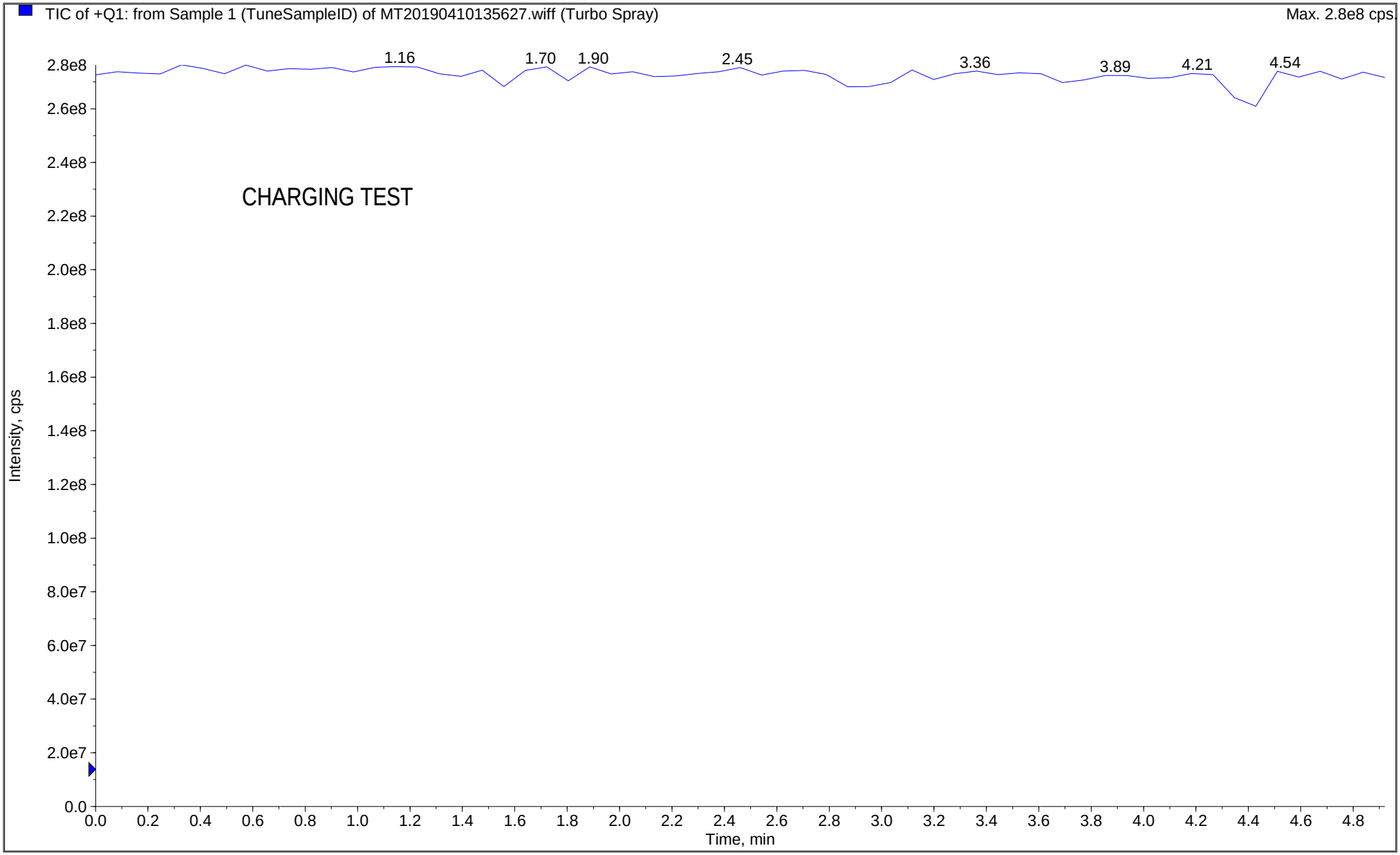
Guidelines for Identifying Components to be Cleaned

If the Q1 quadrupole is showing the charging effect and signal drop out, then clean the Q0 and the vacuum interface components (the curtain plate, orifice plate, the QJet® ion guide, and the Q0 side of the IQ0 lens) using the customer cleaning procedure, with the rod and tissues. In most cases, this will remove the contamination.

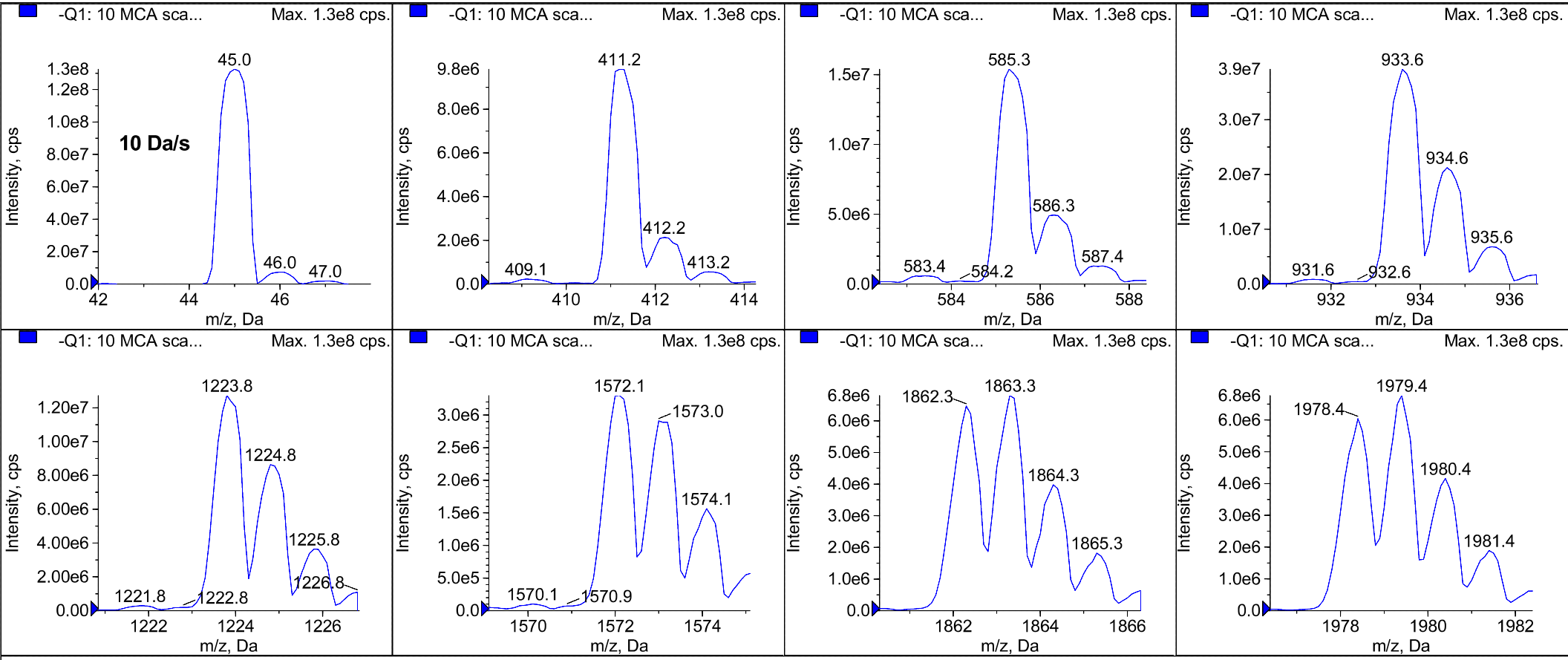
Notes:

- Do not remove the ion optics during a PM. This is considered to be a repair activity and requires a separate service call to be opened.
- Consider cleaning the Q1 quadrupole as well as other components (the stubbies and the IQ1 lens), if cleaning the front end does not eliminate the contamination.
- This guideline does not provide complete troubleshooting for all possible technical root causes of signal degradation or charging effect. Signal degradation might also result from a contaminated TurboIonSpray® probe or electrode, method parameters that are not optimized, and so on.

Printing Time: 6:20:07 PM
Printing Date: Friday, April 26, 2019
Polarity/Scan Type: Positive Q1 MS

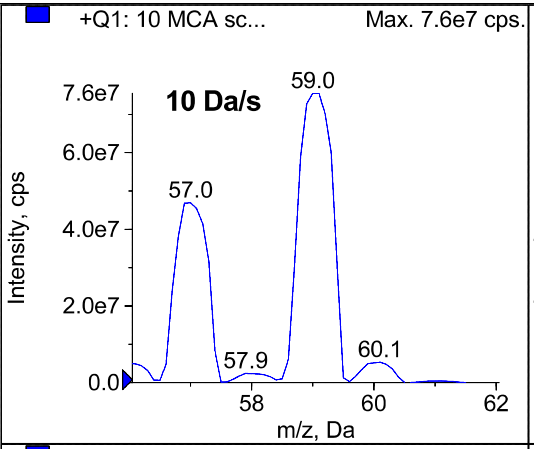


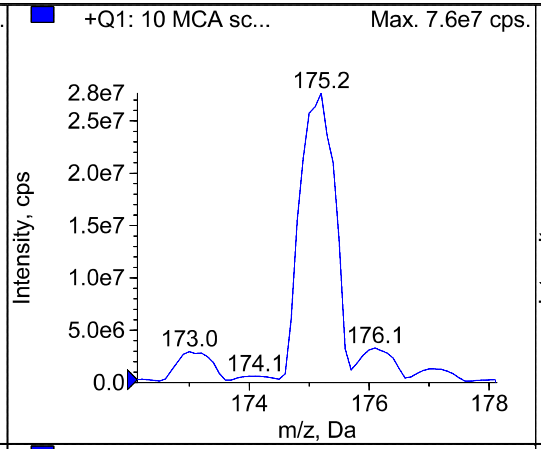
* FSE Lynne Russell
*Post-PM Results

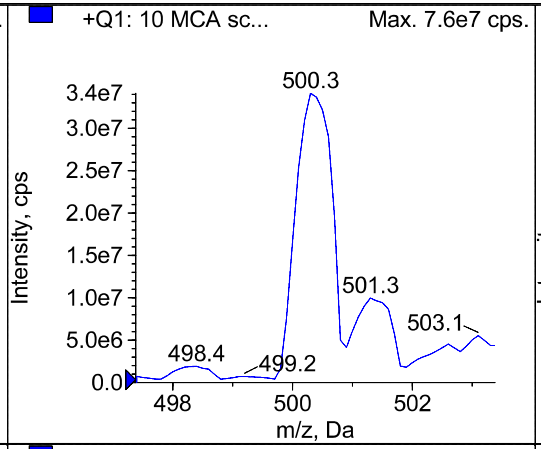


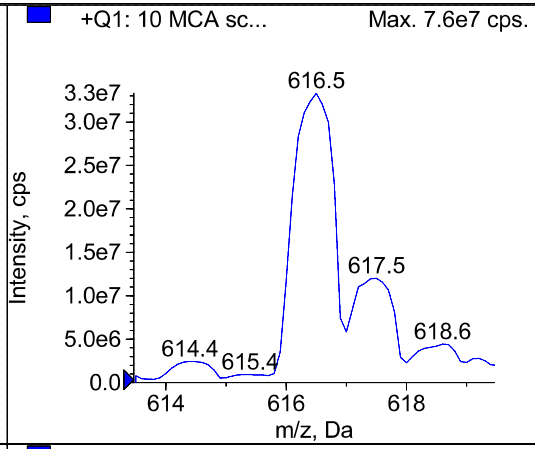
Peak List for " -Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20190410144335.wiff (Turbo Spray)"

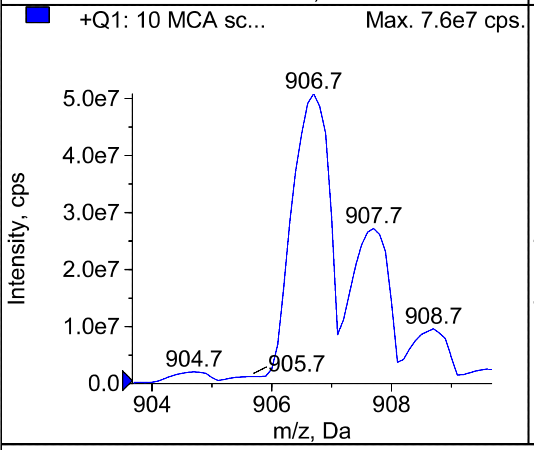
	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9960	1.3258e8	0.7208	2.0090e-3
2	411.2590	411.2654	9.8269e6	0.6969	-6.4068e-3
3	585.3850	585.3826	1.5391e7	0.7499	2.4310e-3
4	933.6360	933.6249	3.9214e7	0.7447	0.0111
5	1223.8450	1223.8422	1.2723e7	0.7009	2.8400e-3
6	1572.0970	1572.0890	3.2995e6	0.7321	8.0035e-3
7	1863.3060	1863.3026	6.7988e6	0.7113	3.3643e-3
8	1979.3890	1979.3774	6.7711e6	0.6979	0.0116

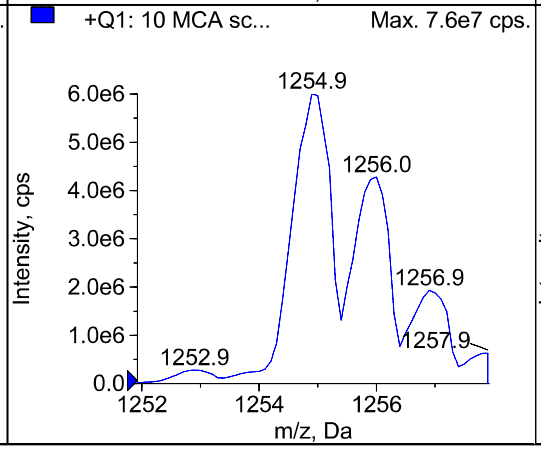


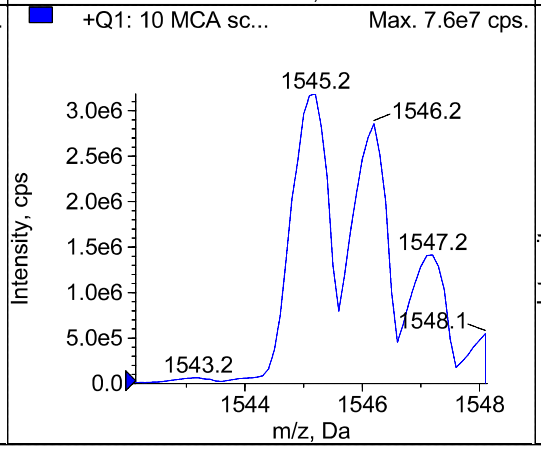


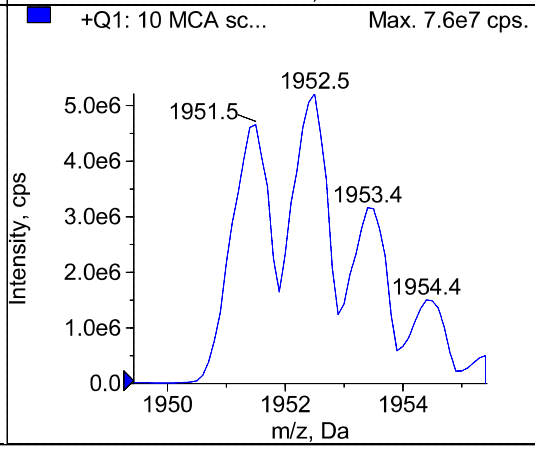






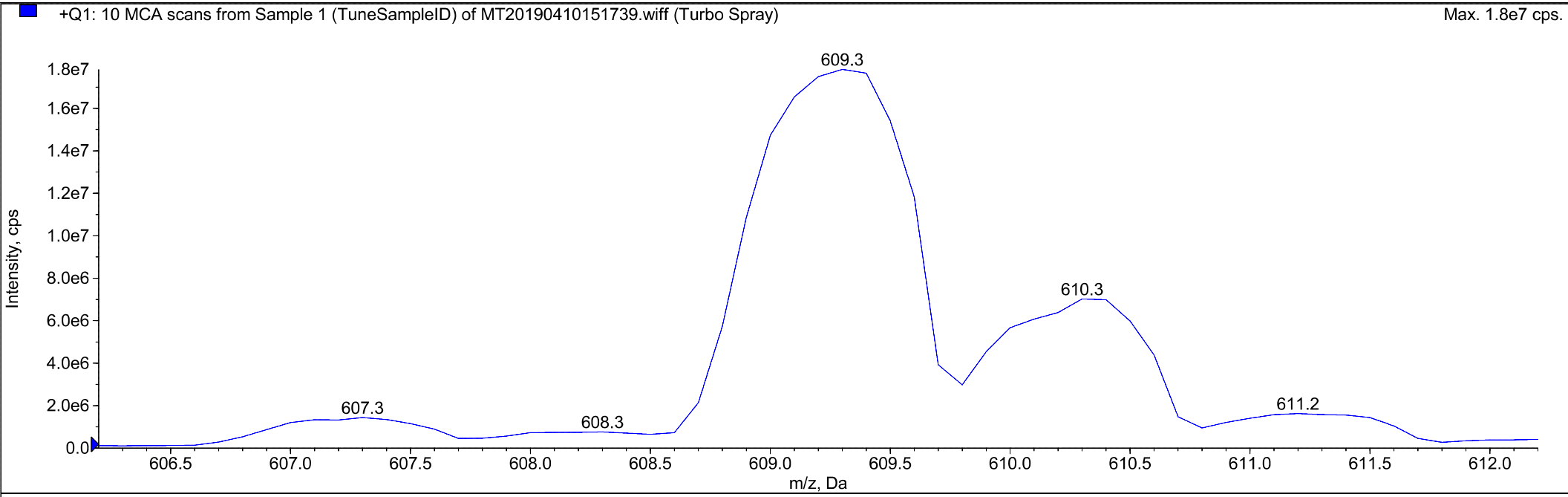






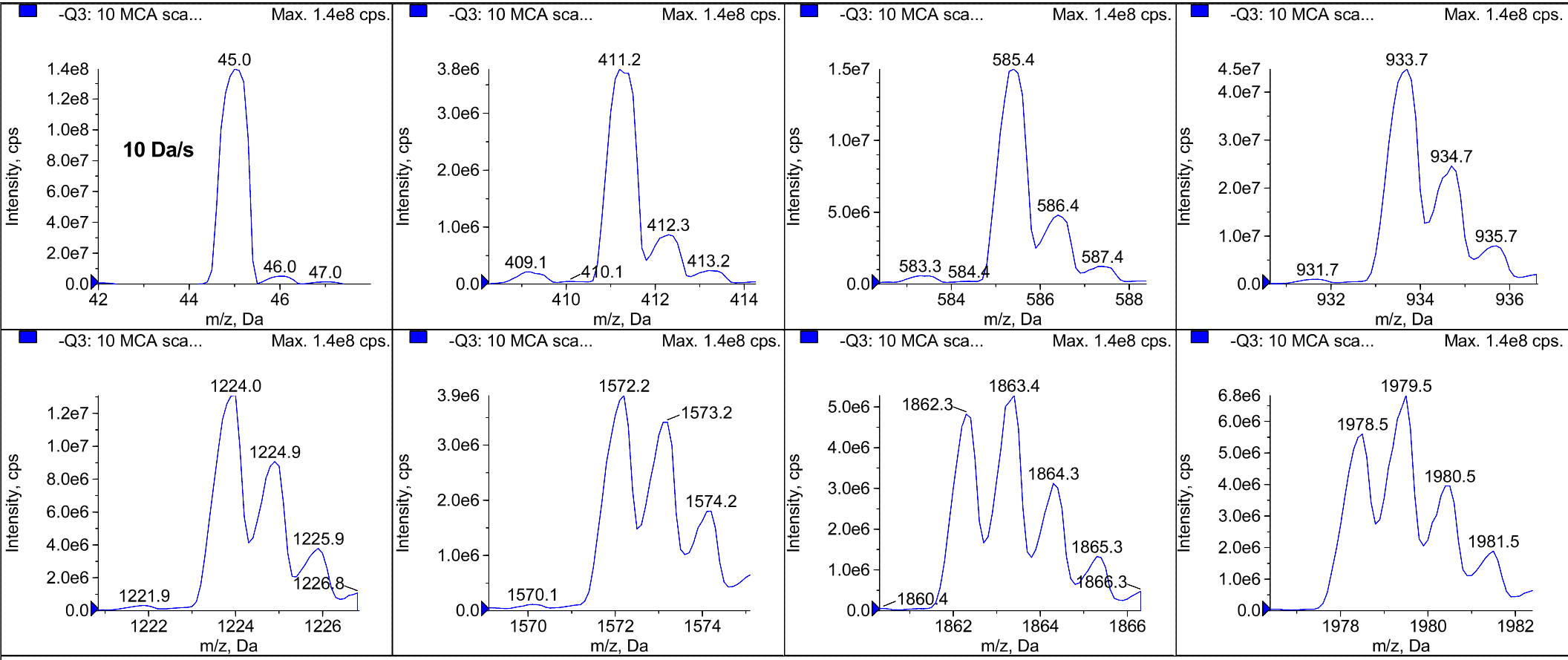
Peak List for " +Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20190410140504.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0496	7.5522e7	0.6480	3.5042e-4
2	175.1330	175.1354	2.7642e7	0.7140	-2.4039e-3
3	500.3800	500.3732	3.4129e7	0.7123	6.8383e-3
4	616.4640	616.4619	3.3315e7	0.7893	2.1491e-3
5	906.6730	906.6713	5.0848e7	0.7432	1.6744e-3
6	1254.9250	1254.9220	6.0055e6	0.7404	3.0310e-3
7	1545.1340	1545.1226	3.1869e6	0.7347	0.0114
8	1952.4270	1952.4270	5.2126e6	0.7365	-1.2862e-5



Peak List for " +Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20190410151739.wiff (Turbo Spray)"

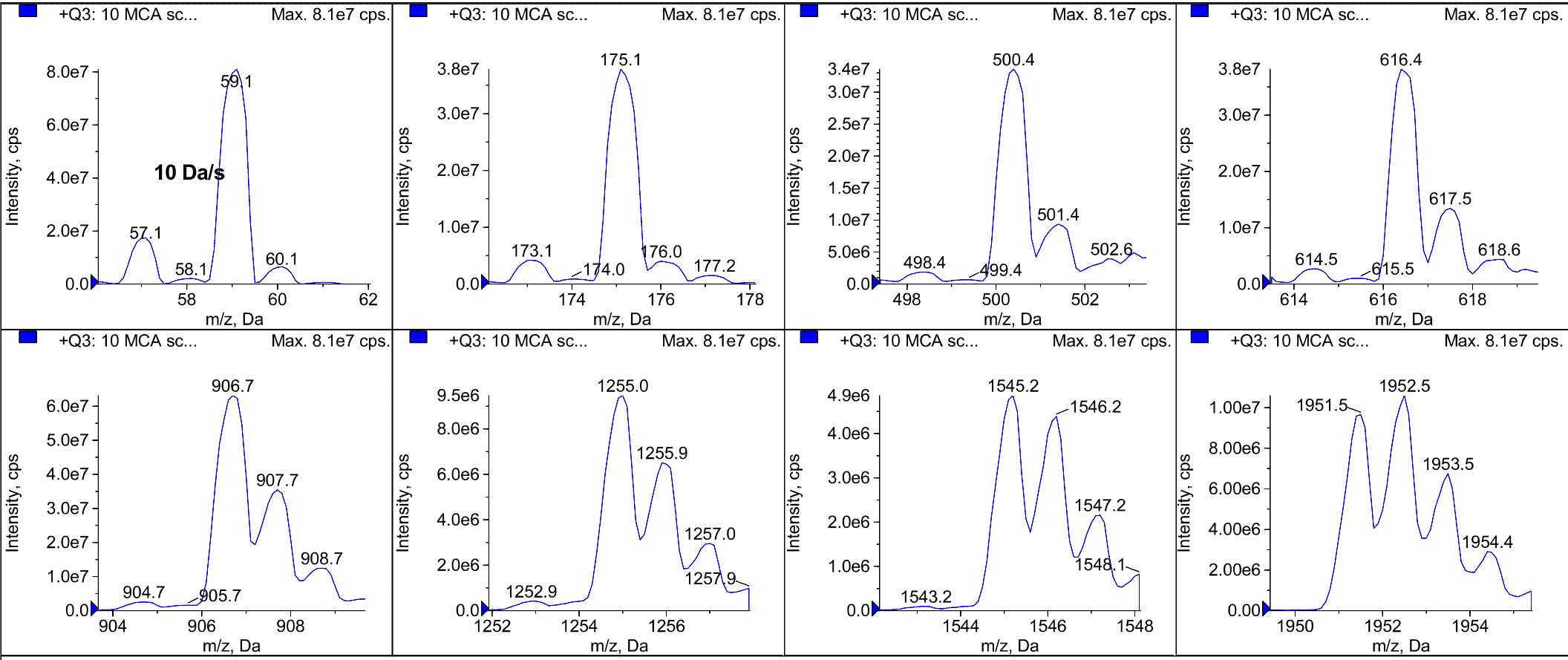
	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	174.1000	n/a	n/a	n/a	n/a
2	195.1000	n/a	n/a	n/a	n/a
3	397.2000	n/a	n/a	n/a	n/a
4	448.1000	n/a	n/a	n/a	n/a
5	609.2810	609.2637	1.7836e7	0.7749	0.0173



Peak List for " -Q3: 10 MCA scans from Sample 1 (TuneSampleID) of MT20190410145833.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9997	1.3930e8	0.6906	-1.7028e-3
2	411.2590	411.2586	3.7750e6	0.7340	4.0505e-4
3	585.3850	585.3859	1.4951e7	0.7153	-9.0261e-4
4	933.6360	933.6250	4.4765e7	0.7611	0.0110
5	1223.8450	1223.8893	1.3086e7	0.7346	-0.0443
6	1572.0970	1572.1183	3.8989e6	0.7413	-0.0213
7	1863.3060	1863.2953	5.2795e6	0.6649	0.0107
8	1979.3890	1979.3951	6.8213e6	0.7412	-6.1049e-3

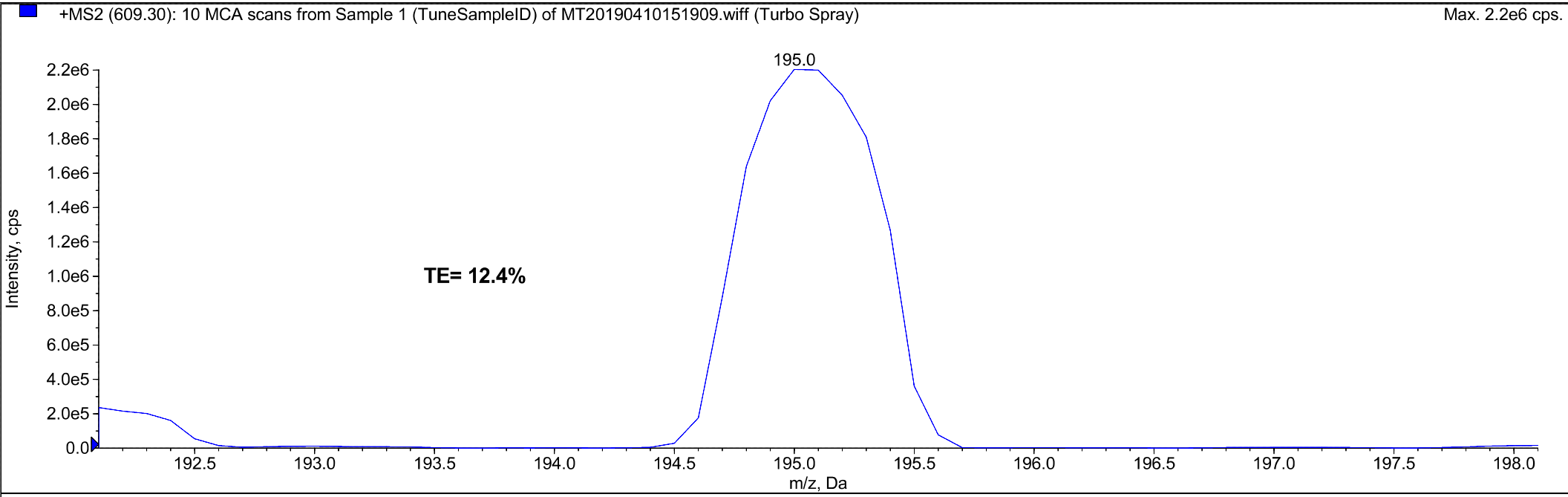
Printing Time: 2:25:26 PM
Printing Date: Wednesday, April 10, 2019
Polarity/Scan Type: Positive Q3 MS



Peak List for " +Q3: 10 MCA scans from Sample 1 (TuneSampleID) of MT20190410142310.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0492	8.1037e7	0.6529	8.1344e-4
2	175.1330	175.1312	3.7823e7	0.7504	1.7640e-3
3	500.3800	500.3815	3.3582e7	0.7095	-1.4637e-3
4	616.4640	616.4596	3.8148e7	0.6573	4.3988e-3
5	906.6730	906.6704	6.3131e7	0.7736	2.5943e-3
6	1254.9250	1254.9236	9.4704e6	0.7407	1.4113e-3
7	1545.1340	1545.1290	4.8598e6	0.7188	5.0259e-3
8	1952.4270	1952.4303	1.0596e7	0.7325	-3.3111e-3

* FSE Lynne Russell
*Post-PM Results



Peak List for " +MS2 (609.30): 10 MCA scans from Sample 1 (TuneSampleID) of MT20190410151909.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	174.1000	n/a	n/a	n/a	n/a
2	195.1000	195.0693	2.2039e6	0.6891	0.0307
3	397.2000	n/a	n/a	n/a	n/a
4	448.1000	n/a	n/a	n/a	n/a
5	609.2810	n/a	n/a	n/a	n/a

SCIEX Triple Quad™ 4500/4500MD System

Planned Maintenance Procedure

GEN-IDV-08-6710-C

August 2019

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Introduction 1

Note: For regulatory and safety information for the mass spectrometer, refer to the *System User Guide*.

The planned maintenance (PM) procedure is designed to help maintain overall system performance.

The PM is not intended to take the place of an Operational Qualification (OQ) nor is it intended to verify the instrument specifications. Separate Installation Qualification (IQ) and OQ services are available. Contact a SCIEX representative.

The procedure must be performed by a trained SCIEX Field Service Employee (FSE).

The procedure has been developed for the SCIEX Triple Quad™ 4500/4500MD system with the Turbo V™ ion source. It does not apply to any other products or processes.

The procedure does not address any customer-specific analytical protocol (performance qualification) or method validation.

Note: If an issue is identified and the system requires repair, then the customer is responsible for the repair at the expense of the customer, except to the extent that the system and the required repairs are covered by a SCIEX warranty or service contract. A separate repair service call must be opened and the repair hours must not be charged against this procedure.

Planned Maintenance Tasks 2

Note: Perform all procedures using the Turbo V™ ion source, unless otherwise specified.

Pre-Planned Maintenance

Note: Guideline values are for reference only. The pre-PM test results are not required to meet or exceed these values.

Pre-PM Tasks

Task	Complete	N/A
Ask the customer about system performance since the last visit and record comments.	✓	—
If the customer maintains a log for the system, then review it.	○	◉
Review the work to be performed with the customer.	✓	—

Task	Complete	N/A
Inspect for front-end contamination. Refer to Inspect for Contamination.	✓	—
Check the status of the RAID 1 hard drives.		—

Vacuum System Tests

Task			Complete
Record the turbo pump operational values.			
Parameter	**Results**		
Temperature (°C)	see notes		
Current (A)	see notes		
Voltage (V)	see notes		
Power (W)	see notes		
Driving frequency (Hz)	see notes		
Inspect the vacuum gauge filament using the Analyst® Service Diagnostics (ASD) software and identify the filament position. If the mass spectrometer is using filament 2, then order a replacement vacuum gauge as a separate service call.	1	◯	
	2	◯	

Pre-PM Pressure Test

Pre-PM Pressure Test is Complete	✓

Test	Guideline	Result
Vacuum chamber pressure with CAD gas off	0.4×10^{-5} torr $\leq P_{CAD\ 0} \leq 1.1 \times 10^{-5}$ torr	0.8e-5
Pressure difference (CAD_{12} minus CAD_0)	1.8×10^{-5} torr $\leq (P_{CAD\ 12} - P_{CAD\ 0}) \leq 2.8 \times 10^{-5}$ torr	2.5e-5

Pre-PM System Tests

Q1 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
175.133	$\geq 8.0 \times 10^6$	2.1e7	0.6 to 0.8	0.80
500.380	$\geq 8.0 \times 10^6$	3.0e7	0.6 to 0.8	0.99
906.673	$\geq 2.0 \times 10^7$	4.3e7	0.6 to 0.8	0.98
1 952.427	$\geq 8.8 \times 10^5$	8.2e6	0.6 to 0.8	n/a

Q3 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
175.133	$\geq 8.0 \times 10^6$	3.2e7	0.6 to 0.8	0.74
500.380	$\geq 8.0 \times 10^6$	3.3e7	0.6 to 0.8	0.80
906.673	$\geq 2.0 \times 10^7$	5.6e7	0.6 to 0.8	0.84
1 952.427	$\geq 8.8 \times 10^5$	9.8e6	0.6 to 0.8	1.1

Q1 Negative PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
933.636	$\geq 1.8 \times 10^7$	1.7e7	0.6 to 0.8	0.66
1 863.306	$\geq 1.4 \times 10^6$	1.8e6	0.6 to 0.8	0.75

Q3 Negative PPGs Test is Complete	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
933.636	$\geq 1.8 \times 10^7$	2.8e7	0.6 to 0.8	0.85
1 863.306	$\geq 2.0 \times 10^6$	3.3e6	0.6 to 0.8	0.69

Reserpine MS/MS Test is Complete	✓

- **Test solution:** Reserpine solution 0.167 pmol/µL
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s (both MS and MS/MS)
- **Scan mode:** Product Ion (MS2)
- **Product Of:** 609.3 (or as calibrated)
- **Product Ion:** 195.1
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 609.3 and 195.1, with peak intensities, peak width, and mass shift results, complete with method file information.

Guideline	Result
Transmission efficiency $\frac{Intensity\ for\ ion\ at\ m/z\ 195.1}{Intensity\ for\ ion\ at\ m/z\ 609.3\ (or\ as\ calibrated)} \times 100 \Rightarrow 10\%$	4.3%

Planned Maintenance

Mass Spectrometer Maintenance

Task	Complete	N/A
Shut down the system and then disconnect the mains supply power cable.	✓	—
Verify the expiry date on the Powervar UPS battery system, and then recommend replacement of the battery tray, if required.	○	◉
If required, replace the roughing pump oil. The recommended interval is every 3 years. **Note:** If an oil change is not required, then inspect the oil level and top up, if necessary. **CAUTION: Potential System Damage. Do not mix different types of oil. Mixing mineral oil with synthetic oil can cause pump failure.**	✓	—
If required, replace the roughing pump oil exhaust filter. The recommended interval is every 3 years.	○	◉
Clean or replace the four air filters in the base of the mass spectrometer chassis.	✓	—
(If applicable) Clean the turbo pump filter screen.	○	◉
(If applicable) Verify the operation of the SCIEX-supplied bench cooling fans.	◉	○
Inspect the mass spectrometer, components, and cabling, as required.	✓	—
Clean the curtain plate.	✓	—
Clean the orifice plate.	✓	—
Clean the QJet® ion guide and IQ0 lens.	✓	—

Task	Complete	N/A
(If contamination is detected) Clean the Q0 region.	○	◉
Start up the system.	✓	—

Turbo V™ Ion Source Maintenance

Task	Complete	N/A
If necessary, replace the electrode in the TurboIonSpray® and the APCI probe.	◉	○
With the TurboIonSpray® probe installed, verify that the temperature (TEM) reaches the recommended set point of 500 °C.	✓	—
(If applicable) With the APCI probe installed, verify that the temperature (TEM) reaches the recommended set point of 400 °C.	○	◉

Software Maintenance

Note: This task is not applicable to MD systems.

Task	Complete	N/A
(Obtain customer approval first) Install any applicable Analyst® Software HotFixes.	○	◉

Post-Planned Maintenance

Task	Complete
Inspect for front-end contamination. Refer to Inspect for Contamination.	✓

Voltage Tests

Task	Complete
Inspect the RF tuning voltages at the QPS amplifier module and then, if required, tune the coil boxes.	✓
Inspect the detector voltage. Optimize, if required. Detector voltage: 2100	

Post-PM Pressure Test

Post-PM Pressure Test is Complete	✓

Test	Specification	Result
Vacuum chamber pressure with CAD gas off	0.4×10^{-5} torr ≤ $P_{CAD\ 0}$ ≤ 1.1×10^{-5} torr	0.8e-5
Pressure difference (CAD_{12} minus CAD_0)	1.8×10^{-5} torr ≤ ($P_{CAD\ 12} - P_{CAD\ 0}$) ≤ 2.8×10^{-5} torr	3.4e-5

Post-PM System Tests

Q1 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
175.133	$\geq 8.0 \times 10^6$	2.1e7	0.6 to 0.8	0.75
500.380	$\geq 8.0 \times 10^6$	2.4e7	0.6 to 0.8	0.72
906.673	$\geq 2.0 \times 10^7$	3.6e7	0.6 to 0.8	0.72
1 952.427	$\geq 8.8 \times 10^5$	5.3e6	0.6 to 0.8	0.72

Q1 Positive PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Q3 Positive PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
175.133	$\geq 8.0 \times 10^6$	2.7e7	0.6 to 0.8	0.72
500.380	$\geq 8.0 \times 10^6$	3.0e7	0.6 to 0.8	0.76
906.673	$\geq 2.0 \times 10^7$	4.9e7	0.6 to 0.8	0.70
1 952.427	$\geq 8.8 \times 10^5$	5.4e6	0.6 to 0.8	0.74

Q3 Positive PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
59.050, 175.133, 500.380, 616.464, 906.673, 1 254.925, 1 545.134, 1 952.427	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Q1 Negative PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
933.636	$\geq 1.8 \times 10^7$	2.2e7	0.6 to 0.8	0.76
1 863.306	$\geq 1.4 \times 10^6$	3.0e6	0.6 to 0.8	0.72

Q1 Negative PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Q3 Negative PPGs Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
933.636	$\geq 1.8 \times 10^7$	2.9e7	0.6 to 0.8	0.74
1 863.306	$\geq 2.0 \times 10^6$	4.5e6	0.6 to 0.8	0.74

Q3 Negative PPGs Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
44.998, 411.259, 585.385, 933.636, 1 223.845, 1 572.097, 1 863.306, 1 979.389	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1 000	50	0.6 to 0.8	
	2 000	100	0.6 to 0.8	

Reserpine MS/MS Test is Complete	✓

- **Test solution:** Reserpine solution 0.167 pmol/µL
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s (both MS and MS/MS)
- **Scan mode:** Product Ion (MS2)
- **Product Of:** 609.3 (or as calibrated)
- **Product Ion:** 195.1
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 609.3 and 195.1, with peak intensities, peak width, and mass shift results, complete with method file information.

Specification	Result
Transmission efficiency $\frac{Intensity\ for\ ion\ at\ m/z\ 195.1}{Intensity\ for\ ion\ at\ m/z\ 609.3\ (or\ as\ calibrated)} \times 100 \Rightarrow 10\%$	11.9%

Post-PM Tasks

Task	Complete	N/A
Delete any unnecessary files.	✓	—
Back up the Analyst Data folder.	✓	—
(If applicable) Defragment the hard drive.	○	◉
(Not applicable for MD instrument families) If the customer has a Software Support Plan, then perform the Software Health Check: • (Obtain customer approval first) Install any compatible HotFixes and updates for SCIEX add-on software.	◉	○
(Not applicable for MD instrument families) Discuss warranty coverage for the StatusScope® Remote Monitoring Service. Determine whether the customer already has StatusScope® Remote Monitoring Service installed and, if not, whether it should be installed. **Note:** Installation of the StatusScope® Remote Monitoring Service is available only to warranty and eligible contract customers. Refer to sciex.com/instrument-service-and-support/statusscope-remote-monitoring for a list of eligible contracts.	○	◉

StatusScope® Remote Monitoring Service Tasks

Note: The StatusScope® remote monitoring service is not applicable for MD systems.

Task	Complete	N/A
If the StatusScope® Remote Monitoring Service is not installed, then perform these tasks: 1. Make sure that the *StatusScope® Customer Remote Connectivity Authorization* and *Customer Remote Connectivity Registration* forms are both completed. 2. Verify the connection to the server for the StatusScope® Remote Monitoring Service. 3. Install the agent for the StatusScope® Remote Monitoring Service.	○	◉
Log on to the server for the StatusScope® Remote Monitoring Service using the FSE user name and then verify that the assets under the customer organization are connected to the server for the StatusScope® Remote Monitoring Service.	○	◉
Perform the post-PM fault test to verify that the mass spectrometer fault generated is shown in the StatusScope® Remote Monitoring Service.	○	◉

Wrap Up

Task	Complete	N/A
Review the work performed with the customer.	✓	—
Record the test results in this document and then attach all of the test data.	✓	—
Review the routine maintenance schedule and the procedures with the customer.	✓	—
Complete this document: • Review the test results with the customer. • Provide the customer with the completed document and the test data. • If an electronic copy of the document is supplied to the customer, then save a copy on the Service drive.	✓	—

Signoff 3

Organization	Shealy Environmental		
Mass spectrometer serial number	EB250231807	Service request number	4534266
FSE name	Lynne Russell	Date (yyyy-mm-dd)	2020-03-09
FSE signature			

Comments and Exceptions

Due to administrative restrictions, I was unable to use ASD to perform vacuum system test.
Oil and filter changes were not performed during this PM because they were not due. LER 09Mar2020

Inspect for Contamination A

1. Run the **Q1 Pos PPG** method for 10 minutes, monitoring the TIC for degradation of the signal or sensitivity drops.
2. Change the polarity to negative, and then scan for one minute.
3. Change the polarity to positive, and then make sure that the **IS** parameter returns to the original value.
4. Run the method.

   If the signal sensitivity is restored temporarily but it starts to degrade again, then the charging effect is present.

Guidelines for Identifying Components to be Cleaned

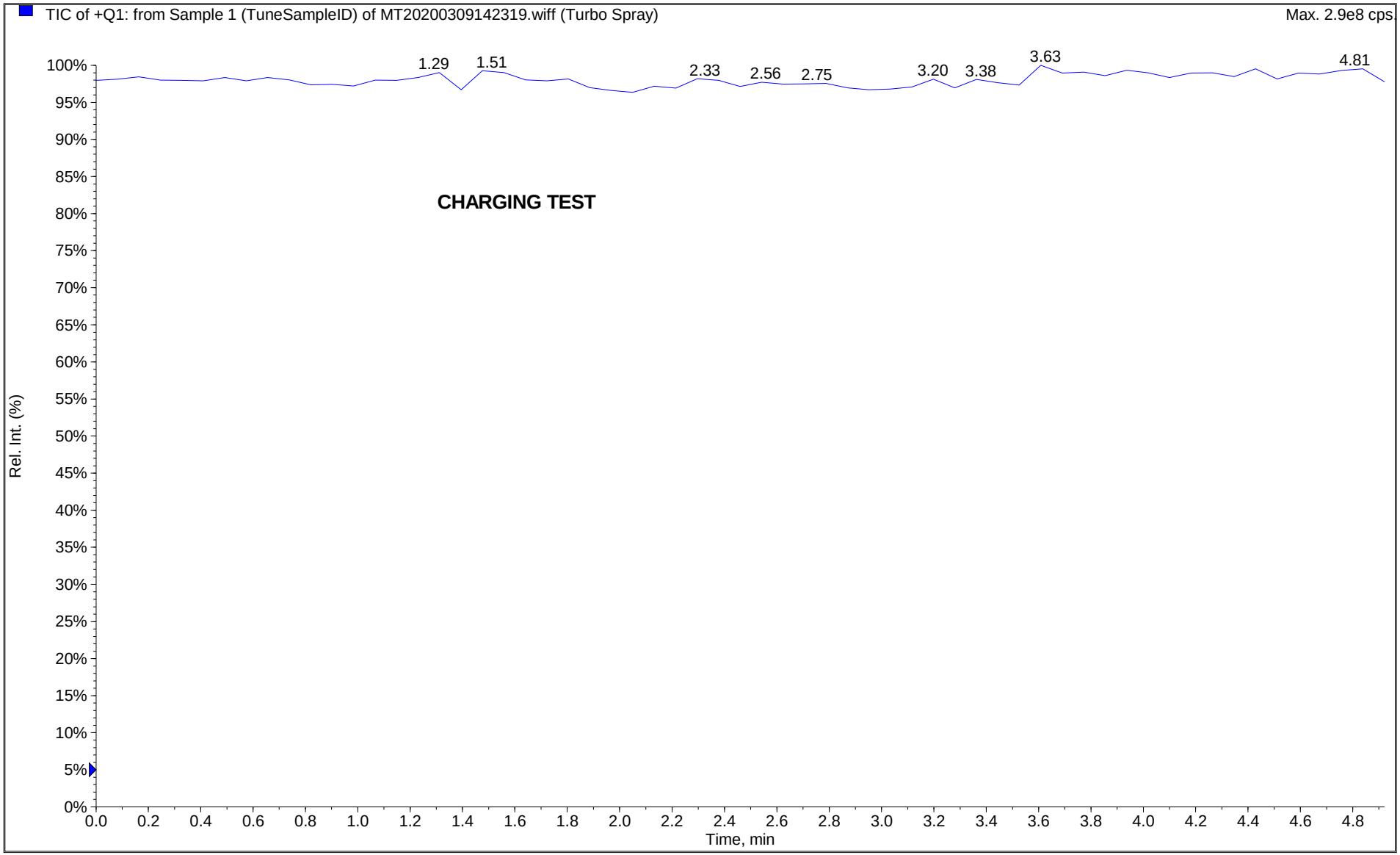
If the Q1 quadrupole is showing the charging effect and signal drop out, then clean the Q0 and the vacuum interface components (the curtain plate, orifice plate, the QJet® ion guide, and the Q0 side of the IQ0 and IQ1 lens) using the customer cleaning procedure, with the rod and tissues. In most cases, this will remove the contamination.

Notes:

- Do not remove the ion optics during a PM. This is considered to be a repair activity and requires a separate service call to be opened.
- Consider cleaning the Q1 quadrupole as well as other components (the stubbies and the IQ1 lens), if cleaning the front end does not eliminate the contamination.
- This guideline does not provide complete troubleshooting for all possible technical root causes of signal degradation or charging effect. Signal degradation might also result from a contaminated TurboIonSpray® probe or electrode, method parameters that are not optimized, and so on.

Acq. Time: 14:23
Acq. Date: Monday, March 09, 2020

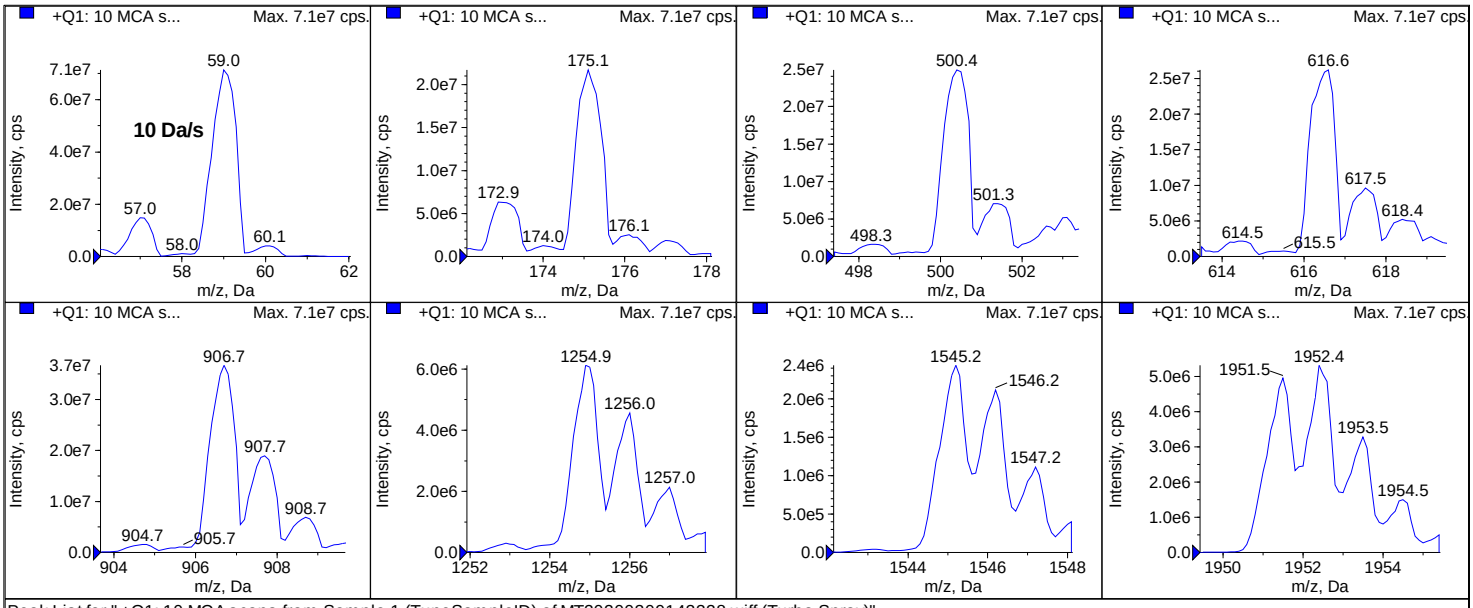
Analyst Version: 1.7.0
*SN: EB250231807



*Post-PM
*FSE: Lynne Russell

Acq. Time: 14:33
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



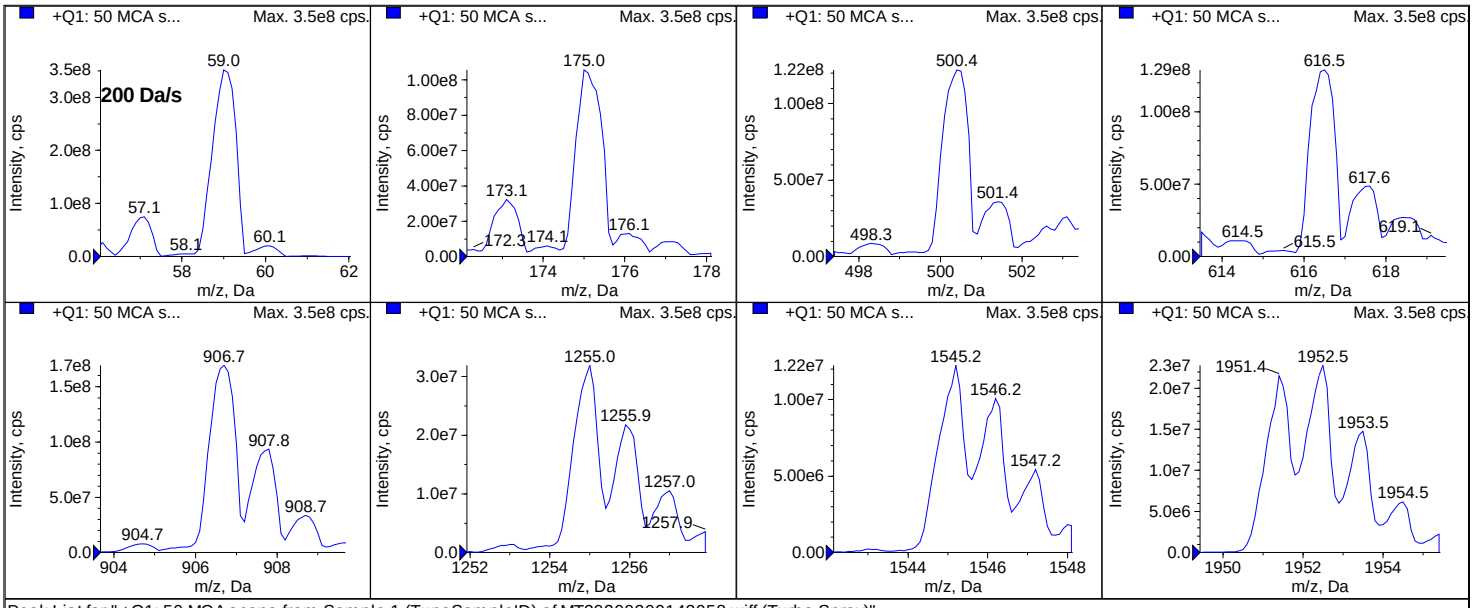
Peak List for " +Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20200309143328.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0403	7.1359e7	0.6692	9.6940e-3
2	175.1330	175.1170	2.1686e7	0.7574	0.0160
3	500.3800	500.4049	2.4873e7	0.7296	-0.0249
4	616.4640	616.4564	2.6201e7	0.7194	7.6080e-3
5	906.6730	906.6762	3.6657e7	0.7211	-3.2397e-3
6	1254.9250	1254.9156	6.1174e6	0.7141	9.4336e-3
7	1545.1340	1545.1477	2.4373e6	0.7781	-0.0137
8	1952.4270	1952.4311	5.3103e6	0.7239	-4.1026e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 14:40
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



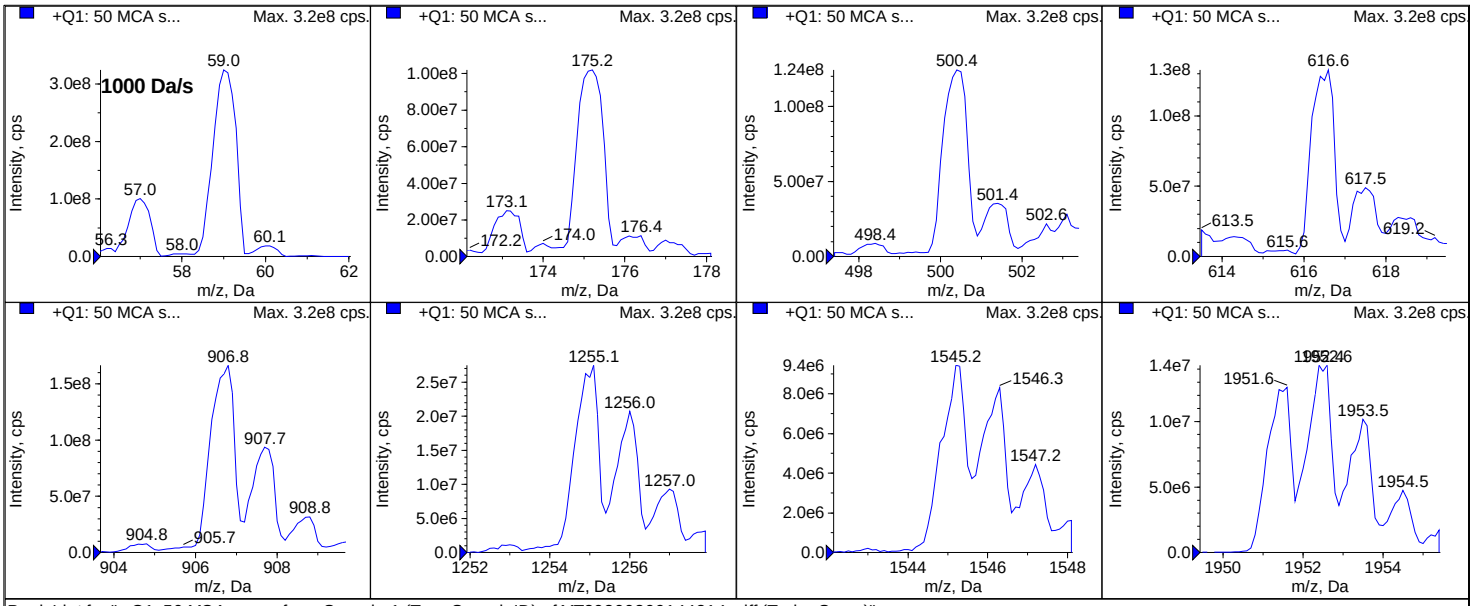
Peak List for " +Q1: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309143958.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0426	3.5185e8	0.6526	7.3620e-3
2	175.1330	175.1285	1.0569e8	0.7634	4.4530e-3
3	500.3800	500.3824	1.2207e8	0.7427	-2.3841e-3
4	616.4640	616.4559	1.2884e8	0.7249	8.1053e-3
5	906.6730	906.6721	1.6932e8	0.7323	8.6040e-4
6	1254.9250	1254.9208	3.1914e7	0.6958	4.2190e-3
7	1545.1340	1545.1217	1.2244e7	0.7698	0.0123
8	1952.4270	1952.3998	2.2800e7	0.7075	0.0272

*Post-PM
*FSE: Lynne Russell

Acq. Time: 14:42
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



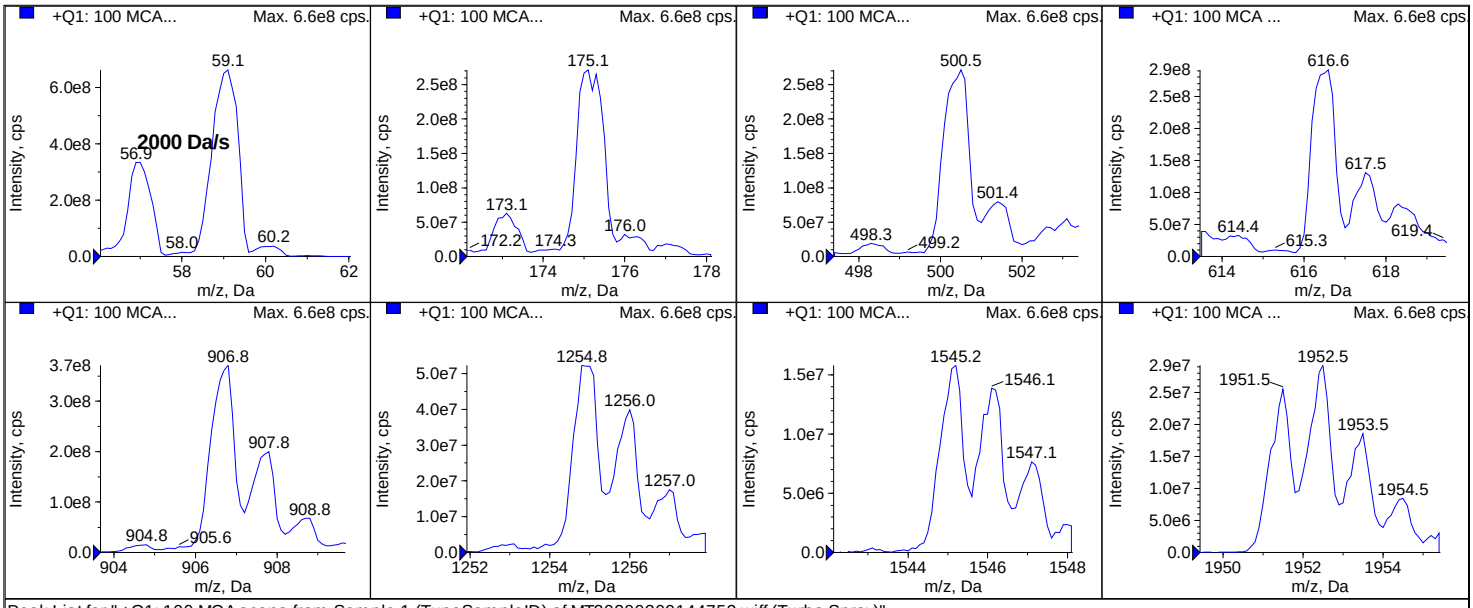
Peak List for " +Q1: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309144214.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0447	3.2454e8	0.6334	5.2631e-3
2	175.1330	175.1572	1.0197e8	0.7487	-0.0242
3	500.3800	500.3686	1.2434e8	0.6955	0.0114
4	616.4640	616.4687	1.3271e8	0.6439	-4.7115e-3
5	906.6730	906.6772	1.6629e8	0.6655	-4.1937e-3
6	1254.9250	1254.9605	2.7440e7	0.6670	-0.0355
7	1545.1340	1545.1771	9.4300e6	0.7409	-0.0431
8	1952.4270	1952.4754	1.4280e7	0.6846	-0.0484

*Post-PM
*FSE: Lynne Russell

Acq. Time: 14:47
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



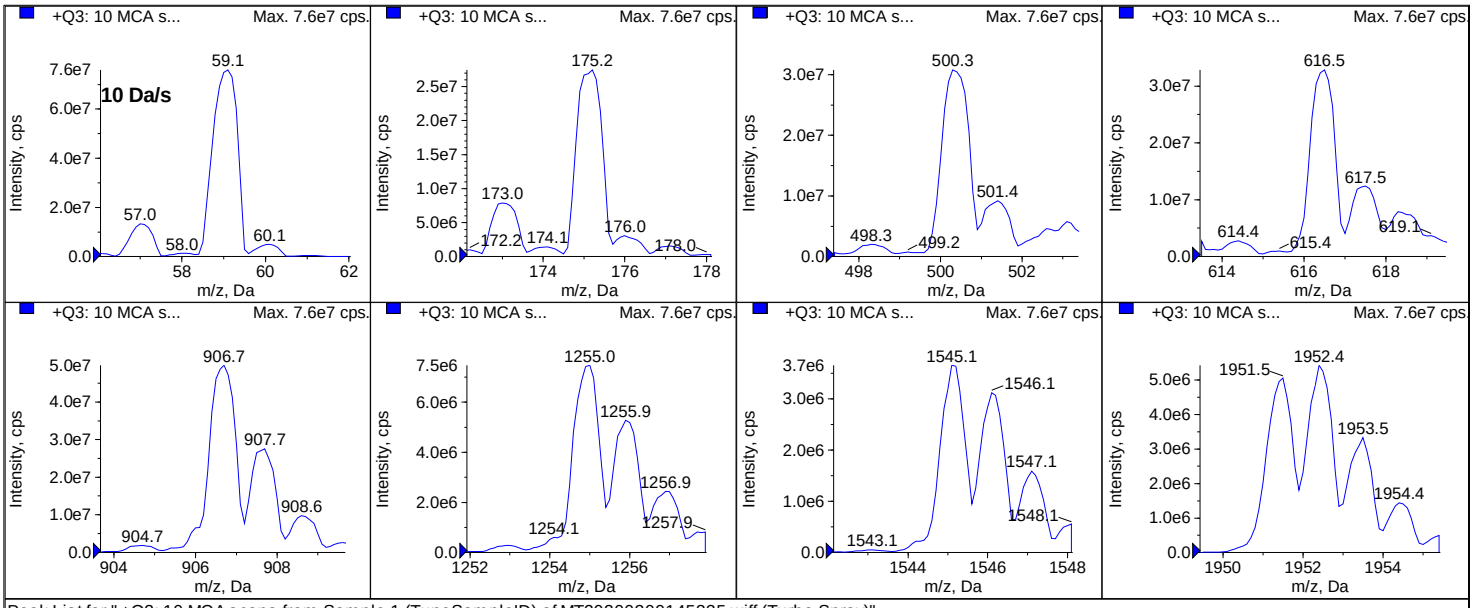
Peak List for " +Q1: 100 MCA scans from Sample 1 (TuneSampleID) of MT20200309144752.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0522	6.6290e8	0.7172	-2.2374e-3
2	175.1330	175.1580	2.7148e8	0.7493	-0.0250
3	500.3800	500.3949	2.7144e8	0.7271	-0.0149
4	616.4640	616.4704	2.9130e8	0.6476	-6.3561e-3
5	906.6730	906.6744	3.7100e8	0.6497	-1.3994e-3
6	1254.9250	1254.9073	5.2260e7	0.6858	0.0177
7	1545.1340	1545.1120	1.5800e7	0.6532	0.0220
8	1952.4270	1952.4295	2.9220e7	0.6414	-2.5268e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 14:53
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



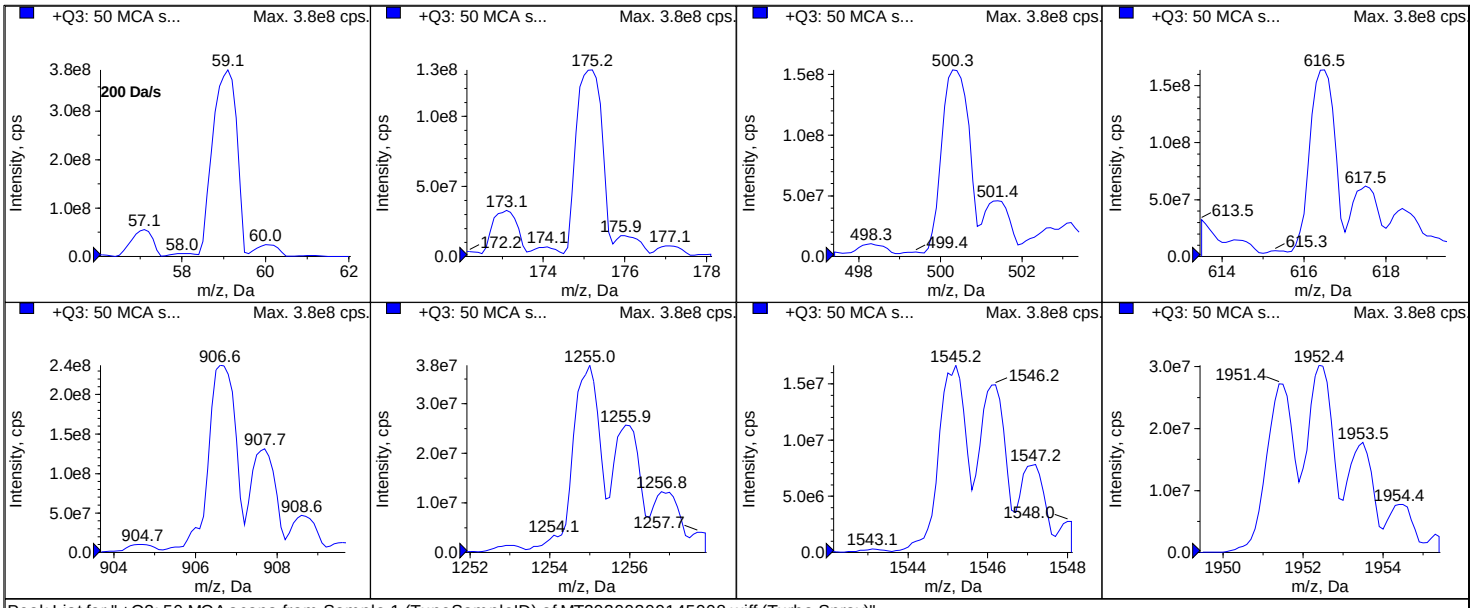
Peak List for " +Q3: 10 MCA scans from Sample 1 (TuneSampleID) of MT20200309145335.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0513	7.5905e7	0.6954	-1.3188e-3
2	175.1330	175.1236	2.7460e7	0.7285	9.3617e-3
3	500.3800	500.3774	3.0791e7	0.7606	2.5750e-3
4	616.4640	616.4578	3.2865e7	0.6715	6.2175e-3
5	906.6730	906.6698	4.9688e7	0.7026	3.2171e-3
6	1254.9250	1254.9194	7.4667e6	0.7363	5.5598e-3
7	1545.1340	1545.1297	3.6516e6	0.7119	4.2899e-3
8	1952.4270	1952.4240	5.4222e6	0.7396	2.9901e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 14:59
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



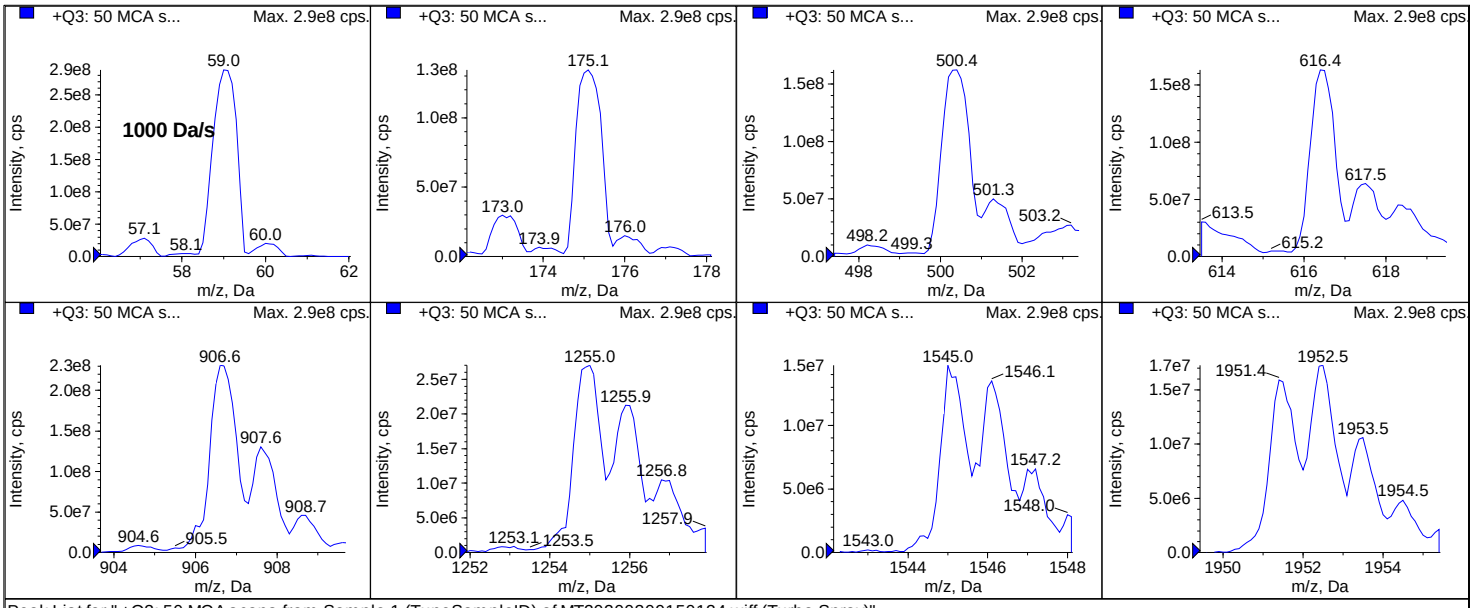
Peak List for " +Q3: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309145908.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0417	3.8495e8	0.6883	8.2519e-3
2	175.1330	175.1206	1.3316e8	0.7429	0.0124
3	500.3800	500.3761	1.5378e8	0.7795	3.8903e-3
4	616.4640	616.4581	1.6392e8	0.6983	5.8954e-3
5	906.6730	906.6698	2.3689e8	0.7180	3.1950e-3
6	1254.9250	1254.9230	3.7754e7	0.7466	2.0402e-3
7	1545.1340	1545.1237	1.6638e7	0.7683	0.0103
8	1952.4270	1952.4323	3.0168e7	0.7410	-5.3377e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:01
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



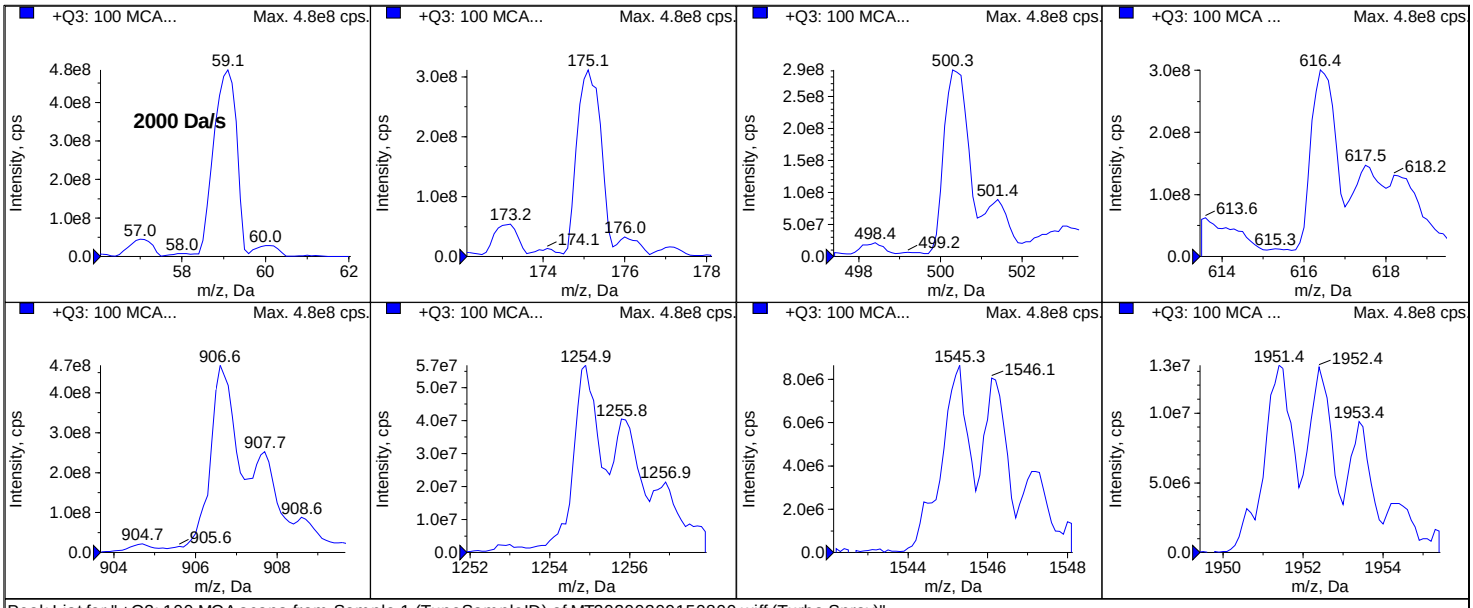
Peak List for " +Q3: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309150124.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0456	2.8843e8	0.6720	4.3685e-3
2	175.1330	175.1080	1.3443e8	0.7289	0.0250
3	500.3800	500.3716	1.6225e8	0.7737	8.4217e-3
4	616.4640	616.4572	1.6319e8	0.6772	6.8124e-3
5	906.6730	906.6761	2.3076e8	0.7093	-3.1097e-3
6	1254.9250	1254.9430	2.7010e7	0.7649	-0.0180
7	1545.1340	1545.1274	1.4710e7	0.7307	6.5536e-3
8	1952.4270	1952.4675	1.7250e7	0.7893	-0.0405

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:08
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



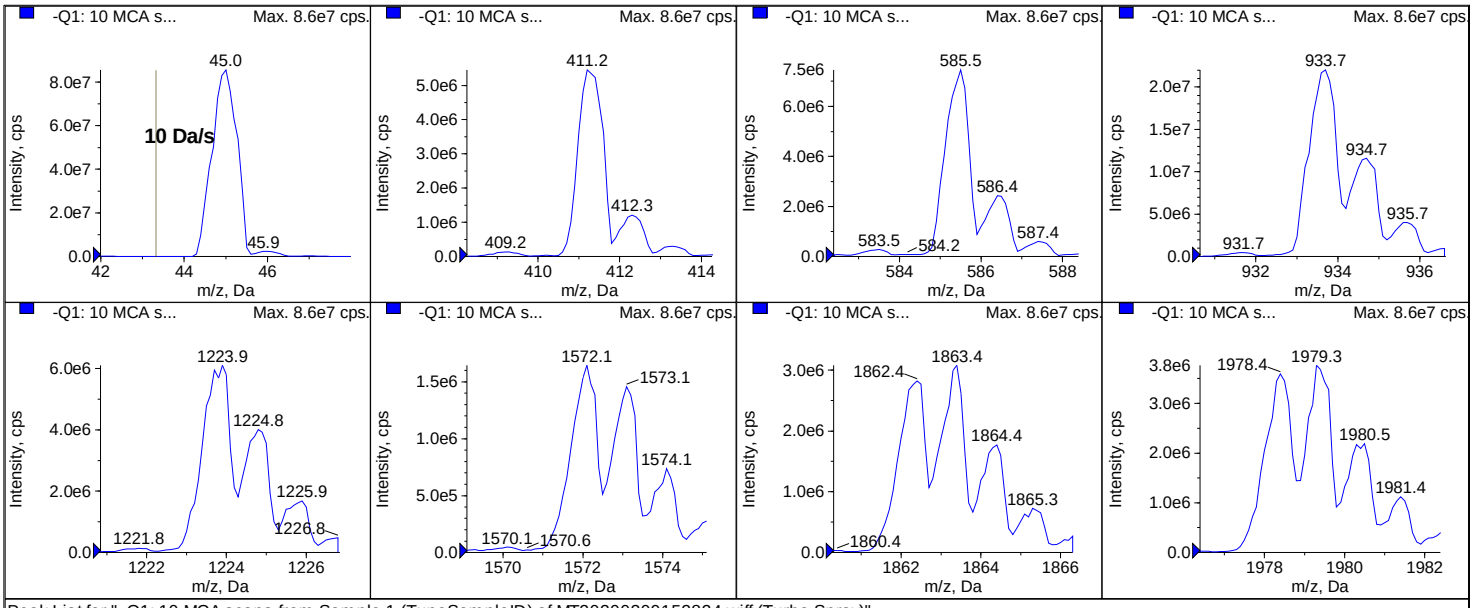
Peak List for " +Q3: 100 MCA scans from Sample 1 (TuneSampleID) of MT20200309150800.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0586	4.8450e8	0.6461	-8.6402e-3
2	175.1330	175.1219	3.1148e8	0.6940	0.0111
3	500.3800	500.3758	2.9134e8	0.6873	4.1700e-3
4	616.4640	616.4724	3.0084e8	0.7039	-8.3635e-3
5	906.6730	906.6726	4.6822e8	0.6683	4.4023e-4
6	1254.9250	1254.9151	5.6720e7	0.6771	9.9478e-3
7	1545.1340	1545.2148	8.6400e6	0.7237	-0.0808
8	1952.4270	1952.4301	1.3300e7	0.6979	-3.0947e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:28
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



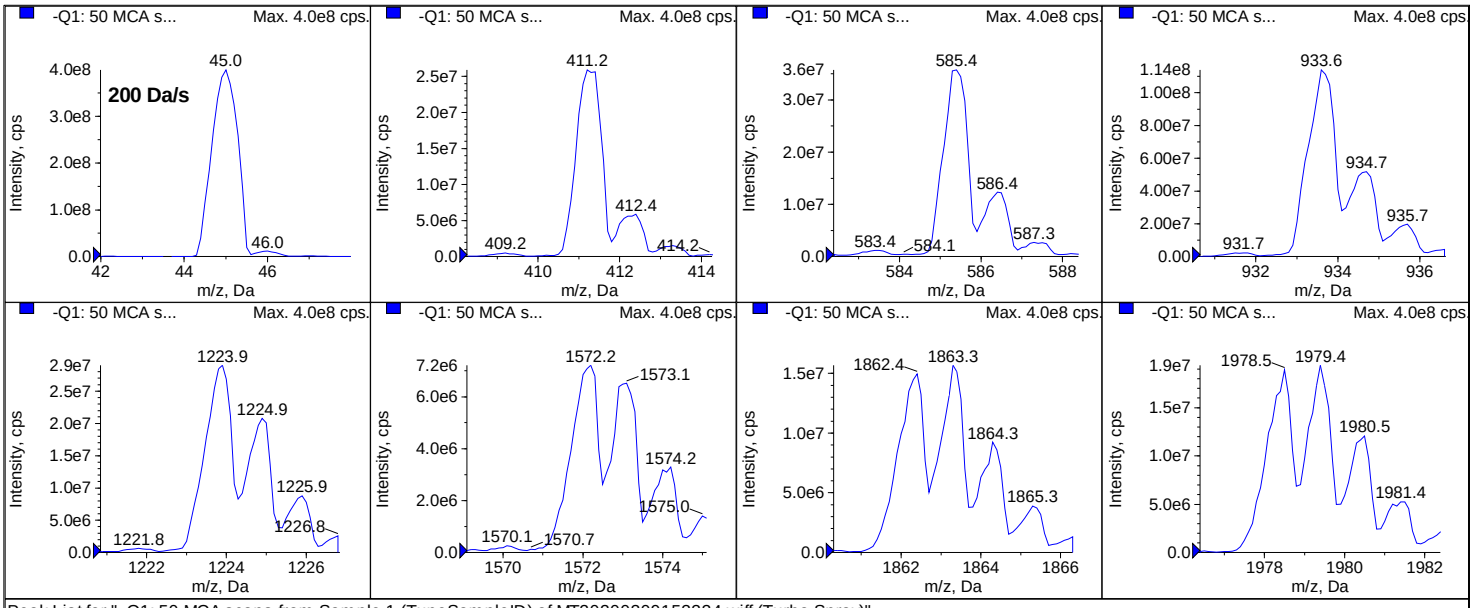
Peak List for "-Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20200309152824.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9918	8.5579e7	0.7257	6.1756e-3
2	411.2590	411.2931	5.4518e6	0.7033	-0.0341
3	585.3850	585.4343	7.4578e6	0.6701	-0.0493
4	933.6360	933.6510	2.2008e7	0.7625	-0.0150
5	1223.8450	1223.7823	6.0980e6	0.7651	0.0627
6	1572.0970	1572.0645	1.6439e6	0.7243	0.0325
7	1863.3060	1863.3143	3.0768e6	0.7252	-8.3485e-3
8	1979.3890	1979.3712	3.7634e6	0.7084	0.0178

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:33
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



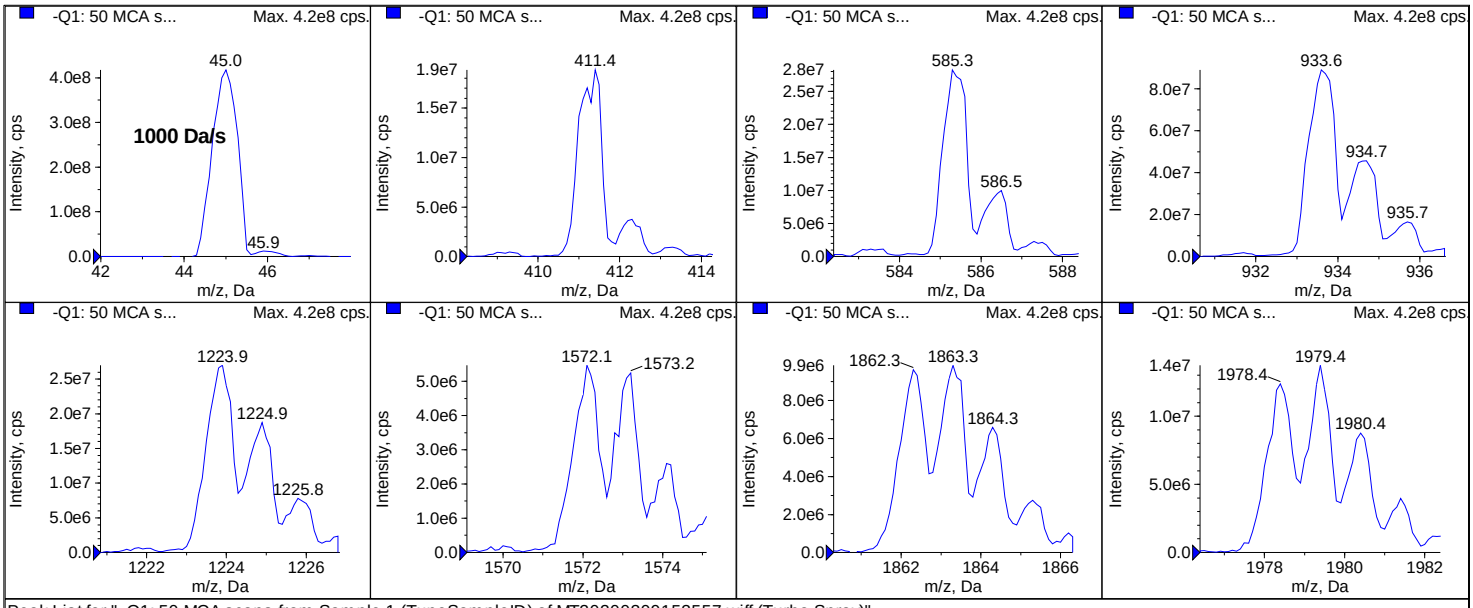
Peak List for "-Q1: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309153334.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9917	3.9936e8	0.7353	6.3073e-3
2	411.2590	411.2565	2.5886e7	0.6981	2.5178e-3
3	585.3850	585.3937	3.5740e7	0.6784	-8.7106e-3
4	933.6360	933.6327	1.1394e8	0.7673	3.2736e-3
5	1223.8450	1223.8361	2.8978e7	0.7422	8.8585e-3
6	1572.0970	1572.1208	7.2060e6	0.7626	-0.0238
7	1863.3060	1863.3024	1.5666e7	0.6735	3.5534e-3
8	1979.3890	1979.3764	1.9374e7	0.7004	0.0126

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:35
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



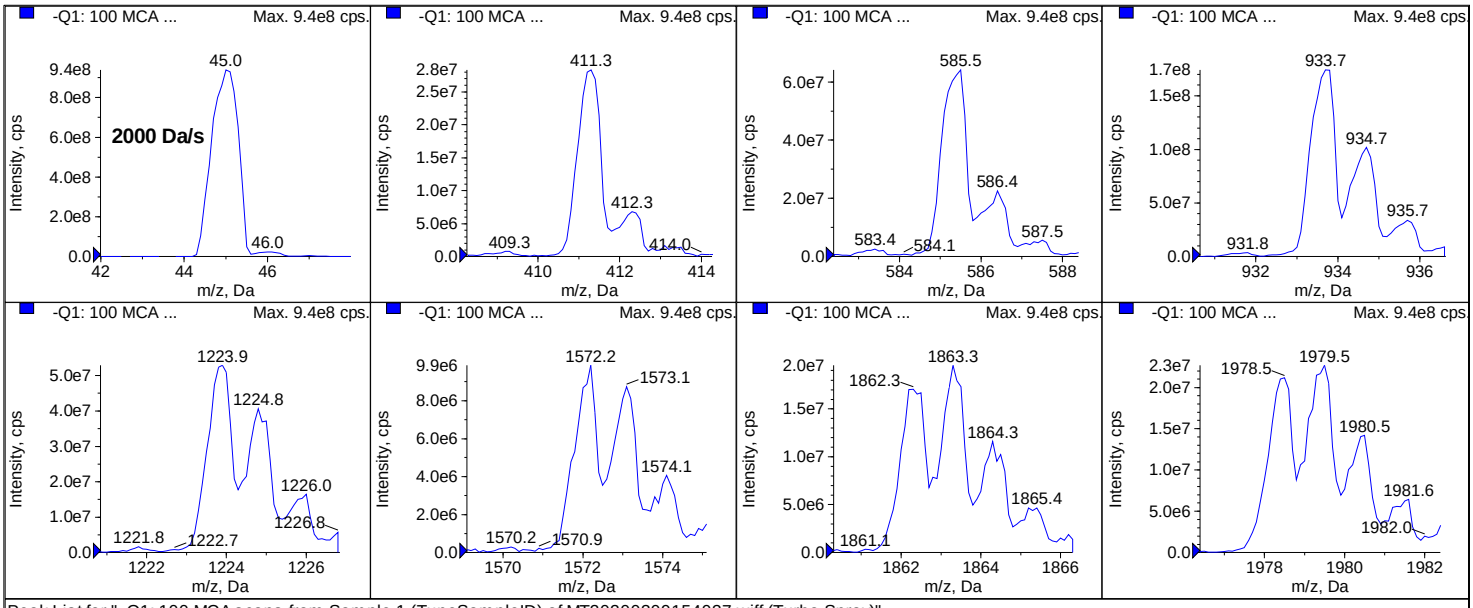
Peak List for "-Q1: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309153557.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9936	4.1751e8	0.7157	4.4174e-3
2	411.2590	411.2776	1.8850e7	0.6512	-0.0186
3	585.3850	585.3771	2.8250e7	0.6670	7.8938e-3
4	933.6360	933.6294	8.9130e7	0.7626	6.5713e-3
5	1223.8450	1223.8444	2.6960e7	0.7422	6.2591e-4
6	1572.0970	1572.1041	5.4600e6	0.7252	-7.0655e-3
7	1863.3060	1863.2936	9.8500e6	0.7713	0.0124
8	1979.3890	1979.3925	1.3720e7	0.6952	-3.4915e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:40
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



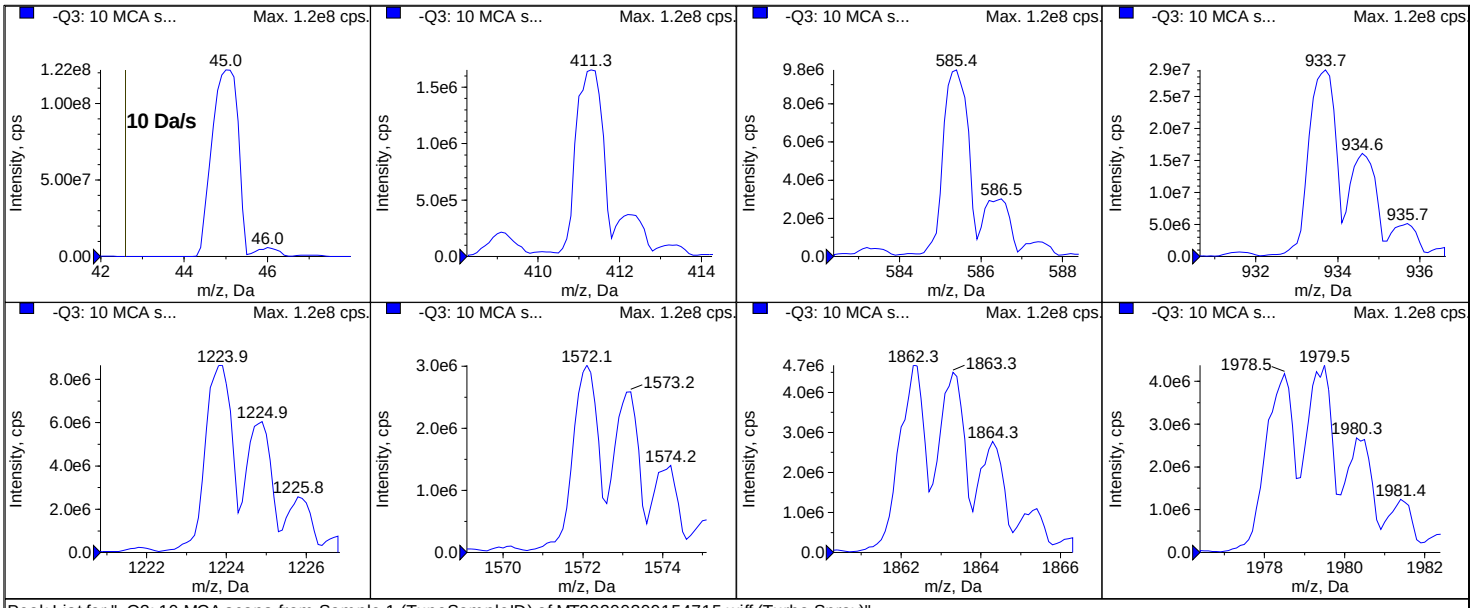
Peak List for "-Q1: 100 MCA scans from Sample 1 (TuneSampleID) of MT20200309154037.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	45.0003	9.3880e8	0.7560	-2.2824e-3
2	411.2590	411.2703	2.8340e7	0.6287	-0.0113
3	585.3850	585.3487	6.4180e7	0.6800	0.0363
4	933.6360	933.6511	1.7412e8	0.6811	-0.0151
5	1223.8450	1223.8511	5.2840e7	0.6856	-6.0596e-3
6	1572.0970	1572.1135	9.8600e6	0.6499	-0.0165
7	1863.3060	1863.3165	1.9540e7	0.6589	-0.0105
8	1979.3890	1979.3944	2.2660e7	0.7319	-5.3568e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:47
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



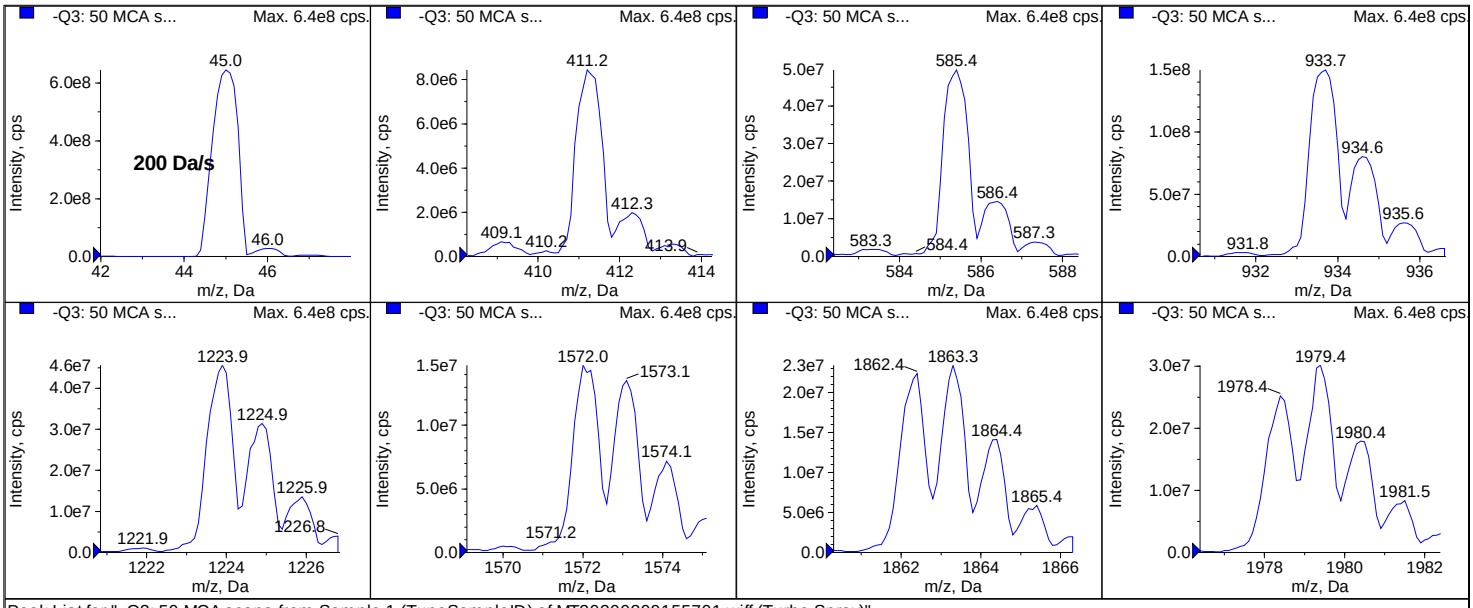
Peak List for "-Q3: 10 MCA scans from Sample 1 (TuneSampleID) of MT20200309154715.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	45.0082	1.2180e8	0.7404	-0.0102
2	411.2590	411.2610	1.6539e6	0.7632	-2.0391e-3
3	585.3850	585.3872	9.7699e6	0.6984	-2.2009e-3
4	933.6360	933.6266	2.9123e7	0.7487	9.4038e-3
5	1223.8450	1223.8149	8.6389e6	0.7511	0.0301
6	1572.0970	1572.0850	3.0115e6	0.7067	0.0120
7	1863.3060	1863.2855	4.5025e6	0.7447	0.0205
8	1979.3890	1979.3871	4.3712e6	0.7716	1.9019e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 15:57
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



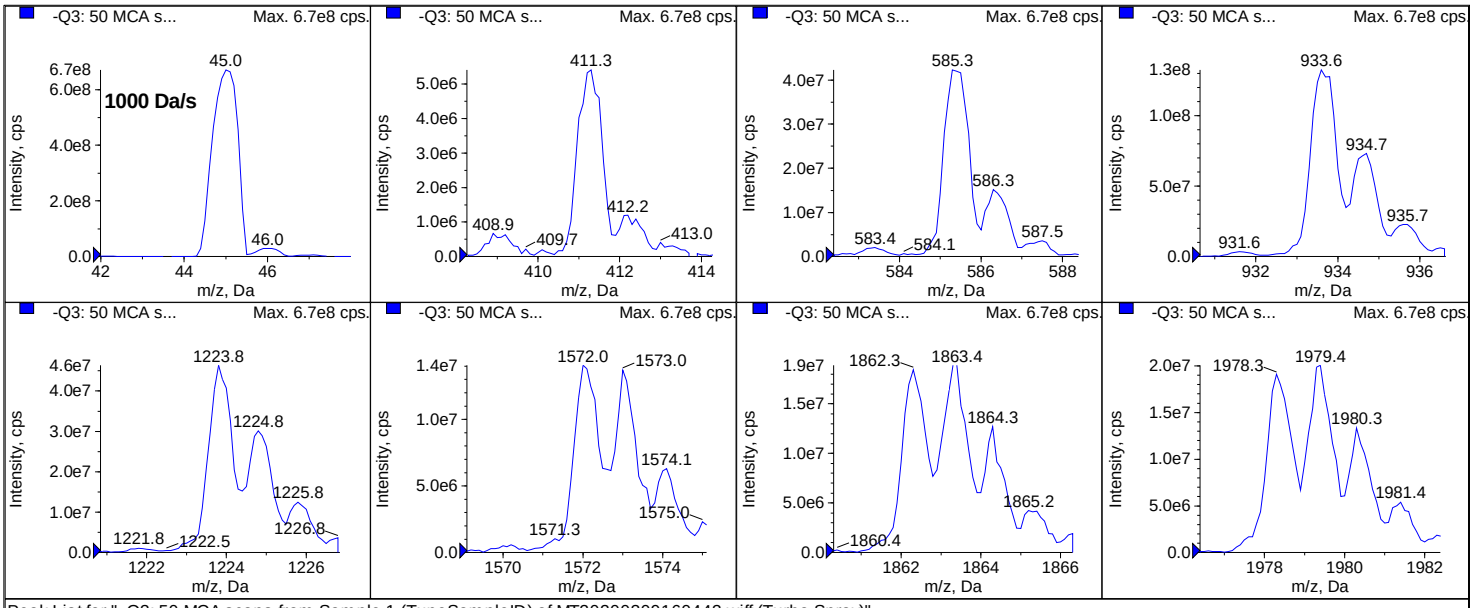
Peak List for "-Q3: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309155701.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	45.0060	6.4463e8	0.7254	-7.9934e-3
2	411.2590	411.2441	8.4440e6	0.7402	0.0149
3	585.3850	585.3776	4.9526e7	0.7000	7.4079e-3
4	933.6360	933.6448	1.4994e8	0.7558	-8.8291e-3
5	1223.8450	1223.8427	4.5540e7	0.7303	2.3178e-3
6	1572.0970	1572.0873	1.4708e7	0.7224	9.6943e-3
7	1863.3060	1863.3116	2.3372e7	0.6821	-5.6179e-3
8	1979.3890	1979.3871	3.0114e7	0.7684	1.9144e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 16:04
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



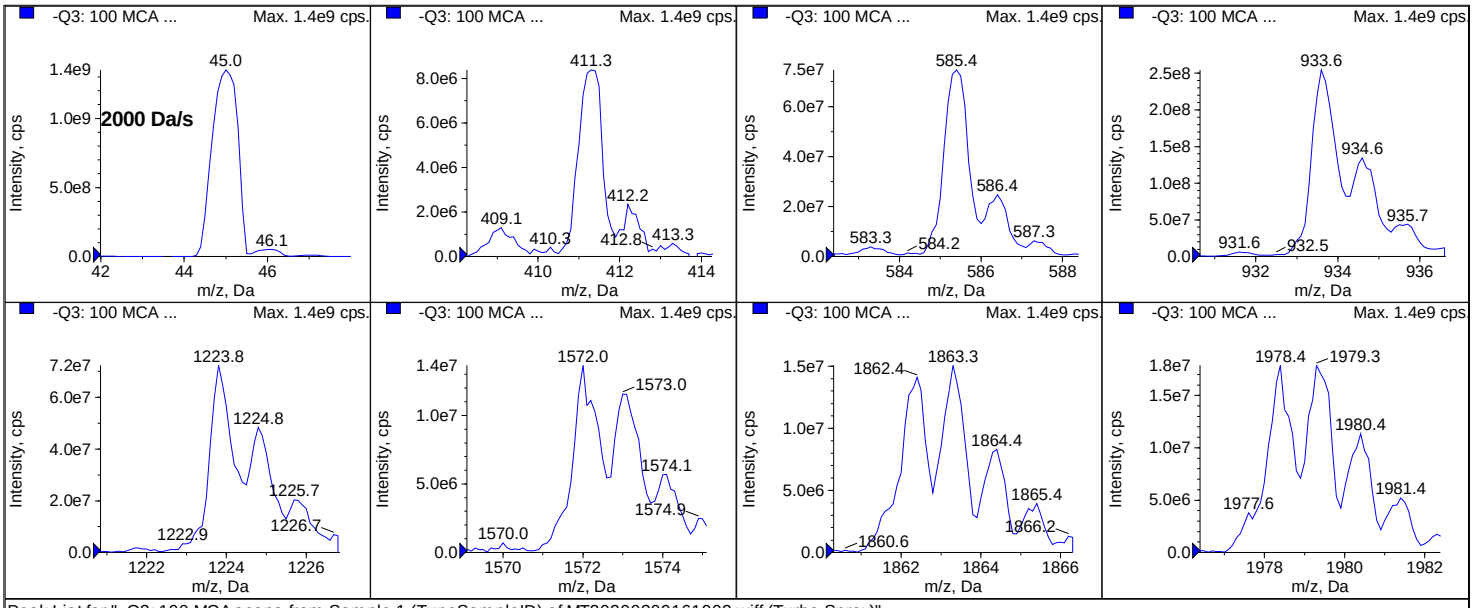
Peak List for "-Q3: 50 MCA scans from Sample 1 (TuneSampleID) of MT20200309160443.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	45.0043	6.7129e8	0.7277	-6.3300e-3
2	411.2590	411.2666	5.4100e6	0.6845	-7.6259e-3
3	585.3850	585.3966	4.2290e7	0.6976	-0.0116
4	933.6360	933.6496	1.3258e8	0.6805	-0.0136
5	1223.8450	1223.8557	4.6330e7	0.6552	-0.0107
6	1572.0970	1572.0882	1.4050e7	0.7080	8.8257e-3
7	1863.3060	1863.3356	1.8880e7	0.7932	-0.0296
8	1979.3890	1979.3810	2.0050e7	0.7797	7.9747e-3

*Post-PM
*FSE: Lynne Russell

Acq. Time: 16:10
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



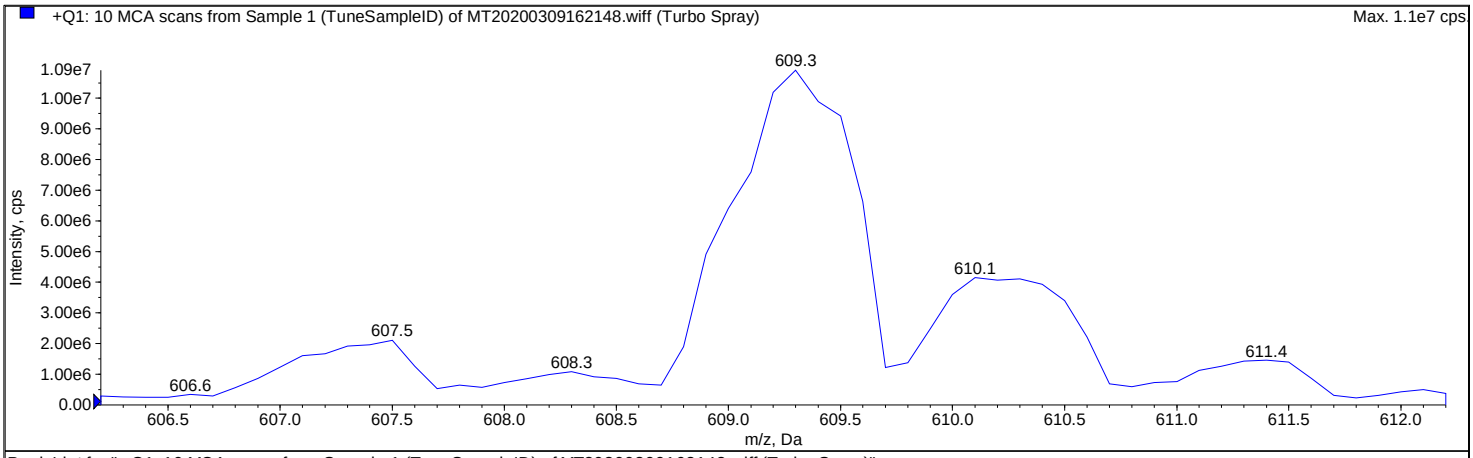
Peak List for "-Q3: 100 MCA scans from Sample 1 (TuneSampleID) of MT20200309161002.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	45.0025	1.3512e9	0.7334	-4.5334e-3
2	411.2590	411.2920	8.3800e6	0.6384	-0.0330
3	585.3850	585.3849	7.4680e7	0.6377	5.1195e-5
4	933.6360	933.6396	2.5452e8	0.6599	-3.5625e-3
5	1223.8450	1223.8458	7.2340e7	0.6032	-7.8090e-4
6	1572.0970	1572.0918	1.3640e7	0.7449	5.2106e-3
7	1863.3060	1863.3134	1.5060e7	0.7096	-7.4095e-3
8	1979.3890	1978.4049	1.7860e7	0.7051	0.9841

*Post-PM
*FSE: Lynne Russell

Acq. Time: 16:21
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



Peak List for " +Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20200309162148.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	174.1000	n/a	n/a	n/a	n/a
2	195.1000	n/a	n/a	n/a	n/a
3	397.2000	n/a	n/a	n/a	n/a
4	448.1000	n/a	n/a	n/a	n/a
5	609.2810	609.3177	1.0915e7	0.6852	-0.0367

*Post-PM
*FSE: Lynne Russell

Acq. Time: N/A
Acq. Date: N/A

Analyst Version: 1.7.0
*SN: EB250231807

State Parameter Editor

Ion Source: Turbo Spray
Ion Source Temperature Reached
Curtain Gas (CUR): 20.0
IonSpray Voltage (IS): 4000.0
Temperature (TEM): 0.0
Ion Source Gas 1 (GS1): 20.0
Ion Source Gas 2 (GS2): 0.0

Entrance Potential (EP): 10.0

Q1 Resolution: Unit
Ion Energy 1 (IE1): 1.0

Deflector (DF): -200.0
CEM (CEM): 2100.0

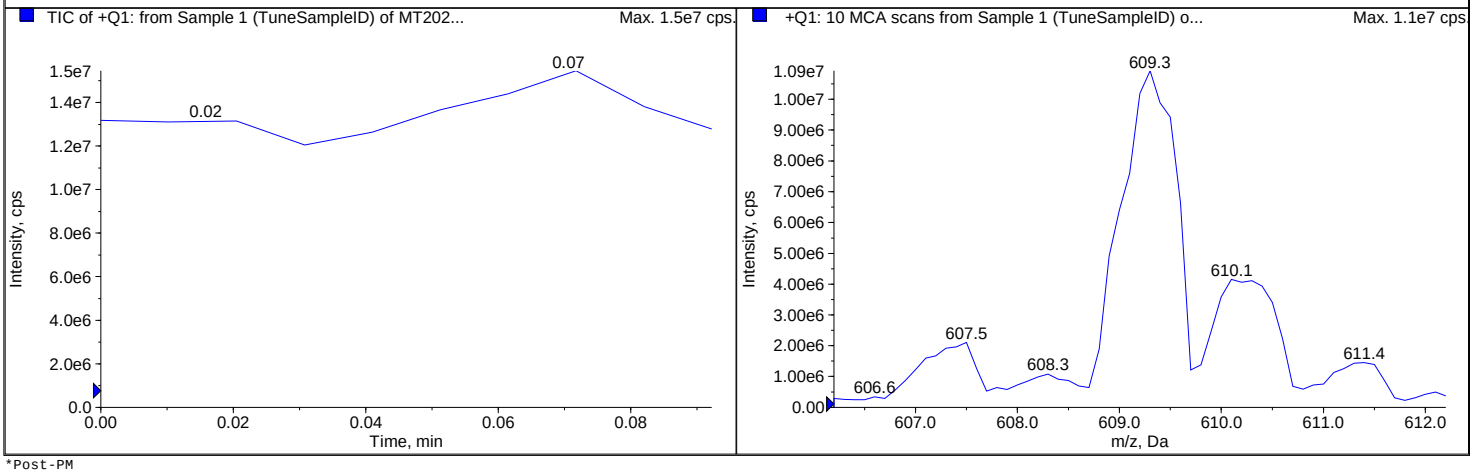
Mass Spectrometer Method Properties

Period 1:

Scans in Period: 10
Relative Start Time: 0.00 msec
Scheduled Ionization: Off
Experiments in Period: 1

Period 1 Experiment 1:

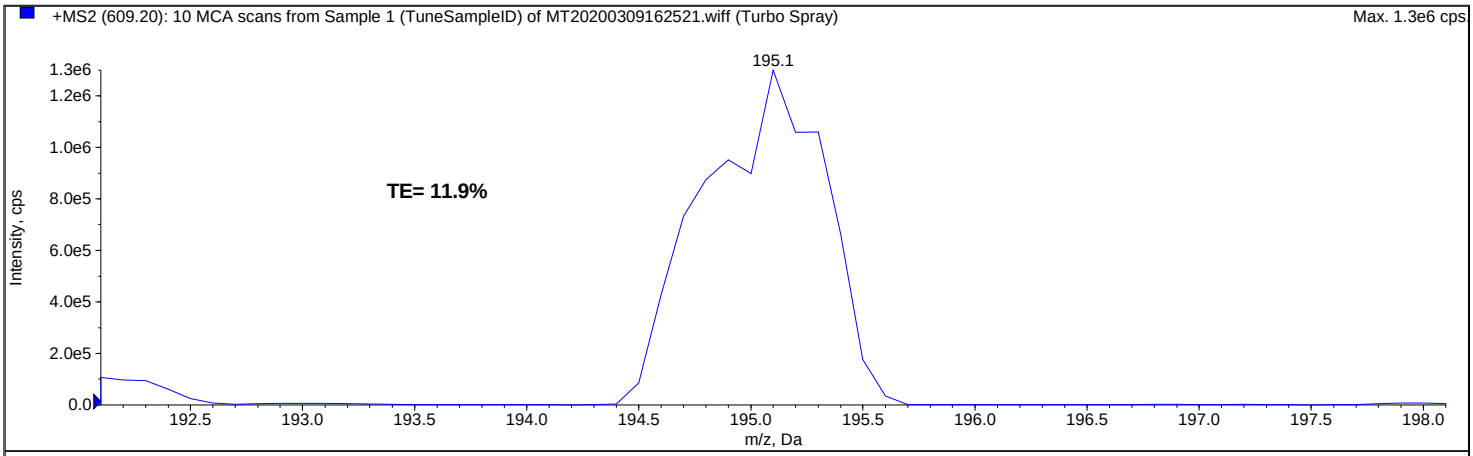
Scan Type: Q1 MS (Q1)
Polarity: Positive
Scan Mode: Profile
Ion Source: Turbo Spray
Scans to Sum: 1



*Post-PM
*FSE: Lynne Russell

Acq. Time: 16:25
Acq. Date: Monday, March 09, 2020

Analyst Version: 1.7.0
*SN: EB250231807



Peak List for " +MS2 (609.20): 10 MCA scans from Sample 1 (TuneSampleID) of MT20200309162521.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	174.1000	n/a	n/a	n/a	n/a
2	195.1000	195.0747	1.3007e6	0.7298	0.0253
3	397.2000	n/a	n/a	n/a	n/a
4	448.1000	n/a	n/a	n/a	n/a
5	609.2810	n/a	n/a	n/a	n/a

*Post-PM
*FSE: Lynne Russell

Acq. Time: N/A
Acq. Date: N/A

Analyst Version: 1.7.0
*SN: EB250231807

State Parameter Editor

Ion Source: Turbo Spray
Ion Source Temperature Reached
Curtain Gas (CUR): 20.0
Collision Gas (CAD): 8
IonSpray Voltage (IS): 4000.0
Temperature (TEM): 0.0
Ion Source Gas 1 (GS1): 20.0
Ion Source Gas 2 (GS2): 0.0

Entrance Potential (EP): 10.0
Focusing Lens 1 (IQ1): -10.5
Collision Energy (CE): 44.0
Collision Cell Exit Potential (CXP): 7.0

Q1 Resolution: Unit Q3 Resolution: Unit

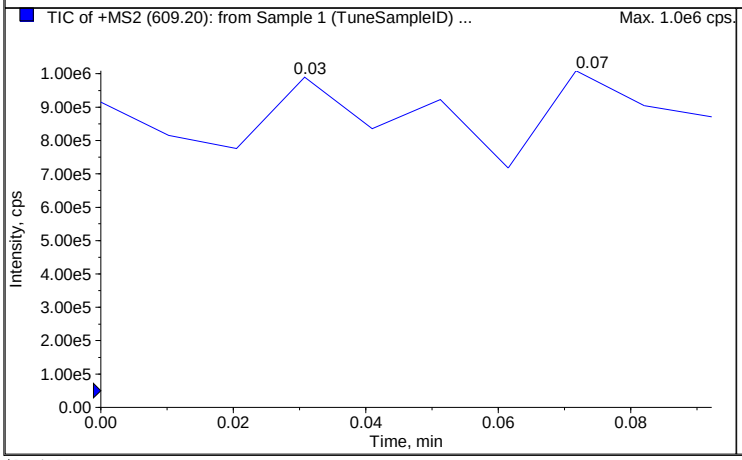
Mass Spectrometer Method Properties

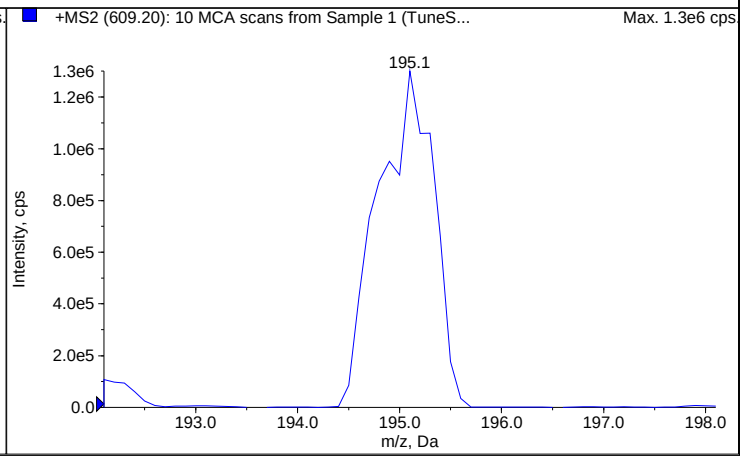
Period 1:

Scans in Period: 10
Relative Start Time: 0.00 msec
Scheduled Ionization: Off
Experiments in Period: 1

Period 1 Experiment 1:

Scan Type: Product Ion (MS2)
Polarity: Positive
Scan Mode: Profile
Ion Source: Turbo Spray
Scans to Sum: 1





*Post-PM
*FSE: Lynne Russell

Pace Environmental Services, LLC
Initial Calibration Response Report

Batch: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b
Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02
Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01
Method Lock: Unlocked Lock Date:
No.Compounds: 66 Integrator: picker
Calib Method: PFAS-ID
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	012621007.d	ICAL 50_SVLC-1272	26-Jan-2021 13:22:18
2	012621008.d	ICAL 100_SVLC-1273	26-Jan-2021 13:32:55
3	012621009.d	ICAL 200_SVLC-1274	26-Jan-2021 13:43:33
4	012621010.d	ICAL 500_SVLC-1275	26-Jan-2021 13:54:07
5	012621011.d	ICAL 1000_SVLC-1276	26-Jan-2021 14:04:47
6	012621012.d	ICAL 2000_SVLC-1277	26-Jan-2021 14:15:21
7	012621013.d	ICAL 5000_SVLC-1278	26-Jan-2021 14:25:58
8	012621014.d	ICAL 10000_SVLC-1279	26-Jan-2021 14:36:40
9	012621015.d	ICAL 15000_SVLC-1280	26-Jan-2021 14:47:21
10	012621016.d	ICAL 20000_SVLC-1281	26-Jan-2021 14:58:01

Quantitation Standards (* - Istd) (D - Iso Dil Std)

* 37 13C2_PFDA	* 39 13C2_PFHxA	* 41 13C2_PFOA
* 43 13C3_PFBA	* 48 13C4_PFOS	D 38 13C2_PFDoA
D 40 13C2_PFHxDA	D 42 13C2_PFTeDA	D 44 13C3_PFBS
D 45 13C3_PFHxS	D 46 13C4_PFBA	D 47 13C4_PFHpA
D 49 13C5_PFHxA	D 50 13C5_PFPeA	D 51 13C6_PFDA
D 52 13C7_PFUdA	D 53 13C8_PFOA	D 54 13C8_PFOS
D 55 13C8_PFOSA	D 56 13C9_PFNA	D 57 d3-MeFOSA
D 58 d3-MeFOSAA	D 59 d5-EtFOSA	D 60 d5-EtFOSAA
D 61 d7-MeFOSE	D 62 d9-EtFOSE	D 63 13C2_4:2 FTS_2
D 64 13C2_6:2 FTS_2	D 65 13C2_8:2 FTS_2	D 66 13C3_GenX

Column: 1 Detector: LCMS-Q3

Compound	Level 1 Conc/Rsp	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp	Std #
D 46 13C4_PFBA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	683019	675994	684273	672473	720687	651337	644048	644832	666145	631467	
8 PFBA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#46
	38291	73157	144553	336486	737574	1307716	3227127	6316964	9987737	12564689	
D 50 13C5_PFPeA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	634189	646008	650219	636967	669031	646265	615145	608527	619477	608741	
21 PFPeA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#50
	37781	66352	138624	319548	666079	1228435	3082351	6185249	9425245	12256345	
D 44 13C3_PFBS	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	191891	196982	187090	194402	208034	186911	185619	183527	195681	183052	
7 PFBS	44.200	88.400	176.80	442.00	884.00	1768.00	4420.00	8840.00	13260	17680	#44
	10861	22854	40333	98156	211986	377633	941809	1933556	2937715	3810877	
1 4:2 FTS	46.700	93.400	186.80	467.00	934.00	1868.00	4670.00	9340.00	14010	18680	#63
	2143	4343	9107	22749	51188	91520	222081	421709	670079	861078	
D 63 13C2_4:2 FTS_2	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	110710	109979	118247	107929	122994	114881	108442	112217	102946	104236	
D 49 13C5_PFHxA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	695717	694949	705868	695880	773207	671018	663610	677281	656835	658516	
15 PFHxA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#49
	35226	75115	139959	337858	740873	1359193	3422647	6566741	10217509	12470888	

Compound	Level 1 Conc/Rsp	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp	Std #
22 PFPeS	46.900	93.800	187.60	469.00	938.00	1876.00	4690.00	9380.00	14070	18760	#44
	6832	14763	29062	78807	157706	306288	755101	1497844	2339904	3027304	
28 GenX	100.00	200.00	400.00	1000.00	2000.00	4000.00	10000	20000	30000	40000	#66
	17517	34442	73602	162510	369792	670477	1656532	3305338	5090244	6489165	
D 66 13C3_GenX	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	1225431	1193517	1227800	1205028	1294237	1189193	1193675	1182986	1223878	1121475	
13 PFHpA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#47
	32047	54894	114660	287635	589712	1118288	2661996	5459491	8426903	11091880	
D 47 13C4_PFHpA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	538894	543654	544215	527217	566534	531768	506304	511175	521771	475717	
14 PFHxS	45.500	91.000	182.00	455.00	910.00	1820.00	4550.00	9100.00	13650	18200	#45
	8352	15619	25426	67084	138237	261105	633398	1211840	1901996	2417291	
D 45 13C3_PFHxS	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	137108	139492	127733	137437	147201	139769	126370	118351	127228	124243	
29 ADONA	47.100	94.200	188.40	471.00	942.00	1884.00	4710.00	9420.00	14130	18840	#45
	47366	97120	188020	457276	948544	1734787	4406343	8453357	13016038	17315419	
D 64 13C2_6:2 FTS_2	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	84936	87774	85627	84113	89400	89077	82227	79636	78543	77794	
2 6:2 FTS	47.400	94.800	189.60	474.00	948.00	1896.00	4740.00	9480.00	14220	18960	#64
	2410	4060	8396	20683	43048	71276	172333	329954	522020	650051	
D 53 13C8_PFOA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	546023	538525	533423	526729	568086	509472	492790	476054	488804	475647	
20 PFOA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#53
	29198	63214	115686	279355	590062	1019789	2571251	4924707	7558627	9671776	
12 PFHpS	47.600	95.200	190.40	476.00	952.00	1904.00	4760.00	9520.00	14280	19040	#45
	5467	13765	24658	60668	126107	251207	613172	1126156	1762665	2247232	
D 54 13C8_PFOS	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	118012	117589	113334	115666	126288	113900	104943	108818	118833	116796	
18 PFOS	46.400	92.800	185.60	464.00	928.00	1856.00	4640.00	9280.00	13920	18560	#54
	9003	14339	27901	63088	147120	278028	658434	1294640	1970181	2633086	
D 56 13C9_PFNA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	653239	655826	646507	638062	703892	665794	639731	598888	626426	626662	
17 PFNA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#56
	32411	76646	143111	319219	730291	1298162	3150350	6315060	9566949	12327233	
30 9Cl-PF3ONS	46.600	93.200	186.40	466.00	932.00	1864.00	4660.00	9320.00	13980	18640	#54
	21669	43409	83891	191901	431623	792217	1998434	3858356	6122088	7876694	
D 55 13C8_PFOSA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	245906	263890	264706	253594	270927	245433	258598	243305	237386	225960	
19 PFOSA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#55
	13741	26543	56292	139419	281505	523694	1276898	2496481	3728297	4866255	
3 8:2 FTS	47.900	95.800	191.60	479.00	958.00	1916.00	4790.00	9580.00	14370	19160	#65
	1858	4574	6808	19413	37688	72682	172821	319182	509822	648828	
16 PFNS	48.000	96.000	192.00	480.00	960.00	1920.00	4800.00	9600.00	14400	19200	#54
	5133	9801	18403	46282	92157	179495	455857	851381	1310741	1652477	
D 65 13C2_8:2 FTS_2	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	85717	85819	79546	85094	91484	86437	81497	74666	72560	75271	
D 51 13C6_PFDA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	625394	622991	610209	596989	643340	603377	606074	588802	556862	560081	
10 PFDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#51
	33707	63666	122857	314562	646324	1174607	2915273	5655332	8613824	10869040	
D 58 d3-MeFOSAA	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	668378	649307	661578	643978	689696	644267	644653	593810	690968	600741	
6 N-MeFOSAA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#58
	4809	10468	20466	49641	102636	195793	478028	919895	1458648	1786874	
9 PFDS	48.200	96.400	192.80	482.00	964.00	1928.00	4820.00	9640.00	14460	19280	#54
	5182	9069	15404	46176	87539	158442	411150	766970	1250794	1544336	

Compound	Level 1 Conc/Rsp	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp	Std #
D 52 13C7_PFUdA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	575743	554807	527405	555828	564025	547387	522375	519758	519977	517000	
D 60 d5-EtFOSAA	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	562672	580829	561602	549440	568396	560775	557305	521525	533271	460640	
25 PFUdA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#52
	29430	55461	121895	272285	537435	1037602	2444822	4585068	7650536	9135698	
5 N-EtFOSAA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#60
	5569	13427	24748	56375	117985	237535	523872	1039015	1585192	1935498	
D 61 d7-MeFOSE	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	88861	93125	80727	85662	84617	80900	81223	77080	83168	74059	
32 MeFOSE	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#61
	4110	7593	19125	44723	96720	165817	400340	808211	1309436	1523822	
D 57 d3-MeFOSA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	47095	41177	43607	48936	44332	44752	47183	40805	47305	49186	
26 MeFOSA		100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000		#57
		6433	13335	27540	63347	109887	264800	525211	840828		
31 11Cl-PF3OUDS	47.100	94.200	188.40	471.00	942.00	1884.00	4710.00	9420.00	14130	18840	#54
	19364	39707	70264	170205	353616	688870	1685340	3415328	5122767	6772481	
D 62 d9-EtFOSE	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	95826	100977	95840	101518	98326	95373	94474	92410	95725	89076	
11 PFDoA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#38
	32449	58654	118246	262678	568760	1110803	2690311	4944659	7905263	9305148	
33 EtFOSE	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#62
	4911	10429	19306	47256	101931	179768	456455	832755	1379736	1723072	
D 38 13C2_PFDoA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	526437	556608	541488	531310	560944	503201	535210	487286	500925	481115	
4 10:2 FTS	48.200	96.400	192.80	482.00	964.00	1928.00	4820.00	9640.00	14460	19280	#65
	2042	4716	9714	20977	46472	77641	202451	385168	542269	728075	
D 59 d5-EtFOSA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	39142	42635	41724	41750	45663	43209	40516	43790	43209	40603	
27 EtFOSA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#59
	3013	5209	10980	22388	42180	90672	214862	438055	667451	833945	
34 PFDOS	48.400	96.800	193.60	484.00	968.00	1936.00	4840.00	9680.00	14520	19360	#54
	5322	11498	23051	56033	114903	211455	541908	1012764	1566090	2068671	
24 PFTrDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#38
	29538	53463	106921	243250	554569	1037053	2555223	4910787	7215002	9458149	
D 42 13C2_PFTeDA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	736456	747482	739782	728253	782673	703860	736505	719959	741303	708403	
23 PFTeDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#42
	36144	71764	133986	318847	689532	1236083	3046229	6240118	9223660	12079475	
35 PFHxDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#40
	30902	57400	104377	250537	520028	985088	2386535	4600812	7057697	8850408	
D 40 13C2_PFHxDA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	753644	755177	750700	733617	785856	730601	752213	737038	737566	713656	
36 PFODA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#40
	42881	80091	154693	368356	782949	1493548	3714101	7139168	11035071	14065311	

Report Date: 27-Jan-2021 16:50:50 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Initial Calibration RF Report

Batch: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b

Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02

Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	012621007.d	ICAL 50_SVLC-1272	26-Jan-2021 13:22:18
2	012621008.d	ICAL 100_SVLC-1273	26-Jan-2021 13:32:55
3	012621009.d	ICAL 200_SVLC-1274	26-Jan-2021 13:43:33
4	012621010.d	ICAL 500_SVLC-1275	26-Jan-2021 13:54:07
5	012621011.d	ICAL 1000_SVLC-1276	26-Jan-2021 14:04:47
6	012621012.d	ICAL 2000_SVLC-1277	26-Jan-2021 14:15:21
7	012621013.d	ICAL 5000_SVLC-1278	26-Jan-2021 14:25:58
8	012621014.d	ICAL 10000_SVLC-1279	26-Jan-2021 14:36:40
9	012621015.d	ICAL 15000_SVLC-1280	26-Jan-2021 14:47:21
10	012621016.d	ICAL 20000_SVLC-1281	26-Jan-2021 14:58:01

Curve Legend: Ex. Avg:H Wt:C2 Org:F Dep:A

Curve Type: Avg, Ln, Qd Response Type: H-Height, A-Area

Wt: Curve Weighting, C-1/Conc, C2-1/Conc^2, R-1/Rsp, R2-1/Rsp^2, N-None

Org: Origin, F-Force, I-Include, N-Neither

Dep: Dependent Variable, A-Amount, R-Response

%Rec = (Measured Amount / True Amount) * 100

Column: 1 Detector: LCMS-Q3

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
D 46 13C4_PFBA	683	676	684	672	721	651	644	645	666	631	Avg:A Wt:C2	667		RSD=3.9	
	102	101	103	101	108	97.6	96.5	96.6	99.8	94.6	Org:N Dep:A		✓		✓
8 PFBA	1.121228	1.082214	1.056252	1.000742	1.023432	1.003871	1.002139	0.979629	0.999556	0.994881	Avg:A Wt:C2	1.026394		RSD=4.4	
	109 ✓	105 ✓	103 ✓	97.5 ✓	99.7 ✓	97.8 ✓	97.6 ✓	95.4 ✓	97.4 ✓	96.9 ✓	Org:N Dep:A				
D 50 13C5_PFPeA	634	646	650	637	669	646	615	609	619	609	Avg:A Wt:C2	633		RSD=3.2	
	100	102	103	101	106	102	97.1	96.1	97.8	96.1	Org:N Dep:A				
21 PFPeA	1.191474	1.027108	1.065979	1.003342	0.995588	0.950411	1.002154	1.016430	1.014323	1.006696	Avg:A Wt:C2	1.027351		RSD=6.3	
	116	100	104	97.7	96.9	92.5	97.5	98.9	98.7	98	Org:N Dep:A				
D 44 13C3_PFBS	192	197	187	194	208	187	186	184	196	183	Avg:A Wt:C2	191		RSD=4.0	
	100	103	97.8	102	109	97.7	97	95.9	102	95.7	Org:N Dep:A				
7 PFBS	1.280539	1.312452	1.219348	1.142336	1.152711	1.142754	1.147937	1.191803	1.132185	1.177520	Avg:A Wt:C2	1.189959		RSD=5.3	
	108	110	102	96	96.9	96	96.5	100	95.1	99	Org:N Dep:A				

✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓

Report Date: 27-Jan-2021 16:50:50 AIM Revision: 2.0 05-Oct-2020 14:59:22
Method Path: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b\LCMSMS02_PFAS-ID.m

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
1 4:2 FTS	2.072471	2.113991	2.061476	2.256718	2.227960	2.132362	2.192638	2.011765	2.322996	2.211148	Avg:A Wt:C2	2.160353		RSD=4.5	
	95.9	97.9	95.4	104	103	98.7	101	93.1	108	102	Org:N Dep:A				
D 63 13C2_4:2 FTS_2	22.1420	21.9958	23.6494	21.5858	24.5988	22.9762	21.6884	22.4434	20.5892	20.8472	Avg:A Wt:C2	22.2516		RSD=5.5	
	99.5	98.9	106	97	111	103	97.5	101	92.5	93.7	Org:N Dep:A				
D 49 13C5_PFHxA	696	695	706	696	773	671	664	677	657	659	Avg:A Wt:C2	689		RSD=5.0	
	101	101	102	101	112	97.3	96.3	98.3	95.3	95.5	Org:N Dep:A				
15 PFHxA	1.012653	1.080871	0.991396	0.971024	0.958182	1.012784	1.031524	0.969574	1.037045	0.946893	Avg:A Wt:C2	1.001195		RSD=4.2	
	101	108	99	97	95.7	101	103	96.8	104	94.6	Org:N Dep:A				
22 PFPeS	0.759137	0.798997	0.828022	0.864353	0.808186	0.873499	0.867381	0.870089	0.849875	0.881554	Avg:A Wt:C2	0.840109		RSD=4.8	
	90.4	95.1	98.6	103	96.2	104	103	104	101	105	Org:N Dep:A				
28 GenX	0.714728	0.721439	0.749328	0.674300	0.714305	0.704760	0.693879	0.698516	0.693185	0.723285	Avg:A Wt:C2	0.708773		RSD=2.9	
	101	102	106	95.1	101	99.4	97.9	98.6	97.8	102	Org:N Dep:A				
D 66 13C3_GenX	245	239	246	241	259	238	239	237	245	224	Avg:A Wt:C2	241		RSD=3.6	
	102	99	102	99.9	107	98.6	99	98.1	102	93	Org:N Dep:A				
13 PFHpA	1.189362	1.009723	1.053444	1.091145	1.040912	1.051481	1.051541	1.068028	1.076705	1.165807	Avg:A Wt:C2	1.079815		RSD=5.2	
	110	93.5	97.6	101	96.4	97.4	97.4	98.9	99.7	108	Org:N Dep:A				
D 47 13C4_PFHpA	539	544	544	527	567	532	506	511	522	476	Avg:A Wt:C2	527		RSD=4.8	
	102	103	103	100	108	101	96.1	97	99.1	90.3	Org:N Dep:A				
14 PFHxS	1.338802	1.230446	1.093713	1.072763	1.031982	1.026439	1.101593	1.125206	1.095202	1.069019	Avg:A Wt:C2	1.118517		RSD=8.6	
	120	110	97.8	95.9	92.3	91.8	98.5	101	97.9	95.6	Org:N Dep:A				
D 45 13C3_PFHxS	137	139	128	137	147	140	126	118	127	124	Avg:A Wt:C2	132		RSD=6.8	
	103	105	96.4	104	111	105	95.4	89.3	96	93.8	Org:N Dep:A				
29 ADONA	7.334711	7.391090	7.813040	7.064051	6.840626	6.588012	7.403096	7.582394	7.240256	7.397418	Avg:A Wt:C2	7.265470		RSD=4.9	
	101	102	108	97.2	94.2	90.7	102	104	99.7	102	Org:N Dep:A				
D 64 13C2_6:2 FTS_2	16.9872	17.5548	17.1254	16.8226	17.8800	17.8154	16.4454	15.9272	15.7086	15.5588	Avg:A Wt:C2	16.7825		RSD=5.1	
	101	105	102	100	107	106	98	94.9	93.6	92.7	Org:N Dep:A				
2 6:2 FTS	2.993070	2.439618	2.585791	2.593833	2.539669	2.110131	2.210781	2.185273	2.336953	2.203601	Avg:A Wt:C2	2.419872		RSD=11.1	
	124	101	107	107	105	87.2	91.4	90.3	96.6	91.1	Org:N Dep:A				
D 53 13C8_PFOA	546	539	533	527	568	509	493	479	489	476	Avg:A Wt:C2	516		RSD=6.2	
	106	104	103	102	110	98.8	95.6	92.3	94.8	92.3	Org:N Dep:A				
20 PFOA	1.069479	1.173836	1.084374	1.060716	1.038684	1.000829	1.043548	1.034485	1.030901	1.016697	Avg:A Wt:C2	1.055355		RSD=4.6	
	101	111	103	101	98.4	94.8	98.9	98	97.7	96.3	Org:N Dep:A				
12 PFHpS	0.837682	1.036549	1.013883	0.927361	0.899894	0.943961	1.019369	0.999516	0.970195	0.949968	Avg:A Wt:C2	0.959838		RSD=6.4	
	87.3	108	106	96.6	93.8	98.3	106	104	101	99	Org:N Dep:A				
D 54 13C8_PFOS	118	118	113	116	126	114	105	109	119	117	Avg:A Wt:C2	115		RSD=5.0	
	102	102	98.2	100	109	98.7	90.9	94.3	103	101	Org:N Dep:A				
18 PFOS	1.644156	1.314027	1.326422	1.175501	1.255341	1.315185	1.352200	1.282036	1.191050	1.214672	Avg:A Wt:C2	1.307059		RSD=10.2	
	126	101	101	89.9	96	101	103	98.1	91.1	92.9	Org:N Dep:A				
D 56 13C9_PFNA	653	656	647	638	704	666	640	599	626	627	Avg:A Wt:C2	646		RSD=4.3	
	101	102	100	98.8	109	103	99.1	92.8	97	97.1	Org:N Dep:A				
17 PFNA	0.992317	1.168694	1.106802	1.000589	1.037504	0.974898	0.984898	1.054464	1.018152	0.983563	Avg:A Wt:C2	1.032188		RSD=6.1	
	96.1	113	107	96.9	101	94.4	95.4	102	98.6	95.3	Org:N Dep:A				

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
30 9Cl-PF3ONS	3.940277	3.960930	3.971086	3.560292	3.667132	3.731423	4.086490	3.804395	3.685151	3.618013	Avg:A Wt:C2	3.802519		RSD=4.7	
	104	104	104	93.6	96.4	98.1	107	100	96.9	95.1	Org:N Dep:A				
D 55 13C8_PFOSA	246	264	265	254	271	245	259	243	237	226	Avg:A Wt:C2	251		RSD=5.5	
	98	105	105	101	108	97.8	103	96.9	94.6	90	Org:N Dep:A				
19 PFOSA	1.117582	1.005836	1.063293	1.099545	1.039044	1.066878	0.987554	1.026071	1.047042	1.076796	Avg:A Wt:C2	1.052964		RSD=3.8	
	106	95.5	101	104	98.7	101	93.8	97.4	99.4	102	Org:N Dep:A				
3 8:2 FTS	2.262628	2.781744	2.233447	2.381377	2.150119	2.194329	2.213550	2.231105	2.444750	2.249450	Avg:A Wt:C2	2.314250		RSD=8.0	
	97.8	120	96.5	103	92.9	94.8	95.6	96.4	106	97.2	Org:N Dep:A				
16 PFNS	0.906158	0.868225	0.845721	0.833614	0.760142	0.820781	0.904969	0.814989	0.765980	0.736896	Avg:A Wt:C2	0.825748		RSD=7.1	
	110	105	102	101	92.1	99.4	110	98.7	92.8	89.2	Org:N Dep:A				
D 65 13C2_8:2 FTS_2	17.1434	17.1638	15.9092	17.0188	18.2968	17.2874	16.2994	14.9332	14.5120	15.0542	Avg:A Wt:C2	16.3618		RSD=7.5	
	105	105	97.2	104	112	106	99.6	91.3	88.7	92	Org:N Dep:A				
D 51 13C6_PFDA	625	623	610	597	643	603	606	589	557	560	Avg:A Wt:C2	601		RSD=4.6	
	104	104	101	99.3	107	100	101	97.9	92.6	93.1	Org:N Dep:A				
10 PFDA	1.077944	1.021941	1.006680	1.053828	1.004638	0.973361	0.962019	0.960481	1.031234	0.970310	Avg:A Wt:C2	1.006244		RSD=4.0	
	107	102	100	105	99.8	96.7	95.6	95.5	102	96.4	Org:N Dep:A				
D 58 d3-MeFOSAA	134	130	132	129	138	129	129	119	138	120	Avg:A Wt:C2	130		RSD=5.0	
	103	100	102	99.3	106	99.3	99.4	91.5	107	92.6	Org:N Dep:A				
6 N-MeFOSAA	0.719503	0.806090	0.773378	0.770849	0.744067	0.759751	0.741528	0.774570	0.703674	0.743612	Avg:A Wt:C2	0.753702		RSD=3.9	
	95.5	107	103	102	98.7	101	98.4	103	93.4	98.7	Org:N Dep:A				
9 PFDS	0.911012	0.800047	0.704963	0.828254	0.719056	0.721505	0.812830	0.731140	0.727915	0.685815	Avg:A Wt:C2	0.764254		RSD=9.3	
	119	105	92.2	108	94.1	94.4	106	95.7	95.2	89.7	Org:N Dep:A				
D 52 13C7_PFUdA	576	555	527	556	564	547	522	520	520	517	Avg:A Wt:C2	540		RSD=4.0	
	107	103	97.6	103	104	101	96.7	96.2	96.2	95.7	Org:N Dep:A				
D 60 d5-EtFOSAA	113	116	112	110	114	112	111	104	107	92.1280	Avg:A Wt:C2	109		RSD=6.3	
	103	106	103	101	104	103	102	95.6	97.7	84.4	Org:N Dep:A				
25 PFUdA	1.022331	0.999645	1.155611	0.979746	0.952857	0.947777	0.936041	0.882154	0.980881	0.883530	Avg:A Wt:C2	0.974057		RSD=8.0	
	105	103	119	101	97.8	97.3	96.1	90.6	101	90.7	Org:N Dep:A				
5 N-EtFOSAA	0.989742	1.155848	1.101670	1.026045	1.037877	1.058959	0.940010	0.996132	0.990861	1.050440	Avg:A Wt:C2	1.034758		RSD=6.0	
	95.6	112	106	99.2	100	102	90.8	96.3	95.8	102	Org:N Dep:A				
D 61 d7-MeFOSE	88.8610	93.1250	80.7270	85.6620	84.6170	80.9000	81.2230	77.0800	83.1680	74.0590	Avg:A Wt:C2	82.9422		RSD=6.7	
	107	112	97.3	103	102	97.5	97.9	92.9	100	89.3	Org:N Dep:A				
32 MeFOSE	0.925040	0.815356	1.184548	1.044174	1.143033	1.024827	0.985780	1.048535	1.049631	1.028789	Avg:A Wt:C2	1.024971		RSD=10.1	
	90.3	79.5	116	102	112	100	96.2	102	102	100	Org:N Dep:A				
D 57 d3-MeFOSA	47.0950	41.1770	43.6070	48.9360	44.3320	44.7520	47.1830	40.8050	47.3050	49.1860	Avg:A Wt:C2	45.4378		RSD=6.6	
	104	90.6	96	108	97.6	98.5	104	89.8	104	108	Org:N Dep:A				
26 MeFOSA		1.562280	1.528998	1.125552	1.428923	1.227733	1.122438	1.287124	1.184974		Avg:A Wt:C2	1.308503		RSD=13.5	
	Disabled	119	117	86	109	93.8	85.8	98.4	90.6	Disabled	Org:N Dep:A				
31 11Cl-PF3OUDS	3.483758	3.584672	3.290726	3.124249	2.972480	3.210204	3.409676	3.331814	3.050882	3.077790	Avg:A Wt:C2	3.253625		RSD=6.2	
	107	110	101	96	91.4	98.7	105	102	93.8	94.6	Org:N Dep:A				
D 62 d9-EtFOSE	95.8260	101	95.8400	102	98.3260	95.3730	94.4740	92.4100	95.7250	89.0760	Avg:A Wt:C2	95.9545		RSD=3.9	
	99.9	105	99.9	106	102	99.4	98.5	96.3	99.8	92.8	Org:N Dep:A				

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
11 PFDoA	1.232778	1.053776	1.091862	0.988794	1.013934	1.103737	1.005329	1.014734	1.052089	0.967040	Avg:A Wt:C2	1.052407		RSD=7.3	
	117	100	104	94	96.3	105	95.5	96.4	100	91.9	Org:N Dep:A				
33 EtFOSE	1.024983	1.032809	1.007199	0.930988	1.036664	0.942447	0.966308	0.901152	0.960903	0.967192	Avg:A Wt:C2	0.977065		RSD=4.8	
	105	106	103	95.3	106	96.5	98.9	92.2	98.3	99	Org:N Dep:A				
D 38 13C2_PFDoA	526	557	541	531	561	503	535	487	501	481	Avg:A Wt:C2	522		RSD=5.4	
	101	107	104	102	107	96.3	102	93.3	95.9	92.1	Org:N Dep:A				
4 10:2 FTS	2.471222	2.850252	3.166961	2.557216	2.634749	2.329455	2.576922	2.675594	2.584159	2.508484	Avg:A Wt:C2	2.635502		RSD=8.8	
	93.8	108	120	97	100	88.4	97.8	102	98.1	95.2	Org:N Dep:A				
D 59 d5-EtFOSA	39.1420	42.6350	41.7240	41.7500	45.6630	43.2090	40.5160	43.7900	43.2090	40.6030	Avg:A Wt:C2	42.2241		RSD=4.5	
	92.7	101	98.8	98.9	108	102	96	104	102	96.2	Org:N Dep:A				
27 EtFOSA	1.539523	1.221766	1.315789	1.072479	0.923724	1.049226	1.060628	1.000354	1.029802	1.026950	Ln:A Wt:C2	1.022646	26.0501	R^2=0.993	
	99.6	94	116	99.8	87.8	101	103	97.6	101	100	Org:N Dep:A			RSE=7.6	
34 PFDOS	0.931758	1.010137	1.050568	1.000905	0.939927	0.958934	1.066907	0.961462	0.907639	0.914867	Avg:A Wt:C2	0.974310		RSD=5.7	
	95.6	104	108	103	96.5	98.4	110	98.7	93.2	93.9	Org:N Dep:A				
24 PFTrDA	1.122186	0.960514	0.987289	0.915661	0.988635	1.030456	0.954849	1.007783	0.960224	0.982941	Avg:A Wt:C2	0.991054		RSD=5.6	
	113	96.9	99.6	92.4	99.8	104	96.3	102	96.9	99.2	Org:N Dep:A				
D 42 13C2_PFTeDA	736	747	740	728	783	704	737	720	741	708	Avg:A Wt:C2	734		RSD=3.0	
	100	102	101	99.2	107	95.8	100	98	101	96.5	Org:N Dep:A				
23 PFTeDA	0.981566	0.960077	0.905578	0.875649	0.880996	0.878074	0.827212	0.866732	0.829500	0.852585	Avg:A Wt:C2	0.885797		RSD=5.7	
	111	108	102	98.9	99.5	99.1	93.4	97.8	93.6	96.3	Org:N Dep:A				
35 PFHxDA	0.820069	0.760087	0.695198	0.683019	0.661734	0.674163	0.634537	0.624230	0.637927	0.620075	Avg:A Wt:C2	0.681104		RSD=9.4	
	120	112	102	100	97.2	99	93.2	91.6	93.7	91	Org:N Dep:A				
D 40 13C2_PFHxDA	754	755	751	734	786	731	752	737	738	714	Avg:A Wt:C2	745		RSD=2.6	
	101	101	101	98.5	105	98.1	101	98.9	99	95.8	Org:N Dep:A				
36 PFODA	1.137964	1.060559	1.030325	1.004219	0.996301	1.022137	0.987513	0.968630	0.997431	0.985441	Avg:A Wt:C2	1.019052		RSD=4.8	
	112	104	101	98.5	97.8	100	96.9	95.1	97.9	96.7	Org:N Dep:A				

Pace Environmental Services, LLC
Initial Calibration RT Report

Batch: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b
Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02
Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01
Method Lock: Unlocked Lock Date:
No.Compounds: 66 Integrator: picker
Calib Method: PFAS-ID
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	012621007.d	ICAL 50_SVLC-1272	26-Jan-2021 13:22:18
2	012621008.d	ICAL 100_SVLC-1273	26-Jan-2021 13:32:55
3	012621009.d	ICAL 200_SVLC-1274	26-Jan-2021 13:43:33
4	012621010.d	ICAL 500_SVLC-1275	26-Jan-2021 13:54:07
5	012621011.d	ICAL 1000_SVLC-1276	26-Jan-2021 14:04:47
6	012621012.d	ICAL 2000_SVLC-1277	26-Jan-2021 14:15:21
7	012621013.d	ICAL 5000_SVLC-1278	26-Jan-2021 14:25:58
8	012621014.d	ICAL 10000_SVLC-1279	26-Jan-2021 14:36:40
9	012621015.d	ICAL 15000_SVLC-1280	26-Jan-2021 14:47:21
10	012621016.d	ICAL 20000_SVLC-1281	26-Jan-2021 14:58:01

Column: 1 Detector: LCMS-Q3

Compound	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10	Avg. RT	%Rsd RT
D 46 13C4_PFBA	1.718	1.715	1.718	1.718	1.718	1.722	1.718	1.718	1.718	1.717	1.717	0.087
8 PFBA	1.718	1.722	1.718	1.724	1.724	1.722	1.724	1.724	1.724	1.724	1.722	0.165
D 50 13C5_PFPeA	2.099	2.104	2.098	2.109	2.109	2.104	2.109	2.109	2.109	2.108	2.106	0.211
21 PFPeA	2.099	2.104	2.109	2.109	2.109	2.104	2.109	2.109	2.109	2.108	2.107	0.171
D 44 13C3_PFBS	2.162	2.157	2.162	2.162	2.162	2.167	2.162	2.162	2.162	2.161	2.161	0.111
7 PFBS	2.162	2.157	2.162	2.162	2.162	2.167	2.162	2.162	2.162	2.161	2.161	0.111
1 4:2 FTS	2.416	2.424	2.424	2.424	2.416	2.423	2.425	2.425	2.425	2.415	2.421	0.175
D 63 13C2_4:2 FTS_2	2.416	2.415	2.416	2.424	2.416	2.423	2.416	2.416	2.425	2.415	2.418	0.177
D 49 13C5_PFHxA	2.451	2.450	2.451	2.460	2.460	2.459	2.460	2.460	2.460	2.460	2.457	0.179
15 PFHxA	2.451	2.459	2.460	2.460	2.460	2.459	2.460	2.460	2.460	2.460	2.459	0.113
22 PFPeS	2.487	2.486	2.496	2.487	2.496	2.495	2.496	2.496	2.496	2.495	2.492	0.179
28 GenX	2.567	2.566	2.567	2.567	2.567	2.566	2.567	2.567	2.567	2.567	2.567	0.019
D 66 13C3_GenX	2.567	2.566	2.567	2.567	2.567	2.566	2.567	2.567	2.567	2.567	2.567	0.019
13 PFHpA	2.819	2.818	2.819	2.818	2.819	2.827	2.828	2.828	2.828	2.827	2.822	0.169
D 47 13C4_PFHpA	2.819	2.818	2.819	2.818	2.828	2.827	2.828	2.828	2.828	2.827	2.823	0.167
14 PFHxS	2.837	2.845	2.837	2.837	2.837	2.845	2.846	2.846	2.846	2.836	2.841	0.169
D 45 13C3_PFHxS	2.837	2.836	2.837	2.837	2.846	2.845	2.846	2.846	2.837	2.845	2.841	0.176
29 ADONA	2.864	2.863	2.855	2.864	2.864	2.863	2.864	2.864	2.864	2.864	2.863	0.097
D 64 13C2_6:2 FTS_2	3.183	3.181	3.182	3.182	3.189	3.188	3.189	3.182	3.183	3.189	3.185	0.104
2 6:2 FTS	3.190	3.195	3.182	3.189	3.189	3.188	3.189	3.182	3.189	3.189	3.188	0.111
D 53 13C8_PFOA	3.203	3.208	3.209	3.209	3.210	3.215	3.216	3.216	3.209	3.216	3.211	0.133
20 PFOA	3.210	3.202	3.209	3.216	3.210	3.215	3.216	3.216	3.216	3.209	3.211	0.153
12 PFHpS	3.217	3.222	3.209	3.216	3.223	3.215	3.223	3.223	3.223	3.222	3.219	0.145
D 54 13C8_PFOS	3.593	3.591	3.592	3.584	3.592	3.591	3.592	3.592	3.584	3.592	3.590	0.091
18 PFOS	3.593	3.599	3.600	3.592	3.592	3.591	3.592	3.592	3.592	3.592	3.593	0.081
D 56 13C9_PFNA	3.593	3.591	3.592	3.592	3.592	3.598	3.600	3.592	3.592	3.592	3.593	0.088
17 PFNA	3.593	3.599	3.592	3.592	3.600	3.598	3.592	3.592	3.592	3.600	3.595	0.102
30 9Cl-PF3ONS	3.803	3.793	3.802	3.794	3.794	3.801	3.794	3.794	3.794	3.794	3.796	0.098
D 55 13C8_PFOSA	3.908	3.906	3.915	3.907	3.907	3.914	3.907	3.907	3.907	3.907	3.908	0.076
19 PFOSA	3.908	3.906	3.915	3.907	3.907	3.906	3.907	3.907	3.907	3.907	3.907	0.065
3 8:2 FTS	3.933	3.931	3.932	3.923	3.923	3.930	3.923	3.932	3.932	3.932	3.929	0.098
16 PFNS	3.933	3.931	3.932	3.923	3.932	3.930	3.932	3.932	3.932	3.932	3.930	0.065
D 65 13C2_8:2 FTS_2	3.933	3.931	3.932	3.932	3.932	3.930	3.923	3.932	3.923	3.932	3.929	0.086

Compound	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10	Avg. RT	%Rsd RT
D 51 13C6_PFDA	3.933	3.931	3.940	3.932	3.940	3.939	3.932	3.932	3.940	3.940	3.935	0.114
10 PFDA	3.950	3.931	3.940	3.932	3.940	3.939	3.932	3.940	3.940	3.940	3.938	0.146
D 58 d3-MeFOSAA	4.091	4.090	4.100	4.091	4.092	4.090	4.091	4.091	4.091	4.091	4.092	0.065
6 N-MeFOSAA	4.099	4.099	4.091	4.091	4.100	4.090	4.091	4.091	4.100	4.100	4.095	0.114
9 PFDS	4.227	4.227	4.238	4.228	4.228	4.227	4.228	4.228	4.228	4.228	4.228	0.077
D 52 13C7_PFUdA	4.247	4.247	4.248	4.248	4.238	4.247	4.238	4.248	4.248	4.248	4.245	0.093
D 60 d5-EtFOSAA	4.237	4.247	4.248	4.238	4.248	4.247	4.238	4.248	4.248	4.248	4.244	0.116
25 PFUdA	4.237	4.247	4.248	4.238	4.248	4.247	4.238	4.248	4.248	4.248	4.244	0.116
5 N-EtFOSAA	4.247	4.247	4.258	4.248	4.258	4.247	4.248	4.248	4.258	4.248	4.251	0.123
D 61 d7-MeFOSE	4.338	4.337	4.338	4.338	4.339	4.337	4.338	4.338	4.338	4.328	4.337	0.071
32 MeFOSE	4.347	4.347	4.348	4.348	4.348	4.347	4.338	4.348	4.348	4.348	4.346	0.068
D 57 d3-MeFOSA	4.357	4.357	4.357	4.348	4.358	4.356	4.348	4.358	4.358	4.348	4.354	0.107
26 MeFOSA		4.375	4.357	4.348	4.358	4.356	4.348	4.358	4.358		4.357	0.192
31 11Cl-PF3OUDS	4.383	4.383	4.384	4.384	4.384	4.383	4.384	4.384	4.384	4.384	4.383	0.013
D 62 d9-EtFOSE	4.501	4.500	4.501	4.501	4.501	4.500	4.492	4.501	4.501	4.492	4.499	0.081
11 PFDoA	4.510	4.509	4.510	4.510	4.510	4.509	4.510	4.510	4.510	4.510	4.510	0.011
33 EtFOSE	4.510	4.509	4.510	4.510	4.510	4.509	4.510	4.510	4.510	4.510	4.510	0.011
D 38 13C2_PFDoA	4.510	4.509	4.510	4.510	4.510	4.509	4.510	4.510	4.510	4.510	4.510	0.011
4 10:2 FTS	4.519	4.518	4.528	4.519	4.520	4.518	4.519	4.519	4.519	4.519	4.520	0.066
D 59 d5-EtFOSA	4.519	4.518	4.510	4.519	4.520	4.518	4.519	4.519	4.519	4.519	4.518	0.062
27 EtFOSA	4.510	4.536	4.528	4.528	4.520	4.527	4.519	4.528	4.528	4.528	4.525	0.164
34 PFDOS	4.717	4.723	4.724	4.724	4.725	4.723	4.724	4.724	4.731	4.724	4.724	0.075
24 PFTrDA	4.744	4.751	4.751	4.745	4.745	4.750	4.745	4.752	4.752	4.752	4.748	0.073
D 42 13C2_PFTeDA	4.964	4.970	4.964	4.964	4.964	4.963	4.964	4.964	4.971	4.964	4.965	0.060
23 PFTeDA	4.964	4.970	4.971	4.964	4.964	4.963	4.964	4.971	4.971	4.971	4.967	0.080
35 PFHxDA	5.351	5.351	5.351	5.351	5.343	5.350	5.352	5.352	5.351	5.352	5.350	0.046
D 40 13C2_PFHxDA	5.351	5.351	5.351	5.351	5.343	5.350	5.343	5.352	5.351	5.352	5.349	0.061
36 PFODA	5.702	5.702	5.702	5.702	5.703	5.701	5.703	5.703	5.709	5.703	5.702	0.041

Pace Environmental Services, LLC
Initial Calibration Signal Ratios Report

Batch: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b
Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02
Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01
Method Lock: Unlocked Lock Date:
No.Compounds: 66 Integrator: picker
Calib Method: PFAS-ID
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	012621007.d	ICAL 50_SVLC-1272	26-Jan-2021 13:22:18
2	012621008.d	ICAL 100_SVLC-1273	26-Jan-2021 13:32:55
3	012621009.d	ICAL 200_SVLC-1274	26-Jan-2021 13:43:33
4	012621010.d	ICAL 500_SVLC-1275	26-Jan-2021 13:54:07
5	012621011.d	ICAL 1000_SVLC-1276	26-Jan-2021 14:04:47
6	012621012.d	ICAL 2000_SVLC-1277	26-Jan-2021 14:15:21
7	012621013.d	ICAL 5000_SVLC-1278	26-Jan-2021 14:25:58
8	012621014.d	ICAL 10000_SVLC-1279	26-Jan-2021 14:36:40
9	012621015.d	ICAL 15000_SVLC-1280	26-Jan-2021 14:47:21
10	012621016.d	ICAL 20000_SVLC-1281	26-Jan-2021 14:58:01

Column: 1 Detector: LCMS-Q3

Compound	Ratio Level 1	Ratio Level 2	Ratio Level 3	Ratio Level 4	Ratio Level 5	Ratio Level 6	Ratio Level 7	Ratio Level 8	Ratio Level 9	Ratio Level 10	Average Ratio	L-5 +/-3 SD Ratio Limits	StdD Limit	50% Limit
7 PFBS	3.180	4.148	3.337	3.477	3.822	3.557	3.590	3.600	3.605	3.759	3.607	3.009-4.634	0.27082	1.911
1 4:2 FTS	1.578	1.190	1.530	1.782	2.187	2.034	2.064	1.787	1.929	2.046	1.812	1.235-3.138	0.31721	1.093
15 PFHxA	23.313	18.271	16.477	16.423	18.187	19.962	19.695	19.548	19.594	18.565	19.003	12.316-24.057	1.95682	9.093
22 PFPeS	2.877	2.742	2.752	3.225	3.031	3.002	3.108	3.138	3.137	3.105	3.011	2.549-3.512	0.16060	1.515
28 GenX	0.730	0.777	0.875	0.742	0.841	0.801	0.803	0.806	0.785	0.796	0.795	0.720-0.961	0.04025	0.420
13 PFHpA	4.105	3.962	4.135	3.787	3.911	3.761	3.767	3.986	3.852	3.887	3.915	3.522-4.299	0.12948	1.955
14 PFHxS	3.320	4.697	3.266	3.169	3.015	3.129	3.115	2.991	3.103	3.128	3.293	1.463-4.566	0.51712	1.507
29 ADONA	3.511	3.353	3.411	3.180	3.134	3.246	3.359	3.192	3.190	3.200	3.277	2.761-3.506	0.12427	1.567
2 6:2 FTS	1.968	2.459	2.114	2.701	2.201	1.691	1.805	1.917	1.965	1.858	2.067	1.262-3.139	0.31275	1.100
20 PFOA	3.001	3.289	2.881	2.956	3.135	3.008	2.923	2.947	2.965	3.027	3.013	2.791-3.478	0.11444	1.567
12 PFHpS	2.721	3.171	2.886	3.008	3.089	3.474	3.467	3.299	3.205	3.360	3.168	2.375-3.802	0.23769	1.544
18 PFOS	4.238	3.106	2.930	3.966	3.635	3.608	3.503	3.700	3.554	3.805	3.604	2.540-4.729	0.36467	1.817
17 PFNA	5.656	8.721	6.560	6.489	6.413	6.351	6.328	6.926	6.503	6.213	6.616	4.015-8.810	0.79915	3.206
3 8:2 FTS	1.381	2.166	1.762	1.673	1.981	2.065	2.011	1.913	1.965	1.908	1.882	1.268-2.693	0.23763	0.990
16 PFNS	2.526	2.940	2.481	2.857	2.878	2.813	2.706	2.860	2.878	2.747	2.768	2.348-3.407	0.17648	1.439
10 PFDA	12.959	12.156	16.627	13.795	13.299	14.295	13.047	14.045	13.448	13.832	13.750	9.752-16.845	1.18220	6.649
6 N-MeFOSAA	1.324	1.640	1.491	1.277	1.349	1.331	1.391	1.267	1.324	1.271	1.366	0.981-1.716	0.12246	0.674
9 PFDS	3.157	2.406	2.463	3.034	2.678	2.395	2.774	2.715	2.839	2.743	2.720	1.757-3.598	0.30694	1.339
25 PFUdA	13.401	15.946	23.441	14.080	13.465	15.460	14.267	13.792	16.115	14.571	15.453	4.594-22.335	2.95690	6.732
5 N-EtFOSAA	1.606	1.668	1.665	1.603	1.661	1.569	1.517	1.585	1.579	1.588	1.604	1.515-1.806	0.04855	0.830
26 MeFOSA		1.319	1.078	1.060	1.141	1.079	1.061	1.050	1.090		1.109	0.856-1.425	0.09492	0.570
11 PFDoA	12.062	11.444	12.119	11.626	10.121	11.649	11.034	11.156	11.049	10.021	11.228	7.808-12.433	0.77070	5.060
4 10:2 FTS	3.180	2.813	4.203	3.383	3.471	3.181	3.377	3.354	3.226	3.366	3.355	2.472-4.469	0.33295	1.735
27 EtFOSA	1.847	0.940	1.369	1.058	0.882	1.044	1.010	1.024	1.026	1.007	1.120	-0.025-1.789	0.30240	0.441
34 PFDOS	2.768	3.306	3.426	3.289	3.398	3.068	3.335	3.231	3.198	3.232	3.225	2.815-3.980	0.19419	1.699
24 PFTrDA	8.434	8.268	8.361	7.679	8.643	7.950	8.461	8.643	8.312	8.427	8.317	7.729-9.556	0.30455	4.321
23 PFTeDA	12.092	12.413	11.552	12.259	12.552	12.003	11.923	12.650	12.118	11.985	12.154	11.557-13.546	0.33153	6.276
35 PFHxDA	11.294	11.500	11.423	12.230	11.541	12.009	11.424	11.307	11.443	11.494	11.566	10.571-12.510	0.32318	5.770
36 PFODA	15.380	14.711	15.469	14.891	14.589	15.244	15.137	15.108	14.743	14.602	14.987	13.618-15.559	0.32355	7.294

Report Date: 27-Jan-2021 16:50:51 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Initial Calibration Ion Suppression Report

Batch: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b
Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02
Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01
Method Lock: Unlocked Lock Date:
No.Compounds: 66 Integrator: picker
Calib Method: PFAS-ID
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	012621007.d	ICAL 50_SVLC-1272	26-Jan-2021 13:22:18
2	012621008.d	ICAL 100_SVLC-1273	26-Jan-2021 13:32:55
3	012621009.d	ICAL 200_SVLC-1274	26-Jan-2021 13:43:33
4	012621010.d	ICAL 500_SVLC-1275	26-Jan-2021 13:54:07
5	012621011.d	ICAL 1000_SVLC-1276	26-Jan-2021 14:04:47
6	012621012.d	ICAL 2000_SVLC-1277	26-Jan-2021 14:15:21
7	012621013.d	ICAL 5000_SVLC-1278	26-Jan-2021 14:25:58
8	012621014.d	ICAL 10000_SVLC-1279	26-Jan-2021 14:36:40
9	012621015.d	ICAL 15000_SVLC-1280	26-Jan-2021 14:47:21
10	012621016.d	ICAL 20000_SVLC-1281	26-Jan-2021 14:58:01

Column: 1 Detector: LCMS-Q3

Compound	Response Level 1	Response Level 2	Response Level 3	Response Level 4	Response Level 5	Response Level 6	Response Level 7	Response Level 8	Response Level 9	Response Level 10	RPD
* 37 13C2_PFDA	647660	639805	629380	636255	719384	630458	613187	587491	606195	595771	2.08
* 39 13C2_PFHxA	706562	679015	706106	681277	743628	661029	673718	643220	685960	648714	2.13
* 41 13C2_PFOA	563220	540114	556163	535037	584844	547271	533563	507346	512024	510390	2.46
* 43 13C3_PFBA	664462	658173	659260	635606	696867	629855	619965	607196	636670	606180	2.29
* 48 13C4_PFOS	139790	129956	133653	134096	139913	123626	126018	116836	127318	127299	2.33

13C2_PFDA ((|595771 - 647660| / (595771 + 647660)) / 2) * 100 = 2.09
13C2_PFHxA ((|648714 - 706562| / (648714 + 706562)) / 2) * 100 = 2.13
13C2_PFOA ((|510390 - 563220| / (510390 + 563220)) / 2) * 100 = 2.46
13C3_PFBA ((|606180 - 664462| / (606180 + 664462)) / 2) * 100 = 2.29
13C4_PFOS ((|127299 - 139790| / (127299 + 139790)) / 2) * 100 = 2.34

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b\012621019.d
Injection Date: 26-Jan-2021 15:29:51 Injection Vol: 10.0 uL
Sample Type: CheckStd Auto Sampler: 13
Sample Info: ISOMER CHECK_SVLC-1266 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Surrogates Conc. Level: Smp Vol. Added: 1.00 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	T RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	Cal Conc ng/L	OnCol Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.717	1.718	0	654453	23	>100:1			100000	980.56	90.8	
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.108	2.109	0	610244	18	>100:1			100000	963.36	91.2	
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.161	2.162	0	184485	17	>100:1			100000	964.28	88.7	
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.414	2.416	0	111864	21	>100:1			500000	5027.23	91	
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.450	2.460	0	652375	20	>100:1			100000	946.45	84.4	
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.566	2.567	0	1162594	21	>100:1			500000	4821.15	89.8	
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.817	2.828	0	514768	20	>100:1			100000	977.30	90.9	
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.836	2.846	0	131363	22	>100:1			100000	991.47	89.2	
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.188	3.189	0	80272	27	>100:1			500000	4783.07	89.8	
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.208	3.210	0	499667	23	>100:1			100000	969.18	88	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.215	3.210	1/1	5166087	36	>100:1	Target = 3.13	0.15	0	979676		
413 > 169	53	3.215	3.210		1877496	38	>100:1	2.75 (1.56-4.70)	0.24				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.598	3.592	1	116725	21	>100:1			100000	1011.32	92.4	
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.598	3.592	1	607013	23	>100:1			100000	940.37	86.2	
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.914	3.907	1	255788	20	>100:1			100000	1019.20	94.4	
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.930	3.932	0	82228	19	>100:1			500000	5025.60	89.9	
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		3.939	3.940	0	593218	20	>100:1			100000	986.38	92.2	
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.090	4.092	0	631186	19	>100:1			500000	4864.72	91.5	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													
570 > 419	58	4.099	4.100	0/0	1084420	31	>100:1	Target = 1.34	0.12	0	1139752		
570 > 483	58	4.099	4.100		867554	33	>100:1	1.24 (0.67-2.02)	0.22				
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.247	4.238	1	538647	16				100000	996.70	95.5	
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.247	4.248	0	544435	17	>100:1			500000	4988.91	95.8	

Report Date: 27-Jan-2021 16:50:23 AIM Revision: 2.0 12-Dec-2020 09:34:50

Pace Environmental Services, LLC

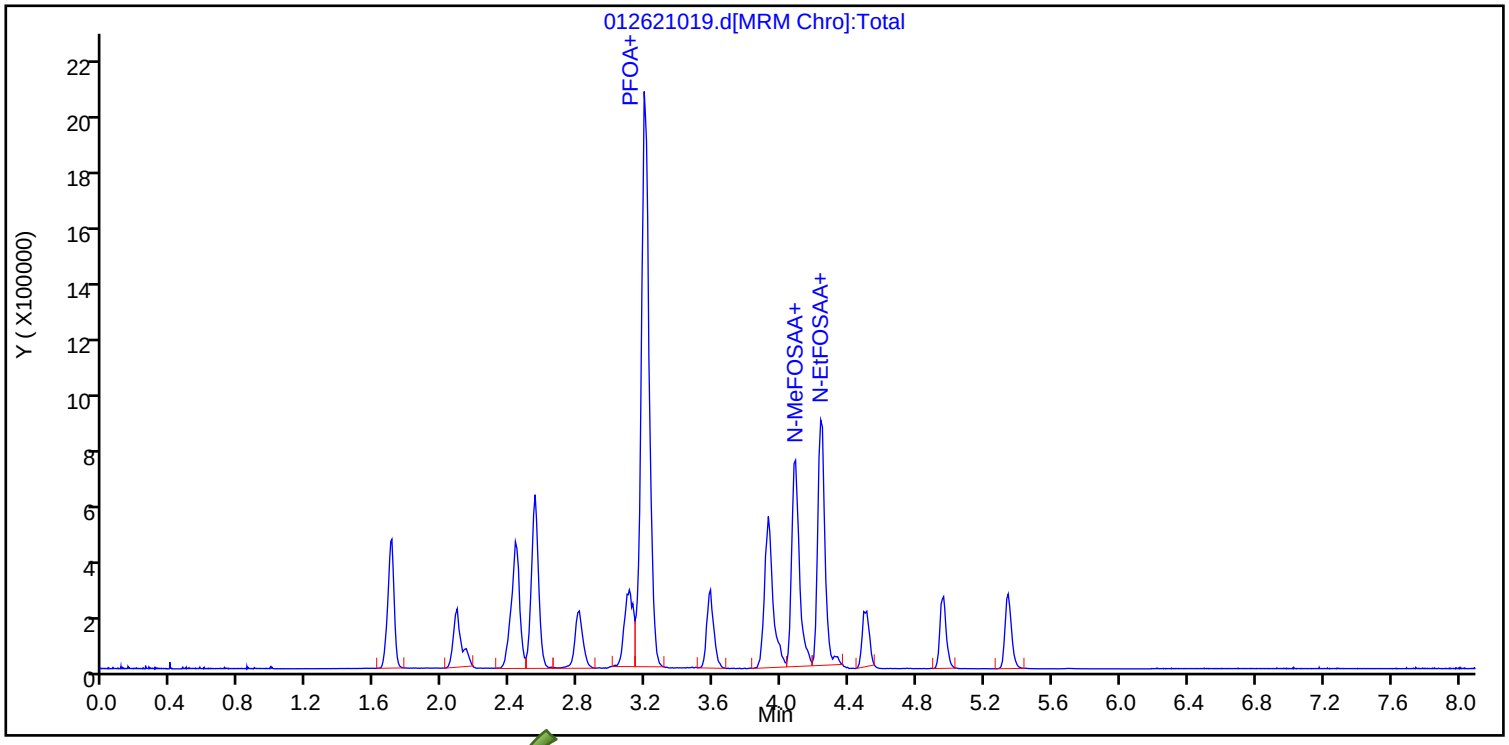
Data File: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b\012621019.d

Injection Date: 26-Jan-2021 15:29:51 Inst. ID: LCMSMS02

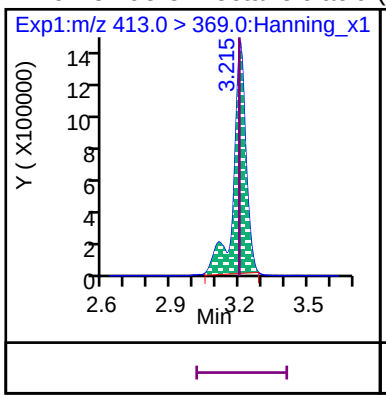
Client ID: Lab ID: ISOMER CHECK_SVLC-1266

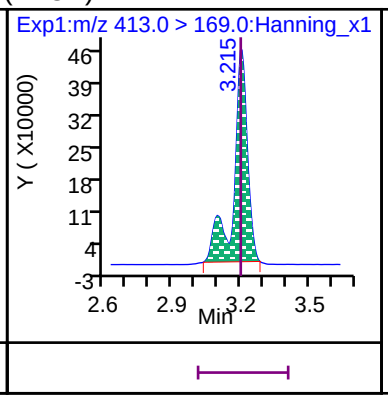
Sample Info: ISOMER CHECK_SVLC-1266

Dil. Factor: 1 Operator: Stephen E. Somerville

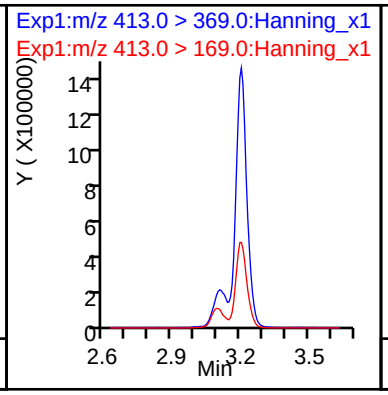


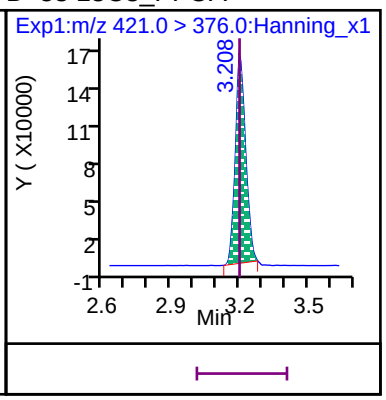
20 Perfluoro-n-octanoic acid (PFOA)



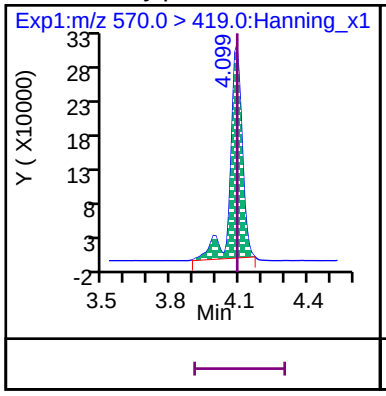


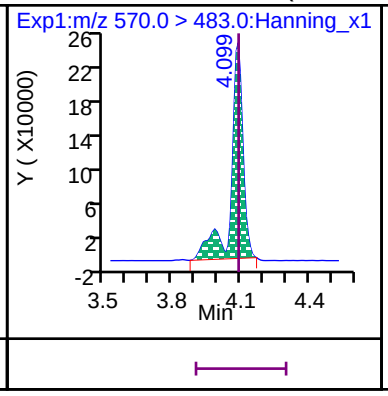
D 53 13C8_PFOA



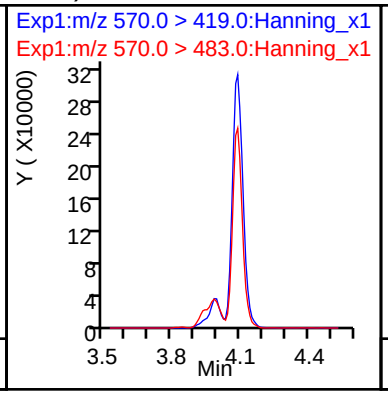


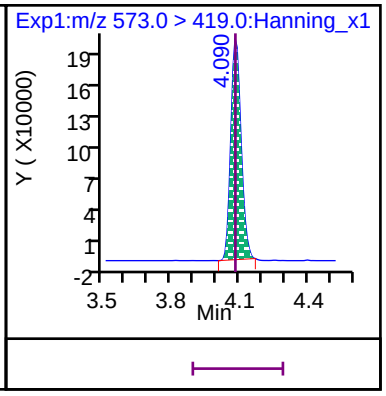
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA)





D 58 d3-MeFOSAA





Pace Environmental Services, LLC
Initial Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b\012621018.d
Injection Date: 26-Jan-2021 15:19:16 Injection Vol: 10.0 uL
Sample Type: ICV Auto Sampler: 12
Sample Info: ICV 500_SVLC-1285 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: ICV Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	720687	699035			97	50 - 150
8 PFBA			500.00	471.27	94.3	70 - 130
D 50 13C5_PFPeA	669031	680342			102	50 - 150
21 PFPeA			500.00	460.84	92.2	70 - 130
7 PFBS			442.50	406.75	91.9	70 - 130
D 44 13C3_PFBS	208034	198698			95.5	50 - 150
1 4:2 FTS			467.50	470.55	101	70 - 130
D 63 13C2_4:2 FTS_2	122994	116717			94.9	50 - 150
D 49 13C5_PFHxA	773207	709894			91.8	50 - 150
15 PFHxA			500.00	463.92	92.8	70 - 130
22 PFPeS			470.00	464.63	98.9	70 - 130
28 GenX			2500.00	2241.13	89.6	70 - 130
D 66 13C3_GenX	1294237	1281902			99	50 - 150
13 PFHpA			500.00	463.06	92.6	70 - 130
D 47 13C4_PFHpA	566534	560736			99	50 - 150
14 PFHxS			456.00	380.01	83.3	70 - 130
D 45 13C3_PFHxS	147201	140519			95.5	50 - 150
29 ADONA			2355.00	2182.02	92.7	70 - 130
D 64 13C2_6:2 FTS_2	89400	83804			93.7	50 - 150
2 6:2 FTS			475.00	392.81	82.7	70 - 130
20 PFOA			500.00	429.32	85.9	70 - 130
D 53 13C8_PFOA	568086	585654			103	50 - 150
12 PFHpS			475.00	436.25	91.8	70 - 130
18 PFOS			462.75	364.99	78.9	70 - 130
D 56 13C9_PFNA	703892	658324			93.5	50 - 150
D 54 13C8_PFOS	126288	124972			99	50 - 150
17 PFNA			500.00	485.78	97.2	70 - 130
30 9Cl-PF3ONS			2330.00	2128.26	91.3	70 - 130
D 55 13C8_PFOSA	270927	281894			104	50 - 150
19 PFOSA			500.00	429.55	85.9	70 - 130
3 8:2 FTS			480.00	502.90	105	70 - 130
16 PFNS			480.00	472.25	98.4	70 - 130
D 65 13C2_8:2 FTS_2	91484	83770			91.6	50 - 150
10 PFDA			500.00	457.62	91.5	70 - 130
D 51 13C6_PFDA	643340	651256			101	50 - 150
D 58 d3-MeFOSAA	689696	679685			98.5	50 - 150

Report Date: 27-Jan-2021 16:50:22 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b\012621018.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			500.00	508.30	102	70 - 130
9 PFDS			482.50	403.91	83.7	70 - 130
D 52 13C7_PFUdA	564025	568614			101	50 - 150
25 PFUdA			500.00	476.59	95.3	70 - 130
D 60 d5-EtFOSAA	568396	617946			109	50 - 150
5 N-EtFOSAA			500.00	516.53	103	70 - 130
D 61 d7-MeFOSE	84617	85662			101	50 - 150
D 57 d3-MeFOSA	44332	41455			93.5	50 - 150
31 11Cl-PF3OUDS			2355.00	2041.80	86.7	70 - 130
D 62 d9-EtFOSE	98326	96309			97.9	50 - 150
11 PFDoA			500.00	467.62	93.5	70 - 130
D 38 13C2_PFDoA	560944	602860			107	50 - 150
D 59 d5-EtFOSA	45663	42759			93.6	50 - 150
4 10:2 FTS			2410.00	2619.78	109	70 - 130
24 PFTrDA			500.00	490.52	98.1	70 - 130
23 PFTeDA			500.00	464.35	92.9	70 - 130
D 42 13C2_PFTeDA	782673	798669			102	50 - 150
D 40 13C2_PFHxDA	785856	792820			101	50 - 150

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\020521-nonDOD.b\020521005.d
Injection Date: 05-Feb-2021 11:54:00 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 95
Sample Info: ID CCV 100_SVLC-1273 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-2 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	720687	609590			84.6	50 - 150
8 PFBA			100.00	110.29	110	70 - 130
D 50 13C5_PFPeA	669031	589875			88.2	50 - 150
21 PFPeA			100.00	100.78	101	70 - 130
7 PFBS			88.400	99.081	112	70 - 130
D 44 13C3_PFBS	208034	183373			88.1	50 - 150
1 4:2 FTS			93.400	111.84	120	70 - 130
D 63 13C2_4:2 FTS_2	122994	97964			79.6	50 - 150
D 49 13C5_PFHxA	773207	650690			84.2 ✓	50 - 150 ✓
15 PFHxA			100.00	102.41	102	70 - 130
22 PFPeS			93.800	107.08	114	70 - 130
28 GenX			200.00	216.51	108	70 - 130
D 66 13C3_GenX	1294237	1173114			90.6	50 - 150
13 PFHpA			100.00	96.366	96.4	70 - 130
D 47 13C4_PFHpA	566534	518637			91.5	50 - 150
14 PFHxS			91.000	106.46	117	70 - 130
D 45 13C3_PFHxS	147201	130090			88.4	50 - 150
29 ADONA			94.200	94.885	101	70 - 130
D 64 13C2_6:2 FTS_2	89400	76666			85.8	50 - 150
2 6:2 FTS			94.800	98.425	104	70 - 130
20 PFOA			100.00	102.10	102	70 - 130
D 53 13C8_PFOA	568086	515820			90.8	50 - 150
12 PFHpS			95.200	105.35	111	70 - 130
18 PFOS			92.800	82.143	88.5	70 - 130
D 56 13C9_PFNA	703892	620421			88.1	50 - 150
D 54 13C8_PFOS	126288	118203			93.6	50 - 150
17 PFNA			100.00	110.80	111	70 - 130
30 9Cl-PF3ONS			93.200	90.956	97.6	70 - 130
D 55 13C8_PFOSA	270927	257370			95	50 - 150
19 PFOSA			100.00	104.63	105	70 - 130
3 8:2 FTS			95.800	81.383	85	70 - 130
16 PFNS			96.000	93.847	97.8	70 - 130
D 65 13C2_8:2 FTS_2	91484	69608			76.1	50 - 150
10 PFDA			100.00	100.03	100 ✓	70 - 130 ✓
D 51 13C6_PFDA	643340	579706			90.1	50 - 150
D 58 d3-MeFOSAA	689696	625960			90.8	50 - 150

Report Date: 09-Feb-2021 14:28:24 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\organics\LL\LCMSMS02.i\020521-nonDOD.b\020521005.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			100.00	129.25	129	70 - 130
9 PFDS			96.400	105.17	109	70 - 130
D 52 13C7_PFUdA	564025	554481			98.3	50 - 150
25 PFUdA			100.00	97.446	97.4	70 - 130
D 60 d5-EtFOSAA	568396	581940			102	50 - 150
5 N-EtFOSAA			100.00	104.41	104	70 - 130
D 61 d7-MeFOSE	84617	96466			114	50 - 150
32 MeFOSE			100.00	112.67	113	70 - 130
26 MeFOSA non target			100.00	139.79	140	70 - 130
D 57 d3-MeFOSA	44332	37017			83.5	50 - 150
31 11Cl-PF3OUDS			94.200	102.80	109	70 - 130
D 62 d9-EtFOSE	98326	99837			102	50 - 150
33 EtFOSE			100.00	102.01	102	70 - 130
11 PFDoA			100.00	103.03	103	70 - 130
D 38 13C2_PFDoA	560944	520987			92.9	50 - 150
D 59 d5-EtFOSA	45663	44014			96.4	50 - 150
4 10:2 FTS			96.400	83.428	86.5	70 - 130
27 EtFOSA			100.00	78.857	78.9	70 - 130
34 PFDOS			96.800	93.152	96.2	70 - 130
24 PFTrDA			100.00	122.27	122	70 - 130
23 PFTeDA			100.00	101.38	101	70 - 130
D 42 13C2_PFTeDA	782673	708324			90.5	50 - 150
35 PFHxDA			100.00	109.58	110	70 - 130
D 40 13C2_PFHxDA	785856	776051			98.8	50 - 150
36 PFODA			100.00	101.69	102	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\020521-nonDOD.b\020521006.d
Injection Date: 05-Feb-2021 12:04:35 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 96
Sample Info: ID CCV 200_SVLC-1274 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-3 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	609590	629586			103	50 - 150
8 PFBA			200.00	201.80	101	70 - 130
D 50 13C5_PFPeA	589875	620165			105	50 - 150
21 PFPeA			200.00	198.08	99	70 - 130
7 PFBS			176.80	183.72	104	70 - 130
D 44 13C3_PFBS	183373	183205			99.9	50 - 150
1 4:2 FTS			186.80	186.72	100	70 - 130
D 63 13C2_4:2 FTS_2	97964	98470			101	50 - 150
D 49 13C5_PFHxA	650690	688380			106	50 - 150
15 PFHxA			200.00	191.68	95.8	70 - 130
22 PFPeS			187.60	195.22	104	70 - 130
28 GenX			400.00	437.35	109	70 - 130
D 66 13C3_GenX	1173114	1209972			103	50 - 150
13 PFHpA			200.00	211.07	106	70 - 130
D 47 13C4_PFHpA	518637	513594			99	50 - 150
14 PFHxS			182.00	167.32	91.9	70 - 130
D 45 13C3_PFHxS	130090	138180			106	50 - 150
29 ADONA			188.40	181.18	96.2	70 - 130
D 64 13C2_6:2 FTS_2	76666	80927			106	50 - 150
2 6:2 FTS			189.60	205.05	108	70 - 130
20 PFOA			200.00	197.00	98.5	70 - 130
D 53 13C8_PFOA	515820	522956			101	50 - 150
12 PFHpS			190.40	182.79	96	70 - 130
18 PFOS			185.60	173.26	93.3	70 - 130
D 56 13C9_PFNA	620421	646643			104	50 - 150
D 54 13C8_PFOS	118203	114561			96.9	50 - 150
17 PFNA			200.00	202.24	101	70 - 130
30 9Cl-PF3ONS			186.40	175.32	94.1	70 - 130
D 55 13C8_PFOSA	257370	271235			105	50 - 150
19 PFOSA			200.00	185.49	92.7	70 - 130
3 8:2 FTS			191.60	169.45	88.4	70 - 130
16 PFNS			192.00	206.97	108	70 - 130
D 65 13C2_8:2 FTS_2	69608	76031			109	50 - 150
10 PFDA			200.00	197.87	98.9	70 - 130
D 51 13C6_PFDA	579706	605872			105	50 - 150
D 58 d3-MeFOSAA	625960	646794			103	50 - 150

Report Date: 09-Feb-2021 14:28:26 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\organics\LL\LCMSMS02.i\020521-nonDOD.b\020521006.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			200.00	215.65	108	70 - 130
9 PFDS			192.80	203.89	106	70 - 130
D 52 13C7_PFUdA	554481	555298			100	50 - 150
25 PFUdA			200.00	194.42	97.2	70 - 130
D 60 d5-EtFOSAA	581940	585851			101	50 - 150
5 N-EtFOSAA			200.00	213.02	107	70 - 130
D 61 d7-MeFOSE	96466	85435			88.6	50 - 150
32 MeFOSE			200.00	206.43	103	70 - 130
26 MeFOSA			200.00	171.48	85.7	70 - 130
D 57 d3-MeFOSA	37017	44923			121	50 - 150
31 11Cl-PF3OUDS			188.40	208.32	111	70 - 130
D 62 d9-EtFOSE	99837	97607			97.8	50 - 150
33 EtFOSE			200.00	235.56	118	70 - 130
11 PFDoA			200.00	194.33	97.2	70 - 130
D 38 13C2_PFDoA	520987	564223			108	50 - 150
D 59 d5-EtFOSA	44014	46266			105	50 - 150
4 10:2 FTS			192.80	213.39	111	70 - 130
27 EtFOSA			200.00	161.26	80.6	70 - 130
34 PFDOS			193.60	189.22	97.7	70 - 130
24 PFTrDA			200.00	236.38	118	70 - 130
23 PFTeDA			200.00	209.98	105	70 - 130
D 42 13C2_PFTeDA	708324	723182			102	50 - 150
35 PFHxDA			200.00	201.75	101	70 - 130
D 40 13C2_PFHxDA	776051	793722			102	50 - 150
36 PFODA			200.00	194.44	97.2	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\020521-nonDOD.b\020521025.d
Injection Date: 05-Feb-2021 15:26:30 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 18
Sample Info: ID CCV 1000_SVLC-1324 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-5 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	609590	659196			108	50 - 150
8 PFBA			1000.00	940.88	94.1	70 - 130
D 50 13C5_PFPeA	589875	651937			111	50 - 150
21 PFPeA			1000.00	939.09	93.9	70 - 130
7 PFBS			884.00	804.62	91	70 - 130
D 44 13C3_PFBS	183373	203362			111	50 - 150
1 4:2 FTS			934.00	870.65	93.2	70 - 130
D 63 13C2_4:2 FTS_2	97964	111571			114	50 - 150
D 49 13C5_PFHxA	650690	692529			106	50 - 150
15 PFHxA			1000.00	941.11	94.1	70 - 130
22 PFPeS			938.00	934.43	99.6	70 - 130
28 GenX			2000.00	1905.84	95.3	70 - 130
D 66 13C3_GenX	1173114	1256801			107	50 - 150
13 PFHpA			1000.00	948.12	94.8	70 - 130
D 47 13C4_PFHpA	518637	554394			107	50 - 150
14 PFHxS			910.00	812.40	89.3	70 - 130
D 45 13C3_PFHxS	130090	150925			116	50 - 150
29 ADONA			942.00	831.12	88.2	70 - 130
D 64 13C2_6:2 FTS_2	76666	87644			114	50 - 150
2 6:2 FTS			948.00	823.25	86.8	70 - 130
20 PFOA			1000.00	874.18	87.4	70 - 130
D 53 13C8_PFOA	515820	567791			110	50 - 150
12 PFHpS			952.00	856.00	89.9	70 - 130
18 PFOS			928.00	777.67	83.8	70 - 130
D 56 13C9_PFNA	620421	675994			109	50 - 150
D 54 13C8_PFOS	118203	129043			109	50 - 150
17 PFNA			1000.00	971.23	97.1	70 - 130
30 9Cl-PF3ONS			932.00	855.40	91.8	70 - 130
D 55 13C8_PFOSA	257370	277291			108	50 - 150
19 PFOSA			1000.00	963.93	96.4	70 - 130
3 8:2 FTS			958.00	956.93	99.9	70 - 130
16 PFNS			960.00	808.53	84.2	70 - 130
D 65 13C2_8:2 FTS_2	69608	80483			116	50 - 150
10 PFDA			1000.00	997.09	99.7	70 - 130
D 51 13C6_PFDA	579706	662471			114	50 - 150
D 58 d3-MeFOSAA	625960	718325			115	50 - 150

Report Date: 09-Feb-2021 14:28:32 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\organics\LL\LCMSMS02.i\020521-nonDOD.b\020521025.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			1000.00	912.31	91.2	70 - 130
9 PFDS			964.00	836.19	86.7	70 - 130
D 52 13C7_PFUdA	554481	585284			106	50 - 150
25 PFUdA			1000.00	867.10	86.7	70 - 130
D 60 d5-EtFOSAA	581940	665088			114	50 - 150
5 N-EtFOSAA			1000.00	887.60	88.8	70 - 130
D 61 d7-MeFOSE	96466	115424			120	50 - 150
32 MeFOSE			1000.00	864.66	86.5	70 - 130
26 MeFOSA			1000.00	859.67	86	70 - 130
D 57 d3-MeFOSA	37017	49133			133	50 - 150
31 11Cl-PF3OUDS			942.00	844.30	89.6	70 - 130
D 62 d9-EtFOSE	99837	120300			120	50 - 150
33 EtFOSE			1000.00	918.57	91.9	70 - 130
11 PFDoA			1000.00	952.89	95.3	70 - 130
D 38 13C2_PFDoA	520987	594033			114	50 - 150
D 59 d5-EtFOSA	44014	48707			111	50 - 150
4 10:2 FTS			964.00	928.14	96.3	70 - 130
27 EtFOSA			1000.00	918.47	91.8	70 - 130
34 PFDOS			968.00	884.88	91.4	70 - 130
24 PFTrDA			1000.00	1108.73	111	70 - 130
23 PFTeDA			1000.00	976.18	97.6	70 - 130
D 42 13C2_PFTeDA	708324	779910			110	50 - 150
35 PFHxDA			1000.00	935.49	93.5	70 - 130
D 40 13C2_PFHxDA	776051	848637			109	50 - 150
36 PFODA			1000.00	909.31	90.9	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821005.d
Injection Date: 08-Feb-2021 11:56:37 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 95
Sample Info: ID CCV 100_SVLC-1273 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-2 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	720687	629382			87.3	50 - 150
8 PFBA			100.00	105.74	106	70 - 130
D 50 13C5_PFPeA	669031	605332			90.5	50 - 150
21 PFPeA			100.00	101.31	101	70 - 130
7 PFBS			88.400	102.64	116	70 - 130
D 44 13C3_PFBS	208034	194467			93.5	50 - 150
1 4:2 FTS			93.400	109.75	118	70 - 130
D 63 13C2_4:2 FTS_2	122994	107257			87.2	50 - 150
D 49 13C5_PFHxA	773207	692380			89.5	50 - 150
15 PFHxA			100.00	99.439	99.4	70 - 130
22 PFPeS			93.800	97.048	103	70 - 130
28 GenX			200.00	208.26	104	70 - 130
D 66 13C3_GenX	1294237	1201937			92.9	50 - 150
13 PFHpA			100.00	104.13	104	70 - 130
D 47 13C4_PFHpA	566534	532291			94	50 - 150
14 PFHxS			91.000	94.746	104	70 - 130
D 45 13C3_PFHxS	147201	136023			92.4	50 - 150
29 ADONA			94.200	92.432	98.1	70 - 130
D 64 13C2_6:2 FTS_2	89400	85634			95.8	50 - 150
2 6:2 FTS			94.800	117.10	124	70 - 130
20 PFOA			100.00	112.58	113	70 - 130
D 53 13C8_PFOA	568086	522077			91.9	50 - 150
12 PFHpS			95.200	93.528	98.2	70 - 130
18 PFOS			92.800	95.323	103	70 - 130
D 56 13C9_PFNA	703892	680992			96.7	50 - 150
D 54 13C8_PFOS	126288	122286			96.8	50 - 150
17 PFNA			100.00	100.89	101	70 - 130
30 9Cl-PF3ONS			93.200	102.73	110	70 - 130
D 55 13C8_PFOSA	270927	279089			103	50 - 150
19 PFOSA			100.00	104.25	104	70 - 130
3 8:2 FTS			95.800	91.060	95.1	70 - 130
16 PFNS			96.000	88.604	92.3	70 - 130
D 65 13C2_8:2 FTS_2	91484	78772			86.1	50 - 150
10 PFDA			100.00	106.25	106	70 - 130
D 51 13C6_PFDA	643340	636238			98.9	50 - 150
D 58 d3-MeFOSAA	689696	680163			98.6	50 - 150

Report Date: 10-Feb-2021 17:19:43 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\Organics\ll\LCMSMS02.i\020821-nonDOD.b\020821005.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			100.00	112.95	113	70 - 130
9 PFDS			96.400	112.50	117	70 - 130
D 52 13C7_PFUdA	564025	559034			99.1	50 - 150
25 PFUdA			100.00	110.15	110	70 - 130
D 60 d5-EtFOSAA	568396	603434			106	50 - 150
5 N-EtFOSAA			100.00	96.515	96.5	70 - 130
D 61 d7-MeFOSE	84617	98439			116	50 - 150
32 MeFOSE			100.00	113.74	114	70 - 130
26 MeFOSA			100.00	97.364	97.4	70 - 130
D 57 d3-MeFOSA	44332	44882			101	50 - 150
31 11Cl-PF3OUDS			94.200	98.474	105	70 - 130
D 62 d9-EtFOSE	98326	111389			113	50 - 150
33 EtFOSE			100.00	107.82	108	70 - 130
11 PFDoA			100.00	106.48	106	70 - 130
D 38 13C2_PFDoA	560944	589944			105	50 - 150
D 59 d5-EtFOSA	45663	42428			92.9	50 - 150
4 10:2 FTS			96.400	116.91	121	70 - 130
27 EtFOSA			100.00	106.22	106	70 - 130
34 PFDOS			96.800	99.224	103	70 - 130
24 PFTrDA			100.00	111.07	111	70 - 130
23 PFTeDA			100.00	104.75	105	70 - 130
D 42 13C2_PFTeDA	782673	748079			95.6	50 - 150
35 PFHxDA			100.00	109.94	110	70 - 130
D 40 13C2_PFHxDA	785856	800223			102	50 - 150
36 PFODA			100.00	98.656	98.7	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821006.d
Injection Date: 08-Feb-2021 12:07:14 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 96
Sample Info: ID CCV 200_SVLC-1274 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-3 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	629382	605562			96.2	50 - 150
8 PFBA			200.00	211.28	106	70 - 130
D 50 13C5_PFPeA	605332	609735			101	50 - 150
21 PFPeA			200.00	202.48	101	70 - 130
7 PFBS			176.80	180.18	102	70 - 130
D 44 13C3_PFBS	194467	199562			103	50 - 150
1 4:2 FTS			186.80	175.52	94	70 - 130
D 63 13C2_4:2 FTS_2	107257	103224			96.2	50 - 150
D 49 13C5_PFHxA	692380	656668			94.8	50 - 150
15 PFHxA			200.00	211.18	106	70 - 130
22 PFPeS			187.60	191.79	102	70 - 130
28 GenX			400.00	424.43	106	70 - 130
D 66 13C3_GenX	1201937	1195486			99.5	50 - 150
13 PFHpA			200.00	207.13	104	70 - 130
D 47 13C4_PFHpA	532291	509777			95.8	50 - 150
14 PFHxS			182.00	200.51	110	70 - 130
D 45 13C3_PFHxS	136023	134329			98.8	50 - 150
29 ADONA			188.40	186.06	98.8	70 - 130
D 64 13C2_6:2 FTS_2	85634	81057			94.7	50 - 150
2 6:2 FTS			189.60	199.24	105	70 - 130
20 PFOA			200.00	213.33	107	70 - 130
D 53 13C8_PFOA	522077	530320			102	50 - 150
12 PFHpS			190.40	211.27	111	70 - 130
18 PFOS			185.60	186.67	101	70 - 130
D 56 13C9_PFNA	680992	643026			94.4	50 - 150
D 54 13C8_PFOS	122286	116691			95.4	50 - 150
17 PFNA			200.00	200.18	100	70 - 130
30 9Cl-PF3ONS			186.40	187.09	100	70 - 130
D 55 13C8_PFOSA	279089	268086			96.1	50 - 150
19 PFOSA			200.00	204.26	102	70 - 130
3 8:2 FTS			191.60	214.27	112	70 - 130
16 PFNS			192.00	211.15	110	70 - 130
D 65 13C2_8:2 FTS_2	78772	79545			101	50 - 150
10 PFDA			200.00	207.51	104	70 - 130
D 51 13C6_PFDA	636238	629968			99	50 - 150
D 58 d3-MeFOSAA	680163	642110			94.4	50 - 150

Report Date: 10-Feb-2021 17:19:44 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\Organics\ll\LCMSMS02.i\020821-nonDOD.b\020821006.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			200.00	209.66	105	70 - 130
9 PFDS			192.80	190.80	99	70 - 130
D 52 13C7_PFUdA	559034	565006			101	50 - 150
25 PFUdA			200.00	185.69	92.8	70 - 130
D 60 d5-EtFOSAA	603434	581533			96.4	50 - 150
5 N-EtFOSAA			200.00	220.96	110	70 - 130
D 61 d7-MeFOSE	98439	87744			89.1	50 - 150
32 MeFOSE			200.00	231.16	116	70 - 130
26 MeFOSA			200.00	183.39	91.7	70 - 130
D 57 d3-MeFOSA	44882	45090			100	50 - 150
31 11Cl-PF3OUDS			188.40	199.42	106	70 - 130
D 62 d9-EtFOSE	111389	114956			103	50 - 150
33 EtFOSE			200.00	213.60	107	70 - 130
11 PFDoA			200.00	192.39	96.2	70 - 130
D 38 13C2_PFDoA	589944	617396			105	50 - 150
D 59 d5-EtFOSA	42428	43530			103	50 - 150
4 10:2 FTS			192.80	247.59	128	70 - 130
27 EtFOSA			200.00	185.73	92.9	70 - 130
34 PFDOS			193.60	202.85	105	70 - 130
24 PFTrDA			200.00	206.67	103	70 - 130
23 PFTeDA			200.00	205.37	103	70 - 130
D 42 13C2_PFTeDA	748079	766523			102	50 - 150
35 PFHxDA			200.00	198.08	99	70 - 130
D 40 13C2_PFHxDA	800223	810023			101	50 - 150
36 PFODA			200.00	192.17	96.1	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821043.d
Injection Date: 08-Feb-2021 18:40:47 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 36
Sample Info: ID CCV 1000B_SVLC-1324 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-5 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	629382	638167			101	50 - 150
8 PFBA			1000.00	921.65	92.2	70 - 130
D 50 13C5_PFPeA	605332	621248			103	50 - 150
21 PFPeA			1000.00	954.72	95.5	70 - 130
7 PFBS			884.00	802.11	90.7	70 - 130
D 44 13C3_PFBS	194467	202691			104	50 - 150
1 4:2 FTS			934.00	926.72	99.2	70 - 130
D 63 13C2_4:2 FTS_2	107257	101474			94.6	50 - 150
D 49 13C5_PFHxA	692380	668977			96.6	50 - 150
15 PFHxA			1000.00	968.66	96.9	70 - 130
22 PFPeS			938.00	855.95	91.3	70 - 130
28 GenX			2000.00	1884.43	94.2	70 - 130
D 66 13C3_GenX	1201937	1248160			104	50 - 150
13 PFHpA			1000.00	997.16	99.7	70 - 130
D 47 13C4_PFHpA	532291	529257			99.4	50 - 150
14 PFHxS			910.00	890.54	97.9	70 - 130
D 45 13C3_PFHxS	136023	141260			104	50 - 150
29 ADONA			942.00	871.34	92.5	70 - 130
D 64 13C2_6:2 FTS_2	85634	81811			95.5	50 - 150
2 6:2 FTS			948.00	865.37	91.3	70 - 130
20 PFOA			1000.00	914.11	91.4	70 - 130
D 53 13C8_PFOA	522077	548624			105	50 - 150
12 PFHpS			952.00	969.60	102	70 - 130
18 PFOS			928.00	804.22	86.7	70 - 130
D 56 13C9_PFNA	680992	671327			98.6	50 - 150
D 54 13C8_PFOS	122286	123516			101	50 - 150
17 PFNA			1000.00	933.54	93.4	70 - 130
30 9Cl-PF3ONS			932.00	846.50	90.8	70 - 130
D 55 13C8_PFOSA	279089	271451			97.3	50 - 150
19 PFOSA			1000.00	984.84	98.5	70 - 130
3 8:2 FTS			958.00	940.31	98.2	70 - 130
16 PFNS			960.00	932.06	97.1	70 - 130
D 65 13C2_8:2 FTS_2	78772	82188			104	50 - 150
10 PFDA			1000.00	945.42	94.5	70 - 130
D 51 13C6_PFDA	636238	624601			98.2	50 - 150
D 58 d3-MeFOSAA	680163	740538			109	50 - 150

Report Date: 10-Feb-2021 17:20:05 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\ORGANICS\LL\LCMSMS02.i\020821-nonDOD.b\020821043.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			1000.00	874.92	87.5	70 - 130
9 PFDS			964.00	950.17	98.6	70 - 130
D 52 13C7_PFUdA	559034	591262			106	50 - 150
25 PFUdA			1000.00	926.60	92.7	70 - 130
D 60 d5-EtFOSAA	603434	591746			98.1	50 - 150
5 N-EtFOSAA			1000.00	939.62	94	70 - 130
D 61 d7-MeFOSE	98439	101868			103	50 - 150
32 MeFOSE			1000.00	949.87	95	70 - 130
26 MeFOSA			1000.00	952.40	95.2	70 - 130
D 57 d3-MeFOSA	44882	45432			101	50 - 150
31 11Cl-PF3OUDS			942.00	905.20	96.1	70 - 130
D 62 d9-EtFOSE	111389	116548			105	50 - 150
33 EtFOSE			1000.00	960.20	96	70 - 130
11 PFDoA			1000.00	896.95	89.7	70 - 130
D 38 13C2_PFDoA	589944	604051			102	50 - 150
D 59 d5-EtFOSA	42428	48130			113	50 - 150
4 10:2 FTS			964.00	951.68	98.7	70 - 130
27 EtFOSA			1000.00	932.88	93.3	70 - 130
34 PFDOS			968.00	907.42	93.7	70 - 130
24 PFTrDA			1000.00	1063.01	106	70 - 130
23 PFTeDA			1000.00	970.78	97.1	70 - 130
D 42 13C2_PFTeDA	748079	742278			99.2	50 - 150
35 PFHxDA			1000.00	947.29	94.7	70 - 130
D 40 13C2_PFHxDA	800223	847510			106	50 - 150
36 PFODA			1000.00	907.29	90.7	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\organics\LL\LCMSMS02.i\020821-nonDOD.b\020821056.d
Injection Date: 08-Feb-2021 20:59:27 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 49
Sample Info: ID CCV 1000C_SVLC-1324 Misc. Info:
Inst. ID: LCMSMS02 Operator: Stephen E. Somerville

Method Name: LCMSMS02_PFAS-ID Version: 2020-09-22 16:12:14
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-5 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	629382	698627			111	50 - 150
8 PFBA			1000.00	913.25	91.3	70 - 130
D 50 13C5_PFPeA	605332	704388			116	50 - 150
21 PFPeA			1000.00	911.03	91.1	70 - 130
7 PFBS			884.00	802.49	90.8	70 - 130
D 44 13C3_PFBS	194467	226798			117	50 - 150
1 4:2 FTS			934.00	787.89	84.4	70 - 130
D 63 13C2_4:2 FTS_2	107257	121296			113	50 - 150
D 49 13C5_PFHxA	692380	748114			108	50 - 150
15 PFHxA			1000.00	923.40	92.3	70 - 130
22 PFPeS			938.00	898.93	95.8	70 - 130
28 GenX			2000.00	1889.73	94.5	70 - 130
D 66 13C3_GenX	1201937	1357157			113	50 - 150
13 PFHpA			1000.00	989.57	99	70 - 130
D 47 13C4_PFHpA	532291	588463			111	50 - 150
14 PFHxS			910.00	839.24	92.2	70 - 130
D 45 13C3_PFHxS	136023	154546			114	50 - 150
29 ADONA			942.00	853.19	90.6	70 - 130
D 64 13C2_6:2 FTS_2	85634	94879			111	50 - 150
2 6:2 FTS			948.00	870.55	91.8	70 - 130
20 PFOA			1000.00	862.39	86.2	70 - 130
D 53 13C8_PFOA	522077	636867			122	50 - 150
12 PFHpS			952.00	965.95	101	70 - 130
18 PFOS			928.00	815.92	87.9	70 - 130
D 56 13C9_PFNA	680992	741942			109	50 - 150
D 54 13C8_PFOS	122286	142985			117	50 - 150
17 PFNA			1000.00	917.39	91.7	70 - 130
30 9Cl-PF3ONS			932.00	787.27	84.5	70 - 130
D 55 13C8_PFOSA	279089	306420			110	50 - 150
19 PFOSA			1000.00	928.41	92.8	70 - 130
3 8:2 FTS			958.00	847.59	88.5	70 - 130
16 PFNS			960.00	865.13	90.1	70 - 130
D 65 13C2_8:2 FTS_2	78772	94008			119	50 - 150
10 PFDA			1000.00	1025.86	103	70 - 130
D 51 13C6_PFDA	636238	668185			105	50 - 150
D 58 d3-MeFOSAA	680163	768922			113	50 - 150

Report Date: 10-Feb-2021 17:20:14 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\ORGANICS\LL\LCMSMS02.i\020821-nonDOD.b\020821056.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			1000.00	1007.89	101	70 - 130
9 PFDS			964.00	832.52	86.4	70 - 130
D 52 13C7_PFUdA	559034	664999			119	50 - 150
25 PFUdA			1000.00	874.78	87.5	70 - 130
D 60 d5-EtFOSAA	603434	683274			113	50 - 150
5 N-EtFOSAA			1000.00	957.75	95.8	70 - 130
D 61 d7-MeFOSE	98439	115699			118	50 - 150
32 MeFOSE			1000.00	887.20	88.7	70 - 130
26 MeFOSA			1000.00	846.23	84.6	70 - 130
D 57 d3-MeFOSA	44882	56406			126	50 - 150
31 11Cl-PF3OUDS			942.00	845.68	89.8	70 - 130
D 62 d9-EtFOSE	111389	127838			115	50 - 150
33 EtFOSE			1000.00	895.46	89.5	70 - 130
11 PFDoA			1000.00	921.60	92.2	70 - 130
D 38 13C2_PFDoA	589944	649121			110	50 - 150
D 59 d5-EtFOSA	42428	48914			115	50 - 150
4 10:2 FTS			964.00	931.76	96.7	70 - 130
27 EtFOSA			1000.00	979.75	98	70 - 130
34 PFDOS			968.00	865.35	89.4	70 - 130
24 PFTrDA			1000.00	1073.70	107	70 - 130
23 PFTeDA			1000.00	929.49	92.9	70 - 130
D 42 13C2_PFTeDA	748079	816326			109	50 - 150
35 PFHxDA			1000.00	960.03	96	70 - 130
D 40 13C2_PFHxDA	800223	938426			117	50 - 150
36 PFODA			1000.00	888.24	88.8	70 - 130

Report Date: 11-Feb-2021 10:00:29 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Initial Calibration Response Report

Batch: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b
Method: LCMSMS01_PFAS-ID.M Instrument: LCMSMS01
Cal Start Date: 07-Feb-2021 14:32:59 Cal End Date: 07-Feb-2021 16:08:04
Method Lock: Unlocked Lock Date:
No.Compounds: 66 Integrator: picker
Calib Method: PFAS-ID
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	020721021.d	ICAL 50_SVLC-1333	07-Feb-2021 14:32:59
2	020721022.d	ICAL 100_SVLC-1334	07-Feb-2021 14:43:30
3	020721023.d	ICAL 200_SVLC-1335	07-Feb-2021 14:54:02
4	020721024.d	ICAL 500_SVLC-1336	07-Feb-2021 15:04:36
5	020721025.d	ICAL 1000_SVLC-1337	07-Feb-2021 15:15:08
6	020721026.d	ICAL 2000_SVLC-1338	07-Feb-2021 15:25:43
7	020721027.d	ICAL 5000_SVLC-1339	07-Feb-2021 15:36:16
8	020721028.d	ICAL 10000_SVLC-1340	07-Feb-2021 15:46:51
9	020721029.d	ICAL 15000_SVLC-1341	07-Feb-2021 15:57:27
10	020721030.d	ICAL 20000_SVLC-1342	07-Feb-2021 16:08:04

Quantitation Standards (* - Istd) (D - Iso Dil Std)

* 37 13C2_PFDA	* 39 13C2_PFHxA	* 41 13C2_PFOA
* 43 13C3_PFBA	* 48 13C4_PFOS	D 38 13C2_PFDoA
D 40 13C2_PFHxDA	D 42 13C2_PFTeDA	D 44 13C3_PFBS
D 45 13C3_PFHxS	D 46 13C4_PFBA	D 47 13C4_PFHpA
D 49 13C5_PFHxA	D 50 13C5_PFPeA	D 51 13C6_PFDA
D 52 13C7_PFUdA	D 53 13C8_PFOA	D 54 13C8_PFOS
D 55 13C8_PFOSA	D 56 13C9_PFNA	D 57 d3-MeFOSA
D 58 d3-MeFOSAA	D 59 d5-EtFOSA	D 60 d5-EtFOSAA
D 61 d7-MeFOSE	D 62 d9-EtFOSE	D 63 13C2_4:2 FTS_2
D 64 13C2_6:2 FTS_2	D 65 13C2_8:2 FTS_2	D 66 13C3_GenX

Column: 1 Detector: LCMS-Q3

Compound	Level 1 Conc/Rsp	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp	Std #
D 46 13C4_PFBA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	901222	886400	968332	963607	940437	906240	902469	881761	820980	944971	
8 PFBA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#46
	77344	119455	211253	501023	935381	1854377	4362836	8540964	11888709	17121726	
D 50 13C5_PFPeA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	858447	912438	998952	1000355	980305	891737	923554	888535	850111	972233	
21 PFPeA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#50
	50991	97843	199890	538219	904402	1961187	4496670	8628879	11757673	17222944	
D 44 13C3_PFBS	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	299249	299580	330601	341516	306015	321904	307314	308894	288335	330875	
7 PFBS	44.200	88.400	176.80	442.00	884.00	1768.00	4420.00	8840.00	13260	17680	#44
	22950	36287	71897	183496	333068	690386	1591181	3265604	4574427	6971400	
1 4:2 FTS	46.700	93.400	186.80	467.00	934.00	1868.00	4670.00	9340.00	14010	18680	#63
	4052	6981	14202	38569	81999	149217	337052	679170	950347	1423506	
D 63 13C2_4:2 FTS_2	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	235443	253854	241712	271700	258946	256205	240065	244931	227361	259814	
D 49 13C5_PFHxA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	832211	780674	876458	928356	925301	792263	925552	820798	793381	871732	
15 PFHxA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#49
	47022	96418	170202	434567	844592	1716616	3733007	7311433	10127070	15673511	

Compound	Level 1 Conc/Rsp	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp	Std #
22 PFPeS	46.900	93.800	187.60	469.00	938.00	1876.00	4690.00	9380.00	14070	18760	#44
	13165	26749	54209	131260	266300	523596	1220275	2604422	3648320	5195862	
28 GenX	100.00	200.00	400.00	1000.00	2000.00	4000.00	10000	20000	30000	40000	#66
	13899	27687	54412	129352	263408	489288	1271317	2379166	3190790	4554993	
D 66 13C3_GenX	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	660623	714268	753305	731709	798996	767589	720275	735458	688373	719711	
D 47 13C4_PFHpA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	817200	810122	766797	835666	738956	794045	789434	779868	686519	768407	
13 PFHpA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#47
	38678	71314	151323	377509	766828	1483906	3418434	6936935	9091957	14226862	
14 PFHxS	45.500	91.000	182.00	455.00	910.00	1820.00	4550.00	9100.00	13650	18200	#45
	10587	24498	49344	122372	240876	484688	1115644	2283360	2986160	4465261	
D 45 13C3_PFHxS	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	222702	247416	228268	255577	238770	214820	242552	225054	199213	226589	
29 ADONA	47.100	94.200	188.40	471.00	942.00	1884.00	4710.00	9420.00	14130	18840	#45
	58297	118484	254466	619232	1147535	2575302	5563777	11477594	14997499	21618370	
D 64 13C2_6:2 FTS_2	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	193300	198669	203934	206074	208098	206526	193374	202674	185967	217726	
2 6:2 FTS	47.400	94.800	189.60	474.00	948.00	1896.00	4740.00	9480.00	14220	18960	#64
	2846	4667	10665	28257	58183	98719	244563	484308	666461	1029574	
D 53 13C8_PFOA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	729032	703579	770973	788680	784254	807653	750051	700848	627097	709251	
20 PFOA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#53
	36292	77746	165414	430024	759340	1587385	3470589	6674915	9696101	13595083	
12 PFHpS	47.600	95.200	190.40	476.00	952.00	1904.00	4760.00	9520.00	14280	19040	#45
	11482	25252	46706	123648	246554	459422	1171859	2278688	2953858	4416856	
D 54 13C8_PFOS	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	196976	227872	216215	230490	217839	218576	201274	176598	192041	212075	
18 PFOS	46.400	92.800	185.60	464.00	928.00	1856.00	4640.00	9280.00	13920	18560	#54
	12027	21443	50274	118570	218781	489552	1108489	2171461	3035261	4457960	
17 PFNA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#56
	30806	61743	126608	305968	612430	1157114	2673906	5683747	7683251	10936738	
D 56 13C9_PFNA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	686633	708861	696260	826362	714408	768130	711546	696705	615638	711579	
30 9Cl-PF3ONS	46.600	93.200	186.40	466.00	932.00	1864.00	4660.00	9320.00	13980	18640	#54
	27211	54715	102245	272763	513033	1131508	2352488	5165825	7024396	10920282	
D 55 13C8_PFOSA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	525230	434122	436500	460198	445030	377224	441039	368120	386742	404404	
3 8:2 FTS	47.900	95.800	191.60	479.00	958.00	1916.00	4790.00	9580.00	14370	19160	#65
	2529	4889	7651	21175	34783	86412	203374	374496	526211	748631	
16 PFNS	48.000	96.000	192.00	480.00	960.00	1920.00	4800.00	9600.00	14400	19200	#54
	10034	17819	41958	99145	171750	368068	887860	1774662	2545636	3635302	
19 PFOSA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#55
	19672	48094	91602	245875	492039	875507	1725613	3978818	5450711	8469644	
D 65 13C2_8:2 FTS_2	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	152739	157456	174468	153749	166309	158836	166003	149364	144445	163461	
D 51 13C6_PFDA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	566937	592709	657692	651893	558348	652423	551842	545885	541902	566298	
10 PFDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#51
	29724	64281	118830	292298	596398	1141131	2760833	5228069	6509228	10159243	
D 58 d3-MeFOSAA	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	671480	669833	848170	849486	774575	805878	770979	790490	768389	798485	
6 N-MeFOSAA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#58
	7143	11812	25433	55979	108347	206342	485920	1157260	1561007	2387349	
9 PFDS	48.200	96.400	192.80	482.00	964.00	1928.00	4820.00	9640.00	14460	19280	#54
	13258	19609	42289	109051	205399	416150	948656	1859262	2669223	3919041	

Compound	Level 1 Conc/Rsp	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp	Std #
D 60 d5-EtFOSAA	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	
	691078	740307	693116	762620	690005	693851	708938	703246	644729	678152	
D 52 13C7_PFUdA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	427586	573256	574250	629677	575243	560632	531297	524676	473627	526717	
5 N-EtFOSAA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#60
	9318	13516	24331	68317	128914	249982	685434	1207121	1552086	2478173	
25 PFUdA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#52
	22238	52975	111460	299255	517369	1044245	2330825	4378846	5941524	8669733	
D 61 d7-MeFOSE	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	163270	176440	168549	166023	169919	160550	159644	155363	149701	170461	
32 MeFOSE	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#61
	7813	14215	30470	84028	143733	317130	702982	1527466	2033792	3224151	
26 MeFOSA		100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#57
		8009	14815	30605	63088	126885	274512	574470	829474	1321165	
D 57 d3-MeFOSA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	58638	55783	53635	66308	59860	67203	59183	61581	50131	73393	
31 11Cl-PF3OUDS	47.100	94.200	188.40	471.00	942.00	1884.00	4710.00	9420.00	14130	18840	#54
	20814	49709	91854	254199	473793	926555	2253249	4613155	6329931	10137194	
11 PFDoA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#38
	26235	57423	125013	305431	575454	1169660	2707010	5560236	7431668	11282035	
D 38 13C2_PFDoA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	614041	608891	639847	694182	647718	622102	588140	622361	539674	610472	
4 10:2 FTS	48.200	96.400	192.80	482.00	964.00	1928.00	4820.00	9640.00	14460	19280	#65
	2293	4545	11714	25479	52827	102027	237783	468935	637465	900502	
D 62 d9-EtFOSE	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	139955	141002	168164	158286	157828	158142	153830	161651	148132	158918	
33 EtFOSE	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#62
	6404	14660	29153	63822	124930	256232	610856	1237595	1738597	2678025	
D 59 d5-EtFOSA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	59809	56267	65620	60318	60047	65526	58098	56740	55075	66341	
27 EtFOSA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#59
	2307	7370	13085	33737	59745	124430	302664	624889	839509	1330920	
34 PFDOS	48.400	96.800	193.60	484.00	968.00	1936.00	4840.00	9680.00	14520	19360	#54
	9488	16975	33031	91987	171480	357950	837794	1612773	2458637	3650462	
24 PFTrDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#38
	13823	22771	52182	127290	228525	496102	1130004	2283753	3148854	4985157	
D 42 13C2_PFTeDA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	597622	640095	684303	699909	680063	648501	653313	674191	626749	701764	
23 PFTeDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#42
	27667	51202	106894	266350	519338	1037132	2397039	5079664	6816439	9924989	
35 PFHxDA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#40
	36307	63258	126879	309466	601035	1161853	2851081	5459847	7438392	11219825	
D 40 13C2_PFHxDA	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
	346221	341286	367178	374301	369178	357983	348686	342607	317066	383500	
36 PFODA	50.000	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000	#40
	19384	36797	79775	203654	386352	779417	1810706	3710438	5334828	7949069	

Report Date: 11-Feb-2021 10:00:29 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Initial Calibration RF Report

Batch: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b

Method: LCMSMS01_PFAS-ID.M Instrument: LCMSMS01

Cal Start Date: 07-Feb-2021 14:32:59 Cal End Date: 07-Feb-2021 16:08:04

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	020721021.d	ICAL 50_SVLC-1333	07-Feb-2021 14:32:59
2	020721022.d	ICAL 100_SVLC-1334	07-Feb-2021 14:43:30
3	020721023.d	ICAL 200_SVLC-1335	07-Feb-2021 14:54:02
4	020721024.d	ICAL 500_SVLC-1336	07-Feb-2021 15:04:36
5	020721025.d	ICAL 1000_SVLC-1337	07-Feb-2021 15:15:08
6	020721026.d	ICAL 2000_SVLC-1338	07-Feb-2021 15:25:43
7	020721027.d	ICAL 5000_SVLC-1339	07-Feb-2021 15:36:16
8	020721028.d	ICAL 10000_SVLC-1340	07-Feb-2021 15:46:51
9	020721029.d	ICAL 15000_SVLC-1341	07-Feb-2021 15:57:27
10	020721030.d	ICAL 20000_SVLC-1342	07-Feb-2021 16:08:04

Curve Legend: Ex. Avg:H Wt:C2 Org:F Dep:A

Curve Type: Avg, Ln, Qd Response Type: H-Height, A-Area

Wt: Curve Weighting, C-1/Conc, C2-1/Conc^2, R-1/Rsp, R2-1/Rsp^2, N-None

Org: Origin, F-Force, I-Include, N-Neither

Dep: Dependent Variable, A-Amount, R-Response

%Rec = (Measured Amount / True Amount) * 100

Column: 1 Detector: LCMS-Q3

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
D 46 13C4_PFBA	901	886	968	964	940	906	902	882	821	945	Avg:A Wt:C2	912		RSD=4.9	
	98.9	97.2	106	106	103	99.4	99	96.7	90.1	104	Org:N Dep:A				
8 PFBA	1.716425	1.347642	1.090809	1.039891	0.994624	1.023116	0.966867	0.968626	0.965408	0.905939	Ln:A Wt:C2	0.954414	37.9067	R^2=0.998	
	100	101	94.4	101	100	105	101	101	101	94.7	Org:N Dep:A			RSE=3.4	
D 50 13C5_PFPeA	858	912	999	1000	980	892	924	889	850	972	Avg:A Wt:C2	928		RSD=6.1	
	92.5	98.4	108	108	106	96.1	99.6	95.8	91.6	105	Org:N Dep:A				
21 PFPeA	1.187982	1.072325	1.000499	1.076056	0.922572	1.099644	0.973775	0.971136	0.922050	0.885742	Avg:A Wt:C2	1.011178		RSD=9.4	
	117	106	98.9	106	91.2	109	96.3	96	91.2	87.6	Org:N Dep:A				
D 44 13C3_PFBS	299	300	331	342	306	322	307	309	288	331	Avg:A Wt:C2	313		RSD=5.4	
	95.5	95.6	105	109	97.6	103	98	98.6	92	106	Org:N Dep:A				
7 PFBS	1.735113	1.370206	1.230054	1.215607	1.231226	1.213063	1.171426	1.195919	1.196453	1.191719	Ln:A Wt:C2	1.175491	22.6217	R^2=0.998	
	104	94.8	93.8	99.1	103	102	99.2	102	102	101	Org:N Dep:A			RSE=3.6	

Report Date: 11-Feb-2021 10:00:29 AIM Revision: 2.0 05-Oct-2020 14:59:22
Method Path: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b\LCMSMS01_PFAS-ID.m

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
1 4:2 FTS	1.842624	1.472166	1.572695	1.519854	1.695206	1.558920	1.503215	1.484424	1.491757	1.466526	Avg:A Wt:C2	1.560739		RSD=7.7	
	118	94.3	101	97.4	109	99.9	96.3	95.1	95.6	94	Org:N Dep:A				
D 63 13C2_4:2 FTS_2	47.0886	50.7708	48.3424	54.3400	51.7892	51.2410	48.0130	48.9862	45.4722	51.9628	Avg:A Wt:C2	49.8006		RSD=5.4	
	94.6	102	97.1	109	104	103	96.4	98.4	91.3	104	Org:N Dep:A				
D 49 13C5_PFHxA	832	781	876	928	925	792	926	821	793	872	Avg:A Wt:C2	855		RSD=6.9	
	97.4	91.3	103	109	108	92.7	108	96	92.8	102	Org:N Dep:A				
15 PFHxA	1.130050	1.235061	0.970965	0.936208	0.912775	1.083362	0.806655	0.890771	0.850963	0.898987	Avg:A Wt:C2	0.971580		RSD=13.9	
	116	127	99.9	96.4	93.9	112	83	91.7	87.6	92.5	Org:N Dep:A				
22 PFPeS	0.938027	0.951901	0.874046	0.819499	0.927739	0.867036	0.846647	0.898874	0.899294	0.837068	Avg:A Wt:C2	0.886013		RSD=5.0	
	106	107	98.6	92.5	105	97.9	95.6	101	101	94.5	Org:N Dep:A				
28 GenX	1.051962	0.969069	0.902888	0.883903	0.824184	0.796794	0.882522	0.808736	0.772544	0.791115	Avg:A Wt:C2	0.868372		RSD=10.2	
	121	112	104	102	94.9	91.8	102	93.1	89	91.1	Org:N Dep:A				
D 66 13C3_GenX	132	143	151	146	160	154	144	147	138	144	Avg:A Wt:C2	146		RSD=5.4	
	90.6	98	103	100	110	105	98.8	101	94.4	98.7	Org:N Dep:A				
D 47 13C4_PFHpA	817	810	767	836	739	794	789	780	687	768	Avg:A Wt:C2	779		RSD=5.5	
	105	104	98.5	107	94.9	102	101	100	88.2	98.7	Org:N Dep:A				
13 PFHpA	0.946598	0.880287	0.986721	0.903493	1.037718	0.934397	0.866047	0.889501	0.882904	0.925737	Avg:A Wt:C2	0.925340		RSD=5.8	
	102	95.1	107	97.6	112	101	93.6	96.1	95.4	100	Org:N Dep:A				
14 PFHxS	1.044810	1.088082	1.187731	1.052323	1.108594	1.239699	1.010903	1.114927	1.098153	1.082771	Avg:A Wt:C2	1.102799		RSD=6.1	
	94.7	98.7	108	95.4	101	112	91.7	101	99.6	98.2	Org:N Dep:A				
D 45 13C3_PFHxS	223	247	228	256	239	215	243	225	199	227	Avg:A Wt:C2	230		RSD=7.2	
	96.8	108	99.2	111	104	93.4	105	97.8	86.6	98.5	Org:N Dep:A				
29 ADONA	5.557778	5.083713	5.917031	5.144116	5.101939	6.363156	4.870168	5.413937	5.327936	5.064111	Avg:A Wt:C2	5.384388		RSD=8.5	
	103	94.4	110	95.5	94.8	118	90.4	101	99	94.1	Org:N Dep:A				
D 64 13C2_6:2 FTS_2	38.6600	39.7338	40.7868	41.2148	41.6196	41.3052	38.6748	40.5348	37.1934	43.5452	Avg:A Wt:C2	40.3268		RSD=4.5	
	95.9	98.5	101	102	103	102	95.9	101	92.2	108	Org:N Dep:A				
2 6:2 FTS	1.553083	1.238994	1.379123	1.446420	1.474653	1.260543	1.334088	1.260333	1.260112	1.247036	Avg:A Wt:C2	1.345439		RSD=8.4	
	115	92.1	103	108	110	93.7	99.2	93.7	93.7	92.7	Org:N Dep:A				
D 53 13C8_PFOA	729	704	771	789	784	808	750	701	627	709	Avg:A Wt:C2	737		RSD=7.4	
	98.9	95.4	105	107	106	110	102	95.1	85.1	96.2	Org:N Dep:A				
20 PFOA	0.995622	1.105007	1.072761	1.090490	0.968232	0.982715	0.925427	0.952406	1.030792	0.958411	Avg:A Wt:C2	1.008186		RSD=6.2	
	98.8	110	106	108	96	97.5	91.8	94.5	102	95.1	Org:N Dep:A				
12 PFHpS	1.083145	1.072090	1.074634	1.016385	1.084664	1.123234	1.014994	1.063558	1.038350	1.023782	Avg:A Wt:C2	1.059484		RSD=3.3	
	102	101	101	95.9	102	106	95.8	100	98	96.6	Org:N Dep:A				
D 54 13C8_PFOS	197	228	216	230	218	219	201	177	192	212	Avg:A Wt:C2	209		RSD=8.1	
	94.2	109	103	110	104	105	96.3	84.5	91.9	101	Org:N Dep:A				
18 PFOS	1.315909	1.014020	1.252794	1.108676	1.082246	1.206753	1.186932	1.325007	1.135436	1.132580	Avg:A Wt:C2	1.176035		RSD=8.6	
	112	86.2	107	94.3	92	103	101	113	96.5	96.3	Org:N Dep:A				
17 PFNA	0.897306	0.871017	0.909201	0.740518	0.857255	0.753202	0.751576	0.815804	0.832010	0.768484	Avg:A Wt:C2	0.819637		RSD=7.7	
	109	106	111	90.3	105	91.9	91.7	99.5	102	93.8	Org:N Dep:A				
D 56 13C9_PFNA	687	709	696	826	714	768	712	697	616	712	Avg:A Wt:C2	714		RSD=7.6	
	96.2	99.3	97.6	116	100	108	99.7	97.6	86.3	99.7	Org:N Dep:A				

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
30 9Cl-PF3ONS	2.964458	2.576318	2.536941	2.539496	2.526933	2.777213	2.508152	3.138615	2.616422	2.762476	Avg:A Wt:C2	2.694702		RSD=8.0	
	110	95.6	94.1	94.2	93.8	103	93.1	116	97.1	103	Org:N Dep:A				
D 55 13C8_PFOSA	525	434	437	460	445	377	441	368	387	404	Avg:A Wt:C2	428		RSD=10.9	
	123	101	102	108	104	88.2	103	86	90.4	94.5	Org:N Dep:A				
3 8:2 FTS	1.728357	1.620561	1.144398	1.437625	1.091581	1.419710	1.278833	1.308596	1.267566	1.195166	Avg:A Wt:C2	1.349239		RSD=15.1	
	128	120	84.8	107	80.9	105	94.8	97	93.9	88.6	Org:N Dep:A				
16 PFNS	1.061255	0.814556	1.010713	0.896143	0.821277	0.877050	0.919000	1.046788	0.920534	0.892791	Avg:A Wt:C2	0.926011		RSD=9.4	
	115	88	109	96.8	88.7	94.7	99.2	113	99.4	96.4	Org:N Dep:A				
19 PFOSA	0.749081	1.107845	1.049278	1.068562	1.105631	1.160460	0.782522	1.080848	0.939595	1.047176	Avg:A Wt:C2	1.009100		RSD=13.9	
	74.2	110	104	106	110	115	77.5	107	93.1	104	Org:N Dep:A				
D 65 13C2_8:2 FTS_2	30.5478	31.4912	34.8936	30.7498	33.2618	31.7672	33.2006	29.8728	28.8890	32.6922	Avg:A Wt:C2	31.7366		RSD=5.7	
	96.3	99.2	110	96.9	105	100	105	94.1	91	103	Org:N Dep:A				
D 51 13C6_PFDA	567	593	658	652	558	652	552	546	542	566	Avg:A Wt:C2	589		RSD=8.0	
	96.3	101	112	111	94.9	111	93.8	92.7	92.1	96.2	Org:N Dep:A				
10 PFDA	1.048582	1.084529	0.903386	0.896767	1.068147	0.874533	1.000588	0.957724	0.800788	0.896987	Avg:A Wt:C2	0.953203		RSD=9.9	
	110	114	94.8	94.1	112	91.7	105	100	84	94.1	Org:N Dep:A				
D 58 d3-MeFOSAA	134	134	170	170	155	161	154	158	154	160	Avg:A Wt:C2	155		RSD=8.0	
	86.7	86.5	109	110	100	104	99.5	102	99.2	103	Org:N Dep:A				
6 N-MeFOSAA	1.063770	0.881712	0.749643	0.658975	0.699396	0.640116	0.630264	0.731989	0.677177	0.747462	Ln:A Wt:C2	0.672568	19.3959	R^2=0.995	
	100	102	97	92.2	101	93.7	93.1	109	100	111	Org:N Dep:A			RSE=6.7	
9 PFDS	1.396425	0.892663	1.014459	0.981591	0.978105	0.987507	0.977854	1.092139	0.961220	0.958481	Ln:A Wt:C	0.986207	9.372732	R^2=0.997	
	122	80.7	97.9	97.6	98.2	99.6	99	111	97.4	97.1	Org:N Dep:A			RSE=11.2	
D 60 d5-EtFOSAA	138	148	139	153	138	139	142	141	129	136	Avg:A Wt:C2	140		RSD=4.6	
	98.6	106	98.9	109	98.5	99	101	100	92	96.8	Org:N Dep:A				
D 52 13C7_PFUdA	428	573	574	630	575	561	531	525	474	527	Avg:A Wt:C2	540		RSD=10.6	
	79.2	106	106	117	107	104	98.4	97.2	87.8	97.6	Org:N Dep:A				
5 N-EtFOSAA	1.348328	0.912865	0.877595	0.895820	0.934153	0.900705	0.966846	0.858249	0.802449	0.913576	Ln:A Wt:C	0.874106	17.2040	R^2=0.995	
	115	84.8	90.6	98.5	105	102	110	98	91.7	104	Org:N Dep:A			RSE=9.8	
25 PFUdA	1.040165	0.924107	0.970483	0.950503	0.899392	0.931311	0.877409	0.834581	0.836315	0.822997	Avg:A Wt:C2	0.908726		RSD=7.6	
	114	102	107	105	99	102	96.6	91.8	92	90.6	Org:N Dep:A				
D 61 d7-MeFOSE	163	176	169	166	170	161	160	155	150	170	Avg:A Wt:C2	164		RSD=4.8	
	99.6	108	103	101	104	97.9	97.3	94.7	91.3	104	Org:N Dep:A				
32 MeFOSE	0.957065	0.805656	0.903891	1.012245	0.845891	0.987636	0.880687	0.983159	0.905713	0.945715	Avg:A Wt:C2	0.922766		RSD=7.2	
	104	87.3	98	110	91.7	107	95.4	107	98.2	102	Org:N Dep:A				
26 MeFOSA		1.435742	1.381094	0.923116	1.053926	0.944043	0.927672	0.932869	1.103075	0.900062	Ln:A Wt:C	0.964691	48.6017	R^2=0.991	
	Disabled	98.4	118	85.6	104	95.3	95.2	96.2	114	93	Org:N Dep:A			RSE=11	
D 57 d3-MeFOSA	58.6380	55.7830	53.6350	66.3080	59.8600	67.2030	59.1830	61.5810	50.1310	73.3930	Avg:A Wt:C2	60.5715		RSD=11.4	
	96.8	92.1	88.5	109	98.8	111	97.7	102	82.8	121	Org:N Dep:A				
31 11Cl-PF3OUDS	2.243475	2.315758	2.254921	2.341536	2.308884	2.250028	2.376844	2.773073	2.332721	2.537157	Avg:A Wt:C2	2.373440		RSD=6.9	
	94.5	97.6	95	98.7	97.3	94.8	100	117	98.3	107	Org:N Dep:A				
11 PFDoA	0.854503	0.943075	0.976898	0.879974	0.888433	0.940087	0.920533	0.893410	0.918044	0.924042	Avg:A Wt:C2	0.913900		RSD=3.9	
	93.5	103	107	96.3	97.2	103	101	97.8	100	101	Org:N Dep:A				

Compound	Level 1 / %Rec	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
D 38 13C2_PFDoA	614	609	640	694	648	622	588	622	540	610	Avg:A Wt:C2	619		RSD=6.5	
	99.2	98.4	103	112	105	101	95.1	101	87.2	98.7	Org:N Dep:A				
4 10:2 FTS	1.557317	1.497158	1.741215	1.719068	1.647529	1.665824	1.485894	1.628395	1.526004	1.428675	Avg:A Wt:C2	1.589708		RSD=6.7	
	98	94.2	110	108	104	105	93.5	102	96	89.9	Org:N Dep:A				
D 62 d9-EtFOSE	140	141	168	158	158	158	154	162	148	159	Avg:A Wt:C2	155		RSD=5.8	
	90.5	91.2	109	102	102	102	99.5	105	95.8	103	Org:N Dep:A				
33 EtFOSE	0.915151	1.039702	0.866803	0.806414	0.791558	0.810133	0.794196	0.765597	0.782454	0.842581	Avg:A Wt:C2	0.841459		RSD=9.8	
	109	124	103	95.8	94.1	96.3	94.4	91	93	100	Org:N Dep:A				
D 59 d5-EtFOSA	59.8090	56.2670	65.6200	60.3180	60.0470	65.5260	58.0980	56.7400	55.0750	66.3410	Avg:A Wt:C2	60.3841		RSD=6.8	
	99	93.2	109	99.9	99.4	109	96.2	94	91.2	110	Org:N Dep:A				
27 EtFOSA	0.771456	1.309826	0.997028	1.118638	0.994971	0.949470	1.041908	1.101320	1.016201	1.003090	Avg:A Wt:C2	1.030391		RSD=13.3	
	74.9	127	96.8	109	96.6	92.1	101	107	98.6	97.4	Org:N Dep:A				
34 PFDOS	0.995213	0.769562	0.789097	0.824573	0.813210	0.845891	0.860011	0.943435	0.881726	0.889105	Avg:A Wt:C2	0.861182		RSD=8.1	
	116	89.4	91.6	95.7	94.4	98.2	99.9	110	102	103	Org:N Dep:A				
24 PFTrDA	0.450231	0.373975	0.407769	0.366734	0.352816	0.398730	0.384264	0.366950	0.388982	0.408303	Avg:A Wt:C2	0.389875		RSD=7.2	
	115	95.9	105	94.1	90.5	102	98.6	94.1	99.8	105	Org:N Dep:A				
D 42 13C2_PFTeDA	598	640	684	700	680	649	653	674	627	702	Avg:A Wt:C2	661		RSD=5.1	
	90.5	96.9	104	106	103	98.2	98.9	102	94.9	106	Org:N Dep:A				
23 PFTeDA	0.925903	0.799913	0.781043	0.761099	0.763662	0.799638	0.733810	0.753446	0.725058	0.707146	Avg:A Wt:C2	0.775072		RSD=7.9	
	119	103	101	98.2	98.5	103	94.7	97.2	93.5	91.2	Org:N Dep:A				
35 PFHxDA	2.097331	1.853519	1.727759	1.653568	1.628036	1.622777	1.635329	1.593618	1.564005	1.462819	Avg:A Wt:C2	1.683876		RSD=10.5	
	125	110	103	98.2	96.7	96.4	97.1	94.6	92.9	86.9	Org:N Dep:A				
D 40 13C2_PFHxDA	346	341	367	374	369	358	349	343	317	384	Avg:A Wt:C2	355		RSD=5.5	
	97.6	96.2	103	105	104	101	98.3	96.6	89.4	108	Org:N Dep:A				
36 PFODA	1.119747	1.078187	1.086326	1.088183	1.046520	1.088623	1.038588	1.083001	1.121707	1.036384	Avg:A Wt:C2	1.078727		RSD=2.8	
	104	99.9	101	101	97	101	96.3	100	104	96.1	Org:N Dep:A				

Report Date: 11-Feb-2021 10:00:30 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Initial Calibration RT Report

Batch: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b

Method: LCMSMS01_PFAS-ID.M Instrument: LCMSMS01

Cal Start Date: 07-Feb-2021 14:32:59 Cal End Date: 07-Feb-2021 16:08:04

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	020721021.d	ICAL 50_SVLC-1333	07-Feb-2021 14:32:59
2	020721022.d	ICAL 100_SVLC-1334	07-Feb-2021 14:43:30
3	020721023.d	ICAL 200_SVLC-1335	07-Feb-2021 14:54:02
4	020721024.d	ICAL 500_SVLC-1336	07-Feb-2021 15:04:36
5	020721025.d	ICAL 1000_SVLC-1337	07-Feb-2021 15:15:08
6	020721026.d	ICAL 2000_SVLC-1338	07-Feb-2021 15:25:43
7	020721027.d	ICAL 5000_SVLC-1339	07-Feb-2021 15:36:16
8	020721028.d	ICAL 10000_SVLC-1340	07-Feb-2021 15:46:51
9	020721029.d	ICAL 15000_SVLC-1341	07-Feb-2021 15:57:27
10	020721030.d	ICAL 20000_SVLC-1342	07-Feb-2021 16:08:04

Column: 1 Detector: LCMS-Q3

Compound	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10	Avg. RT	%Rsd RT
D 46 13C4_PFBA	1.720	1.719	1.718	1.719	1.718	1.719	1.719	1.719	1.719	1.719	1.719	0.025
8 PFBA	1.720	1.719	1.718	1.719	1.718	1.719	1.719	1.719	1.719	1.719	1.719	0.025
D 50 13C5_PFPeA	2.099	2.098	2.097	2.098	2.095	2.099	2.098	2.098	2.098	2.098	2.097	0.054
21 PFPeA	2.099	2.098	2.097	2.098	2.095	2.099	2.098	2.098	2.098	2.098	2.097	0.054
D 44 13C3_PFBS	2.161	2.161	2.160	2.161	2.158	2.161	2.161	2.150	2.160	2.161	2.159	0.153
7 PFBS	2.161	2.161	2.160	2.161	2.158	2.161	2.161	2.160	2.160	2.161	2.160	0.053
1 4:2 FTS	2.424	2.423	2.431	2.432	2.424	2.433	2.432	2.432	2.432	2.432	2.429	0.157
D 63 13C2_4:2 FTS_2	2.433	2.432	2.431	2.432	2.424	2.433	2.432	2.432	2.432	2.432	2.431	0.097
D 49 13C5_PFHxA	2.467	2.467	2.474	2.467	2.468	2.467	2.467	2.467	2.475	2.467	2.468	0.140
15 PFHxA	2.467	2.475	2.474	2.467	2.468	2.467	2.475	2.467	2.475	2.467	2.470	0.174
22 PFPeS	2.502	2.501	2.500	2.501	2.502	2.502	2.502	2.501	2.510	2.501	2.502	0.101
28 GenX	2.587	2.586	2.586	2.586	2.587	2.587	2.586	2.586	2.586	2.594	2.587	0.085
D 66 13C3_GenX	2.587	2.586	2.586	2.586	2.587	2.587	2.586	2.586	2.594	2.586	2.587	0.085
D 47 13C4_PFHpA	2.856	2.854	2.854	2.847	2.848	2.856	2.847	2.845	2.854	2.854	2.851	0.153
13 PFHpA	2.856	2.854	2.854	2.847	2.848	2.847	2.855	2.845	2.854	2.854	2.851	0.149
14 PFHxS	2.865	2.872	2.872	2.864	2.866	2.865	2.873	2.872	2.872	2.872	2.869	0.126
D 45 13C3_PFHxS	2.865	2.872	2.872	2.873	2.866	2.865	2.864	2.863	2.881	2.872	2.869	0.190
29 ADONA	2.899	2.898	2.898	2.891	2.900	2.899	2.891	2.890	2.898	2.898	2.896	0.148
D 64 13C2_6:2 FTS_2	3.220	3.226	3.219	3.219	3.221	3.220	3.219	3.219	3.226	3.219	3.220	0.078
2 6:2 FTS	3.220	3.219	3.219	3.219	3.221	3.220	3.219	3.219	3.226	3.219	3.220	0.059
D 53 13C8_PFOA	3.245	3.251	3.245	3.245	3.247	3.245	3.245	3.245	3.252	3.251	3.247	0.098
20 PFOA	3.245	3.245	3.245	3.245	3.247	3.245	3.251	3.245	3.258	3.251	3.247	0.144
12 PFHpS	3.252	3.258	3.251	3.251	3.253	3.258	3.251	3.258	3.265	3.258	3.255	0.134
D 54 13C8_PFOS	3.620	3.624	3.624	3.624	3.622	3.627	3.624	3.617	3.634	3.624	3.624	0.122
18 PFOS	3.627	3.632	3.624	3.624	3.629	3.627	3.624	3.624	3.634	3.624	3.627	0.092
17 PFNA	3.627	3.624	3.632	3.632	3.629	3.627	3.624	3.632	3.634	3.632	3.629	0.091
D 56 13C9_PFNA	3.627	3.624	3.624	3.632	3.629	3.627	3.624	3.624	3.634	3.632	3.627	0.096
30 9Cl-PF3ONS	3.834	3.832	3.832	3.832	3.831	3.834	3.832	3.832	3.834	3.832	3.832	0.034
D 55 13C8_PFOSA	3.947	3.952	3.952	3.952	3.944	3.947	3.952	3.952	3.955	3.953	3.951	0.085
3 8:2 FTS	3.955	3.952	3.961	3.961	3.961	3.964	3.961	3.961	3.972	3.961	3.961	0.131
16 PFNS	3.964	3.961	3.961	3.952	3.961	3.964	3.961	3.961	3.964	3.961	3.961	0.081
19 PFOSA	3.955	3.952	3.952	3.952	3.961	3.955	3.944	3.952	3.955	3.953	3.953	0.102
D 65 13C2_8:2 FTS_2	3.955	3.961	3.961	3.952	3.961	3.955	3.961	3.961	3.964	3.961	3.959	0.091

Compound	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10	Avg. RT	%Rsd RT
D 51 13C6_PFDA	3.964	3.970	3.970	3.970	3.969	3.964	3.970	3.970	3.972	3.970	3.968	0.072
10 PFDA	3.973	3.970	3.970	3.970	3.969	3.973	3.970	3.970	3.972	3.970	3.970	0.037
D 58 d3-MeFOSAA	4.118	4.114	4.114	4.114	4.122	4.117	4.122	4.122	4.125	4.122	4.119	0.109
6 N-MeFOSAA	4.126	4.130	4.122	4.122	4.122	4.126	4.122	4.122	4.133	4.122	4.124	0.098
9 PFDS	4.253	4.258	4.249	4.248	4.258	4.253	4.249	4.258	4.262	4.258	4.254	0.115
D 60 d5-EtFOSAA	4.271	4.267	4.267	4.267	4.267	4.271	4.267	4.277	4.280	4.277	4.271	0.113
D 52 13C7_PFUdA	4.262	4.267	4.267	4.267	4.276	4.271	4.267	4.277	4.271	4.268	4.269	0.103
5 N-EtFOSAA	4.281	4.277	4.277	4.277	4.276	4.281	4.286	4.277	4.280	4.277	4.278	0.072
25 PFUdA	4.271	4.267	4.267	4.267	4.276	4.271	4.267	4.277	4.280	4.277	4.272	0.114
D 61 d7-MeFOSE	4.381	4.377	4.377	4.377	4.377	4.381	4.377	4.386	4.381	4.377	4.378	0.070
32 MeFOSE	4.390	4.394	4.394	4.386	4.394	4.390	4.386	4.395	4.389	4.386	4.390	0.090
26 MeFOSA		4.394	4.403	4.403	4.403	4.407	4.403	4.403	4.407	4.403	4.402	0.079
D 57 d3-MeFOSA	4.399	4.403	4.394	4.395	4.403	4.398	4.394	4.403	4.398	4.395	4.398	0.083
31 11Cl-PF3OUDS	4.407	4.411	4.411	4.411	4.410	4.415	4.411	4.411	4.414	4.411	4.410	0.051
11 PFDoA	4.530	4.534	4.534	4.534	4.534	4.538	4.534	4.534	4.538	4.534	4.534	0.050
D 38 13C2_PFDoA	4.530	4.534	4.534	4.534	4.534	4.538	4.534	4.534	4.538	4.534	4.534	0.050
4 10:2 FTS	4.538	4.534	4.551	4.543	4.542	4.547	4.543	4.551	4.546	4.551	4.544	0.119
D 62 d9-EtFOSE	4.547	4.543	4.543	4.543	4.542	4.547	4.543	4.543	4.546	4.543	4.543	0.043
33 EtFOSE	4.547	4.551	4.559	4.551	4.559	4.555	4.551	4.559	4.555	4.559	4.554	0.104
D 59 d5-EtFOSA	4.563	4.567	4.567	4.559	4.567	4.563	4.559	4.567	4.571	4.567	4.565	0.082
27 EtFOSA	4.563	4.575	4.575	4.567	4.575	4.571	4.567	4.575	4.571	4.567	4.570	0.094
34 PFDOS	4.746	4.743	4.743	4.743	4.743	4.746	4.743	4.749	4.746	4.743	4.744	0.049
24 PFTrDA	4.771	4.767	4.767	4.767	4.773	4.771	4.767	4.773	4.771	4.773	4.770	0.052
D 42 13C2_PFTeDA	4.983	4.980	4.980	4.980	4.980	4.983	4.980	4.987	4.990	4.987	4.983	0.073
23 PFTeDA	4.983	4.980	4.980	4.980	4.987	4.983	4.987	4.987	4.990	4.987	4.984	0.070
35 PFHxDA	5.353	5.356	5.356	5.356	5.356	5.361	5.356	5.356	5.361	5.356	5.357	0.050
D 40 13C2_PFHxDA	5.353	5.356	5.348	5.348	5.356	5.353	5.356	5.356	5.361	5.356	5.354	0.082
36 PFODA	5.691	5.694	5.693	5.686	5.694	5.691	5.694	5.693	5.698	5.695	5.692	0.058

Report Date: 11-Feb-2021 10:00:30 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Initial Calibration Signal Ratios Report

Batch: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b

Method: LCMSMS01_PFAS-ID.M Instrument: LCMSMS01

Cal Start Date: 07-Feb-2021 14:32:59 Cal End Date: 07-Feb-2021 16:08:04

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	020721021.d	ICAL 50_SVLC-1333	07-Feb-2021 14:32:59
2	020721022.d	ICAL 100_SVLC-1334	07-Feb-2021 14:43:30
3	020721023.d	ICAL 200_SVLC-1335	07-Feb-2021 14:54:02
4	020721024.d	ICAL 500_SVLC-1336	07-Feb-2021 15:04:36
5	020721025.d	ICAL 1000_SVLC-1337	07-Feb-2021 15:15:08
6	020721026.d	ICAL 2000_SVLC-1338	07-Feb-2021 15:25:43
7	020721027.d	ICAL 5000_SVLC-1339	07-Feb-2021 15:36:16
8	020721028.d	ICAL 10000_SVLC-1340	07-Feb-2021 15:46:51
9	020721029.d	ICAL 15000_SVLC-1341	07-Feb-2021 15:57:27
10	020721030.d	ICAL 20000_SVLC-1342	07-Feb-2021 16:08:04

Column: 1 Detector: LCMS-Q3

Compound	Ratio Level 1	Ratio Level 2	Ratio Level 3	Ratio Level 4	Ratio Level 5	Ratio Level 6	Ratio Level 7	Ratio Level 8	Ratio Level 9	Ratio Level 10	Average Ratio	L-5 +/-3 SD Ratio Limits	StdD Limit	50% Limit
7 PFBS	3.028	3.005	3.373	3.778	3.467	3.750	3.827	3.672	3.704	3.607	3.521	2.467-4.466	0.33308	1.733
1 4:2 FTS	1.365	1.262	1.277	1.655	1.718	1.513	1.511	1.572	1.589	1.514	1.497	1.243-2.192	0.15805	0.859
15 PFHxA	18.246	16.484	15.299	16.952	17.175	15.593	15.031	16.445	15.697	15.058	16.198	13.540-20.809	1.21159	8.587
22 PFPeS	3.432	3.187	3.465	3.076	3.263	2.973	3.143	3.227	3.478	3.165	3.240	2.766-3.759	0.16551	1.631
28 GenX	0.952	0.905	0.816	0.881	0.852	0.782	1.021	0.812	0.852	0.852	0.872	0.628-1.075	0.07437	0.426
13 PFHpA	3.358	2.960	2.995	2.805	3.049	3.173	3.023	3.228	3.023	3.064	3.067	2.607-3.490	0.14712	1.524
14 PFHxS	2.372	3.670	2.915	3.172	3.667	3.215	3.413	3.613	3.227	3.353	3.261	2.538-4.795	0.37615	1.833
29 ADONA	2.259	2.441	2.509	2.313	2.508	2.843	2.680	2.399	2.299	2.199	2.445	1.836-3.179	0.22370	1.254
2 6:2 FTS	1.199	1.072	1.005	1.138	1.398	1.093	1.269	1.163	1.235	1.182	1.175	1.077-1.718	0.10687	0.699
20 PFOA	2.042	2.457	2.566	2.560	2.383	2.477	2.372	2.402	2.361	2.432	2.405	1.939-2.826	0.14799	1.191
12 PFHpS	3.109	4.252	3.365	3.598	3.561	3.400	3.756	3.803	3.489	3.638	3.597	2.634-4.487	0.30885	1.780
18 PFOS	4.623	3.495	4.114	3.814	4.006	4.674	4.243	4.189	4.136	3.962	4.125	2.920-5.091	0.36169	2.003
17 PFNA	4.222	4.113	4.104	3.913	3.995	4.082	3.884	4.133	4.158	3.703	4.030	3.517-4.472	0.15925	1.997
3 8:2 FTS	1.820	1.306	1.307	1.122	0.977	1.086	1.156	1.183	1.211	1.231	1.239	0.308-1.645	0.22272	0.488
16 PFNS	2.798	2.919	3.469	3.457	2.713	3.101	3.433	3.289	3.263	3.529	3.197	1.794-3.631	0.30619	1.356
10 PFDA	9.720	11.919	8.988	8.960	9.021	8.511	9.948	8.917	7.590	8.395	9.196	5.632-12.409	1.12946	4.510
6 N-MeFOSAA	1.514	1.466	1.258	1.157	1.305	1.226	1.248	1.509	1.402	1.301	1.338	0.790-1.819	0.17134	0.652
9 PFDS	4.140	3.292	3.349	3.322	3.647	3.226	3.408	2.975	3.288	3.449	3.409	2.728-4.565	0.30627	1.823
5 N-EtFOSAA	1.959	2.136	1.634	1.707	1.631	1.637	1.923	1.784	1.596	1.669	1.767	1.084-2.177	0.18201	0.815
25 PFUdA	5.608	6.898	12.027	10.019	8.378	8.528	8.189	7.710	7.838	7.683	8.287	3.424-13.331	1.65123	4.189
26 MeFOSA		1.614	0.931	0.991	1.240	1.210	1.124	1.148	1.188	1.356	1.200	0.637-1.842	0.20083	0.620
11 PFDoA	5.009	5.486	6.127	5.702	6.026	6.168	6.480	6.262	6.300	6.035	5.959	4.525-7.526	0.50017	3.013
4 10:2 FTS	1.693	1.211	1.640	1.778	1.696	1.939	1.846	1.764	1.831	1.724	1.712	1.135-2.256	0.18696	0.848
27 EtFOSA	0.581	1.344	1.213	1.168	1.114	1.079	1.114	1.148	1.148	1.142	1.105	0.506-1.721	0.20238	0.557
34 PFDOS	3.499	3.830	3.533	3.642	3.155	3.327	3.455	3.121	3.438	3.404	3.440	2.519-3.790	0.21167	1.577
24 PFTrDA	3.005	2.852	2.909	2.762	2.644	2.951	2.709	2.855	2.809	2.992	2.848	2.292-2.995	0.11720	1.322
23 PFTeDA	8.229	8.349	7.936	7.775	7.710	7.835	7.413	7.732	7.477	7.232	7.768	6.577-8.842	0.37750	3.855
35 PFHxDA	12.943	12.854	12.443	12.706	12.078	12.082	13.172	12.549	12.315	11.780	12.492	10.763-13.392	0.43811	6.039
36 PFODA	10.321	11.488	11.194	11.183	10.675	10.883	10.763	11.129	11.190	11.130	10.995	9.582-11.767	0.36432	5.337

Pace Environmental Services, LLC
Initial Calibration Ion Suppression Report

Batch: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b
Method: LCMSMS01_PFAS-ID.M Instrument: LCMSMS01
Cal Start Date: 07-Feb-2021 14:32:59 Cal End Date: 07-Feb-2021 16:08:04
Method Lock: Unlocked Lock Date:
No.Compounds: 66 Integrator: picker
Calib Method: PFAS-ID
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes

Level	Cal File	Cal Sample ID	Cal Date
1	020721021.d	ICAL 50_SVLC-1333	07-Feb-2021 14:32:59
2	020721022.d	ICAL 100_SVLC-1334	07-Feb-2021 14:43:30
3	020721023.d	ICAL 200_SVLC-1335	07-Feb-2021 14:54:02
4	020721024.d	ICAL 500_SVLC-1336	07-Feb-2021 15:04:36
5	020721025.d	ICAL 1000_SVLC-1337	07-Feb-2021 15:15:08
6	020721026.d	ICAL 2000_SVLC-1338	07-Feb-2021 15:25:43
7	020721027.d	ICAL 5000_SVLC-1339	07-Feb-2021 15:36:16
8	020721028.d	ICAL 10000_SVLC-1340	07-Feb-2021 15:46:51
9	020721029.d	ICAL 15000_SVLC-1341	07-Feb-2021 15:57:27
10	020721030.d	ICAL 20000_SVLC-1342	07-Feb-2021 16:08:04

Column: 1 Detector: LCMS-Q3

Compound	Response Level 1	Response Level 2	Response Level 3	Response Level 4	Response Level 5	Response Level 6	Response Level 7	Response Level 8	Response Level 9	Response Level 10	RPD
* 37 13C2_PFDA	618359	562439	587666	650609	608256	558319	591928	559560	546670	577103	1.72
* 39 13C2_PFHxA	695820	732591	821730	861966	836294	726113	753233	718857	676987	790551	3.18
* 41 13C2_PFOA	752472	805148	773358	829061	794645	801033	748016	720801	670983	729223	0.78
* 43 13C3_PFBA	861081	821418	842918	912455	830556	863456	836036	812446	755323	856318	0.13
* 48 13C4_PFOS	217314	224894	225272	229533	217059	218308	215527	211143	196556	223206	0.66

13C2_PFDA ((|577103 - 618359| / (577103 + 618359)) / 2) * 100 = 1.73
13C2_PFHxA ((|790551 - 695820| / (790551 + 695820)) / 2) * 100 = 3.19
13C2_PFOA ((|729223 - 752472| / (729223 + 752472)) / 2) * 100 = 0.78
13C3_PFBA ((|856318 - 861081| / (856318 + 861081)) / 2) * 100 = 0.14
13C4_PFOS ((|223206 - 217314| / (223206 + 217314)) / 2) * 100 = 0.67

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b\020721033.d
Injection Date: 07-Feb-2021 16:39:49 Injection Vol: 10.0 uL
Sample Type: CheckStd Auto Sampler: 12
Sample Info: ISOMER CHECK_SVLC-1266 Misc. Info:
Inst. ID: LCMSMS01 Operator: Matthew M. Miller

Method Name: LCMSMS01_PFAS-ID Version: 2020-09-23 10:00:21
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Surrogates Conc. Level: Smp Vol. Added: 1.00 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	T RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	Cal Conc ng/L	OnCol Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.719	1.718	1	985446	19	>100:1			100000	1080.96	105	
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		2.099	2.095	1	985384	16	>100:1			100000	1062.22	101	
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.161	2.158	1	349762	14	>100:1			100000	1115.92	114	
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.433	2.424	1	255426	17	>100:1			500000	5128.97	98.6	
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.476	2.468	1	819022	17	>100:1			100000	958.29	88.5	
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.595	2.587	1	771095	17	>100:1			500000	5288.49	96.5	
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.856	2.848	1	859152	18	>100:1			100000	1103.31	116	
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.874	2.866	1	247935	18	>100:1			100000	1077.53	104	
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.226	3.221	1	199392	20	>100:1			500000	4944.40	95.8	
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.246	3.247	0	730884	21	>100:1			100000	991.51	93.2	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.252	3.247	1/1	7923014	34	>100:1	Target = 2.38	0.14	0	1075229		
413 > 169	53	3.246	3.247		3460356	35	>100:1	2.28 (1.19-3.57)	0.22				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.627	3.622	1	212284	20	>100:1			100000	1015.73	97.4	
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.634	3.629	1	692973	18	>100:1			100000	971.08	97	
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		3.955	3.944	1	485027	17	>100:1			100000	1133.61	109	
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		3.955	3.961	0	220564	17	>100:1			500000	6949.83	133	
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		3.964	3.969	0	688611	19	>100:1			100000	1169.93	123	
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.118	4.122	0	842437	17	>100:1			500000	5436.65	109	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													
570 > 419	58	4.126	4.122	1/1	1457762	35	>100:1	Target = 1.30	0.12	0	1286392		M
570 > 483	58	4.126	4.122		1023460	31	>100:1	1.42 (0.65-1.95)	0.27				
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.272	4.267	1	701485	18	>100:1			500000	5006.29	102	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													
584 > 419	60	4.281	4.276	1/0	1765750	31	>100:1	Target = 1.63	0.13	0	1439828		
584 > 526	60	4.281	4.276		976515	32	>100:1	1.80 (0.81-2.44)	0.23				

Report Date: 11-Feb-2021 10:00:28 AIM Revision: 2.0 12-Dec-2020 09:34:50

Pace Environmental Services, LLC

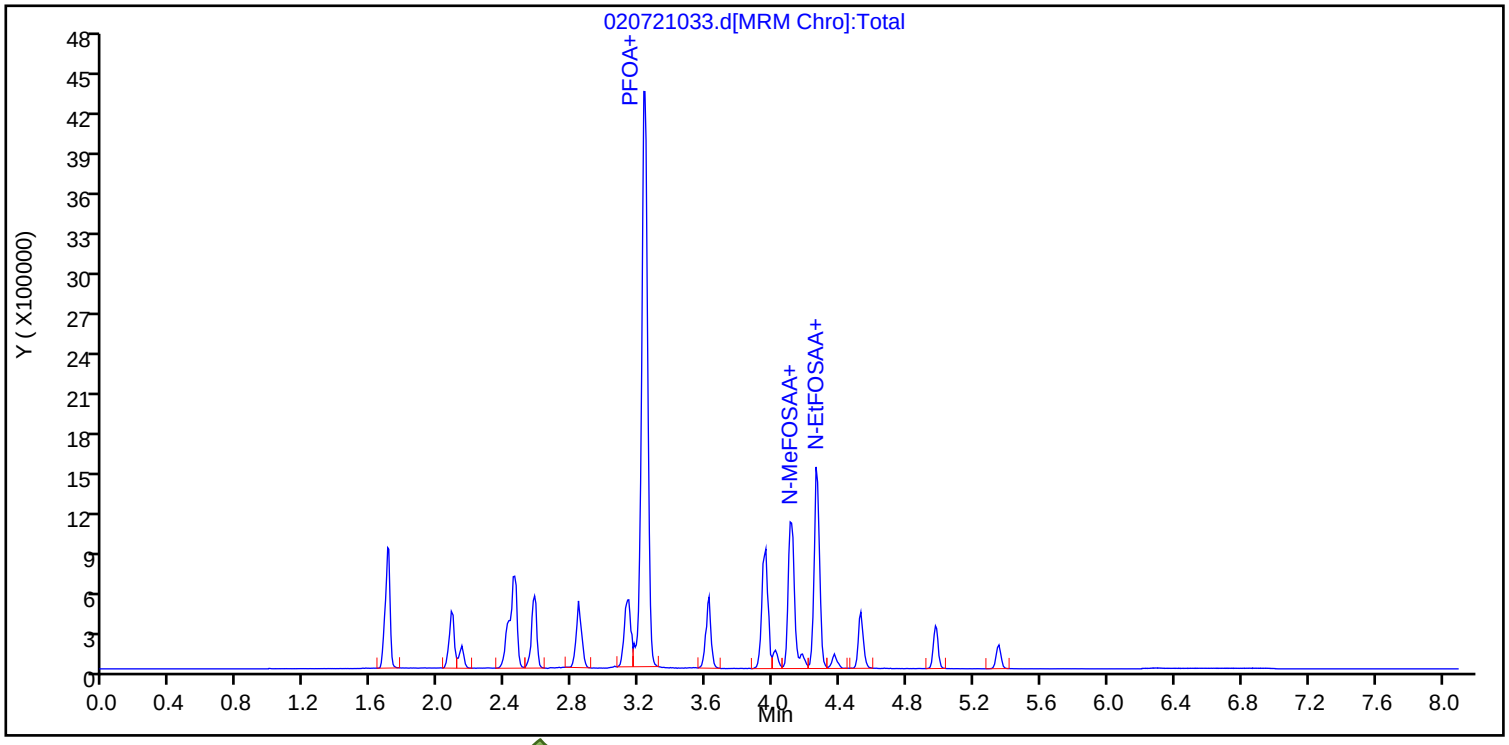
Data File: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b\020721033.d

Injection Date: 07-Feb-2021 16:39:49 Inst. ID: LCMSMS01

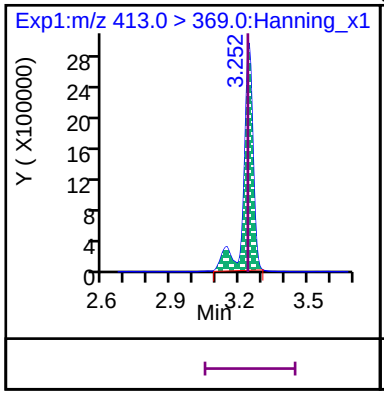
Client ID: Lab ID: ISOMER CHECK_SVLC-1266

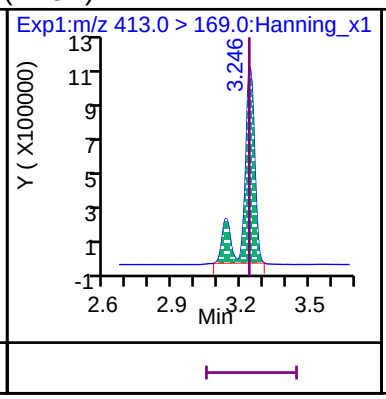
Sample Info: ISOMER CHECK_SVLC-1266

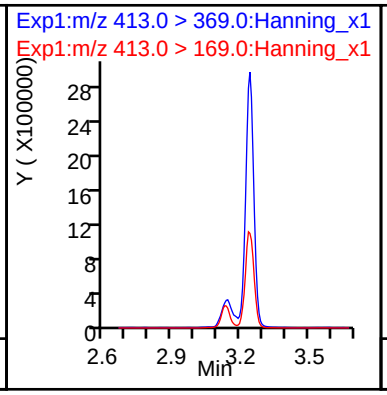
Dil. Factor: 1 Operator: Matthew M. Miller



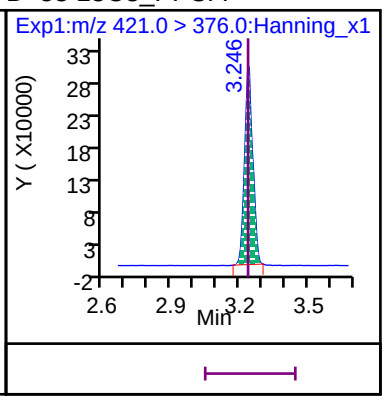
20 Perfluoro-n-octanoic acid (PFOA)



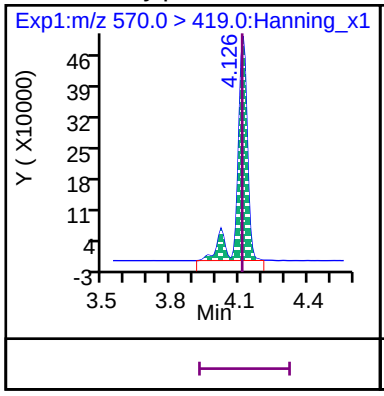


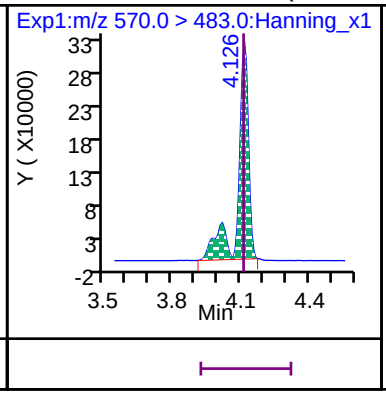


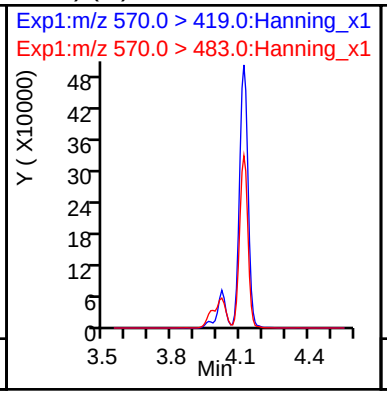
D 53 13C8_PFOA



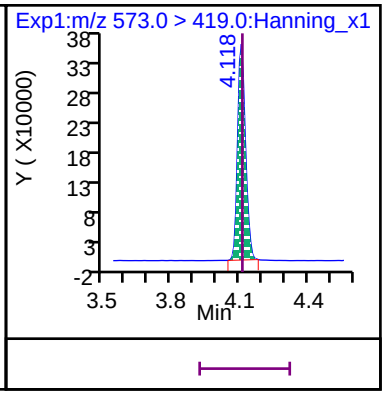
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) (M)







D 58 d3-MeFOSAA



Pace Environmental Services, LLC
Initial Calibration Verification Report

Data File: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b\020821015.d
Injection Date: 08-Feb-2021 11:48:09 Injection Vol: 10.0 uL
Sample Type: ICV Auto Sampler: 98
Sample Info: ID ICV 500_SVLC-1343 Misc. Info:
Inst. ID: LCMSMS01 Operator: Matthew M. Miller

Method Name: LCMSMS01_PFAS-ID Version: 2020-09-23 10:00:21
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: ICV Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
8 PFBA			500.00	470.96	94.2	70 - 130
D 46 13C4_PFBA	940437	1027111			109	50 - 150
D 50 13C5_PFPeA	980305	1053070			107	50 - 150
21 PFPeA			500.00	470.79	94.2	70 - 130
7 PFBS			442.50	465.67	105	70 - 130
D 44 13C3_PFBS	306015	348660			114	50 - 150
1 4:2 FTS			467.50	486.95	104	70 - 130
D 63 13C2_4:2 FTS_2	258946	332040			128	50 - 150
D 49 13C5_PFHxA	925301	1013144			109	50 - 150
15 PFHxA			500.00	495.74	99.1	70 - 130
22 PFPeS			470.00	493.36	105	70 - 130
28 GenX			2500.00	2401.91	96.1	70 - 130
D 66 13C3_GenX	798996	792864			99.2	50 - 150
D 47 13C4_PFHpA	738956	905397			123	50 - 150
13 PFHpA			500.00	459.63	91.9	70 - 130
D 45 13C3_PFHxS	238770	280828			118	50 - 150
14 PFHxS			456.00	423.78	92.9	70 - 130
29 ADONA			2355.00	2028.25	86.1	70 - 130
D 64 13C2_6:2 FTS_2	208098	274530			132	50 - 150
2 6:2 FTS			475.00	485.86	102	70 - 130
20 PFOA			500.00	495.29	99.1	70 - 130
D 53 13C8_PFOA	784254	872046			111	50 - 150
12 PFHpS			475.00	422.67	89	70 - 130
D 54 13C8_PFOS	217839	245629			113	50 - 150
18 PFOS			462.75	408.34	88.2	70 - 130
17 PFNA			500.00	483.61	96.7	70 - 130
D 56 13C9_PFNA	714408	821116			115	50 - 150
30 9Cl-PF3ONS			2330.00	2055.22	88.2	70 - 130
D 55 13C8_PFOSA	445030	537480			121	50 - 150
16 PFNS			480.00	442.10	92.1	70 - 130
19 PFOSA			500.00	454.45	90.9	70 - 130
D 65 13C2_8:2 FTS_2	166309	225085			135	50 - 150
3 8:2 FTS			480.00	377.88	78.7	70 - 130
10 PFDA			500.00	459.03	91.8	70 - 130
D 51 13C6_PFDA	558348	680851			122	50 - 150
6 N-MeFOSAA			500.00	597.14	119	70 - 130

Report Date: 11-Feb-2021 10:00:28 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b\020821015.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 58 d3-MeFOSAA	774575	949383			123	50 - 150
9 PFDS			482.50	477.64	99	70 - 130
D 60 d5-EtFOSAA	690005	897991			130	50 - 150
25 PFUdA			500.00	540.31	108	70 - 130
D 52 13C7_PFUdA	575243	555310			96.5	50 - 150
5 N-EtFOSAA			500.00	494.54	98.9	70 - 130
D 61 d7-MeFOSE	169919	167867			98.8	50 - 150
D 57 d3-MeFOSA	59860	61923			103	50 - 150
31 11Cl-PF3OUDS			2355.00	2157.07	91.6	70 - 130
11 PFDoA			500.00	515.52	103	70 - 130
D 38 13C2_PFDoA	647718	687377			106	50 - 150
D 62 d9-EtFOSE	157828	166828			106	50 - 150
4 10:2 FTS			2410.00	1813.65	75.3	70 - 130
D 59 d5-EtFOSA	60047	58625			97.6	50 - 150
24 PFTrDA			500.00	521.35	104	70 - 130
D 42 13C2_PFTeDA	680063	760607			112	50 - 150
23 PFTeDA			500.00	514.53	103	70 - 130
D 40 13C2_PFHxDA	369178	410169			111	50 - 150

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821005.d
Injection Date: 08-Feb-2021 10:02:45 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 95
Sample Info: ID CCV 100_SVLC-1334 Misc. Info:
Inst. ID: LCMSMS01 Operator: Matthew M. Miller

Method Name: LCMSMS01_PFAS-ID Version: 2020-09-23 10:00:21
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-2 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
8 PFBA			100.00	87.246	87.2	70 - 130
D 46 13C4_PFBA	940437	1018417			108	50 - 150
D 50 13C5_PFPeA	980305	1027157			105	50 - 150
21 PFPeA			100.00	98.141	98.1	70 - 130
7 PFBS			88.400	93.986	106	70 - 130
D 44 13C3_PFBS	306015	349891			114	50 - 150
1 4:2 FTS			93.400	101.05	108	70 - 130
D 63 13C2_4:2 FTS_2	258946	279266			108	50 - 150
D 49 13C5_PFHxA	925301	870198			94	50 - 150
15 PFHxA			100.00	112.35	112	70 - 130
22 PFPeS			93.800	91.940	98	70 - 130
28 GenX			200.00	237.03	119	70 - 130
D 66 13C3_GenX	798996	749783			93.8	50 - 150
D 47 13C4_PFHpA	738956	852436			115	50 - 150
13 PFHpA			100.00	98.103	98.1	70 - 130
D 45 13C3_PFHxS	238770	262249			110	50 - 150
14 PFHxS			91.000	77.280	84.9	70 - 130
29 ADONA			94.200	92.809	98.5	70 - 130
D 64 13C2_6:2 FTS_2	208098	263528			127	50 - 150
2 6:2 FTS			94.800	118.43	125	70 - 130
20 PFOA			100.00	111.50	111	70 - 130
D 53 13C8_PFOA	784254	801193			102	50 - 150
12 PFHpS			95.200	87.130	91.5	70 - 130
D 54 13C8_PFOS	217839	226466			104	50 - 150
18 PFOS			92.800	90.049	97	70 - 130
17 PFNA			100.00	98.531	98.5	70 - 130
D 56 13C9_PFNA	714408	790887			111	50 - 150
30 9Cl-PF3ONS			93.200	98.661	106	70 - 130
D 55 13C8_PFOSA	445030	464386			104	50 - 150
16 PFNS			96.000	108.06	113	70 - 130
19 PFOSA			100.00	109.67	110	70 - 130
D 65 13C2_8:2 FTS_2	166309	201463			121	50 - 150
3 8:2 FTS			95.800	75.693	79	70 - 130
10 PFDA			100.00	94.048	94	70 - 130
D 51 13C6_PFDA	558348	696423			125	50 - 150
6 N-MeFOSAA			100.00	99.726	99.7	70 - 130

Report Date: 11-Feb-2021 10:19:07 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821005.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 58 d3-MeFOSAA	774575	771725			99.6	50 - 150
9 PFDS			96.400	78.943	81.9	70 - 130
D 60 d5-EtFOSAA	690005	868665			126	50 - 150
25 PFUdA			100.00	101.11	101	70 - 130
D 52 13C7_PFUdA	575243	615503			107	50 - 150
5 N-EtFOSAA			100.00	101.63	102	70 - 130
D 61 d7-MeFOSE	169919	160062			94.2	50 - 150
32 MeFOSE			100.00	110.03	110	70 - 130
D 57 d3-MeFOSA	59860	65967			110	50 - 150
26 MeFOSA non target			100.00	56.898	56.9	70 - 130
31 11Cl-PF3OUDS			94.200	102.40	109	70 - 130
11 PFDoA no +			100.00	139.45	139	70 - 130
D 38 13C2_PFDoA	647718	665222			103	50 - 150
D 62 d9-EtFOSE	157828	172463			109	50 - 150
4 10:2 FTS			96.400	97.981	102	70 - 130
33 EtFOSE			100.00	87.224	87.2	70 - 130
D 59 d5-EtFOSA	60047	61187			102	50 - 150
27 EtFOSA			100.00	101.83	102	70 - 130
34 PFDOS			96.800	100.00	103	70 - 130
24 PFTrDA			100.00	99.733	99.7	70 - 130
D 42 13C2_PFTeDA	680063	754678			111	50 - 150
23 PFTeDA			100.00	104.38	104	70 - 130
35 PFHxDA			100.00	111.20	111	70 - 130
D 40 13C2_PFHxDA	369178	372820			101	50 - 150
36 PFODA			100.00	109.00	109	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821006.d
Injection Date: 08-Feb-2021 10:13:17 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 96
Sample Info: ID CCV 200_SVLC-1335 Misc. Info:
Inst. ID: LCMSMS01 Operator: Matthew M. Miller

Method Name: LCMSMS01_PFAS-ID Version: 2020-09-23 10:00:21
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-3 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
8 PFBA			200.00	172.88	86.4	70 - 130
D 46 13C4_PFBA	1018417	995278			97.7	50 - 150
D 50 13C5_PFPeA	1027157	1021752			99.5	50 - 150
21 PFPeA			200.00	211.83	106	70 - 130
7 PFBS			176.80	165.28	93.5	70 - 130
D 44 13C3_PFBS	349891	342829			98	50 - 150
1 4:2 FTS			186.80	185.86	99.5	70 - 130
D 63 13C2_4:2 FTS_2	279266	293804			105	50 - 150
D 49 13C5_PFHxA	870198	935627			108	50 - 150
15 PFHxA			200.00	213.26	107	70 - 130
22 PFPeS			187.60	182.65	97.4	70 - 130
28 GenX			400.00	374.35	93.6	70 - 130
D 66 13C3_GenX	749783	786896			105	50 - 150
D 47 13C4_PFHpA	852436	868482			102	50 - 150
13 PFHpA			200.00	208.35	104	70 - 130
D 45 13C3_PFHxS	262249	248976			94.9	50 - 150
14 PFHxS			182.00	190.20	105	70 - 130
29 ADONA			188.40	193.16	103	70 - 130
D 64 13C2_6:2 FTS_2	263528	265874			101	50 - 150
2 6:2 FTS			189.60	190.91	101	70 - 130
20 PFOA			200.00	199.38	99.7	70 - 130
D 53 13C8_PFOA	801193	831812			104	50 - 150
12 PFHpS			190.40	203.46	107	70 - 130
D 54 13C8_PFOS	226466	244575			108	50 - 150
18 PFOS			185.60	183.99	99.1	70 - 130
17 PFNA			200.00	201.96	101	70 - 130
D 56 13C9_PFNA	790887	818008			103	50 - 150
30 9Cl-PF3ONS			186.40	176.08	94.5	70 - 130
D 55 13C8_PFOSA	464386	495386			107	50 - 150
16 PFNS			192.00	183.95	95.8	70 - 130
19 PFOSA			200.00	188.08	94	70 - 130
D 65 13C2_8:2 FTS_2	201463	195053			96.8	50 - 150
3 8:2 FTS			191.60	228.73	119	70 - 130
10 PFDA			200.00	186.81	93.4	70 - 130
D 51 13C6_PFDA	696423	742353			107	50 - 150
6 N-MeFOSAA			200.00	231.78	116	70 - 130

Report Date: 11-Feb-2021 10:19:08 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821006.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 58 d3-MeFOSAA	771725	828824			107	50 - 150
9 PFDS			192.80	183.26	95.1	70 - 130
D 60 d5-EtFOSAA	868665	864294			99.5	50 - 150
25 PFUdA			200.00	211.81	106	70 - 130
D 52 13C7_PFUdA	615503	670702			109	50 - 150
5 N-EtFOSAA			200.00	153.25	76.6	70 - 130
D 61 d7-MeFOSE	160062	183649			115	50 - 150
32 MeFOSE			200.00	210.56	105	70 - 130
D 57 d3-MeFOSA	65967	65677			99.6	50 - 150
26 MeFOSA			200.00	225.20	113	70 - 130
31 11Cl-PF3OUDS			188.40	177.24	94.1	70 - 130
11 PFDoA			200.00	216.46	108	70 - 130
D 38 13C2_PFDoA	665222	678240			102	50 - 150
D 62 d9-EtFOSE	172463	153262			88.9	50 - 150
4 10:2 FTS			192.80	216.22	112	70 - 130
33 EtFOSE			200.00	195.58	97.8	70 - 130
D 59 d5-EtFOSA	61187	60261			98.5	50 - 150
27 EtFOSA			200.00	222.28	111	70 - 130
34 PFDOS			193.60	181.10	93.5	70 - 130
24 PFTrDA			200.00	197.11	98.6	70 - 130
D 42 13C2_PFTeDA	754678	756837			100	50 - 150
23 PFTeDA			200.00	197.47	98.7	70 - 130
35 PFHxDA			200.00	203.13	102	70 - 130
D 40 13C2_PFHxDA	372820	392693			105	50 - 150
36 PFODA			200.00	203.21	102	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821042.d
Injection Date: 08-Feb-2021 16:33:23 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 27
Sample Info: ID CCV 1000A_SVLC-1337 Misc. Info:
Inst. ID: LCMSMS01 Operator: Matthew M. Miller

Method Name: LCMSMS01_PFAS-ID Version: 2020-09-23 10:00:21
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-5 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
8 PFBA			1000.00	1025.19	103	70 - 130
D 46 13C4_PFBA	1018417	954683			93.7	50 - 150
D 50 13C5_PFPeA	1027157	1004174			97.8	50 - 150
21 PFPeA			1000.00	1019.71	102	70 - 130
7 PFBS			884.00	900.31	102	70 - 130
D 44 13C3_PFBS	349891	347711			99.4	50 - 150
1 4:2 FTS			934.00	987.46	106	70 - 130
D 63 13C2_4:2 FTS_2	279266	295925			106	50 - 150
D 49 13C5_PFHxA	870198	921108			106	50 - 150
15 PFHxA			1000.00	845.41	84.5	70 - 130
22 PFPeS			938.00	904.25	96.4	70 - 130
28 GenX			2000.00	1796.10	89.8	70 - 130
D 66 13C3_GenX	749783	843785			113	50 - 150
D 47 13C4_PFHpA	852436	858139			101	50 - 150
13 PFHpA			1000.00	1074.84	107	70 - 130
D 45 13C3_PFHxS	262249	263569			101	50 - 150
14 PFHxS			910.00	904.82	99.4	70 - 130
29 ADONA			942.00	919.98	97.7	70 - 130
D 64 13C2_6:2 FTS_2	263528	258487			98.1	50 - 150
2 6:2 FTS			948.00	909.54	95.9	70 - 130
20 PFOA			1000.00	966.82	96.7	70 - 130
D 53 13C8_PFOA	801193	793804			99.1	50 - 150
12 PFHpS			952.00	926.64	97.3	70 - 130
D 54 13C8_PFOS	226466	222205			98.1	50 - 150
18 PFOS			928.00	881.85	95	70 - 130
17 PFNA			1000.00	1139.35	114	70 - 130
D 56 13C9_PFNA	790887	731290			92.5	50 - 150
30 9Cl-PF3ONS			932.00	996.83	107	70 - 130
D 55 13C8_PFOSA	464386	506686			109	50 - 150
16 PFNS			960.00	930.95	97	70 - 130
19 PFOSA			1000.00	976.18	97.6	70 - 130
D 65 13C2_8:2 FTS_2	201463	275668			137	50 - 150
3 8:2 FTS			958.00	678.24	70.8	70 - 130
10 PFDA			1000.00	911.69	91.2	70 - 130
D 51 13C6_PFDA	696423	665623			95.6	50 - 150
6 N-MeFOSAA			1000.00	1034.16	103	70 - 130

Report Date: 11-Feb-2021 10:19:19 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821042.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 58 d3-MeFOSAA	771725	936944			121	50 - 150
9 PFDS			964.00	1009.50	105	70 - 130
D 60 d5-EtFOSAA	868665	879638			101	50 - 150
25 PFUdA			1000.00	1156.54	116	70 - 130
D 52 13C7_PFUdA	615503	587870			95.5	50 - 150
5 N-EtFOSAA			1000.00	954.60	95.5	70 - 130
D 61 d7-MeFOSE	160062	181158			113	50 - 150
32 MeFOSE			1000.00	994.67	99.5	70 - 130
D 57 d3-MeFOSA	65967	70799			107	50 - 150
26 MeFOSA			1000.00	830.67	83.1	70 - 130
31 11Cl-PF3OUDS			942.00	953.31	101	70 - 130
11 PFDoA			1000.00	1147.98	115	70 - 130
D 38 13C2_PFDoA	665222	603198			90.7	50 - 150
D 62 d9-EtFOSE	172463	166767			96.7	50 - 150
4 10:2 FTS			964.00	685.09	71.1	70 - 130
33 EtFOSE			1000.00	995.63	99.6	70 - 130
D 59 d5-EtFOSA	61187	64798			106	50 - 150
27 EtFOSA			1000.00	1103.33	110	70 - 130
34 PFDOS			968.00	1011.66	105	70 - 130
24 PFTrDA			1000.00	1050.56	105	70 - 130
D 42 13C2_PFTeDA	754678	724869			96.1	50 - 150
23 PFTeDA			1000.00	1032.49	103	70 - 130
35 PFHxDA			1000.00	940.48	94	70 - 130
D 40 13C2_PFHxDA	372820	390351			105	50 - 150
36 PFODA			1000.00	963.02	96.3	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821057.d
Injection Date: 08-Feb-2021 19:12:13 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 42
Sample Info: ID CCV 1000B_SVLC-1337 Misc. Info:
Inst. ID: LCMSMS01 Operator: Matthew M. Miller

Method Name: LCMSMS01_PFAS-ID Version: 2020-09-23 10:00:21
Calib Method: PFAS-ID Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-5 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
8 PFBA			1000.00	973.15	97.3	70 - 130
D 46 13C4_PFBA	1018417	964623			94.7	50 - 150
D 50 13C5_PFPeA	1027157	1007602			98.1	50 - 150
21 PFPeA			1000.00	948.29	94.8	70 - 130
7 PFBS			884.00	898.27	102	70 - 130
D 44 13C3_PFBS	349891	344226			98.4	50 - 150
1 4:2 FTS			934.00	1010.84	108	70 - 130
D 63 13C2_4:2 FTS_2	279266	280895			101	50 - 150
D 49 13C5_PFHxA	870198	916492			105	50 - 150
15 PFHxA			1000.00	965.17	96.5	70 - 130
22 PFPeS			938.00	918.37	97.9	70 - 130
28 GenX			2000.00	1957.49	97.9	70 - 130
D 66 13C3_GenX	749783	742945			99.1	50 - 150
D 47 13C4_PFHpA	852436	847091			99.4	50 - 150
13 PFHpA			1000.00	939.01	93.9	70 - 130
D 45 13C3_PFHxS	262249	252649			96.3	50 - 150
14 PFHxS			910.00	899.40	98.8	70 - 130
29 ADONA			942.00	932.77	99	70 - 130
D 64 13C2_6:2 FTS_2	263528	246197			93.4	50 - 150
2 6:2 FTS			948.00	958.36	101	70 - 130
20 PFOA			1000.00	1026.42	103	70 - 130
D 53 13C8_PFOA	801193	767248			95.8	50 - 150
12 PFHpS			952.00	1034.14	109	70 - 130
D 54 13C8_PFOS	226466	233425			103	50 - 150
18 PFOS			928.00	881.48	95	70 - 130
17 PFNA			1000.00	1137.62	114	70 - 130
D 56 13C9_PFNA	790887	680800			86.1	50 - 150
30 9Cl-PF3ONS			932.00	885.27	95	70 - 130
D 55 13C8_PFOSA	464386	451200			97.2	50 - 150
16 PFNS			960.00	921.13	96	70 - 130
19 PFOSA			1000.00	1073.60	107	70 - 130
D 65 13C2_8:2 FTS_2	201463	196514			97.5	50 - 150
3 8:2 FTS			958.00	1013.32	106	70 - 130
10 PFDA			1000.00	1041.07	104	70 - 130
D 51 13C6_PFDA	696423	590827			84.8	50 - 150
6 N-MeFOSAA			1000.00	1302.33	130	70 - 130

Report Date: 11-Feb-2021 10:19:38 AIM Revision: 2.0 12-Dec-2020 09:34:50
Data File: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b\020821057.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 58 d3-MeFOSAA	771725	742853			96.3	50 - 150
9 PFDS			964.00	896.50	93	70 - 130
D 60 d5-EtFOSAA	868665	788304			90.7	50 - 150
25 PFUdA			1000.00	891.56	89.2	70 - 130
D 52 13C7_PFUdA	615503	646576			105	50 - 150
5 N-EtFOSAA			1000.00	1033.49	103	70 - 130
D 61 d7-MeFOSE	160062	165834			104	50 - 150
32 MeFOSE			1000.00	988.49	98.8	70 - 130
D 57 d3-MeFOSA	65967	66308			101	50 - 150
26 MeFOSA			1000.00	949.37	94.9	70 - 130
31 11Cl-PF3OUDS			942.00	967.74	103	70 - 130
11 PFDoA			1000.00	979.97	98	70 - 130
D 38 13C2_PFDoA	665222	680113			102	50 - 150
D 62 d9-EtFOSE	172463	155424			90.1	50 - 150
4 10:2 FTS			964.00	866.73	89.9	70 - 130
33 EtFOSE			1000.00	941.79	94.2	70 - 130
D 59 d5-EtFOSA	61187	56649			92.6	50 - 150
27 EtFOSA			1000.00	1079.05	108	70 - 130
34 PFDOS			968.00	925.46	95.6	70 - 130
24 PFTrDA			1000.00	932.88	93.3	70 - 130
D 42 13C2_PFTeDA	754678	698159			92.5	50 - 150
23 PFTeDA			1000.00	1026.31	103	70 - 130
35 PFHxDA			1000.00	955.82	95.6	70 - 130
D 40 13C2_PFHxDA	372820	374092			100	50 - 150
36 PFODA			1000.00	1014.93	101	70 - 130

Report Date: 27-Jan-2021 16:50:50 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Batch Run Log Report

Batch: \\organics\LL\LCMSMS02.i\012621-nonDOD+ICAL.b

Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02

Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
1	ICAL 50_SVLC-1272	26-Jan-2021 13:22:18	012621007.d	ICal					Analytes	L-1	1.00		
2	ICAL 100_SVLC-1273	26-Jan-2021 13:32:55	012621008.d	ICal					Analytes	L-2	1.00		
3	ICAL 200_SVLC-1274	26-Jan-2021 13:43:33	012621009.d	ICal					Analytes	L-3	1.00		
4	ICAL 500_SVLC-1275	26-Jan-2021 13:54:07	012621010.d	ICal					Analytes	L-4	1.00		
5	ICAL 1000_SVLC-1276	26-Jan-2021 14:04:47	012621011.d	ICal					Analytes	L-5	1.00		
6	ICAL 2000_SVLC-1277	26-Jan-2021 14:15:21	012621012.d	ICal					Analytes	L-6	1.00		
7	ICAL 5000_SVLC-1278	26-Jan-2021 14:25:58	012621013.d	ICal					Analytes	L-7	1.00		
8	ICAL 10000_SVLC-1279	26-Jan-2021 14:36:40	012621014.d	ICal					Analytes	L-8	1.00		
9	ICAL 15000_SVLC-1280	26-Jan-2021 14:47:21	012621015.d	ICal					Analytes	L-9	1.00		
10	ICAL 20000_SVLC-1281	26-Jan-2021 14:58:01	012621016.d	ICal					Analytes	L-10	1.00		
11	ID IBLK A	26-Jan-2021 15:08:41	012621017.d	InstBlk					Surrogates	Smp	0.1100		
12	ICV 500_SVLC-1285	26-Jan-2021 15:19:16	012621018.d	ICV					Analytes	ICV	1.00		
13	ISOMER CHECK_SVLC-1266	26-Jan-2021 15:29:51	012621019.d	CheckStd					Surrogates	Smp	1.00		
14	ID BLK B	26-Jan-2021 15:51:09	012621021.d	InstBlk					Surrogates	Smp	0.1100		
17	ID CCV 1000_SVLC-1276	26-Jan-2021 16:12:22	012621023.d	CCV					Analytes	L-5	1.00		
18	WQ80489-001	26-Jan-2021 16:23:01	012621024.d	MBlk		Aqueous	1	80489	Surrogates	Smp	0.1100		
19	WQ80489-002	26-Jan-2021 16:33:38	012621025.d	LCS		Aqueous	1	80489	Analytes	100x PDS	0.2000		
20	WA11027-006	26-Jan-2021 16:44:17	012621026.d	Client	MDLv PFAS AQ Full List L	Aqueous	1	80206	Surrogates	Smp	0.1100		
21	WA11029-006	26-Jan-2021 16:54:58	012621027.d	Client	LOQ PFAS AQ Full List LC	Aqueous	1	80206	Surrogates	Smp	0.1100		
22	WA11027-008	26-Jan-2021 17:05:32	012621028.d	Client	MDLv PFAS SOIL Full List	Soil	1	80348	Surrogates	Smp	0.1100		RX
23	WA11029-008	26-Jan-2021 17:16:10	012621029.d	Client	LOQ PFAS SOIL Full List	Soil	1	80348	Surrogates	Smp	0.1100		RX
24	WA14018-001	26-Jan-2021 17:26:48	012621030.d	Client	Effluent Grab	Aqueous	1	79746	Surrogates	Smp	0.1100		
25	WA20010-009	26-Jan-2021 17:37:27	012621031.d	Client	MW-13	Aqueous	1	80206	Surrogates	Smp	0.1100		SUR/ND, NCM
26	WA20010-009DU	26-Jan-2021 17:48:04	012621032.d	Client		Aqueous	1	80206	Surrogates	Smp	0.1100		SUR/ND
27	WA20010-010	26-Jan-2021 17:58:42	012621033.d	Client	MW-9D	Aqueous	1	80206	Surrogates	Smp	0.1100		SUR, RR
28	WA20010-011	26-Jan-2021 18:09:24	012621034.d	Client	S8MW-R	Aqueous	1	80206	Surrogates	Smp	0.1100		
29	WA16019-016	26-Jan-2021 18:20:04	012621035.d	Client	MW-3	Aqueous	1	80489	Surrogates	Smp	0.1100		
30	WA16019-016MS	26-Jan-2021 18:30:42	012621036.d	MS		Aqueous	1	80489	Analytes	100x PDS	0.2000		
31	WA16019-017	26-Jan-2021 18:41:21	012621037.d	Client	MW-3I	Aqueous	1	80489	Surrogates	Smp	0.1100		
32	ID CCV 1000A_SVLC-1276	26-Jan-2021 18:51:55	012621038.d	CCV					Analytes	L-5	1.00		
33	WA16019-018	26-Jan-2021 19:02:31	012621039.d	Client	MW-3D	Aqueous	1	80489	Surrogates	Smp	0.1100		
34	WA16019-019	26-Jan-2021 19:13:06	012621040.d	Client	MW-9	Aqueous	1	80489	Surrogates	Smp	0.1100		SUR 4:2(ND), 6:2(DETECT); RR to confirm
35	WA16019-020	26-Jan-2021 19:23:44	012621041.d	Client	MW-9I	Aqueous	1	80489	Surrogates	Smp	0.1100		
36	WA16019-020DU	26-Jan-2021 19:34:27	012621042.d	Client		Aqueous	1	80489	Surrogates	Smp	0.1100		
37	WA16019-021	26-Jan-2021 19:45:05	012621043.d	Client	Duplicate #1	Aqueous	1	80489	Surrogates	Smp	0.1100		
38	WA16019-022	26-Jan-2021 19:55:44	012621044.d	Client	Equipment Blank #2	Aqueous	1	80489	Surrogates	Smp	0.1100		
39	WA16019-023	26-Jan-2021 20:06:22	012621045.d	Client	MW-28	Aqueous	1	80489	Surrogates	Smp	0.1100		
40	WA19030-001	26-Jan-2021 20:17:02	012621046.d	Client	335-0	Aqueous	1	80489	Surrogates	Smp	0.1100		
41	WA19030-002	26-Jan-2021 20:27:46	012621047.d	Client	362-0	Aqueous	1	80489	Surrogates	Smp	0.1100		
42	WA19030-003	26-Jan-2021 20:38:22	012621048.d	Client	182-0	Aqueous	1	80489	Surrogates	Smp	0.1100		
43	WA20026-001	26-Jan-2021 20:48:58	012621049.d	Client	1694-0	Aqueous	1	80489	Surrogates	Smp	0.1100		
44	ID CCV 1000B_SVLC-1276	26-Jan-2021 20:59:38	012621050.d	CCV					Analytes	L-5	1.00		
45	WA20027-001	26-Jan-2021 21:10:16	012621051.d	Client	1694-16	Aqueous	1	80489	Surrogates	Smp	0.1100		
46	WA20028-001	26-Jan-2021 21:20:53	012621052.d	Client	372-0	Aqueous	1	80489	Surrogates	Smp	0.1100		

Report Date: 09-Feb-2021 14:28:36 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Batch Run Log Report

Batch: \\organics\LL\LCMSMS02.i\020521-nonDOD.b

Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02

Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
95	ID CCV 100_SVLC-1273	05-Feb-2021 11:54:00	020521005.d	CCV					Analytes	L-2	1.00		
96	ID CCV 200_SVLC-1274	05-Feb-2021 12:04:35	020521006.d	CCV					Analytes	L-3	1.00		
97	ID IBLK A	05-Feb-2021 12:15:09	020521007.d	InstBlk					Surrogates	Smp	0.1100		
1	WQ81820-001	05-Feb-2021 12:25:44	020521008.d	MBlk		Soil	1	81820	Surrogates	Smp	0.1100		
2	WQ81820-002	05-Feb-2021 12:36:21	020521009.d	LCS		Soil	1	81820	Analytes	100x PDS	0.1000		
3	WQ81803-001	05-Feb-2021 12:46:56	020521010.d	MBlk		Aqueous	1	81803	Surrogates	Smp	0.1100		
4	WQ81803-002	05-Feb-2021 12:57:34	020521011.d	LCS		Aqueous	1	81803	Analytes	100x PDS	0.2000		
7	WA29014-001	05-Feb-2021 13:29:25	020521014.d	Client	EQ Blank	Aqueous	1	81803	Surrogates	Smp	0.1100		
9	WA28026-007	05-Feb-2021 13:50:47	020521016.d	Client	FIELD BLANK	Aqueous	1	81803	Surrogates	Smp	0.1100		
10	WA28026-008	05-Feb-2021 14:01:27	020521017.d	Client	EQUIPMENT BLANK	Aqueous	1	81803	Surrogates	Smp	0.1100		
18	ID CCV 1000_SVLC-1324	05-Feb-2021 15:26:30	020521025.d	CCV					Analytes	L-5	1.00		
43	ID CCV 1000B_SVLC-1324	05-Feb-2021 19:52:32	020521050.d	CCV					Analytes	L-5	1.00		
59	WA29014-002	05-Feb-2021 22:11:03	020521066.d	Client	LMW-6	Aqueous	1	81803	Surrogates	Smp	0.1100		RR - 10+ SAMPLES B/W CCVs
60	WA29014-003	05-Feb-2021 22:21:43	020521067.d	Client	LMW-10	Aqueous	1	81803	Surrogates	Smp	0.1100		RR - 10+ SAMPLES B/W CCVs
61	WA29014-004	05-Feb-2021 22:32:27	020521068.d	Client	LMW-11R	Aqueous	1	81803	Surrogates	Smp	0.1100		RR - 10+ SAMPLES B/W CCVs
62	WA29014-005	05-Feb-2021 22:43:09	020521069.d	Client	LMW-12	Aqueous	1	81803	Surrogates	Smp	0.1100		RR - 10+ SAMPLES B/W CCVs
63	WA29014-006	05-Feb-2021 22:53:48	020521070.d	Client	LMW-14	Aqueous	1	81803	Surrogates	Smp	0.1100		RR - 10+ SAMPLES B/W CCVs
64	ID CCV 1000D_SVLC-1324	05-Feb-2021 23:04:28	020521071.d	CCV					Analytes	L-5	1.00		

Report Date: 10-Feb-2021 17:20:23 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Batch Run Log Report

Batch: \\organics\LL\LCMSMS02.i\020821-nonDOD.b

Method: LCMSMS02_PFAS-ID.M Instrument: LCMSMS02

Cal Start Date: 26-Jan-2021 13:22:18 Cal End Date: 26-Jan-2021 14:58:01

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
95	ID CCV 100_SVLC-1273	08-Feb-2021 11:56:37	020821005.d	CCV					Analytes	L-2	1.00		
96	ID CCV 200_SVLC-1274	08-Feb-2021 12:07:14	020821006.d	CCV					Analytes	L-3	1.00		
97	ID IBLK A	08-Feb-2021 12:17:49	020821007.d	InstBlk					Surrogates	Smp	0.1100		
1	WQ82105-001	08-Feb-2021 12:28:23	020821008.d	MBlk		Aqueous	1	82105	Surrogates	Smp	0.1100		
2	WQ82105-002	08-Feb-2021 12:39:00	020821009.d	LCS		Aqueous	1	82105	Analytes	100x PDS	0.2000		
4	WA28028-008	08-Feb-2021 13:00:13	020821011.d	Client	BLANK-10	Aqueous	1	82105	Surrogates	Smp	0.1100		
5	WB04011-003	08-Feb-2021 13:10:51	020821012.d	Client	EQB-1	Aqueous	1	82105	Surrogates	Smp	0.1100		
6	WB04011-004	08-Feb-2021 13:21:27	020821013.d	Client	Field Blank	Aqueous	1	82105	Surrogates	Smp	0.1100		
7	WB04011-015	08-Feb-2021 13:32:02	020821014.d	Client	EQB-2	Aqueous	1	82105	Surrogates	Smp	0.1100		
8	WA29014-002	08-Feb-2021 13:42:44	020821015.d	Client	LMW-6	Aqueous	1	81803	Surrogates	Smp	0.1100		SUR; 4:2,6:2 (ND), NCM
9	WA29014-003	08-Feb-2021 13:53:26	020821016.d	Client	LMW-10	Aqueous	1	81803	Surrogates	Smp	0.1100		SUR: 4:2, 6:2, 8:2(ND), NCM
10	WA29014-004	08-Feb-2021 14:04:05	020821017.d	Client	LMW-11R	Aqueous	1	81803	Surrogates	Smp	0.1100		SUR; 4:2, 6:2, 8:2 (ND), NCM
11	WA29014-005	08-Feb-2021 14:14:45	020821018.d	Client	LMW-12	Aqueous	1	81803	Surrogates	Smp	0.1100		SUR; 4:2 (ND), NCM
12	WA29014-006	08-Feb-2021 14:25:19	020821019.d	Client	LMW-14	Aqueous	1	81803	Surrogates	Smp	0.1100		SUR; 4:2 (ND), NCM
13	ID CCV 1000_SVLC-1324	08-Feb-2021 14:35:54	020821020.d	CCV					Analytes	L-5	1.00		
17	WA29015-012	08-Feb-2021 15:18:27	020821024.d	Client	B-6	Aqueous	1	82105	Surrogates	Smp	0.1100		
18	WA29015-013	08-Feb-2021 15:29:05	020821025.d	Client	B-7	Aqueous	1	82105	Surrogates	Smp	0.1100		
19	WA29015-014	08-Feb-2021 15:39:43	020821026.d	Client	B-5	Aqueous	1	82105	Surrogates	Smp	0.1100		
20	WA29015-015	08-Feb-2021 15:50:24	020821027.d	Client	B-4	Aqueous	1	82105	Surrogates	Smp	0.1100		
21	WA29015-017	08-Feb-2021 16:01:08	020821028.d	Client	B-2	Aqueous	1	82105	Surrogates	Smp	0.1100		
22	WA28028-005	08-Feb-2021 16:11:47	020821029.d	Client	375-0	Aqueous	1	82105	Surrogates	Smp	0.1100		
23	WA28028-006	08-Feb-2021 16:22:23	020821030.d	Client	471-0	Aqueous	1	82105	Surrogates	Smp	0.1100		
24	ID CCV 1000A_SVLC-1324	08-Feb-2021 16:32:57	020821031.d	CCV					Analytes	L-5	1.00		
25	WA29015-016	08-Feb-2021 16:43:38	020821032.d	Client	EB-126	Aqueous	1	82105	Surrogates	Smp	0.1100		
28	WA29014-007	08-Feb-2021 17:15:34	020821035.d	Client	LMW-7	Aqueous	1	81803	Surrogates	Smp	0.1100		SUR 4:2, 6:2, 8:2 (ND) - NCM 47952 - REPORT
29	WA28026-003	08-Feb-2021 17:26:11	020821036.d	Client	SMW-5	Aqueous	5	81803	Surrogates	Smp	0.1100		
30	WA28026-004	08-Feb-2021 17:36:52	020821037.d	Client	CPMW02	Aqueous	5	81803	Surrogates	Smp	0.1100		
31	WA28026-005	08-Feb-2021 17:47:31	020821038.d	Client	CPMW03	Aqueous	5	81803	Surrogates	Smp	0.1100		
32	WA28026-005DU	08-Feb-2021 17:58:05	020821039.d	Client		Aqueous	5	81803	Surrogates	Smp	0.1100		
33	WA28026-006	08-Feb-2021 18:08:41	020821040.d	Client	DUPLICATE	Aqueous	5	81803	Surrogates	Smp	0.1100		
34	WA28028-007	08-Feb-2021 18:19:26	020821041.d	Client	DUP 10	Aqueous	1	82105	Surrogates	Smp	0.1100		
35	WA28028-009	08-Feb-2021 18:30:04	020821042.d	Client	406-2	Aqueous	1	82105	Surrogates	Smp	0.1100		
36	ID CCV 1000B_SVLC-1324	08-Feb-2021 18:40:47	020821043.d	CCV					Analytes	L-5	1.00		
37	WA28028-010	08-Feb-2021 18:51:26	020821044.d	Client	144-0	Aqueous	1	82105	Surrogates	Smp	0.1100		
38	WA28028-011	08-Feb-2021 19:02:07	020821045.d	Client	85-0	Aqueous	1	82105	Surrogates	Smp	0.1100		
39	WA28028-012	08-Feb-2021 19:12:46	020821046.d	Client	94-0	Aqueous	1	82105	Surrogates	Smp	0.1100		
40	WA28028-013	08-Feb-2021 19:23:25	020821047.d	Client	408-0	Aqueous	1	82105	Surrogates	Smp	0.1100		
41	WA28028-014	08-Feb-2021 19:34:11	020821048.d	Client	412-0	Aqueous	1	82105	Surrogates	Smp	0.1100		
42	WA28028-014MS	08-Feb-2021 19:44:50	020821049.d	MS		Aqueous	1	82105	Analytes	100x PDS	0.2000		
43	WA28028-015	08-Feb-2021 19:55:27	020821050.d	Client	144-1	Aqueous	1	82105	Surrogates	Smp	0.1100		
44	WA28028-015DU	08-Feb-2021 20:06:08	020821051.d	Client		Aqueous	1	82105	Surrogates	Smp	0.1100		
45	WA28027-002	08-Feb-2021 20:16:48	020821052.d	Client	HS-PW-2.5 (B)	Aqueous	1	81803	Surrogates	Smp	0.1100		
46	WA28027-001	08-Feb-2021 20:27:25	020821053.d	Client	HS-PW-2.5 (A)	Aqueous	5	81803	Surrogates	Smp	0.1100		
47	WA28027-003	08-Feb-2021 20:38:06	020821054.d	Client	HS-PW-3 (A)	Aqueous	5	81803	Surrogates	Smp	0.1100		

Report Date: 10-Feb-2021 17:20:23 AIM Revision: 2.0 05-Oct-2020 14:59:22

Batch Path: \\organics\LL\LCMSMS02.i\020821-nonDOD.b

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
48	WA28027-004	08-Feb-2021 20:48:46	020821055.d	Client	HS-PW-3 (A) DUP	Aqueous	5	81803	Surrogates	Smp	0.1100		
49	ID CCV 1000C_SVLC-1324	08-Feb-2021 20:59:27	020821056.d	CCV					Analytes	L-5	1.00		
50	WB03046-001	08-Feb-2021 21:10:08	020821057.d	Client	MW-1 (0-6-inch)	Soil	1	81820	Surrogates	Smp	0.1100		
51	WB03046-002	08-Feb-2021 21:20:48	020821058.d	Client	MW-1 (6-inch-2ft)	Soil	1	81820	Surrogates	Smp	0.1100		
52	WB03046-003	08-Feb-2021 21:31:23	020821059.d	Client	SB-7 (0-6-inch)	Soil	1	81820	Surrogates	Smp	0.1100		
53	WB03046-004	08-Feb-2021 21:41:59	020821060.d	Client	SB-7 (6-24-inch)	Soil	1	81820	Surrogates	Smp	0.1100		
54	WB02009-001	08-Feb-2021 21:52:39	020821061.d	Client	B1 @1	Soil	1	81820	Surrogates	Smp	0.1100		
55	WB02009-001MS	08-Feb-2021 22:03:22	020821062.d	MS		Soil	1	81820	Analytes	100x PDS	0.1000		
56	WB02009-001MD	08-Feb-2021 22:14:08	020821063.d	MSD		Soil	1	81820	Analytes	100x PDS	0.1000		
57	WB02009-002	08-Feb-2021 22:24:48	020821064.d	Client	B1 @10	Soil	1	81820	Surrogates	Smp	0.1100		
58	WB02009-003	08-Feb-2021 22:35:28	020821065.d	Client	B3 @5	Soil	1	81820	Surrogates	Smp	0.1100		
59	WB02009-004	08-Feb-2021 22:46:09	020821066.d	Client	B3 @15	Soil	1	81820	Surrogates	Smp	0.1100		
60	ID CCV 1000D_SVLC-1324	08-Feb-2021 22:57:08	020821067.d	CCV					Analytes	L-5	1.00		
61	WB02009-007	08-Feb-2021 23:07:47	020821068.d	Client	B13 @1	Soil	1	81820	Surrogates	Smp	0.1100		
62	WB02009-008	08-Feb-2021 23:18:27	020821069.d	Client	B13 @10	Soil	1	81820	Surrogates	Smp	0.1100		
63	WB02009-009	08-Feb-2021 23:29:03	020821070.d	Client	B1300 @10	Soil	1	81820	Surrogates	Smp	0.1100		
64	ID CCV 1000E_SVLC-1324	08-Feb-2021 23:39:44	020821071.d	CCV					Analytes	L-5	1.00		

Report Date: 11-Feb-2021 10:00:29 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Batch Run Log Report

Batch: \\Organics\LL\LCMSMS01.i\020721-nonDOD-ICAL.b

Method: LCMSMS01_PFAS-ID.M Instrument: LCMSMS01

Cal Start Date: 07-Feb-2021 14:32:59 Cal End Date: 07-Feb-2021 16:08:04

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
1	ICAL 50_SVLC-1333	07-Feb-2021 14:32:59	020721021.d	ICal					Analytes	L-1	1.00		
2	ICAL 100_SVLC-1334	07-Feb-2021 14:43:30	020721022.d	ICal					Analytes	L-2	1.00		
3	ICAL 200_SVLC-1335	07-Feb-2021 14:54:02	020721023.d	ICal					Analytes	L-3	1.00		
4	ICAL 500_SVLC-1336	07-Feb-2021 15:04:36	020721024.d	ICal					Analytes	L-4	1.00		
5	ICAL 1000_SVLC-1337	07-Feb-2021 15:15:08	020721025.d	ICal					Analytes	L-5	1.00		
6	ICAL 2000_SVLC-1338	07-Feb-2021 15:25:43	020721026.d	ICal					Analytes	L-6	1.00		
7	ICAL 5000_SVLC-1339	07-Feb-2021 15:36:16	020721027.d	ICal					Analytes	L-7	1.00		
8	ICAL 10000_SVLC-1340	07-Feb-2021 15:46:51	020721028.d	ICal					Analytes	L-8	1.00		
9	ICAL 15000_SVLC-1341	07-Feb-2021 15:57:27	020721029.d	ICal					Analytes	L-9	1.00		
10	ICAL 20000_SVLC-1342	07-Feb-2021 16:08:04	020721030.d	ICal					Analytes	L-10	1.00		
95	ID BLK	07-Feb-2021 16:18:43	020721031.d	InstBlk					Surrogates	Smp	0.1100		
12	ISOMER CHECK_SVLC-1266	07-Feb-2021 16:39:49	020721033.d	CheckStd					Surrogates	Smp	1.00	Yes	
98	ID ICV 500_SVLC-1343	08-Feb-2021 11:48:09	020821015.d	ICV					Analytes	ICV	1.00		

Report Date: 11-Feb-2021 10:19:47 AIM Revision: 2.0 05-Oct-2020 14:59:22

Pace Environmental Services, LLC

Batch Run Log Report

Batch: \\Organics\LL\LCMSMS01.i\020821-nonDOD.b

Method: LCMSMS01_PFAS-ID.M Instrument: LCMSMS01

Cal Start Date: 07-Feb-2021 14:32:59 Cal End Date: 07-Feb-2021 16:08:04

Method Lock: Unlocked Lock Date:

No.Compounds: 66 Integrator: picker

Calib Method: PFAS-ID

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
95	ID CCV 100_SVLC-1334	08-Feb-2021 10:02:45	020821005.d	CCV					Analytes	L-2	1.00		RR-PFDoA high
96	ID CCV 200_SVLC-1335	08-Feb-2021 10:13:17	020821006.d	CCV					Analytes	L-3	1.00		All dilutions refortified w/EIS SVLC-1328
97	ID IBLK A	08-Feb-2021 10:23:47	020821007.d	InstBlk					Surrogates	Smp	0.1100		
95	ID CCV 100A_SVLC-1334	08-Feb-2021 10:34:22	020821008.d	CCV					Analytes	L-2	1.00		All pass
95	ID CCV 100A DUP_SVLC-1334	08-Feb-2021 10:44:55	020821009.d	CCV					Analytes	L-2	1.00		Confirms all pass
97	ID IBLK A	08-Feb-2021 10:55:27	020821010.d	InstBlk					Surrogates	Smp	0.1100		
98	ID ICV 500_SVLC-1343	08-Feb-2021 11:06:02	020821011.d	Client		Aqueous	1						
1	WQ81967-001	08-Feb-2021 11:16:36	020821012.d	MBlk		Aqueous	1	81967	Surrogates	Smp	0.1100		RR after ICV
94	ID BLK B2	08-Feb-2021 11:27:08	020821013.d	InstBlk					Surrogates	Smp	0.1100		
94	ID BLK B3	08-Feb-2021 11:37:39	020821014.d	InstBlk					Surrogates	Smp	0.1100		
98	ID ICV 500_SVLC-1343	08-Feb-2021 11:48:09	020821015.d	ICV					Analytes	ICV	1.00		
27	ID CCV 1000A_SVLC-1337	08-Feb-2021 16:33:23	020821042.d	CCV					Analytes	L-5	1.00		
28	WQ81968-001	08-Feb-2021 16:43:57	020821043.d	MBlk		Aqueous	1	81968	Surrogates	Smp	0.1100		
29	WQ81968-002	08-Feb-2021 16:54:33	020821044.d	LCS		Aqueous	1	81968	Analytes	100x PDS	0.2000		
30	WQ81971-001	08-Feb-2021 17:05:09	020821045.d	MBlk		Soil	1	81971	Surrogates	Smp	0.1100		
31	WQ81971-002	08-Feb-2021 17:15:47	020821046.d	LCS		Soil	1	81971	Analytes	100x PDS	0.1000		
32	WA28027-005	08-Feb-2021 17:26:20	020821047.d	Client	HS-PW-3.5 (A)	Aqueous	1	81968	Surrogates	Smp	0.1100		
33	WA28027-005MS	08-Feb-2021 17:36:54	020821048.d	MS		Aqueous	1	81968	Analytes	100x PDS	0.2000		EIS double spiked, NCM #47852
34	WA28027-005MD	08-Feb-2021 17:47:28	020821049.d	MSD		Aqueous	1	81968	Analytes	100x PDS	0.2000		
35	WA28027-006	08-Feb-2021 17:58:02	020821050.d	Client	FB-1/26	Aqueous	1	81968	Surrogates	Smp	0.1100		
36	WA28027-007	08-Feb-2021 18:08:36	020821051.d	Client	EB-HT	Aqueous	1	81968	Surrogates	Smp	0.1100		
37	WA28028-001	08-Feb-2021 18:19:13	020821052.d	Client	354-0	Aqueous	1	81968	Surrogates	Smp	0.1100		
38	WA28028-002	08-Feb-2021 18:29:49	020821053.d	Client	358-0	Aqueous	1	81968	Surrogates	Smp	0.1100		
39	WA28028-003	08-Feb-2021 18:40:24	020821054.d	Client	359-0	Aqueous	1	81968	Surrogates	Smp	0.1100		
40	WA28028-004	08-Feb-2021 18:51:01	020821055.d	Client	381-0	Aqueous	1	81968	Surrogates	Smp	0.1100		
41	WB03053-001	08-Feb-2021 19:01:40	020821056.d	Client	GTW-3	Aqueous	1	81968	Surrogates	Smp	0.1100		
42	ID CCV 1000B_SVLC-1337	08-Feb-2021 19:12:13	020821057.d	CCV					Analytes	L-5	1.00		
43	WB04011-001	08-Feb-2021 19:22:48	020821058.d	Client	MW-3 (0-6-inch)	Soil	50	81971	Surrogates	Smp	0.1100		RR-1X
44	WB04011-002	08-Feb-2021 19:33:23	020821059.d	Client	MW-3 (6-inch-2ft)	Soil	50	81971	Surrogates	Smp	0.1100		RR-1X
45	WB04011-005	08-Feb-2021 19:43:57	020821060.d	Client	SB-8 (0-6-inch)	Soil	50	81971	Surrogates	Smp	0.1100		RR-1X
46	WB04011-006	08-Feb-2021 19:54:33	020821061.d	Client	SB-8 (6-inch-2ft)	Soil	50	81971	Surrogates	Smp	0.1100		RR-1X
47	WB04011-007	08-Feb-2021 20:05:07	020821062.d	Client	SB-9 (0-6-inch)	Soil	50	81971	Surrogates	Smp	0.1100		RR-1X
48	WB04011-008	08-Feb-2021 20:15:43	020821063.d	Client	SB-9 (6-inch-2ft)	Soil	50	81971	Surrogates	Smp	0.1100		RR-1X
49	WB04011-009	08-Feb-2021 20:26:18	020821064.d	Client	SB-10 (0-6-inch)	Soil	50	81971	Surrogates	Smp	0.1100		RR-1X
50	WB04011-010	08-Feb-2021 20:36:55	020821065.d	Client	SB-10 (6-inch-2ft)	Soil	50	81971	Surrogates	Smp	0.1100		

Analyst: MBR **Level 2 Analyst:** NA

Status: Level 1 review released

Matrix: Aqueous

Printed: 02/16/21 0834

Prep Batch: 81803

PFAS Prep by ID - PFAS Aqueous Preparation

Start Date: 02/04/2021 1209

End Date: 02/04/2021 1621

Conc Analyst: MBR

Conc Start Date: 02/04/2021 1621

Conc End Date: 02/04/2021 1621

Ext Solvent: MECH>96%MECH/4%H2O

Surrogate: SVLC-1307B

Surrogate Vol. (mL): 0.110

Reagents Vol. (mL): 10

Chem ID: 20-2857>20-2857/21-252

Balance ID: Balance # 20-1123

Sample ID	QC Code	Client Sample ID	Run	Analysis Method	Container + Sample (g)	Container Empty (g)	Initial Vol. (mL)	Spike ID	Spike Vol. (mL)	Final Vol. (mL)	Comments
WQ81803-001	MB		1	PFAS by ID SOP	280	30	250		0.000	10.0	MB init:300.77g,fin:30.95g;LCS init:301.82g,fin:30.68g;
WQ81803-002	LCS		1	PFAS by ID SOP	280	30	250	SVLC-1327	0.200	10.0	Sorbent dry start/end:1st:1306/1311,2nd:1534/1539;Buf 384;Amm-MeOH:SV21-385(4mL);QC Water:21-252
WA29014-001	Sample	EQ Blank	1	PFAS by ID SOP	307.89	42.59	265		0.000	10.0	Bottletop#:329;Pipettes:383,20-2315;QC Bottles:M0-322-01BB;XL-AW: 20-2827;Reservoirs:20-2623
WA29014-002	Sample	LMW-6	1	PFAS by ID SOP	302.89	43.45	259		0.000	10.0	Filter cartridges: 21-254/21-190; Elution tubes:20-1843;Falcon tubes:21-33;Centrifuge tubes:20-2051
WA29014-003	Sample	LMW-10	1	PFAS by ID SOP	301.48	43.23	258		0.000	10.0	Storage bottles:20-2252;MeOH Ext:4mL,Filt:2mL;IS:SVLC-1303(0.010mL); ASV/Caps:21-208/21-207
WA29014-004	Sample	LMW-11R	1	PFAS by ID SOP	297.8	43.59	254		0.000	10.0	NCM#47659
WA29014-005	Sample	LMW-12	1	PFAS by ID SOP	290.94	43.67	247		0.000	10.0	
WA29014-006	Sample	LMW-14	1	PFAS by ID SOP	295.1	43.43	252		0.000	10.0	
WA29014-007	Sample	LMW-7	1	PFAS by ID SOP	288.3	43.98	244		0.000	10.0	
WA28022-001	Sample	C-6 (110)	1	PFAS by ID SOP	308.43	40.17	268		0.000	10.0	
WA28026-001	Sample	SMW-1	1	PFAS by ID SOP	308.26	32.41	276		0.000	10.0	NCM#47660
WA28026-002	Sample	SMW-2	1	PFAS by ID SOP	313.11	60.25	253		0.000	10.0	NCM#47662
WA28026-003	Sample	SMW-5	1	PFAS by ID SOP	314.55	32.17	282		0.000	10.0	
WA28026-003MSMS			1	PFAS by ID SOP	322.58	31.97	291	SVLC-1327	0.200	10.0	

Analyst: MBR **Level 2 Analyst:** NA

Status: Level 1 review released

Matrix: Aqueous

Printed: 02/16/21 0834

Prep Batch: 81803

PFAS Prep by ID - PFAS Aqueous Preparation

Start Date: 02/04/2021 1209
End Date: 02/04/2021 1621

Conc Analyst: MBR
Conc Start Date: 02/04/2021 1621
Conc End Date: 02/04/2021 1621

Surrogate: SVLC-1307B
Surrogate Vol. (mL): 0.110

Ext Solvent: MECH>96%/MECH/4%/H2O
Reagents Vol. (mL): 10
Chem ID: 20-2857>20-2857/21-252

Balance ID: Balance # 20-1123

Sample ID	QC Code	Client Sample ID	Run	Analysis Method	Container + Sample (g)	Container Empty (g)	Initial Vol. (mL)	Spike ID	Spike Vol. (mL)	Final Vol. (mL)	Comments
WA28026-004	Sample	CRMW02	1	PFAS by ID SOP	313.57	31.62	282		0.000	10.0	
WA28026-005	Sample	CRMW03	1	PFAS by ID SOP	311.86	32.04	280		0.000	10.0	
WA28026-005DU	Duplicate		1	PFAS by ID SOP	320.58	31.82	289		0.000	10.0	
WA28026-006	Sample	DUPLICATE	1	PFAS by ID SOP	321.42	32.2	289		0.000	10.0	
WA28026-007	Sample	FIELD BLANK	1	PFAS by ID SOP	265.69	32.17	234		0.000	10.0	
WA28026-008	Sample	EQUIPMENT BLANK	1	PFAS by ID SOP	274.03	32.01	242		0.000	10.0	
WA28027-001	Sample	HS-PW-2.5 (A)	1	PFAS by ID SOP	315.32	33.61	282	✓	0.000	10.0	
WA28027-002	Sample	HS-PW-2.5 (B)	1	PFAS by ID SOP	314.27	31.52	283	✓	0.000	10.0	
WA28027-003	Sample	HS-PW-3 (A)	1	PFAS by ID SOP	301.91	31.83	270	✓	0.000	10.0	
WA28027-004	Sample	HS-PW-3 (A) DUP	1	PFAS by ID SOP	321.87	33.51	288	✓	0.000	10.0	

(end of report) **Total Samples: 20**

Analyst: ALM **Level 2 Analyst:** NA

Status: Level 1 review released

Matrix: Aqueous

Printed: 02/16/21 0835

Prep Batch: 81968

PFAS Prep by ID - PFAS Aqueous Preparation

Start Date: 02/05/2021 1201

End Date: 02/05/2021 1530

Conc Analyst: ALM

Conc Start Date: 02/05/2021 1530

Conc End Date: 02/05/2021 1530

Surrogate: SVLC-1326

Surrogate Vol. (mL): 0.110

Ext Solvent: MECH-96%/MECH/4%/H2O

Reagents Vol. (mL): 10

Chem ID: 20-2857>20-2857/21-252

Balance ID: Balance # 20-1123

Sample ID	QC Code	Client Sample ID	Run	Analysis Method	Container + Sample (g)	Container Empty (g)	Initial Vol. (mL)	Spike ID	Spike Vol. (mL)	Final Vol. (mL)	Comments
WQ81968-001	MB		1	PFAS by ID SOP	310.93	31.23	280		0.000	10.0	Init: 310.93g; Final: 31.23g
WQ81968-002	LCS		1	PFAS by ID SOP	307.37	31.56	276	SVLC-1327	0.200	10.0	Init: 307.37g; Final: 31.56g
WA28027-005	Sample	HS-PW-3.5 (A)	1	PFAS by ID SOP	307.94	31.4	277		0.000	10.0	Sorbent dry start/end:1431/1436;Buffer:SV21-384;Amm-MeOH:SV21-385(4mL);QC Water:21-252;
WA28027-005MS	MS	HS-PW-3.5 (A)MS	1	PFAS by ID SOP	316.99	33.26	284	SVLC-1327	0.200	10.0	NCM47724
WA28027-005MD	MSD	HS-PW-3.5 (A)MD	1	PFAS by ID SOP	302.37	31.62	271	SVLC-1327	0.200	10.0	NCM47724
WA28027-006	Sample	FB-1/26	1	PFAS by ID SOP	303.36	33.1	270		0.000	10.0	Bottletop#:329;Pipettes:383,20-2315;QC Bottles:M0-322-01BB;XL-AW: 20-2827;Reservoirs:20-2623;
WA28027-007	Sample	EB-HT	1	PFAS by ID SOP	279.5	32.9	247		0.000	10.0	Filter cartridges: 21-254; Elution tubes:20-1843;Storage bottles:20-2828;
WA28028-001	Sample	354-0	1	PFAS by ID SOP	272.66	32.43	240		0.000	10.0	MeOH Ext:4mL,Filt:2mL;IS:SVLC-1303(0.010mL); ASV/Caps:21-208/21-207;
WA28028-002	Sample	358-0	1	PFAS by ID SOP	265.27	32.06	233		0.000	10.0	
WA28028-003	Sample	359-0	1	PFAS by ID SOP	298.83	32.99	266		0.000	10.0	
WA28028-004	Sample	381-0	1	PFAS by ID SOP	289.41	32.44	257		0.000	10.0	
WB03053-001	Sample	GTW-3	1	PFAS by ID SOP	273.73	32.94	241		0.000	10.0	

(end of report) **Total Samples: 8**

SECTION 4

CASE NARRATIVE AND CHAIN-OF-CUSTODY RECORD

Sample Summary

GZA GeoEnvironmental, Inc.

Lot Number: WA28027

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	HS-PW-2.5 (A)	Aqueous	01/26/2021 1130	01/28/2021
002	HS-PW-2.5 (B)	Aqueous	01/26/2021 1215	01/28/2021
003	HS-PW-3 (A)	Aqueous	01/26/2021 1430	01/28/2021
004	HS-PW-3 (A) DUP	Aqueous	01/26/2021 1430	01/28/2021
005	HS-PW-3.5 (A)	Aqueous	01/26/2021 1540	01/28/2021
006	FB-1/26	Aqueous	01/26/2021 1550	01/28/2021
007	EB-HT	Aqueous	01/26/2021 1705	01/28/2021

(7 samples)

Case Narrative
GZA GeoEnvironmental, Inc.
Lot Number: WA28027

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the most current approved The NELAC Institute (TNI) standards, the Pace Analytical Services, LLC ("Pace") Laboratory Quality Manual, standard operating procedures (SOPs), and Pace policies. Any exceptions to the TNI standards, the Laboratory Quality Manual, SOPs or policies are qualified on the results page or discussed below.

If you have any questions regarding this report please contact the Pace Project Manager listed on the cover page.

Due to a spiking error, the WA28027-005 Matrix Spike and Matrix Spike Duplicate (MS/MSD) were double-spiked with the EIS and Surrogate standard, affecting the recoveries. There was insufficient sample remaining to perform a re-extraction; therefore, the data have been reported and qualified. Parent sample WA28027-005 was correctly spiked.

double spike confirmed. MS/MSD not used to qualify data as the parent had acceptable "surrogate" recoveries

REVISED REPORT - February 11, 2021
A revised report was issued. The following PFAS note below was added to the Case Narrative page.

All other sample results are as reported in the original PDF report. This report supersedes and replaces any prior reports issued under this lot number.

PFAS – by Isotope Dilution

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the Pace Quality Assurance Management Plan (QAMP), applicable Shealy standard operating procedures (SOPs), the 2003 NELAC standard, and Shealy policies. Additionally, the DoD QSM version 5.3 has been followed for these samples, and specifically Table B-15 was followed for all PFAS samples. Any exceptions to the QAMP, SOPs, NELAC standards, the DoD QSM, or policies are qualified on the results page or discussed below.

All QC associated with these samples was in compliance with DOD QSM 5.3 table B-15 and our PFAS SOP.

Correction factors (CF) are used to calculate the original sample concentration. The CF is the inverse of the concentration factor (sample volume / extract final volume) times the dilution factor (DF). For undiluted analysis. For undiluted analysis, the extract is prepared for injection by adding 182 uL of

sample extract + 8 uL of reagent water + 10 uL of internal standard solution to a polypropylene autosampler vial. An extra correction factor of 0.91 (182 uL / 200 uL = 0.91) applies. The CF is calculated as follows:

CF = DF * FV / Vo

FV is volume of extract (mL)
Vo is initial sample volume (mL)
DF is dilution factor. For undiluted analysis, DF = 1/0.91.

Sample concentration for aqueous samples:
Concentration (ng/L) = Cs*CF,

$$C_s = \frac{\left(\frac{(A_s x C_{is})}{A_{is}}\right) - B}{M1}$$

Where

C_s is on column concentration of target analyte in the sample (ng/L)
C_{is} is concentration of internal standard in the sample (ng/L)
A_s is peak response of target analyte in the sample
A_{is} is peak response of internal standard in the sample
M1 is the average RF from ICAL or the slope from linear regression ICAL
B is the y-intercept from the ICAL

Shealy Environmental Services, Inc.
106 Vantage Point Drive
West Columbia, South Carolina 29172
Telephone No. (803) 791-9700 Fax No. (803) 791-9111
www.shealylab.com

Chain of Custody Record

Number

Client	Report to Contact	Telephone No. / E-mail	Quote No.
Rose and Westra / GZA	Lori Powers	616-556-6123 loretta.powers@gza.com	

Address	Sampler's Signature	Analysis (Attach list if more space is needed)	Page
601 Fifth Street NW, Suite 102	X Makayla Myers		1 of 1

City	State	Zip Code	Printed Name
Grand Rapids	MI	49504	Makayla Myers

Project Name: 16.0062961.51 T1

Project Number: 16.0062961.51 T1 | P.O No:

WA28027

KLC2

Sample ID / Description (Containers for each sample may be combined on one line)	Date	Time	G=Grab C=Composite	Matrix: Aqueous	Solid	Non-Aqueous	No of Containers by Preservative Type: Unpres	H2SO4	HNO3	HCl	NaOH	H2O	MeOH	PFAS	Remarks / Cooler I.D.
HS-PW-2.5(A)	1/26/2021	11:30	G	x			2							x	
HS-PW-2.5(B)	1/26/2021	12:15	G	x			2							x	
HS-PW-3(A)	1/26/2021	14:30	G	x			2							x	
HS-PW-3(A) DUP	1/26/2021	14:30	G	x			2							x	
HS-PW-3.5(A)	1/26/2021	15:40	G	x			2							x	
HS-PW-3.5(A) MD/MSD	1/26/2021	15:40	G	x			2							x	
FB-1/26	1/26/2021	15:50	G	x			2							x	
EB-HT	1/26/2021	17:05	G	x			2							x	

Turn Around Time Required (Prior lab approval required for expedited TAT)
☐ Standard ☒ Rush (Please Specify) 2 week

Sample Disposal
☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification (List any known hazards in the remarks)
☒ Non-Hazardous ☐ Flammable ☐ Skin Irritant ☐ SDS provided ☐ Unknown

QC Requirements

1. Relinquished by	Date	Time	1. Received by	Date	Time
Makayla Myers	1/27/2021	12:00			
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by FedEx	Date 1/28/21	Time 0930	4. Laboratory Received by	Date 1/28/21	Time 0930

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Check) ☑ Y ☐ N ☐ Ice Pack
Receipt Temp. 1.8 °C

Document Number: ME002OW-01

PACE ANALYTICAL SERVICES, LLC

Pace Analytical

Samples Receipt Checklist (SRC) (ME0018C-15)
Issuing Authority: Pace ENV - WCOL

Revised:9/29/2020
Page 1 of 1

Sample Receipt Checklist (SRC)

Client: GZA Cooler Inspected by/date: JSH / 01/28/2021 Lot #: WA28027

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other: ____

☑ Yes	☐ No		1. Were custody seals present on the cooler?
☑ Yes	☐ No	☐ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA

1.8 / 1.8 °C NA / NA °C NA / NA °C NA / NA °C

Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 5 IR Gun Correction Factor: 0 °C

Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☐ Yes	☐ No	☑ NA	3. If temperature of any cooler exceeded 6.0°C, was Project Manager Notified? PM was Notified by: phone / email / face-to-face (circle one).
☑ Yes	☐ No	☐ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC?
☑ Yes	☐ No		7. Were sample IDs listed on all sample containers?
☑ Yes	☐ No		8. Was collection date & time listed on the COC?
☑ Yes	☐ No		9. Was collection date & time listed on all sample containers?
☑ Yes	☐ No		10. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		11. Were tests to be performed listed on the COC?
☑ Yes	☐ No		12. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)? ____
☑ Yes	☐ No		13. Was adequate sample volume available?
☑ Yes	☐ No		14. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☐ Yes	☑ No		15. Were any samples containers missing/excess (circle one) samples Not listed on COC?
☐ Yes	☐ No	☑ NA	16. For VOA and RSK-175 samples, were bubbles present >"pea-size" (¼"or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	17. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	18. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	19. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☐ No	☑ NA	20. Were client remarks/requests (i.e. requested dilutions, MS/MSD designations, etc…) correctly transcribed from the COC into the comment section in LIMS?
☐ Yes	☑ No		21. Was the quote number listed on the container label? If yes, Quote # NA

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H2SO4, HNO3, HCl, NaOH using SR # NA.
Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA were received with bubbles >6 mm in diameter.

Samples(s) NA were received with TRC > 0.5 mg/L (If #19 is ***no***) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Shealy ID: NA.

SR barcode labels applied by: KHS Date: 01/28/2021

Comments:

SECTION 5

PROJECT CORRESPONDENCE

From:	Karen Coonan
To:	Jared K. Acker; Katherine McDonald
Cc:	Meg Michell; David Blye
Subject:	RE: Pace SC / GZA requests for VI10034,VJ29012,WA28027
Date:	Wednesday, May 26, 2021 2:49:37 PM
Attachments:	image001.png image002.png image003.png VJ29012_Report (1).pdf VI10034_Report.pdf

This sender is trusted.

Hi Jared,

I have attached a revised Level 2 report for VJ29012 and VI10034. The Level IVs are in the process of being revised to include the attached Level 2 reports. As soon as those are completed, I will forward to you.

For VJ29012, the COC was revised to reflect the correct preservative.

For VI10034, a note has been added to the Case Narrative page regarding the VI10034-001DU and VI10034-005MS.

For WA28027 – We no longer supply Internal Standard summary sheets (Form 8) for the Isotope Dilution (ID) methods (ID-AQ and ID-Solid) as they are not required by the methods (QSM Table B-15 or Wisconsin guidance); they are not used in the calculation of PFAS by ID. We only provide Form 8 for EPA 537.1 and 533.

Thank you,

Karen Coonan
Project Manager | Pace South Carolina
formerly Shealy Environmental Services, Inc.
106 Vantage Point Drive, West Columbia, SC 29172
office: 803.509.8398 | main: 803.791.9700 X106 | pacelabs.com

---

From: Karen Coonan
Sent: Monday, May 17, 2021 12:20 PM
To: 'Jared K. Acker' <jacker@envstd.com>; Katherine McDonald <Katherine.McDonald@gza.com>
Cc: Meg Michell <mmichell@envstd.com>; David Blye <DBLYE@envstd.com>; Mike McFadden <mcflylab@aol.com>; Dan Wright <Dan.Wright@pacelabs.com>
Subject: RE: Pace SC / GZA requests for VI10034,VJ29012,WA28027

Hi Jared,

For WA28027, the revision to the report was that the "PFAS – by Isotope Dilution" note that was added to the Case Narrative. It is the note following the statement that is bold. The note pertains to the correction factor.

For the other requests below, I have asked the lab to look into these and provide the requested information. I will forward the information as soon as I receive it.

Thank you,

Karen Coonan
Project Manager | Pace South Carolina
formerly Shealy Environmental Services, Inc.
106 Vantage Point Drive, West Columbia, SC 29172
office: 803.509.8398 | main: 803.791.9700 X106 | pacelabs.com

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From: Jared K. Acker <jacker@envstd.com>
Sent: Monday, May 17, 2021 11:59 AM
To: Karen Coonan <Karen.Coonan@pacelabs.com>; Katherine McDonald <Katherine.McDonald@gza.com>
Cc: Meg Michell <mmichell@envstd.com>; David Blye <DBLYE@envstd.com>; Mike McFadden <mcflylab@aol.com>; Dan Wright <Dan.Wright@pacelabs.com>
Subject: Pace SC / GZA requests for VI10034,VJ29012,WA28027

CAUTION: This email originated from outside Pace Analytical. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good afternoon all, we have some requests for both the laboratory and GZA for a few items in SDGs VI10034, VJ29012, WA28027. Can these please be addressed and revised data packages issued?

VI10034 – Samples VI10034-001DU and VI10034-005 each had a failing pre-injection internal standard, the run log indicated they were to be re-ran. Can details of these failures be noted in the Case Narrative (if the samples were re-ran and confirmed the failure, ect) as it is a method deviation?

VJ29012 – Page 2 of the Chain of Custody indicated water preservation instead of Trizma, this appears to be in error; can this be confirmed and a revised CoC issued?

WA28027 –

1. A pre-injection internal standard summary form was not included. Historically this was provided for 537ID in the old data package format. Can this please be provided?
2. The Case Narrative includes language about the report being revised with a note added. However, I'm not seeing a note indicating a reason for the revision, only language about the repot superseding prior reports. Can this be checked or explained?

Thanks everyone

Jared Acker
Staff Chemist III
Environmental Standards, Inc.
1140 Valley Forge Road • PO Box 810 • Valley Forge, PA 19482
610.935.5577 x403 • www.envstd.com • jacker@envstd.com

Emergency Response Quality Assurance Hotline: 855.374.7272

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ENVIRONMENTAL® STANDARDS
Montrose Environmental Group

Stage 4 Data Validation Report
Groundwater Surface Water Interface Area
Per- and Polyfluoroalkyl Substances Investigation Program
Sample Delivery Group: XG22049

Introduction

This quality assurance (QA) review is based upon an examination of the data generated from the analyses of the samples collected as part of the Per- and Polyfluoroalkyl Substances (PFAS) Investigation Program at Wolverine World Wide, Inc.'s (Wolverine's) Groundwater Surface Water Interface (GSI) Area in Rockford, Michigan, in accordance with a draft version of the Quality Assurance Project Plan Former Wolverine Tannery, House Street Property, and Wolven/Jewell Area (QAPP; GZA GeoEnvironmental, Inc. [GZA], November 1, 2018; Revision June 2021). The samples were analyzed for select PFAS by Pace Analytical Services, LLC (Pace) of West Columbia, South Carolina. Data were examined to determine compliance relative to Pace's standard operating procedure (SOP) "Determination of Per- and Polyfluoroalkyl Substances (PFAS) by LC/MS/MS (Isotope Dilution) QSM 5.1 Table B 15 (EPA 537 MOD ID)" (Pace Document Number: ME00213-14) and the usability of the analytical results in accordance with the Data Validation SOP for PFAS data for samples generated by this Pace SOP.

The analytical results for the organic target analytes are presented on the validated data summary tables in Section 2 of this report. These validated data summary tables were generated from the GZA database. The "Validation Result," "Validation LOQ" (*i.e.*, the limit of quantitation [LOQ]), and "Validation Detect Flag" fields on the validated data summary tables have been updated to reflect all final data validation qualifiers and results. Validation qualifier codes have been placed in the "Validation Qualifiers" fields on the data tables to enable the data user to quickly assess the qualitative and/or quantitative reliability of a result based on the criteria evaluated during this QA review. Finally, the "Validation Reason Code" field has been populated with codes that indicate the reason for the validation qualifiers. Definitions of the validation qualifiers and reason codes are presented with the validated data summary tables in Section 2.

The data reviewer has included copies of validation forms, quality control (QC) summary forms, and other documentation needed to support the findings in this QA review in the Data Support Documentation (Section 3). The cover sheet for this section is a checklist of the QA procedures required by the protocol and examined in this data review. The Case Narrative and Chain-of-Custody (COC) Record are included in Section 4.

The 13 samples (including associated Sample Delivery Group [SDG] batch QC samples) that have undergone a QA review for PFAS are on Table 1.

TABLE 1 – SUMMARY OF SAMPLES REVIEWED

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
Area19-PW-8A	XG22049-001	Aqueous	7/19/22
Area19-PW-9A	XG22049-002	Aqueous	7/19/22
Area19-PW-9B	XG22049-003	Aqueous	7/19/22
Area19-PW-10A	XG22049-004	Aqueous	7/19/22
WVNW-PW-5A	XG22049-005	Aqueous	7/20/22
WVNW-PW-5A DUP (Field Duplicate of WVNW-PW-5A)	XG22049-006	Aqueous	7/20/22
WVNW-PW-6A	XG22049-007	Aqueous	7/20/22
WVNW-PW-6A MS (Matrix Spike)	XG22049-007MS	Aqueous	7/20/22
WVNW-PW-6A MSD (Matrix Spike Duplicate)	XG22049-007MSD	Aqueous	7/20/22
WVNW-PW-6B	XG22049-008	Aqueous	7/20/22
WVNW-PW-7A	XG22049-009	Aqueous	7/20/22
EQB-HT (Equipment Blank)	XG22049-010	Aqueous	7/20/22
FB-7/20 (Field Blank)	XG22049-011	Aqueous	7/20/22

Section 1 Quality Assurance Review

The findings offered in this report for analyses that underwent a Stage 4 QA review are based upon a rigorous review of the tabulated summary forms and raw data, including the following checks and QC measures as applicable to this data set:

- Data completeness
- COC Record and sample condition upon laboratory receipt
- Sample preparation and analysis holding times
- Field and laboratory blank analysis results
- Laboratory control sample (LCS) analyses
- Matrix spike/matrix spike duplicate (MS/MSD) and laboratory duplicate (LD) analyses
- Surrogate/labeled pre-extraction internal standard recoveries
- Field duplicate precision
- Mass spectrometer tune checks
- Instrument calibration and verification
- Quantitation and qualitative identification

Data were examined to determine compliance and usability of the analytical results relative to the QAPP and SOP referenced above. Any findings are identified in the sections below.

Data Completeness

The Level 4 data deliverables were prepared by the laboratory and were reviewed by Environmental Standards, Inc. (Environmental Standards). The analytical data package was checked for completeness to ensure that all data requested were actually present in the data deliverables (refer to completeness forms in the Data Support Documentation [Section 3]). The data package was complete with any exceptions noted on the completeness forms.

Chain-of-Custody Record and Sample Condition upon Laboratory Receipt

All sample identifications (IDs) were consistent with the COC Record.

The sample reports were consistent with the analytical request designated on the COC Record.

The samples for PFAS analysis were received in good condition and within the method acceptance criterion of ≤ 10°C.

Sample Preparation and Analysis Holding Times

All samples were extracted and analyzed within the QAPP-specified holding times.

Field and Laboratory Blank Analyses

Laboratory blank analyses were performed at the required frequencies. A summary of any positive results observed in the blanks associated with the samples is included in Section 3.

Instrument blanks were analyzed daily, at a minimum, and were evaluated to the LOQ. Qualification of data due to instrument blank contamination was not warranted.

Laboratory method blanks were evaluated to the LOQ for samples prepared within the same preparation batch. Qualification of data due to method blank contamination was not warranted.

One aqueous field blank (sample FB-7/20) and one aqueous equipment blank (sample EQB-HT) were evaluated to the LOQ for the aqueous samples included in this SDG. Qualification of aqueous sample data due to field and equipment blank contamination was not warranted.

Laboratory Control Sample Analyses

An LCS was included in the extraction batch.

All LCS percent recoveries (%Rs) were within QC acceptance limits.

Matrix Spike/Matrix Spike Duplicate and Laboratory Duplicate Analyses

An MS/MSD pair was included in the extraction batch.

The %Rs in all MS/MSDs listed on Table 1 were within QC acceptance limits (70-150 %R)

The relative percent difference (RPD) in the MS/MSDs listed on Table 1 were within QC acceptance limits (RPD ≤ 30%).

Surrogate/Labeled Pre-extraction Internal Standard Recoveries

Surrogates were spiked prior to extraction and used as internal standards for the quantitation of target PFAS results. All surrogate (labeled pre-extraction internal standard) %Rs were within the QAPP acceptance criterion with the following exceptions.

Samples	Type of %R Exceedance	Analyte(s)	Qualifier	Validation Reason Code
Area19-PW-8A, WVNW-PW-5A, WVNW-PW-6A, WVNW-PW-6B, WVNW-PW-7A, EQB-HT, and FB-7/20	%R > 150%	6:2 FTS	UJ	IS
Area19-PW-9A, Area19-PW-9B, Area19-PW-10A, and WVNW-PW-5A DUP	%R > 150%	4:2 FTS and 6:2 FTS	UJ	IS

Field Duplicate Analyses

One field duplicate pair was collected and analyzed for PFAS with the aqueous samples in this data set (refer to Table 1). All field duplicate analyses were within QC acceptance limits (the difference was ≤ the LOQ when at least one result was < 5× the LOQ).

Mass Spectrometer Tune Checks

The liquid chromatograph/tandem mass spectrometer (LC/MS/MS) tune check was performed at the required frequency and met acceptance criteria.

Instrument Calibration and Verification

Instrument calibration, second-source initial calibration verification (ICV), and continuing calibration verification (CCV) analyses were performed at the required frequency and met acceptance criteria.

Quantitation and Qualitative Identification

The laboratory-reported values (*e.g.*, sample results, instrument calibration results) were verified by recalculating the values using the raw instrument data provided by the laboratory. In addition, the raw data chromatograms were checked to ensure that the laboratory-reported analytes were correctly identified and quantitated. These checks were performed on a fraction of the results. Additional results were verified and/or recalculated if any issues were noted with the initial checks. Issues were not noted.

The reported positive results for the analytes in the following samples should be considered estimated. In the chromatograms for these samples, the response for the potential branched isomer peaks that was included in the response for the analyte and used to quantitate the result was significant in size compared to the linear isomer peak that is the only isomer present in the calibration standards.

Sample(s)	Analyte(s)	Qualifier	Validation Reason Code
Area19-PW-8A	PFOA and PFOS	J	LB
Area19-PW-9A, Area19-PW-9B, Area19-PW-10A, WVNW-PW-5A, and WVNW-PW-5A DUP	PFOS	J	LB

The reported positive results for the analyte in the following samples should be considered estimated. The ion transition ratio was out-of-criteria for the compound in the analyses of these samples.

Samples	Analyte	Qualifier	Validation Reason Code
Area19-PW-8A, Area19-PW-9A, and Area19-PW-9B	PFOS	J	PJ

Conclusions

This QA review has identified several aspects of the data that required qualification. The analytical data should be considered acceptable for use unless otherwise indicated in the QA review. Positive results that demonstrate a combination of low bias ("J-"), high bias ("J+"), and/or bias of unknown direction ("J") have been flagged "J" (unknown direction of bias) on the data tables as the direction of bias could not be assigned. In order to use any of the data, the data user should understand the qualifications and limitations specified in this QA review.

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Date: 10/2/2023

SECTION 2

ANALYTICAL RESULTS

Validation Qualifier and Reason Code Definitions

Table 1. Validation Qualifiers and Definitions

Validation Qualifier	Definition
U	The analyte was analyzed for, but was not detected above the level of the reported sample method detection limit (MDL) or sample limit of quantitation (LOQ), depending on reporting requirements.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J -	The result is an estimated quantity. The associated numerical value is possibly biased low.
J +	The result is an estimated quantity. The associated numerical value is possibly biased high.
N	The analyte has been “tentatively identified” or considered “presumptively” present.
UJ	The analyte was analyzed for, but was not detected. The reported MDL and/or LOQ are approximate and may be inaccurate or imprecise.
R	The positive result is unusable. The sample result is rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
UR	The not-detected result is unusable. The sample result is rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
UB	The analyte was not detected substantially above the level reported in the associated laboratory, equipment, field, or trip blank.

Table 2. Validation Reason Codes and Descriptions

Validation Reason Code	Description
CI	Chromatographic interference
CR	Calculated result in which one or more of the components has been qualified, potential bias indeterminate
CRH	Calculated result in which one or more of the components has been qualified, potential high bias
CRL	Calculated result in which one or more of the components has been qualified potential low bias
CV	Continuing calibration verification evaluation criteria not met, potential bias indeterminate
CVH	Continuing calibration verification evaluation criteria not met, potential high bias
CVL	Continuing calibration verification evaluation criteria not met, potential low bias
DC	Reporting limit exceeds decision criteria (for non-detects)
DL	The analysis meets all qualitative identification criteria, but the measured concentration is less than the detection limit.

Validation Qualifier and Reason Code Definitions

Validation Reason Code	Description
DT	Dissolved metals concentration exceeded total metals concentration in the sample above the acceptance criteria
DV	Missing deliverables
EB	Equipment blank contamination
EC	Result exceeds the calibration range, potential bias indeterminate
ECH	Result exceeds the calibration range, potential high bias
ECL	Result exceeds the calibration range, potential low bias
EP	Estimated Maximum Possible Concentration (EMPC)
FB	Field blank contamination
FD	Field duplicate imprecision, potential bias indeterminate
FP	Potential false positive
FR	Field replicate imprecision, potential bias indeterminate
HA	Holding time - preparation to analysis, potential bias indeterminate
HAH	Holding time - preparation to analysis, potential high bias
HAL	Holding time - preparation to analysis, potential low bias
HC	Holding time - collection to analysis, potential bias indeterminate
HCH	Holding time - collection to analysis, potential high bias
HCL	Holding time - collection to analysis, potential low bias
HP	Holding time - collection to preparation, potential bias indeterminate
HPH	Holding time - collection to preparation, potential high bias
HPL	Holding time - collection to preparation, potential low bias
HV	Headspace present in volatile vials, potential bias indeterminate
HVL	Headspace present in volatile vials, potential low bias
IB	Instrument (including initial calibration or continuing calibration) blank contamination
IC	Initial calibration evaluation criteria not met, potential bias indeterminate
ICH	Initial calibration evaluation criteria not met, potential high bias
ICL	Initial calibration evaluation criteria not met, potential low bias
ID	Target compound identification criteria not met
IN	Interference (i.e., laboratory, chemical, and/or matrix), potential bias indeterminate
INH	Interference (i.e., laboratory, chemical, and/or matrix), potential high bias
INL	Interference (i.e., laboratory, chemical, and/or matrix), potential low bias
IR	Interference check standard recovery criteria not met, potential bias indeterminate
IRH	Interference check standard recovery criteria not met, potential high bias
IRL	Interference check standard recovery criteria not met, potential low bias
IS	Internal standard evaluation criteria not met, potential bias indeterminate
ISH	Internal standard evaluation criteria not met, potential high bias
ISL	Internal standard evaluation criteria not met, potential low bias

Validation Qualifier and Reason Code Definitions

Validation Reason Code	Description
LA	Laboratory control sample/laboratory control sample duplicate recovery criteria not met, potential bias indeterminate
LAH	Laboratory control sample/laboratory control sample duplicate recovery criteria not met, potential high bias
LAL	Laboratory control sample/laboratory control sample duplicate recovery criteria not met, potential low bias
LB	Composition (linear/branched) of the PFAS analyte in the sample is significantly different than the composition (linear/branched) of the PFAS analyte in the calibration standards used for quantitation, potential bias indeterminate
LD	Laboratory duplicate precision criteria not met, potential bias indeterminate
LM	The lock mass SICPs indicate that ion suppression evident
LP	Laboratory control sample/laboratory control sample duplicate precision criteria not met, potential bias indeterminate
LPH	Laboratory control sample/laboratory control sample duplicate precision criteria not met, potential high bias
LPL	Laboratory control sample/laboratory control sample duplicate precision criteria not met, potential low bias
LR	Linear range exceeded, potential bias indeterminate
MA	Matrix spike (MS &/or MSD) recovery criteria not met, potential bias indeterminate
MAH	Matrix spike (MS &/or MSD) recovery criteria not met, potential high bias
MAL	Matrix spike (MS &/or MSD) recovery criteria not met, potential low bias
MB	Method blank or preparation blank contamination
MP	Matrix spike (MS/MSD) or laboratory duplicate precision criteria not met, potential bias indeterminate
NB	Elevated detection limit or estimated result due to instrument drift (i.e., negative ICB or CCB result with an absolute value > 2× the MDL)
PD	Post-digestion spike recovery outside acceptance range, potential bias indeterminate
PDH	Post-digestion spike recovery outside acceptance range, potential high bias
PDL	Post-digestion spike recovery outside acceptance range, potential low bias
PJ	Professional judgment, potential bias indeterminate
PJH	Professional judgment, potential high bias
PJL	Professional judgment, potential low bias
PM	Performance evaluation mixture criteria not met, potential bias indeterminate
PMH	Performance evaluation mixture criteria not met, potential high bias
PML	Performance evaluation mixture criteria not met, potential low bias
PR	Peak(s) not adequately resolved, potential bias indeterminate
PRH	Peak(s) not adequately resolved, potential high bias
PRL	Peak(s) not adequately resolved, potential low bias
PS	Low percent solids could affect accuracy, potential bias indeterminate

Validation Qualifier and Reason Code Definitions

Validation Reason Code	Description
PT	Chromatographic pattern in sample does not match pattern of calibration standard
RA	Reference material recovery criteria not met, potential bias indeterminate
RAH	Reference material recovery criteria not met, potential high bias
RAL	Reference material recovery criteria not met, potential low bias
RB	Rinsate blank contamination
RL	The analysis meets all qualitative identification criteria, but the measured concentration is less than the quantitation or reporting limit, potential bias indeterminate
SA	Method of standard additions correction coefficient <0.995, potential bias indeterminate
SC	RPD Between two columns exceeds criteria, potential bias indeterminate
SD	Serial dilution results did not meet evaluation criteria, potential bias indeterminate
SDH	Serial dilution results did not meet evaluation criteria, potential high bias
SDL	Serial dilution results did not meet evaluation criteria, potential low bias
SP	Sample preservation / cooler temperature criteria not met, potential bias indeterminate
SPH	Sample preservation / cooler temperature criteria not met, potential high bias
SPL	Sample preservation / cooler temperature criteria not met, potential low bias
SR	Surrogate recovery outside acceptance range, potential bias indeterminate
SRH	Surrogate recovery outside acceptance range, potential high bias
SRL	Surrogate recovery outside acceptance range, potential low bias
SS	Second source evaluation criteria not met, potential bias indeterminate
SSH	Second source evaluation criteria not met, potential high bias
SSL	Second source evaluation criteria not met, potential low bias
ST	Compound not quantitated against an authentic standard, potential bias indeterminate
TB	Trip blank contamination
TD	Result for dissolved constituent significantly exceeded result for total constituent, potential bias indeterminate
TIC	Tentative identification, quantified using an assumed calibration factor, potential bias indeterminate.
TIR	Tentative identification and was observed in an associated laboratory, equipment, field, or trip blank.
TN	Instrument performance (tuning) criteria not met
YH	Potential high bias due to a y-intercept in the calibration curve that significantly contributes to the analyte response.
YL	Potential high bias due to a y-intercept in the calibration curve that significantly decreases the analyte response.

Lab Sample ID	XG22049-001
Sample Name	Area19-PW-8A
Sample Type	N
Sample Date	7/19/2022 11:05:00 AM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	763051-92-9	INITIAL	1		7.3	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	INITIAL	1		7.3	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	INITIAL	1		7.3	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	INITIAL	1		7.3	ng/l	U	UJ	N	IS	Yes
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	INITIAL	1		7.3	ng/l	U	U	N		Yes
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS	756426-58-1	INITIAL	1		7.3	ng/l	U	U	N		Yes
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	INITIAL	1		7.3	ng/l	U	U	N		Yes
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	INITIAL	1		7.3	ng/l	U	U	N		Yes
	N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	INITIAL	1		7.3	ng/l	U	U	N		Yes
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	INITIAL	1	7.3	3.6	ng/l			Y		Yes
	Perfluorobutanoic Acid (PFBA)	375-22-4	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorodecanoic acid (PFDA)	335-76-2	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorododecanoic acid (PFDoA)	307-55-1	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluoroheptanoic acid (PFHpA)	375-85-9	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	INITIAL	1	6.8	3.6	ng/l			Y		Yes
	Perfluorohexanoic acid (PFHxA)	307-24-4	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorononanoic acid (PFNA)	375-95-1	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	INITIAL	1	6.7	3.6	ng/l		J	Y	LB,PJ	Yes
	Perfluorooctanoic acid (PFOA)	335-67-1	INITIAL	1	6.3	3.6	ng/l		J	Y	LB	Yes
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	INITIAL	1		3.6	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-001
Sample Name	Area19-PW-8A
Sample Type	N
Sample Date	7/19/2022 11:05:00 AM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	INITIAL	1		3.6	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-002
Sample Name	Area19-PW-9A
Sample Type	N
Sample Date	7/19/2022 2:20:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	763051-92-9	INITIAL	1		7.1	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	INITIAL	1		7.1	ng/l	U	UJ	N	IS	Yes
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	INITIAL	1		7.1	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	INITIAL	1		7.1	ng/l	U	UJ	N	IS	Yes
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	INITIAL	1		7.1	ng/l	U	U	N		Yes
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS	756426-58-1	INITIAL	1		7.1	ng/l	U	U	N		Yes
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	INITIAL	1		7.1	ng/l	U	U	N		Yes
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	INITIAL	1		7.1	ng/l	U	U	N		Yes
	N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	INITIAL	1		7.1	ng/l	U	U	N		Yes
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	INITIAL	1	8.1	3.6	ng/l			Y		Yes
	Perfluorobutanoic Acid (PFBA)	375-22-4	INITIAL	1	3.6	3.6	ng/l			Y		Yes
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorodecanoic acid (PFDA)	335-76-2	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorododecanoic acid (PFDoA)	307-55-1	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluoroheptanoic acid (PFHpA)	375-85-9	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	INITIAL	1	6.4	3.6	ng/l			Y		Yes
	Perfluorohexanoic acid (PFHxA)	307-24-4	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorononanoic acid (PFNA)	375-95-1	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	INITIAL	1	11	3.6	ng/l		J	Y	LB,PJ	Yes
	Perfluorooctanoic acid (PFOA)	335-67-1	INITIAL	1	5.1	3.6	ng/l			Y		Yes
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	INITIAL	1		3.6	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-002
Sample Name	Area19-PW-9A
Sample Type	N
Sample Date	7/19/2022 2:20:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	INITIAL	1		3.6	ng/l	U	U	N		Yes
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	INITIAL	1		3.6	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-003
Sample Name	Area19-PW-9B
Sample Type	N
Sample Date	7/19/2022 3:05:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	763051-92-9	INITIAL	1		7.5	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	INITIAL	1		7.5	ng/l	U	UJ	N	IS	Yes
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	INITIAL	1		7.5	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	INITIAL	1		7.5	ng/l	U	UJ	N	IS	Yes
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	INITIAL	1		7.5	ng/l	U	U	N		Yes
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS	756426-58-1	INITIAL	1		7.5	ng/l	U	U	N		Yes
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	INITIAL	1		7.5	ng/l	U	U	N		Yes
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	INITIAL	1		7.5	ng/l	U	U	N		Yes
	N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	INITIAL	1		7.5	ng/l	U	U	N		Yes
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	INITIAL	1		3.8	ng/l	U	U	N		Yes
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	INITIAL	1		3.8	ng/l	U	U	N		Yes
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	INITIAL	1		3.8	ng/l	U	U	N		Yes
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	INITIAL	1	9.9	3.8	ng/l			Y		Yes
	Perfluorobutanoic Acid (PFBA)	375-22-4	INITIAL	1		3.8	ng/l	U	U	N		Yes
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	INITIAL	1		3.8	ng/l	U	U	N		Yes
	Perfluorodecanoic acid (PFDA)	335-76-2	INITIAL	1		3.8	ng/l	U	U	N		Yes
	Perfluorododecanoic acid (PFDoA)	307-55-1	INITIAL	1		3.8	ng/l	U	U	N		Yes
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	INITIAL	1		3.8	ng/l	U	U	N		Yes
	Perfluoroheptanoic acid (PFHpA)	375-85-9	INITIAL	1		3.8	ng/l	U	U	N		Yes
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	INITIAL	1	7.7	3.8	ng/l			Y		Yes
	Perfluorohexanoic acid (PFHxA)	307-24-4	INITIAL	1		3.8	ng/l	U	U	N		Yes
	Perfluorononanoic acid (PFNA)	375-95-1	INITIAL	1		3.8	ng/l	U	U	N		Yes
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	INITIAL	1	14	3.8	ng/l		J	Y	LB,PJ	Yes
	Perfluorooctanoic acid (PFOA)	335-67-1	INITIAL	1	5.7	3.8	ng/l			Y		Yes
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	INITIAL	1		3.8	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-003
Sample Name	Area19-PW-9B
Sample Type	N
Sample Date	7/19/2022 3:05:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	INITIAL	1		3.8	ng/l	U	U	N		Yes
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	INITIAL	1		3.8	ng/l	U	U	N		Yes
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	INITIAL	1		3.8	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-004
Sample Name	Area19-PW-10A
Sample Type	N
Sample Date	7/19/2022 4:40:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	763051-92-9	INITIAL	1		6.9	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	INITIAL	1		6.9	ng/l	U	UJ	N	IS	Yes
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	INITIAL	1		6.9	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	INITIAL	1		6.9	ng/l	U	UJ	N	IS	Yes
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	INITIAL	1		6.9	ng/l	U	U	N		Yes
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS	756426-58-1	INITIAL	1		6.9	ng/l	U	U	N		Yes
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	INITIAL	1		6.9	ng/l	U	U	N		Yes
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	INITIAL	1		6.9	ng/l	U	U	N		Yes
	N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	INITIAL	1		6.9	ng/l	U	U	N		Yes
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	INITIAL	1	3.9	3.5	ng/l			Y		Yes
	Perfluorobutanoic Acid (PFBA)	375-22-4	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorodecanoic acid (PFDA)	335-76-2	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorododecanoic acid (PFDoA)	307-55-1	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoroheptanoic acid (PFHpA)	375-85-9	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorohexanoic acid (PFHxA)	307-24-4	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorononanoic acid (PFNA)	375-95-1	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	INITIAL	1	7.1	3.5	ng/l		J	Y	LB	Yes
	Perfluorooctanoic acid (PFOA)	335-67-1	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	INITIAL	1		3.5	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-004
Sample Name	Area19-PW-10A
Sample Type	N
Sample Date	7/19/2022 4:40:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	INITIAL	1		3.5	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-005
Sample Name	WVNW-PW-5A
Sample Type	N
Sample Date	7/20/2022 11:00:00 AM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	763051-92-9	INITIAL	1		6.9	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	INITIAL	1		6.9	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	INITIAL	1		6.9	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	INITIAL	1		6.9	ng/l	U	UJ	N	IS	Yes
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	INITIAL	1		6.9	ng/l	U	U	N		Yes
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS	756426-58-1	INITIAL	1		6.9	ng/l	U	U	N		Yes
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	INITIAL	1		6.9	ng/l	U	U	N		Yes
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	INITIAL	1		6.9	ng/l	U	U	N		Yes
	N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	INITIAL	1		6.9	ng/l	U	U	N		Yes
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorobutanoic Acid (PFBA)	375-22-4	INITIAL	1	4.1	3.5	ng/l			Y		Yes
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorodecanoic acid (PFDA)	335-76-2	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorododecanoic acid (PFDoA)	307-55-1	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoroheptanoic acid (PFHpA)	375-85-9	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorohexanoic acid (PFHxA)	307-24-4	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorononanoic acid (PFNA)	375-95-1	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	INITIAL	1	7.5	3.5	ng/l		J	Y	LB	Yes
	Perfluorooctanoic acid (PFOA)	335-67-1	INITIAL	1	7.3	3.5	ng/l			Y		Yes
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	INITIAL	1		3.5	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-005
Sample Name	WVNW-PW-5A
Sample Type	N
Sample Date	7/20/2022 11:00:00 AM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	INITIAL	1		3.5	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-006
Sample Name	WVNW-PW-5A DUP
Sample Type	N
Sample Date	7/20/2022 11:00:00 AM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	763051-92-9	INITIAL	1		7.4	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	INITIAL	1		7.4	ng/l	U	UJ	N	IS	Yes
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	INITIAL	1		7.4	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	INITIAL	1		7.4	ng/l	U	UJ	N	IS	Yes
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	INITIAL	1		7.4	ng/l	U	U	N		Yes
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS	756426-58-1	INITIAL	1		7.4	ng/l	U	U	N		Yes
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	INITIAL	1		7.4	ng/l	U	U	N		Yes
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	INITIAL	1		7.4	ng/l	U	U	N		Yes
	N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	INITIAL	1		7.4	ng/l	U	U	N		Yes
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorobutanoic Acid (PFBA)	375-22-4	INITIAL	1	4.3	3.7	ng/l			Y		Yes
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorodecanoic acid (PFDA)	335-76-2	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorododecanoic acid (PFDoA)	307-55-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoroheptanoic acid (PFHpA)	375-85-9	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorohexanoic acid (PFHxA)	307-24-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorononanoic acid (PFNA)	375-95-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	INITIAL	1	8.5	3.7	ng/l		J	Y	LB	Yes
	Perfluorooctanoic acid (PFOA)	335-67-1	INITIAL	1	7.7	3.7	ng/l			Y		Yes
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	INITIAL	1		3.7	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-006
Sample Name	WVNW-PW-5A DUP
Sample Type	N
Sample Date	7/20/2022 11:00:00 AM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	INITIAL	1		3.7	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-007
Sample Name	WVNW-PW-6A
Sample Type	N
Sample Date	7/20/2022 2:05:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	763051-92-9	INITIAL	1		7.5	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	INITIAL	1		7.5	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	INITIAL	1		7.5	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	INITIAL	1		7.5	ng/l	U	UJ	N	IS	Yes
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	INITIAL	1		7.5	ng/l	U	U	N		Yes
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS	756426-58-1	INITIAL	1		7.5	ng/l	U	U	N		Yes
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	INITIAL	1		7.5	ng/l	U	U	N		Yes
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	INITIAL	1		7.5	ng/l	U	U	N		Yes
	N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	INITIAL	1		7.5	ng/l	U	U	N		Yes
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorobutanoic Acid (PFBA)	375-22-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorodecanoic acid (PFDA)	335-76-2	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorododecanoic acid (PFDoA)	307-55-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoroheptanoic acid (PFHpA)	375-85-9	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorohexanoic acid (PFHxA)	307-24-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorononanoic acid (PFNA)	375-95-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorooctanoic acid (PFOA)	335-67-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	INITIAL	1		3.7	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-007
Sample Name	WVNW-PW-6A
Sample Type	N
Sample Date	7/20/2022 2:05:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	INITIAL	1		3.7	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-008
Sample Name	WVNW-PW-6B
Sample Type	N
Sample Date	7/20/2022 2:35:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	763051-92-9	INITIAL	1		7.4	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	INITIAL	1		7.4	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	INITIAL	1		7.4	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	INITIAL	1		7.4	ng/l	U	UJ	N	IS	Yes
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	INITIAL	1		7.4	ng/l	U	U	N		Yes
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS	756426-58-1	INITIAL	1		7.4	ng/l	U	U	N		Yes
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	INITIAL	1		7.4	ng/l	U	U	N		Yes
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	INITIAL	1		7.4	ng/l	U	U	N		Yes
	N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	INITIAL	1		7.4	ng/l	U	U	N		Yes
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorobutanoic Acid (PFBA)	375-22-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorodecanoic acid (PFDA)	335-76-2	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorododecanoic acid (PFDoA)	307-55-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoroheptanoic acid (PFHpA)	375-85-9	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorohexanoic acid (PFHxA)	307-24-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorononanoic acid (PFNA)	375-95-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorooctanoic acid (PFOA)	335-67-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	INITIAL	1		3.7	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-008
Sample Name	WVNW-PW-6B
Sample Type	N
Sample Date	7/20/2022 2:35:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	INITIAL	1		3.7	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-009
Sample Name	WVNW-PW-7A
Sample Type	N
Sample Date	7/20/2022 3:25:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	763051-92-9	INITIAL	1		7.4	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	INITIAL	1		7.4	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	INITIAL	1		7.4	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	INITIAL	1		7.4	ng/l	U	UJ	N	IS	Yes
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	INITIAL	1		7.4	ng/l	U	U	N		Yes
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS	756426-58-1	INITIAL	1		7.4	ng/l	U	U	N		Yes
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	INITIAL	1		7.4	ng/l	U	U	N		Yes
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	INITIAL	1		7.4	ng/l	U	U	N		Yes
	N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	INITIAL	1		7.4	ng/l	U	U	N		Yes
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorobutanoic Acid (PFBA)	375-22-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorodecanoic acid (PFDA)	335-76-2	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorododecanoic acid (PFDoA)	307-55-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoroheptanoic acid (PFHpA)	375-85-9	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorohexanoic acid (PFHxA)	307-24-4	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorononanoic acid (PFNA)	375-95-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorooctanoic acid (PFOA)	335-67-1	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	INITIAL	1		3.7	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-009
Sample Name	WVNW-PW-7A
Sample Type	N
Sample Date	7/20/2022 3:25:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	INITIAL	1		3.7	ng/l	U	U	N		Yes
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	INITIAL	1		3.7	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-010
Sample Name	EQB-HT
Sample Type	N
Sample Date	7/20/2022 4:45:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	763051-92-9	INITIAL	1		7.9	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	INITIAL	1		7.9	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	INITIAL	1		7.9	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	INITIAL	1		7.9	ng/l	U	UJ	N	IS	Yes
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	INITIAL	1		7.9	ng/l	U	U	N		Yes
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS	756426-58-1	INITIAL	1		7.9	ng/l	U	U	N		Yes
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	INITIAL	1		7.9	ng/l	U	U	N		Yes
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	INITIAL	1		7.9	ng/l	U	U	N		Yes
	N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	INITIAL	1		7.9	ng/l	U	U	N		Yes
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluorobutanoic Acid (PFBA)	375-22-4	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluorodecanoic acid (PFDA)	335-76-2	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluorododecanoic acid (PFDoA)	307-55-1	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluoroheptanoic acid (PFHpA)	375-85-9	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluorohexanoic acid (PFHxA)	307-24-4	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluorononanoic acid (PFNA)	375-95-1	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluorooctanoic acid (PFOA)	335-67-1	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	INITIAL	1		3.9	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-010
Sample Name	EQB-HT
Sample Type	N
Sample Date	7/20/2022 4:45:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	INITIAL	1		3.9	ng/l	U	U	N		Yes
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	INITIAL	1		3.9	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-011
Sample Name	FB-7/20
Sample Type	N
Sample Date	7/20/2022 3:30:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	763051-92-9	INITIAL	1		7.0	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluohexane sulfonic acid (4:2 FTS)	757124-72-4	INITIAL	1		7.0	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	INITIAL	1		7.0	ng/l	U	U	N		Yes
	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	INITIAL	1		7.0	ng/l	U	UJ	N	IS	Yes
	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	INITIAL	1		7.0	ng/l	U	U	N		Yes
	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS	756426-58-1	INITIAL	1		7.0	ng/l	U	U	N		Yes
	Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	INITIAL	1		7.0	ng/l	U	U	N		Yes
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	INITIAL	1		7.0	ng/l	U	U	N		Yes
	N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	INITIAL	1		7.0	ng/l	U	U	N		Yes
	Perfluoro-1-nonane sulfonic acid (PFNS)	68259-12-1	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoro-1-pentane sulfonic acid (PFPeS)	2706-91-4	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorobutanoic Acid (PFBA)	375-22-4	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorodecanesulfonic acid (PFDS)	335-77-3	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorodecanoic acid (PFDA)	335-76-2	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorododecanoic acid (PFDoA)	307-55-1	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoroheptanesulfonic acid (PFHPS)	375-92-8	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoroheptanoic acid (PFHpA)	375-85-9	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorohexanoic acid (PFHxA)	307-24-4	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorononanoic acid (PFNA)	375-95-1	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorooctanoic acid (PFOA)	335-67-1	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoropentanoic Acid (PFPeA)	2706-90-3	INITIAL	1		3.5	ng/l	U	U	N		Yes

Lab Sample ID	XG22049-011
Sample Name	FB-7/20
Sample Type	N
Sample Date	7/20/2022 3:30:00 PM
Sample Matrix	WG
Validated?	Y
Validation Level	Level 4

ANALYTIC METHOD	Chemical Name	CAS	Test Type	DF	Validation Result	Validation LOQ	UNIT	Lab Qualifiers	Validation Qualifiers	Validation Detect Flag	Validation Reason Code	Reportable?
PFAS by ID SO	Perfluorotetradecanoic acid (PFTA)	376-06-7	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluorotridecanoic Acid (PFTriA)	72629-94-8	INITIAL	1		3.5	ng/l	U	U	N		Yes
	Perfluoroundecanoic Acid (PFUnA)	2058-94-8	INITIAL	1		3.5	ng/l	U	U	N		Yes

SECTION 3

DATA SUPPORT DOCUMENTATION

HI-RES AND PFAS ORGANIC ANALYSIS SUPPORT DOCUMENTATION

Client Name:	WNJ	EnvStd Project Manager:	Jared A.
Site/Project Name:	Groundwater Surface Water Interface GSI	Reviewed by:	Dwight M. Hoster
Job Number/Task:	2021 PFAS DV Wolverine World Wide (20219475.A000) > Professional Services > Groundwater Surface Water Interface GSI : PFAS Data Validation	Approved by:	Bryan J. Eck
Laboratory/Location:	Pace SC	Completion Date:	9/6/2023
SDG:	XG22049	Validation Level:	L4
Sample Collection Dates:	7/19/22 – 7/20/22		

The following table indicates criteria that were examined, the identified problems, and support documentation attachments.

	Criteria Examined in Detail							**Problems Identified**						
	Note: All items examined have been included in the Support Document unless otherwise noted.													
	Check (√) if Yes or Footnote Letter for Comments Below													
Parameter/ Method	PFAS							PFAS						
Condition Upon Receipt	√													
Sample Preservation	√													
Holding Times	√													
Blank Analysis Results	√													
Laboratory Control Sample/Laboratory Fortified Blank/ On-going Precision and Recovery Standard	√													
Surrogates	√							√						
PFAS Pre-Extraction Internal Standards	√							√						
Laboratory Duplicate														
Field Duplicate	√													
Matrix Spike/Matrix Spike Duplicate	√													
Sample Preparation	√													
Mass Tuning	√													
Initial Calibration	√													
Second-Source Calibration Verification	√													
PFAS Signal Suppression Check	√													
Peak Asymmetry														
Continuing Calibrations	√													
Resolution Check Standards	√													
Detection Limit/Sensitivity	√													
Post-Extraction Internal Standards														
Quantitation of Results	√													
Linear/Branched Identification/Quantitation	√							√						
Qualitative Identification	√							√						
2,3,7,8-TCDD – 2nd column confirmation														
PFAS Ion Transition Ratio/Hi-Res Ion Ratio	√							√						
Hi-Res Lock Mass Monitoring														
Dioxin/Furan Chlorodiphenyl Ethers Monitoring														
Analytical Sequence	√													
Percent Solids														
Deliverable was Complete	√													
Other: chromatographic interference	√													

Comments: Qualitative Identification and Quantitation of Results are not included in the Support Documentation unless a problem was identified.

WWW Data Package Deliverable Checklist
Shealy EPA 537 MOD ID

Reviewer: DMH	Laboratory:			Project: Groundwater Surface Water Interface GSI
Date of Review: 8/2023	Pace SC			SDG#: XG22049
Items	**YES**	**NO**	**N/A**	**Comments**
1. Laboratory Case Narrative	X			
2. Chain-of-Custody	X			
3. Sample Receipt Checklist	X			
4. Sample Results Summary (Form 1)	X			
A. Sample Raw Data	X			
B. Correct Reporting Limits?	X			
C. All analytes requested are reported?	X			
5. Surrogate (Pre-Extraction Internal Standard) Summary (Form 2)	X			
A. Correct Recovery Limits?	X			
6. MS/MSD Summary (Form 3A)	X			
A. MS/MSD Raw Data	X			
B. Correct MS/MSD Recovery and RPD Limits?	X			
4. LCS/LCSD Summary (Form 3B)	X			
A. LCS/LCSD Raw Data	X			
B. Correct LCS/LCSD Recovery and RPD Limits?	X			
5. Blank Summary and Association (Form 4)	X			
A. Blank Raw Data	X			
6. Internal Standard Summary (Form 8)	X			
A. Correct Internal Standard Limits?	X			
7. Initial Calibration Summary - Target Analytes	X			
A. Initial Calibration Summary - Surrogates	X			
B. Initial Calibration Raw Data	X			
C. Qualitative Linear/Branched PFOA Standard Raw Data	X			
8. Initial Calibration Verification Summary	X			
A. Initial Calibration Verification Raw Data	X			
9. Continuing Calibration Verification Summary	X			
A. Daily Instrument Sensitivity Check	X			
B. Continuing Calibration Verification Raw Data	X			
10. Tune Data	X			
11. Instrument Blank Raw Data	X			
12. Analytical Sequence Logs	X			
13. Extraction Logs	X			
14. Percent Solids Raw Data			X	
15. Standard Preparation Sheets	X			
16. Certificates of Analysis	X			
17. Other				

ENVIRONMENTAL® STANDARDS
Montrose Environmental Group

BLANK ANALYSIS RESULTS

Fraction[1]	Matrix[2]	Blank Type[3]	Blank Sample Number	Contaminant	Concentration	Units[4]	Qualification limit (5×)	Qualification limit (10×)
PFAS	Aq	ICB	ICB 8/15/22 20:05	PFDA	7.1194	ng/L	35.597	71.194
PFAS	Aq	ICB	ICB 8/15/22 20:05	MeFOSAA	16.268	ng/L	81.34	162.68
PFAS	Aq	ICB	ICB 8/15/22 20:05	EtFOSAA	27.465	ng/L	137.325	274.65
PFAS	Aq	ICB	ICB 8/15/22 20:05	PFTeDA	8.318	ng/L	41.59	83.18
PFAS	Aq	CCB	CCB 8/18/22 12:44	PFOS	23.103	ng/L	115.515	231.03
PFAS	Aq	CCB	CCB 8/18/22 12:44	PFTeDA	3.4869	ng/L	17.4345	34.869

1 - M = Metal; G = General Chemistry; V = Volatile; S = Semivolatile; P = Pesticide/PCB; O = Other:
2 - Aq = Aqueous; S = Solid
3 - MB = Method Blank; TB = Trip Blank; EB = Equipment Blank; FB = Field Blank;
IB = Instrument Blank; CCB = Continuing Calibration Blank; ICB = Initial Calibration Blank
4 - µg/L, mg/L, µg/kg, mg/kg

Notes: Evaluated using on-column concentrations.

Pace Environmental Services, LLC
Analyte Quantitation Report

Samples reported with ICB are ND for analytes w/ BLK detections no qual warranted

Data File: \\Organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b\081522B017.d
Injection Date: 15-Aug-2022 20:05:39 Injection Vol: 10.0 uL
Sample Type: InstBlk Auto Sampler: 94
Lab Sample ID: ID BLK B3 Lab Prep. Batch:
Sample Info: ID BLK B3 Misc. Info:
Inst. ID: LCMSMS02.i Operator: Matthew M. Miller

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1000 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	T RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	Cal Conc ng/L	OnCol Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.660	1.659	0	1421644	20	>100:1			2000.00	1368.09	62.1	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													U
212.9 > 168.9	46		1.666		ND								
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		1.994	1.994	0	1344005	17	>100:1			2000.00	1355.06	62.4	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													U
262.9 > 218.9	50		1.994		ND								
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.045	2.045	0	380337	16	>100:1			2000.00	1336.96	61.4	
7 Perfluoro-1-butanesulfonate (PFBS) CAS: 375-73-5													U
298.9 > 80	44		2.045		ND								
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													U
349 > 80	44		2.362		ND								
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.300	2.299	0	272535	18	>100:1			10000	6962.82	60.1	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonate] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.299		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.335	2.335	0	1406181	17	>100:1			2000.00	1378.18	62.2	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													U
313 > 269	49		2.335		ND								
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.452	2.451	0	2170302	18	>100:1			10000	7394.90	64.7	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.451		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.721	2.720	0	1130814	19	>100:1			2000.00	1367.44	61.8	
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													U
363 > 319	47		2.720		ND								
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.739	2.739	0	272998	18	>100:1			2000.00	1345.01	62	
14 Perfluorohexanesulfonate (PFHxS) CAS: 355-46-4													U
399 > 80	45		2.739		ND								
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.766		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													U
449 > 80	45		3.186		ND								
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.144	3.143	0	200393	24	>100:1			10000	6911.05	58.2	

Signal	Quant Std	RT (min.)	Exp RT (min.)	T RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	Cal Conc ng/L	OnCol Conc ng/L	%Rec	Flags
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.143		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.179	3.172	0	1144289	22	>100:1			2000.00	1350.20	60.5	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													U
413 > 369	53		3.179		ND								
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.680	3.674	0	252955	24	>100:1			2000.00	1397.34	66.4	
18 Perfluorooctanesulfonate (PFOS) CAS: 1763-23-1													U
499 > 80	54		3.680		ND								
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.973		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		4.161		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.615		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													
631 > 451	54	4.878	4.862	1/1	1725	15	11:1			4.3475	4.3475		
34 Perfluorododecanesulfonic acid (PFDOS) CAS: 79780-39-5													U
699 > 80	54		5.402		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.680	3.680	0	1331149	25	>100:1			2000.00	1397.07	64.8	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.680		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		4.060	4.048	1	497625	23	>100:1			2000.00	1388.51	61.9	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		4.048		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		4.161	4.155	0	178976	24	>100:1			10000	6905.76	66.8	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonate] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		4.161		ND								
4 1H,1H,2H,2H-perfluorododecane sulfonate (10:2FTS) CAS: 120226-60-0													U
627 > 607	65		5.057		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.174	4.174	0	1202436	23	>100:1			2000.00	1315.05	59.8	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													
513 > 469	51	4.167	4.174	0/0	4427	16	11:1	Target = 13.43		7.1194	7.1194		
513 > 169	51	4.180	4.174		261	15	5.8:1	16.96 (6.71-20.15)					
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.399	4.395	0	1374154	36	>100:1			10000	6890.06	63	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													
570 > 419	58	4.399	4.399	0/0	1763	45	26:1	Target = 1.32	5.50	16.268	16.268		
570 > 483	58	4.403	4.399		2370	56	34:1	0.74 (0.66-1.99)	3.60				
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.638	4.631	0	1201164	22	>100:1			10000	7204.36	63.8	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													
584 > 419	60	4.646	4.640	0/0	3353	44	19:1	Target = 1.55	11.14	27.465	27.465		
584 > 526	60	4.655	4.640		2559	32	23:1	1.31 (0.77-2.32)	4.29				
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.646	4.640	0	1116385	21	>100:1			2000.00	1337.52	58.1	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.640		ND								
D 61 d7-MeFOSE CAS: SESI-0129													
623 > 59		4.696	4.689	0	156480	21	>100:1			2000.00	1424.04	64.3	
32 2-N-methylperfluoro-1-octanesulfonamido-ethanol (MeFOSE) CAS: 24448-09-7													
616 > 59	61	4.720	4.705	1/1	1015	14	7.9:1			10.916	10.916		

Signal	Quant Std	RT (min.)	Exp RT (min.)	T RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	Cal Conc ng/L	OnCol Conc ng/L	%Rec	Flags
D 57 d3-MeFOSA CAS: SESI-0109													
515 > 169		4.728	4.713	1	80425	21	>100:1			2000.00	1326.05	60.3	
26 N-methylperfluoro-1-octanesulfonamide (MeFOSA) CAS: 31506-32-8													U
512 > 169	57		4.730		ND								
D 62 d9-EtFOSE CAS: SESI-0130													
639 > 59		4.960	4.952	0	166103	18	>100:1			2000.00	1273.37	61.1	
33 2-N-ethylperfluoro-1-octanesulfonamido-ethanol (EtFOSE) CAS: 1691-99-2													
630 > 59	62	4.969	4.971	0/0	1359	15	5.9:1			16.731	16.731		
D 59 d5-EtFOSA CAS: SESI-0108													
531 > 169		4.989	4.981	0	87078	20	>100:1			2000.00	1494.92	72.7	
27 N-ethylperfluoro-1-octanesulfonamide (EtFOSA) CAS: 4151-50-2													
526 > 169	59	4.998	4.990	0/0	2043	16	11:1	Target = 1.00		43.622	43.622		
526 > 219	59	5.017	4.990		1026	13	10:1	1.99 (0.50-1.50)*					J
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		5.065	5.057	0	1097930	20	>100:1			2000.00	1294.12	60.3	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		5.057		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													
663 > 619	38	5.435	5.436	0/0	3642	15	10:1	Target = 8.53		6.7146	6.7146		
663 > 169	38	5.443	5.436		304	14	7.2:1	11.98 (4.26-12.79)					
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.774	5.769	0	1359346	38	>100:1			2000.00	1298.55	61.8	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													
713 > 669	42	5.774	5.774	0/0	5206	20	24:1	Target = 11.99		8.3180	8.3180		
713 > 169	42	5.774	5.774		404	18	17:1	12.88 (5.99-17.99)					
D 40 13C2_PFHxDA CAS: SESI-0103													
815 > 770		6.378	6.377	0	1156665	21	>100:1			2000.00	1343.13	61.2	
35 Perfluoro-n-hexadecanoic acid (PFHxDA) CAS: 67905-19-5													
813 > 769	40	6.378	6.377	0/0	7605	17	49:1	Target = 10.18		26.907	26.907		
813 > 269	40	6.378	6.377		857	19	23:1	8.87 (5.09-15.27)					
36 Perfluoro-n-octadecanoic acid (PFODA) CAS: 16517-11-6													
913 > 869	40	6.909	6.913	0/0	5251	22	9.9:1	Target = 14.01		11.745	11.745		
913 > 319	40	6.905	6.913		321	17	15:1	16.35 (7.00-21.02)					
*** 37 13C2_PFDA**													
515 > 470		4.187	4.161	2	108	11	78:1			0			
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.317	2.335	-1	745	14	7.8:1			0			
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.187	3.179	0	185	12	6.9:1			0			
*** 43 13C3_PFBA**													
216 > 172		1.666	1.666	0	7653	18	14:1			0			
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.692	3.674	1	3072	24	27:1			0			

Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

QC Flag Legend

U - Result Less Than Method Detection Limit

Pace Environmental Services, LLC
Analyte Quantitation Report

Sample results are ND or > 5x blank detections, no qual

Data File: \\Organics\LL\LCMSMS02.i\081822-nonDOD.b\081822006.d
Injection Date: 18-Aug-2022 12:44:27 Injection Vol: 10.0 uL
Sample Type: InstBlk Auto Sampler: 96
Lab Sample ID: ID IBLK A Lab Prep. Batch:
Sample Info: ID IBLK A Misc. Info:
Inst. ID: LCMSMS02.i Operator: eqi.svoa

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1000 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	T RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	Cal Conc ng/L	OnCol Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.653	1.654	0	2096382	21	>100:1			2000.00	2017.41	102.9	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													U
212.9 > 168.9	46		1.654		ND								
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		1.985	1.986	0	1995094	17	>100:1			2000.00	2011.50	106.3	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													U
262.9 > 218.9	50		1.986		ND								
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.034	2.035	0	583725	16	>100:1			2000.00	2051.91	102.5	
7 Perfluoro-1-butanesulfonate (PFBS) CAS: 375-73-5													U
298.9 > 80	44		2.035		ND								
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													U
349 > 80	44		2.354		ND								
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.283	2.284	0	444255	20	>100:1			10000	11350	106.1	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonate] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.284		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.326	2.327	0	2056204	19	>100:1			2000.00	2015.25	105.4	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													U
313 > 269	49		2.327		ND								
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.433	2.434	0	3281443	18	>100:1			10000	11181	106.6	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.434		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.706	2.708	0	1770189	18	>100:1			2000.00	2140.61	115.4	
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													U
363 > 319	47		2.708		ND								
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.725	2.728	0	440582	18	>100:1			2000.00	2170.66	111	
14 Perfluorohexanesulfonate (PFHxS) CAS: 355-46-4													U
399 > 80	45		2.728		ND								
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.757		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													U
449 > 80	45		3.180		ND								
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.130	3.132	0	332155	22	>100:1			10000	11455	91.1	

Signal	Quant Std	RT (min.)	Exp RT (min.)	T RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	Cal Conc ng/L	OnCol Conc ng/L	%Rec	Flags
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.132		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.162	3.164	0	1782025	23	>100:1			2000.00	2102.70	101.3	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													U
413 > 369	53		3.164		ND								
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.671	3.669	0	415378	36	>100:1			2000.00	2294.58	110.4	
18 Perfluorooctanesulfonate (PFOS) CAS: 1763-23-1													
499 > 80	54	3.690	3.669	1/1	5780	59	35:1	Target = 3.67	1.57	23.103	23.103		M
499 > 99	54	3.677	3.669		1930	52	32:1	2.99 (1.83-5.51)	3.49				M
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.963		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		4.163		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.621		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.874		ND								
34 Perfluorododecanesulfonic acid (PFDOS) CAS: 79780-39-5													U
699 > 80	54		5.408		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.671	3.669	0	2129667	27	>100:1			2000.00	2235.13	105.2	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.675		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		4.050	4.048	0	752938	23	>100:1			2000.00	2100.91	100.1	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		4.048		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		4.153	4.157	0	287324	25	>100:1			10000	11086	104.6	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonate] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		4.157		ND								
4 1H,1H,2H,2H-perfluorododecane sulfonate (10:2FTS) CAS: 120226-60-0													U
627 > 607	65		5.069		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.171	4.169	0	1827936	24	>100:1			2000.00	1999.14	105	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.175		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.394	4.399	0	2305889	21	>100:1			10000	11562	109	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.399		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.633	4.631	0	1939713	19	>100:1			10000	11634	106.4	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.641		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.633	4.641	0	1710584	19	>100:1			2000.00	2049.43	105.6	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.641		ND								
D 61 d7-MeFOSE CAS: SESI-0129													
623 > 59		4.689	4.686	0	213202	18	>100:1			2000.00	1940.24	94.5	
32 2-N-methylperfluoro-1-octanesulfonamido-ethanol (MeFOSE) CAS: 24448-09-7													U
616 > 59	61		4.709		ND								
D 57 d3-MeFOSA CAS: SESI-0109													
515 > 169		4.719	4.724	0	117794	19	>100:1			2000.00	1942.18	97.5	

Signal	Quant Std	RT (min.)	Exp RT (min.)	T RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	Cal Conc ng/L	OnCol Conc ng/L	%Rec	Flags
26 N-methylperfluoro-1-octanesulfonamide (MeFOSA) CAS: 31506-32-8													U
512 > 169	57		4.724		ND								
D 62 d9-EtFOSE CAS: SESI-0130													
639 > 59		4.954	4.950	0	272488	19	>100:1			2000.00	2088.93	106.1	
33 2-N-ethylperfluoro-1-octanesulfonamido-ethanol (EtFOSE) CAS: 1691-99-2													U
630 > 59	62		4.969		ND								
D 59 d5-EtFOSA CAS: SESI-0108													
531 > 169		4.981	4.978	0	122477	24	>100:1			2000.00	2102.63	103.5	
27 N-ethylperfluoro-1-octanesulfonamide (EtFOSA) CAS: 4151-50-2													U
526 > 169	59		4.987		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		5.064	5.060	0	1787354	20	>100:1			2000.00	2106.74	108.6	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		5.069		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		5.441		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.780	5.783	0	2094122	38	>100:1			2000.00	2000.46	104	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													
713 > 669	42	5.780	5.783	0/0	3362	27	11:1	Target = 12.03		3.4869	3.4869		
713 > 169	42	5.764	5.783		245	28	5.0:1	13.72 (6.01-18.04)					M
D 40 13C2_PFHxDA CAS: SESI-0103													
815 > 770		6.387	6.389	0	1994787	38	>100:1			2000.00	2316.36	105.5	
35 Perfluoro-n-hexadecanoic acid (PFHxDA) CAS: 67905-19-5													
813 > 769	40	6.383	6.389	0/0	10187	25	61:1	Target = 10.18		20.899	20.899		
813 > 269	40	6.383	6.389		946	21	43:1	10.76 (5.09-15.27)					
36 Perfluoro-n-octadecanoic acid (PFODA) CAS: 16517-11-6													U
913 > 869	40		6.934		ND								
*** 37 13C2_PFDA**													U
515 > 470			4.194		ND								
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.335	2.327	0	984	21	12:1			0			
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.146	3.156	-1	701	11	16:1			0			
*** 43 13C3_PFBA**													
216 > 172		1.653	1.654	0	11097	18	33:1			0			
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.654	3.652	0	2083	16	40:1			0			

Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

QC Flag Legend

U - Result Less Than Method Detection Limit
M - Compound Hit/Peak Manually Integrated

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\Organics\LL\LCMSMS02.i\081822-nonDOD.b\081822023.d
Injection Date: 18-Aug-2022 15:50:08 Injection Vol: 10.0 uL
Sample Type: MBlk Auto Sampler: 15
Lab Sample ID: XQ50680-001 Lab Prep. Batch: 50680
Sample Info: XQ50680-001 Misc. Info:
Inst. ID: LCMSMS02.i Operator: eqi.svoa

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Matrix: Aqueous
Final Conc.: Amt * DF * CF
Concentration Formula: CF = (VF/1000) * 1/VI = 0.0200000

Name	Value	Units	Description
DF	1		Dilution Factor
VF	5000	ul	Final Volume
VI	250	ml	Initial Sample Volume

Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1000 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.654	1.654	0	2265581	18	>100:1			2000.00	2180.24	111.2	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													U
212.9 > 168.9	46		1.654		ND								
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		1.986	1.986	0	2064599	15	>100:1			2000.00	2081.58	110	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													U
262.9 > 218.9	50		1.986		ND								
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.035	2.035	0	626657	14	>100:1			2000.00	2202.83	110.1	
7 Perfluoro-1-butanesulfonate (PFBS) CAS: 375-73-5													U
298.9 > 80	44		2.035		ND								
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													U
349 > 80	44		2.354		ND								
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.283	2.284	0	497243	18	>100:1			10000	12704	118.7	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonate] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.284		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.318	2.327	-1	2211135	16	>100:1			2000.00	2167.10	113.4	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													U
313 > 269	49		2.327		ND								
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.434	2.434	0	3480635	16	>100:1			10000	11860	113	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.434		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.708	2.708	0	1802989	17	>100:1			2000.00	2180.27	117.5	
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													U
363 > 319	47		2.708		ND								
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.727	2.728	0	447016	17	>100:1			2000.00	2202.36	112.7	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
14 Perfluorohexanesulfonate (PFHxS) CAS: 355-46-4													U
399 > 80	45		2.728		ND								
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.757		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													U
449 > 80	45		3.180		ND								
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.132	3.132	0	1278092	20	>100:1			10000	44078	350.7*	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.132		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.164	3.164	0	1971308	22	>100:1			2000.00	2326.05	112	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													U
413 > 369	53		3.164		ND								
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.662	3.669	0	406382	26	>100:1			2000.00	2244.89	108	
18 Perfluorooctanesulfonate (PFOS) CAS: 1763-23-1													U
499 > 80	54		3.669		ND								
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.963		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		4.163		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.621		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.874		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.669	3.669	0	2161010	27	>100:1			2000.00	2268.02	106.8	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.675		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		4.047	4.048	0	774065	25	>100:1			2000.00	2159.86	102.9	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		4.048		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		4.150	4.157	0	284275	25	>100:1			10000	10969	103.5	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonate] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		4.157		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.169	4.169	0	1852601	24	>100:1			2000.00	2026.11	106.5	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.175		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.390	4.399	-1	2186594	21	>100:1			10000	10964	103.3	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.399		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.630	4.631	0	1924857	20	>100:1			10000	11545	105.6	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.641		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.630	4.641	-1	1626829	20	>100:1			2000.00	1949.08	100.5	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.641		ND								
D 61 d7-MeFOSE CAS: SESI-0129													
623 > 59		4.693	4.686	0	212728	21	>100:1			2000.00	1935.93	94.3	
D 57 d3-MeFOSA CAS: SESI-0109													
515 > 169		4.715	4.724	-1	95393	21	>100:1			2000.00	1572.84	79	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 62 d9-EtFOSE CAS: SESI-0130													
639 > 59		4.949	4.950	0	237660	20	>100:1			2000.00	1821.93	92.5	
D 59 d5-EtFOSA CAS: SESI-0108													
531 > 169		4.976	4.978	0	98546	21	>100:1			2000.00	1691.80	83.3	
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		5.059	5.060	0	1619026	20	>100:1			2000.00	1908.33	98.3	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		5.069		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		5.441		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.777	5.783	0	1957921	38	>100:1			2000.00	1870.35	97.2	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.783		ND								
D 40 13C2_PFHxDA CAS: SESI-0103													
815 > 770		6.378	6.389	-1	1712065	38	>100:1			2000.00	1988.06	90.5	

Compound Type Legend

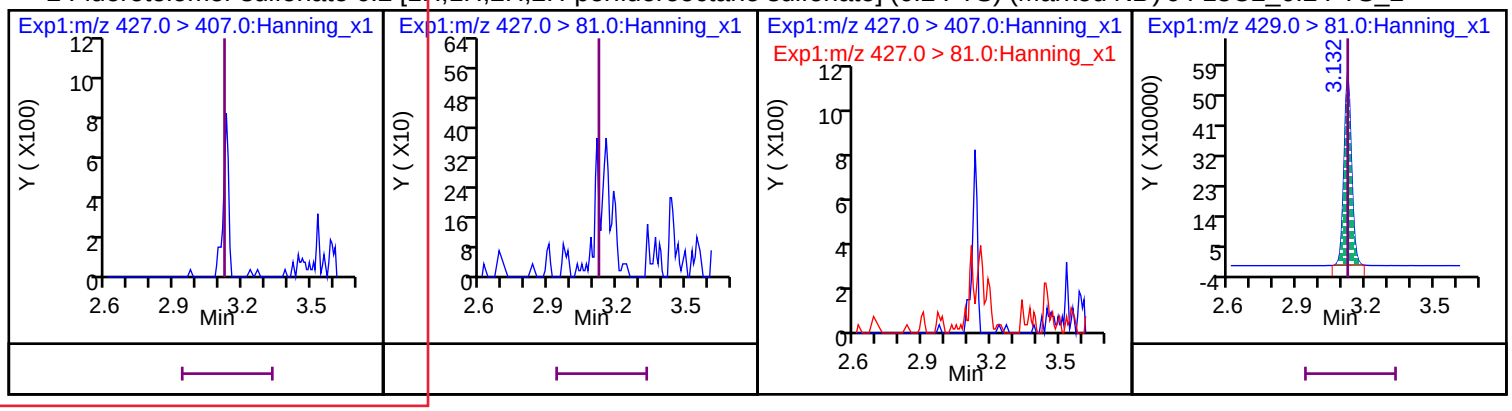
D - Isotopic Dilution Std.

QC Flag Legend

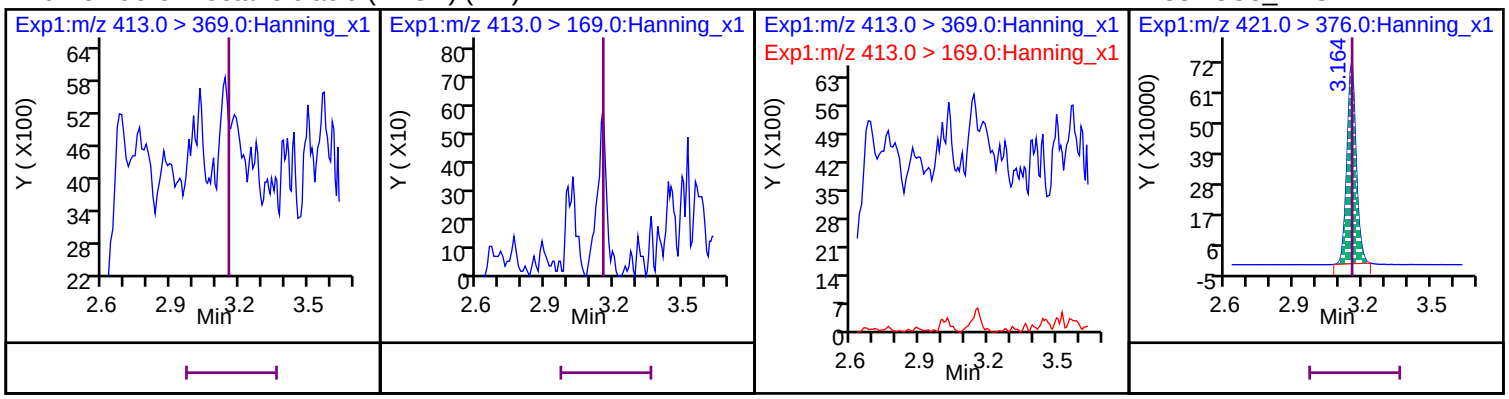
U - Result Less Than Method Detection Limit

peak response significantly lower than low level cal response, no detection

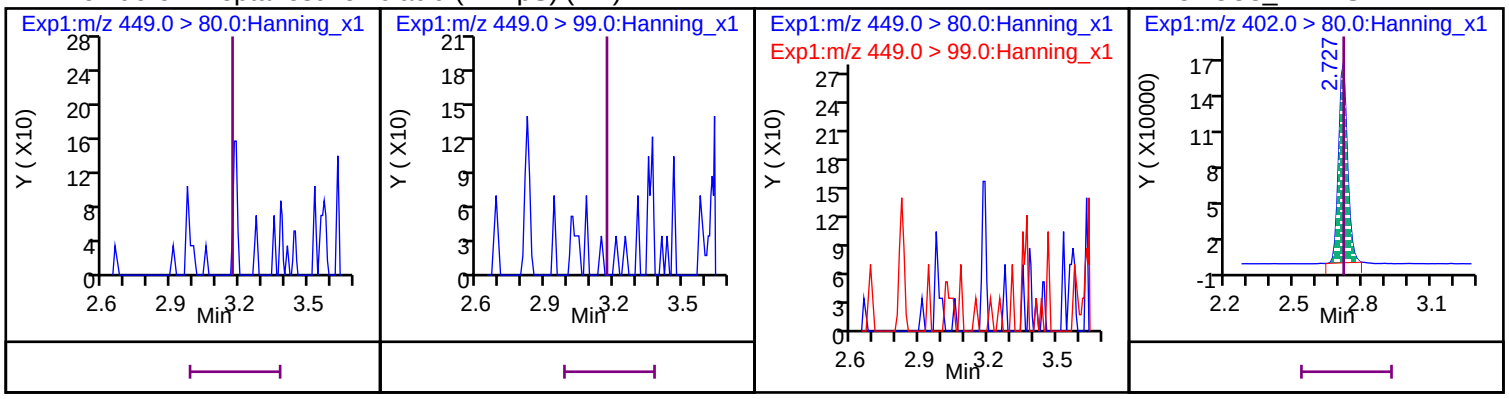
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) (Marked ND) 64 13C2_6:2 FTS_2



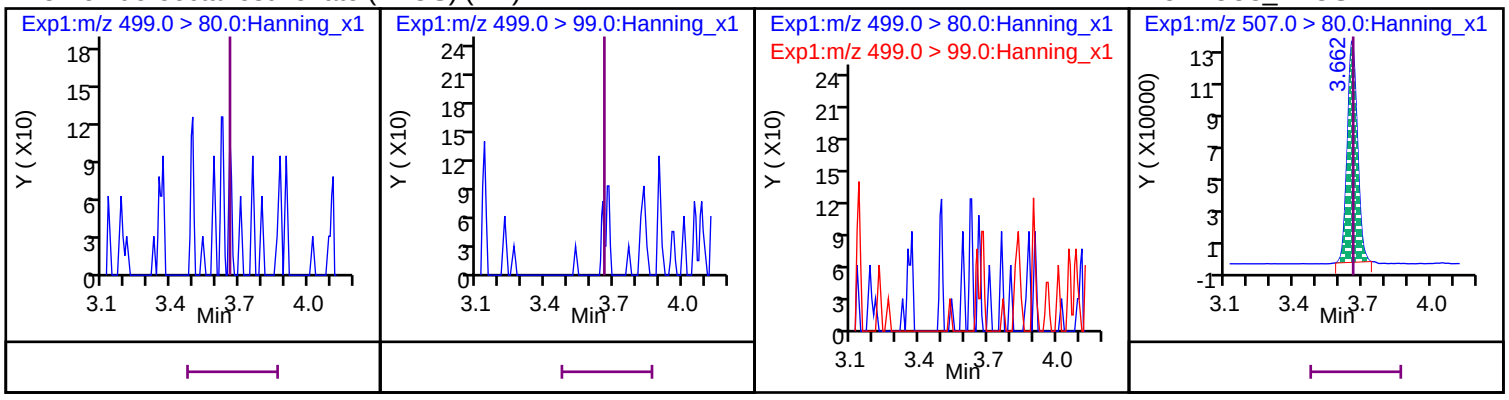
20 Perfluoro-n-octanoic acid (PFOA) (ND) D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS) (ND) D 45 13C3_PFHxS



18 Perfluorooctanesulfonate (PFOS) (ND) D 54 13C8_PFOS



ENVIRONMENTAL STANDARDS, INC.
EVALUATION OF DUPLICATE RESULTS

Matrix: ◉ Aqueous ○ Non-aq.
Reporting Level: ○ MDL ◉ QL
Units: ng/L

PRECISION OBJECTIVES:
If Both Results ≥ 5 × Their QL, RPD ≤: 30
If Either Result < 5 × Its QL, Dif. ≤: 1 **× Highest QL**

Sample ID:	WVNW-PW-5A				**Duplicate Sample ID:**	WVNW-PW-5A DUP					
Analyte	**Sample Concentration**	**Qual**	**QL**	**MDL**	**Duplicate Concentration**	**Qual**	**QL**	**MDL**	**Difference**	**RPD**	**Flag**
PFBA	4.1		3.5	NA	4.3		3.7	NA	0.2	NA	
PFOA	7.3		3.5	NA	7.7		3.7	NA	0.4	NA	
PFOS	7.5		3.5	NA	8.5		3.7	NA	1	NA	
				NA				NA			
				NA				NA			
				NA				NA			
				NA				NA			
				NA				NA			
				NA				NA			
				NA				NA			
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				NA				NA			
				NA				NA			
				NA				NA			
				NA				NA			
				NA				NA			
				NA				NA			

NOTES:

Qual: Qualifier(s) based on evaluation(s) other than Total/ vs. Dissolved comparison, if applicable (J, U, U* or B)
RPD: Relative Percent Difference
QL: Quantitation Limit
MDL: Method Detection Limit
RL: Reporting Limit. RL = QL for QL reporting and MDL for MDL reporting
J: The analyte concentration should be considered estimated
U: The analyte was not detected in the sample at or above the RL indicated. The RL will be used for comparison purposes.
UJ: The analyte was not detected in the sample at or above the Reporting Limit Indicated. The RL is approximate.
R: The analyte was analyzed for and detected, but sample results are unreliable. The presence or absence of the analyte cannot be verified.
UR: The analyte was analyzed for and not detected, but the determination that the analyte was not present in the sample is unreliable. The presence or absence of the analyte cannot be verified.
U* The result was blank qualified. The RL will be used for comparison purposes.
NA: The MDL (for QL reporting), RPD or Difference is not applicable

Comments:

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-001
Description: Area19-PW-8A
Matrix: Aqueous
Date Sampled: 07/19/2022 1105
Date Received: 07/22/2022

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	08/18/2022 1612	MMM	08/10/2022 1743	50680

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.3	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.3	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.3	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	7.3		3.6	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	6.8		3.6	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	6.3		3.6	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	6.7		3.6	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		117	50-150
13C2_6:2FTS	N	181	50-150
13C2_8:2FTS		103	50-150
13C2_PFDoA		104	50-150
13C2_PFTeDA		103	50-150
13C3_PFBS		108	50-150
13C3_PFHxS		109	50-150
13C3-HFPO-DA		109	50-150
13C4_PFBA		98	50-150
13C4_PFHpA		113	50-150
13C5_PFHxA		113	50-150
13C5_PFPeA		108	50-150
13C6_PFDA		109	50-150
13C7_PFUdA		106	50-150

SA %R > 150%
(-) result, UJ

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-001
Description: Area19-PW-8A
Matrix: Aqueous
Date Sampled: 07/19/2022 1105
Date Received: 07/22/2022

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		110	50-150
13C8_PFOS		109	50-150
13C8_PFOSA		99	50-150
13C9_PFNA		106	50-150
d5-EtFOSAA		106	50-150
d3-MeFOSAA		103	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\Organics\LL\LCMSMS02.i\081822-nonDOD.b\081822025.d
Injection Date: 18-Aug-2022 16:12:05 Injection Vol: 10.0 uL
Sample Type: Client Auto Sampler: 17
Lab Sample ID: XG22049-001 Lab Prep. Batch: 50680
Client ID: Area19-PW-8A Sample Group: XG22049
Sample Info: XG22049-001 Misc. Info:
Inst. ID: LCMSMS02.i Operator: eqi.svoa

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Matrix: Aqueous
Final Conc.: Amt * DF * CF
Concentration Formula: CF = (VF/1000) * 1/VI = 0.0182482

Name	Value	Units	Description
DF	1		Dilution Factor
VF	5000	ul	Final Volume
VI	274	ml	Initial Sample Volume

Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1000 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.654	1.654	0	2000479	18	>100:1			2000.00	1925.12	98.2	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													J
212.9 > 168.9	46	1.654	1.654	0/0	115816	17	86:1			114.79	2.0946		
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		1.986	1.986	0	2027682	14	>100:1			2000.00	2044.36	108	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													U
262.9 > 218.9	50		1.986		ND								
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.035	2.035	0	612950	14	>100:1			2000.00	2154.64	107.7	
7 Perfluoro-1-butanesulfonate (PFBS) CAS: 375-73-5													
298.9 > 80	44	2.035	2.035	0/0	161136	16	>100:1	Target = 3.53	✓	401.96	7.3350		
298.9 > 99	44	2.035	2.035		43691	15	>100:1	3.68 (1.76-5.30)					
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													J
349 > 80	44	2.354	2.354	0/0	31150	13	>100:1	Target = 2.93	✓	118.44	2.1614		
349 > 99	44	2.354	2.354		12203	17	>100:1	2.55 (1.46-4.40)					
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.284	2.284	0	489094	18	>100:1			10000	12496	116.8	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonate] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.284		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.318	2.327	-1	2200380	16	>100:1			2000.00	2156.56	112.8	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													J
313 > 269	49	2.318	2.327	-1/0	49999	12	69:1	Target = 18.12	✓	45.600	0.83211		M
313 > 119	49	2.318	2.327		3664	14	34:1	13.64 (9.06-27.18)					
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.434	2.434	0	3357641	16	>100:1			10000	11441	109	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.434		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.708	2.708	0	1730437	17	>100:1			2000.00	2092.54	112.8	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													J
363 > 319	47	2.708	2.708	0/0	24704	17	30:1	Target = 3.62		28.051	0.51189		
363 > 169	47	2.698	2.708		7679	12	74:1	3.21 (1.81-5.44)					
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.728	2.728	0	433312	17	>100:1			2000.00	2134.84	109.2	
14 Perfluorohexanesulfonate (PFHxS) CAS: 355-46-4													
399 > 80	45	2.728	2.728	0/0	89972	25	>100:1	Target = 3.03	4.66	373.10	6.8084		
399 > 99	45	2.728	2.728		26873	27	>100:1	3.34 (1.51-4.55)	6.97				
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.757		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													J
449 > 80	45	3.172	3.180	0/0	8013	16	78:1	Target = 3.08		39.596	0.72255		
449 > 99	45	3.172	3.180		2340	13	14:1	3.42 (1.54-4.63)					
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.132	3.132	0	658404	21	>100:1			10000	22707	180.6*	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.132		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.164	3.164	0	1926265	22	>100:1			2000.00	2272.90	109.5	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.058	3.164	-6/-6	323195	38	43:1	Target = 2.80		344.69	6.2900		M
413 > 169	53	3.032	3.164		143324	50	>100:1	2.25 (1.40-4.20)	112.11				M
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.669	3.669	0	410309	26	>100:1			2000.00	2266.58	109	
18 Perfluorooctanesulfonate (PFOS) CAS: 1763-23-1													
499 > 80	54	3.501	3.669	-10/-10	90311	84	>100:1	Target = 3.67	4.52	365.44	6.6686		M
499 > 99	54	3.669	3.669		13485	78	55:1	6.69 (1.83-5.51)*	0.54				MJ
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.963		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		4.163		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.621		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.874		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.669	3.669	0	2153099	27	>100:1			2000.00	2259.72	106.4	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.675		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		4.048	4.048	0	745981	23	>100:1			2000.00	2081.50	99.2	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		4.048		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		4.151	4.157	0	281944	25	>100:1			10000	10879	102.6	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonate] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		4.157		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.169	4.169	0	1888596	24	>100:1			2000.00	2065.48	108.5	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.175		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.391	4.399	-1	2177578	22	>100:1			10000	10918	102.9	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.399		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.631	4.631	0	1938419	20	>100:1			10000	11626	106.3	

Ion ratio > CUL (+) result, J

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.641		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.631	4.641	-1	1720762	20	>100:1			2000.00	2061.62	106.3	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.641		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		5.059	5.060	0	1712461	20	>100:1			2000.00	2018.47	104	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		5.069		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		5.441		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.772	5.783	-1	2070786	38	>100:1			2000.00	1978.16	102.8	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.783		ND								

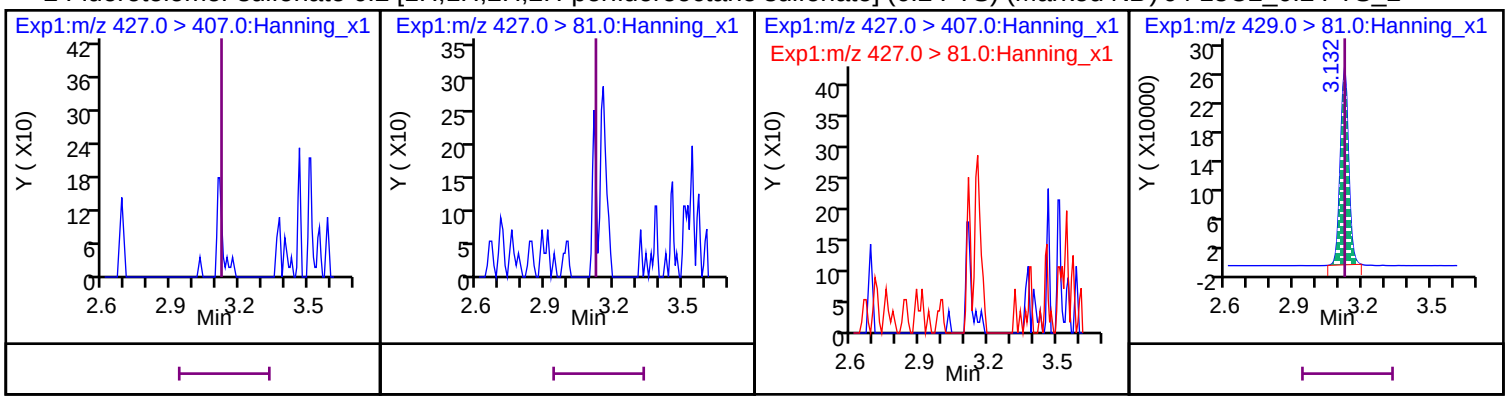
Compound Type Legend

D - Isotopic Dilution Std.

QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
M - Compound Hit/Peak Manually Integrated

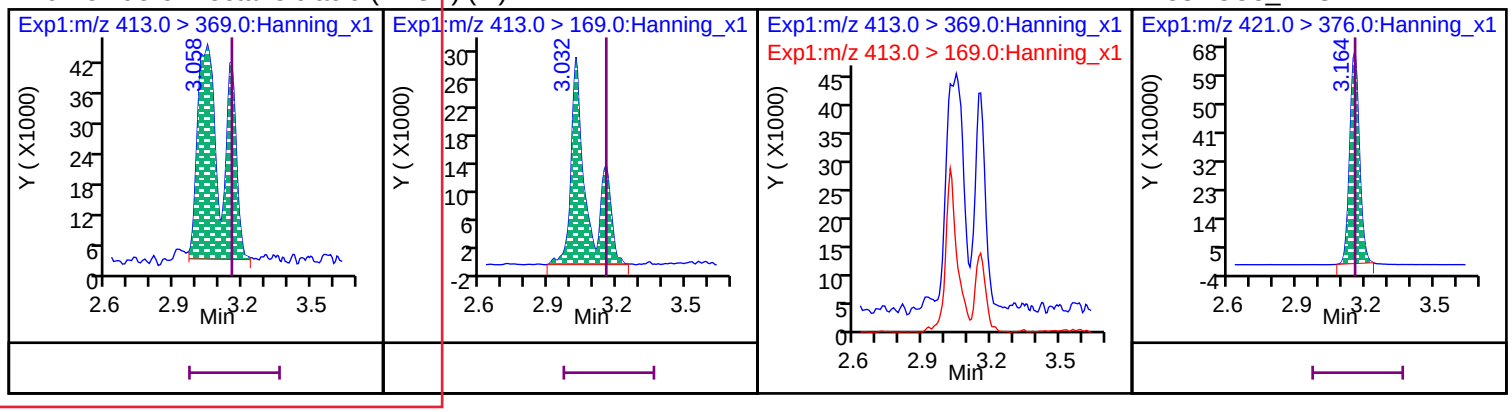
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) (Marked ND) 64 13C2_6:2 FTS_2



significant branched isomers

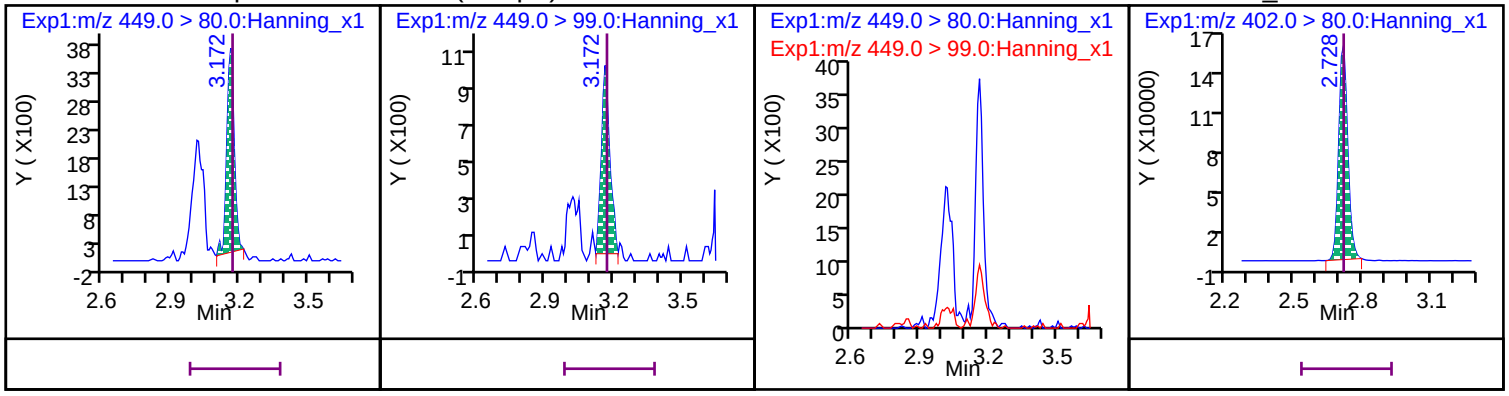
20 Perfluoro-n-octanoic acid (PFOA) (M)

D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS)

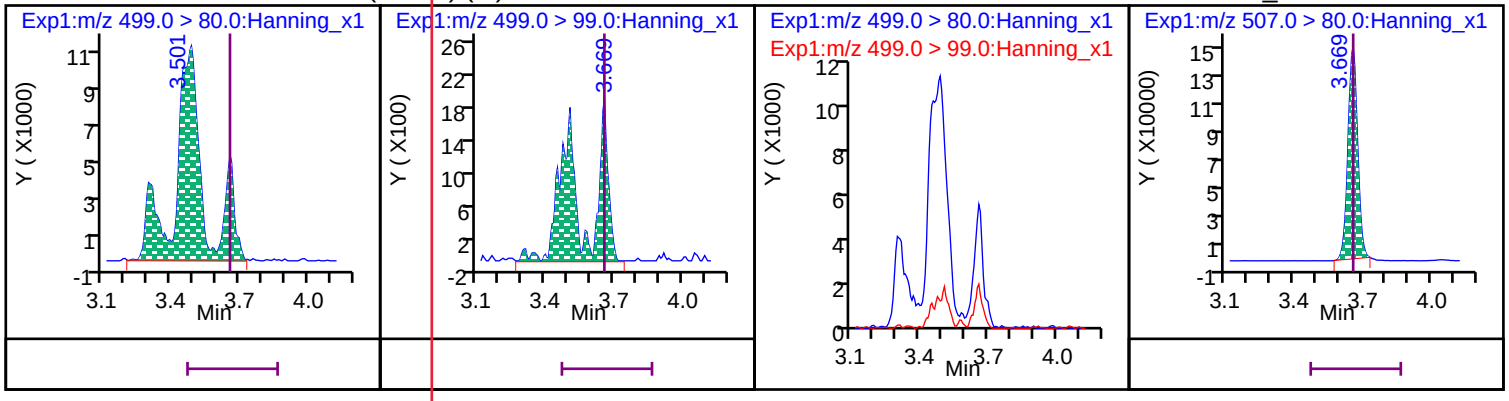
D 45 13C3_PFHxS



significant branched isomers

18 Perfluorooctanesulfonate (PFOS) (M)

D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-002
Description: Area19-PW-9A
Matrix: Aqueous
Date Sampled: 07/19/2022 1420
Date Received: 07/22/2022

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	08/18/2022 1623	MMM	08/10/2022 1743	50680

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.1	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.1	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.1	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.1	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.1	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	8.1		3.6	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	6.4		3.6	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	3.6		3.6	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	5.1		3.6	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	11	✓	3.6	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	181	50-150
13C2_6:2FTS	N	188	50-150
13C2_8:2FTS		103	50-150
13C2_PFDoA		97	50-150
13C2_PFTeDA		93	50-150
13C3_PFBS		100	50-150
13C3_PFHxS		108	50-150
13C3-HFPO-DA		106	50-150
13C4_PFBA		71	50-150
13C4_PFHpA		113	50-150
13C5_PFHxA		110	50-150
13C5_PFPeA		105	50-150
13C6_PFDA		107	50-150
13C7_PFUdA		102	50-150

SA %R > 150%
(-) result, UJ

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-002
Description: Area19-PW-9A
Matrix: Aqueous
Date Sampled: 07/19/2022 1420
Date Received: 07/22/2022

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		103	50-150
13C8_PFOS		109	50-150
13C8_PFOSA		96	50-150
13C9_PFNA		105	50-150
d5-EtFOSAA		100	50-150
d3-MeFOSAA		99	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\Organics\LL\LCMSMS02.i\081822-nonDOD.b\081822026.d
Injection Date: 18-Aug-2022 16:23:00 Injection Vol: 10.0 uL
Sample Type: Client Auto Sampler: 18
Lab Sample ID: XG22049-002 Lab Prep. Batch: 50680
Client ID: Area19-PW-9A Sample Group: XG22049
Sample Info: XG22049-002 Misc. Info:
Inst. ID: LCMSMS02.i Operator: eqi.svoa

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Matrix: Aqueous
Final Conc.: Amt * DF * CF
Concentration Formula: CF = (VF/1000) * 1/VI = 0.0177936

Name	Value	Units	Description
DF	1		Dilution Factor
VF	5000	ul	Final Volume
VI	281	ml	Initial Sample Volume

Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1000 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags	
D 46 13C4_PFBA CAS: SESI-0111														
217 > 172		1.654	1.654	0	1455469	18	>100:1			2000.00	1400.64	71.4		
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4														
212.9 > 168.9	46	1.660	1.654	0/0	147402	19	39:1			200.80	3.5729			
D 50 13C5_PFPeA CAS: SESI-0112														
267.9 > 223		1.986	1.986	0	1970146	17	>100:1			2000.00	1986.35	104.9		
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													J	
262.9 > 218.9	50	1.986	1.986	0/0	68178	12	12:1			66.371	1.1810			
D 44 13C3_PFBS CAS: SESI-0116														
302 > 80		2.035	2.035	0	569152	14	>100:1			2000.00	2000.68	100		
7 Perfluoro-1-butanesulfonate (PFBS) CAS: 375-73-5														
298.9 > 80	44	2.035	2.035	0/0	170245	15	>100:1	Target = 3.53		457.36	8.1381			
298.9 > 99	44	2.035	2.035		45878	17	>100:1	3.71 (1.76-5.30)						
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													J	
349 > 80	44	2.354	2.354	0/0	38909	15	>100:1	Target = 2.93		159.33	2.8351			M
349 > 99	44	2.354	2.354		12498	13	69:1	3.11 (1.46-4.40)						
D 63 13C2_4:2 FTS_2 CAS: SESI-0104														
329 >81		2.284	2.284	0	758057	19	>100:1			10000	19367	181*		
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonate] (4:2 FTS) CAS: 757124-72-4													U	
327 > 307	63		2.284		ND									
D 49 13C5_PFHxA CAS: SESI-0113														
318 > 273		2.318	2.327	-1	2144864	16	>100:1			2000.00	2102.15	110		
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													J	
313 > 269	49	2.327	2.327	0/1	89295	12	53:1	Target = 18.12		83.546	1.4866			M
313 > 119	49	2.318	2.327		4847	10	20:1	18.42 (9.06-27.18)						M
D 66 13C3_GenX CAS: SESI-0121														
287 > 185		2.434	2.434	0	3267788	17	>100:1			10000	11134	106.1		
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U	
285 > 119	66		2.434		ND									
D 47 13C4_PFHpA CAS: SESI-0114														
367 > 322		2.708	2.708	0	1732429	17	>100:1			2000.00	2094.95	112.9		

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													J
363 > 319	47	2.708	2.708	0/0	40934	11	54:1	Target = 3.62		46.427	0.82611		M
363 > 169	47	2.708	2.708		9666	13	45:1	4.23 (1.81-5.44)					
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.728	2.728	0	430230	17	>100:1			2000.00	2119.66	108.4	
14 Perfluorohexanesulfonate (PFHxS) CAS: 355-46-4													
399 > 80	45	2.728	2.728	0/0	85501	28	>100:1	Target = 3.03	3.99	357.10	6.3541		
399 > 99	45	2.728	2.728		24300	59	78:1	3.51 (1.51-4.55)	4.15				
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.757		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													J
449 > 80	45	3.172	3.180	0/0	5742	13	59:1	Target = 3.08		28.577	0.50849		
449 > 99	45	3.156	3.180		2083	16	15:1	2.75 (1.54-4.63)					
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.132	3.132	0	685454	21	>100:1			10000	23640	188.1*	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.132		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.156	3.164	0	1805984	22	>100:1			2000.00	2130.97	102.6	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.164	3.164	0/0	249703	35	75:1	Target = 2.80	1.48	284.05	5.0542		
413 > 169	53	3.164	3.164		95359	41	>100:1	2.61 (1.40-4.20)	1.35				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.662	3.669	0	408590	37	>100:1			2000.00	2257.08	108.6	
18 Perfluorooctanesulfonate (PFOS) CAS: 1763-23-1													
499 > 80	54	3.662	3.669	0/0	153711	76	>100:1	Target = 3.67	0.14	624.60	11.114		
499 > 99	54	3.669	3.669		23316	75	62:1	6.59 (1.83-5.51)*	0.42				J
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.963		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		4.163		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.621		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.874		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.669	3.669	0	2124190	27	>100:1			2000.00	2229.38	104.9	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.675		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		4.048	4.048	0	723660	24	>100:1			2000.00	2019.22	96.2	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		4.048		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		4.157	4.157	0	282598	25	>100:1			10000	10904	102.9	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonate] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		4.157		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.169	4.169	0	1855943	24	>100:1			2000.00	2029.77	106.7	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.175		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.391	4.399	-1	2096851	21	>100:1			10000	10514	99.1	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.399		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.631	4.631	0	1826178	19	>100:1			10000	10953	100.1	

Ion ratio > CUL (+) result, J

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.641		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.641	4.641	0	1651512	19	>100:1			2000.00	1978.65	102	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.641		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		5.059	5.060	0	1589554	20	>100:1			2000.00	1873.60	96.5	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		5.069		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		5.441		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.777	5.783	0	1873412	38	>100:1			2000.00	1789.62	93	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.783		ND								

Compound Type Legend

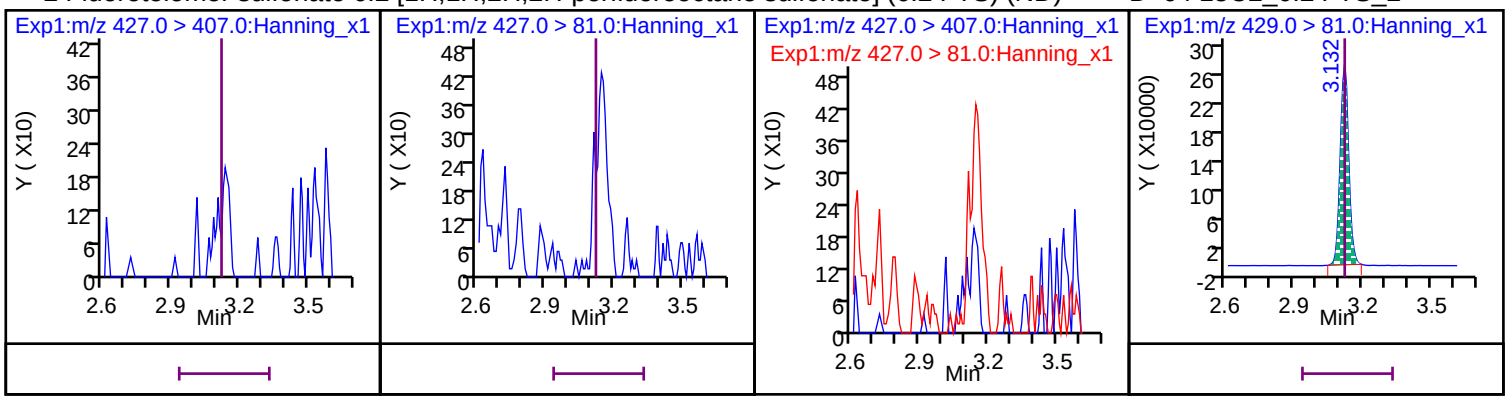
D - Isotopic Dilution Std.

QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
M - Compound Hit/Peak Manually Integrated

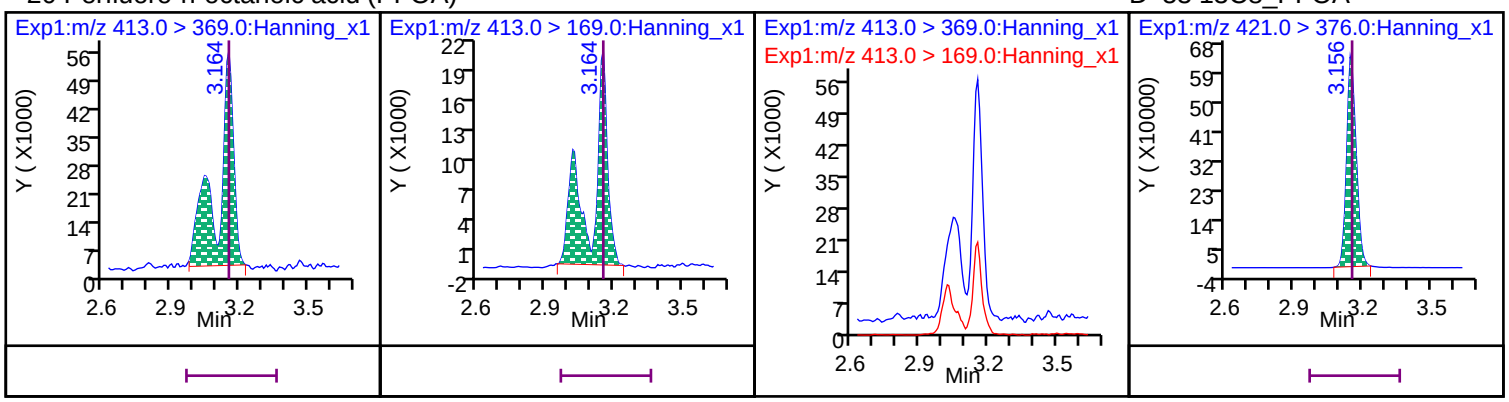
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) (ND)

D 64 13C2_6:2 FTS_2



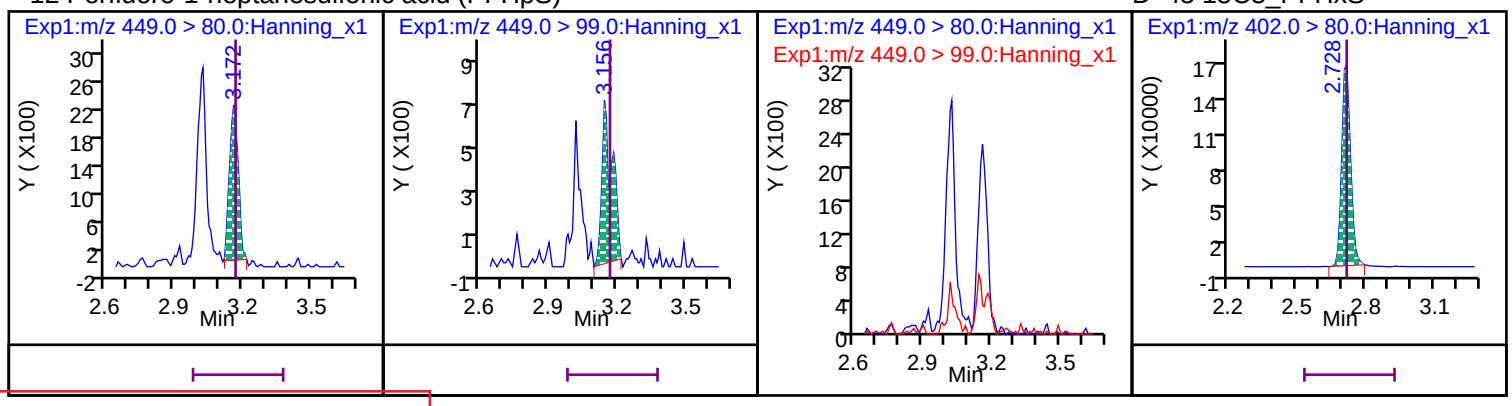
20 Perfluoro-n-octanoic acid (PFOA)

D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS)

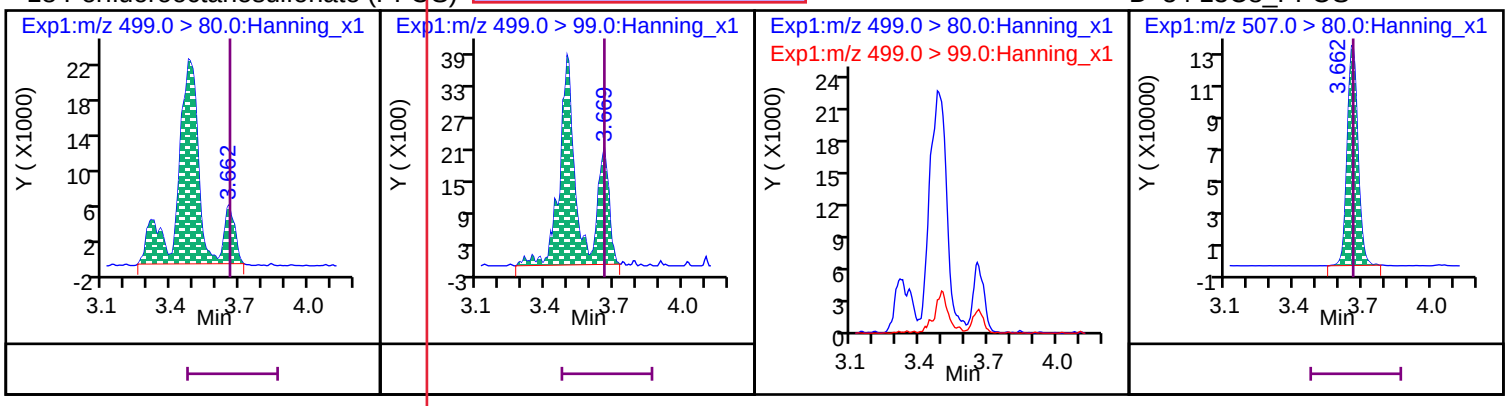
D 45 13C3_PFHxS



18 Perfluorooctanesulfonate (PFOS)

significant branched isomers

D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-003
Description: Area19-PW-9B
Matrix: Aqueous
Date Sampled: 07/19/2022 1505
Date Received: 07/22/2022

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	08/18/2022 1633	MMM	08/10/2022 1743	50680

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.5	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.5	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.5	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.5	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.5	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.5	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.5	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.5	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	9.9		3.8	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	7.7		3.8	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	5.7		3.8	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	14		3.8	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	172	50-150
13C2_6:2FTS	N	314	50-150
13C2_8:2FTS		110	50-150
13C2_PFDoA		98	50-150
13C2_PFTeDA		94	50-150
13C3_PFBS		103	50-150
13C3_PFHxS		120	50-150
13C3-HFPO-DA		105	50-150
13C4_PFBA		71	50-150
13C4_PFHpA		112	50-150
13C5_PFHxA		115	50-150
13C5_PFPeA		102	50-150
13C6_PFDA		111	50-150
13C7_PFUdA		109	50-150

SA %R > 150%
(-) result, UJ

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-003
Description: Area19-PW-9B
Matrix: Aqueous
Date Sampled: 07/19/2022 1505
Date Received: 07/22/2022

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		107	50-150
13C8_PFOS		109	50-150
13C8_PFOSA		101	50-150
13C9_PFNA		106	50-150
d5-EtFOSAA		105	50-150
d3-MeFOSAA		103	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\Organics\LL\LCMSMS02.i\081822-nonDOD.b\081822027.d
Injection Date: 18-Aug-2022 16:33:56 Injection Vol: 10.0 uL
Sample Type: Client Auto Sampler: 19
Lab Sample ID: XG22049-003 Lab Prep. Batch: 50680
Client ID: Area19-PW-9B Sample Group: XG22049
Sample Info: XG22049-003 Misc. Info:
Inst. ID: LCMSMS02.i Operator: eqi.svoa

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Matrix: Aqueous
Final Conc.: Amt * DF * CF
Concentration Formula: CF = (VF/1000) * 1/VI = 0.0187970

Name	Value	Units	Description
DF	1		Dilution Factor
VF	5000	ul	Final Volume
VI	266	ml	Initial Sample Volume

Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1000 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.658	1.654	0	1447730	17	>100:1			2000.00	1393.19	71.1	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													J
212.9 > 168.9	46	1.658	1.654	0/0	133725	16	44:1			183.14	3.4425		
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		1.982	1.986	0	1921967	15	>100:1			2000.00	1937.78	102.4	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													J
262.9 > 218.9	50	1.982	1.986	0/0	47806	11	9.0:1			47.705	0.89672		
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.030	2.035	0	585026	15	>100:1			2000.00	2056.48	102.8	
7 Perfluoro-1-butanesulfonate (PFBS) CAS: 375-73-5													
298.9 > 80	44	2.030	2.035	0/0	201022	15	>100:1	Target = 3.53		525.39	9.8757		
298.9 > 99	44	2.030	2.035		54455	15	>100:1	3.69 (1.76-5.30)					
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													J
349 > 80	44	2.352	2.354	0/0	47355	13	>100:1	Target = 2.93		188.66	3.5462		M
349 > 99	44	2.352	2.354		16996	13	75:1	2.78 (1.46-4.40)					
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.282	2.284	0	721670	18	>100:1			10000	18437	172.3*	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonate] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.284		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.326	2.327	0	2237837	17	>100:1			2000.00	2193.27	114.8	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													J
313 > 269	49	2.326	2.327	0/0	70837	15	45:1	Target = 18.12		63.523	1.1940		
313 > 119	49	2.326	2.327		4236	18	16:1	16.72 (9.06-27.18)					
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.433	2.434	0	3233277	17	>100:1			10000	11017	105	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.434		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.706	2.708	0	1718886	17	>100:1			2000.00	2078.57	112	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													J
363 > 319	47	2.706	2.708	0/0	38473	13	33:1	Target = 3.62		43.980	0.82669		
363 > 169	47	2.715	2.708		10682	13	62:1	3.60 (1.81-5.44)					
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.725	2.728	0	476642	16	>100:1			2000.00	2348.32	120.1	
14 Perfluorohexanesulfonate (PFHxS) CAS: 355-46-4													
399 > 80	45	2.725	2.728	0/0	108239	26	>100:1	Target = 3.03	4.34	408.05	7.6701		
399 > 99	45	2.725	2.728		32489	27	>100:1	3.33 (1.51-4.55)	6.25				
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.757		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													J
449 > 80	45	3.170	3.180	-1/-1	7824	16	61:1	Target = 3.08		35.147	0.66066		
449 > 99	45	3.170	3.180		2968	16	16:1	2.63 (1.54-4.63)					
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.130	3.132	0	1144975	20	>100:1			10000	39487	314.1*	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.132		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.162	3.164	0	1877643	21	>100:1			2000.00	2215.53	106.7	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.162	3.164	0/0	276465	35	84:1	Target = 2.80	1.50	302.49	5.6859		
413 > 169	53	3.162	3.164		105843	36	>100:1	2.61 (1.40-4.20)	1.33				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.670	3.669	0	411167	26	>100:1			2000.00	2271.32	109.3	
18 Perfluorooctanesulfonate (PFOS) CAS: 1763-23-1													
499 > 80	54	3.492	3.669	-11/-11	185129	81	>100:1	Target = 3.67	4.89	747.56	14.052		M
499 > 99	54	3.511	3.669		23277	81	91:1	7.95 (1.83-5.51)*	24.80				MJ
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.963		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		4.163		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.621		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.874		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.670	3.669	0	2135217	26	>100:1			2000.00	2240.95	105.5	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.675		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		4.049	4.048	0	763070	25	>100:1			2000.00	2129.18	101.4	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		4.048		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		4.152	4.157	0	300799	25	>100:1			10000	11606	109.5	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonate] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		4.157		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.171	4.169	0	1931170	24	>100:1			2000.00	2112.04	111	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.175		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.394	4.399	0	2188503	22	>100:1			10000	10973	103.4	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.399		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.633	4.631	0	1906056	20	>100:1			10000	11432	104.5	

Ion ratio > CUL (+) result, J

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.641		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.633	4.641	0	1760521	19	>100:1			2000.00	2109.25	108.7	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.641		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		5.062	5.060	0	1619230	20	>100:1			2000.00	1908.57	98.3	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		5.069		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		5.441		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.773	5.783	-1	1891574	37	>100:1			2000.00	1806.97	93.9	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.783		ND								

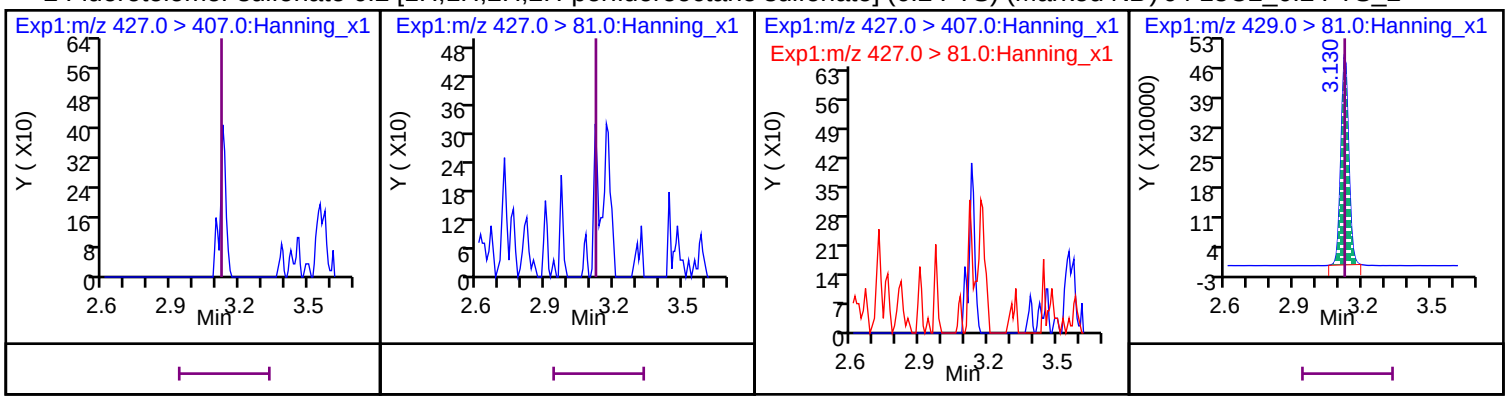
Compound Type Legend

D - Isotopic Dilution Std.

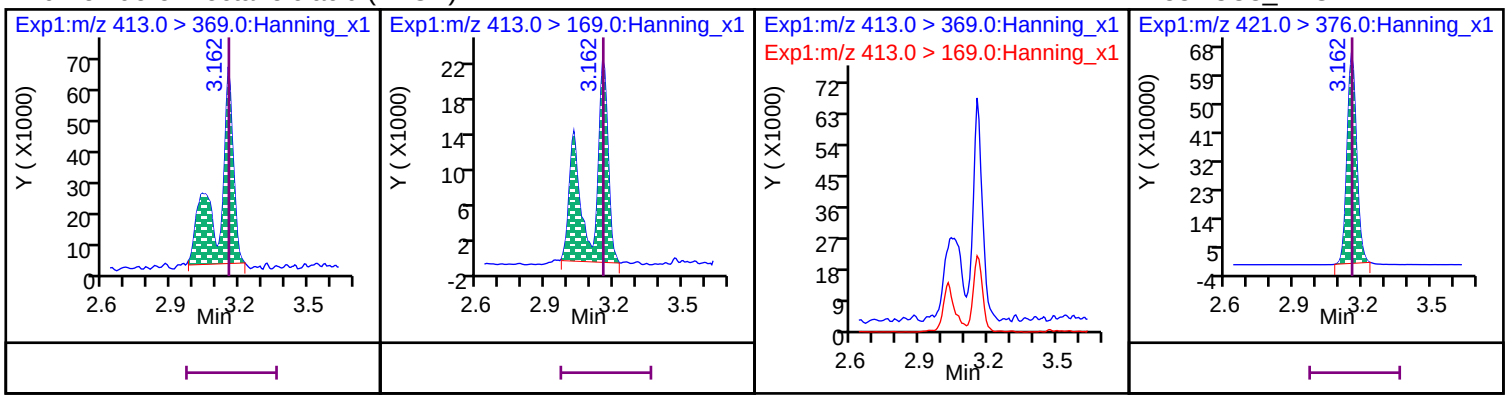
QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
M - Compound Hit/Peak Manually Integrated

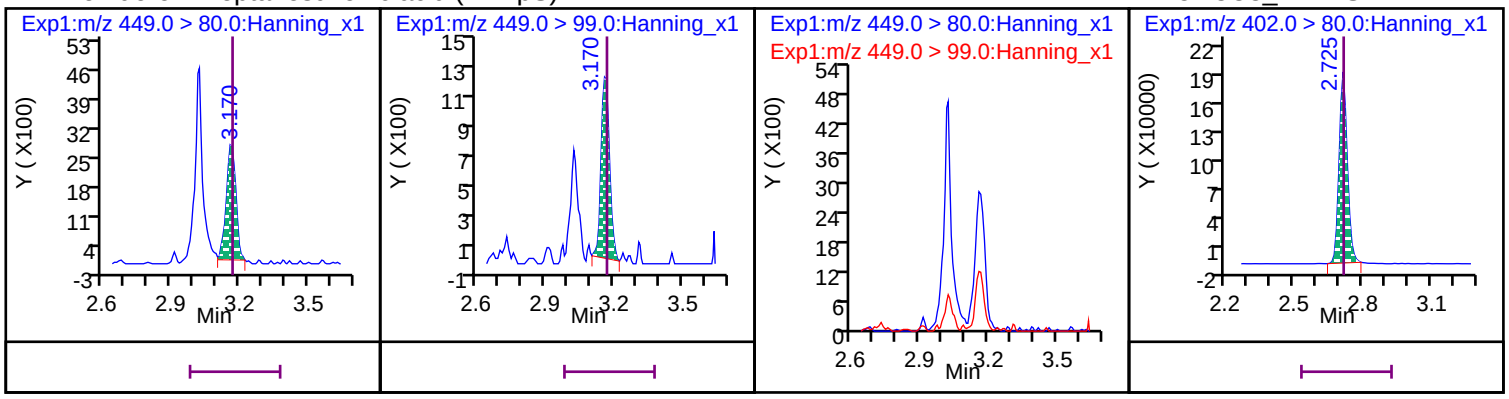
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) (Marked ND) 64 13C2_6:2 FTS_2



20 Perfluoro-n-octanoic acid (PFOA) D 53 13C8_PFOA

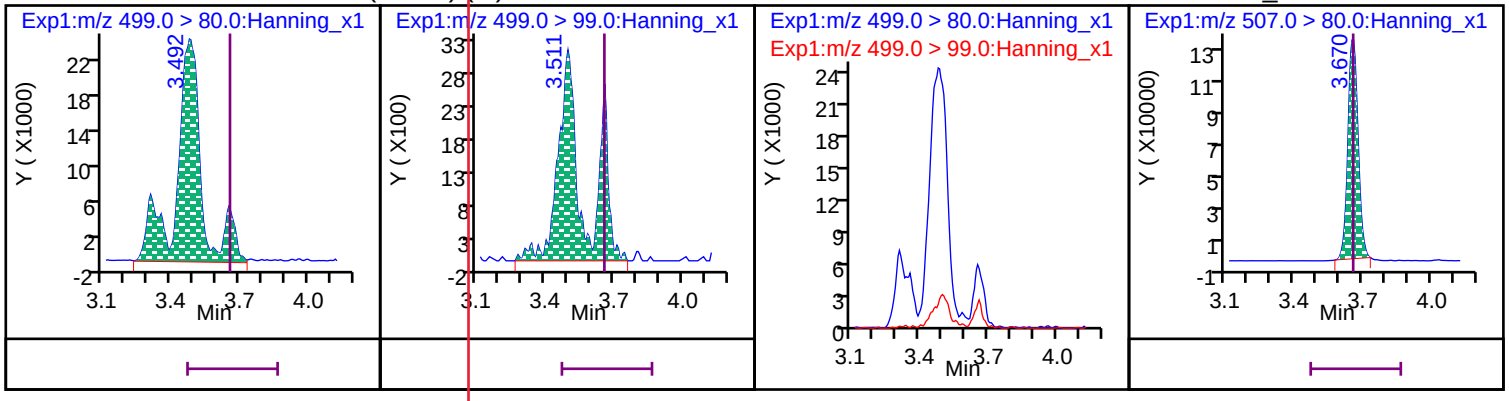


12 Perfluoro-1-heptanesulfonic acid (PFHpS) D 45 13C3_PFHxS



significant branched isomers

18 Perfluorooctanesulfonate (PFOS) (M) D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-004
Description: Area19-PW-10A
Matrix: Aqueous
Date Sampled: 07/19/2022 1640
Date Received: 07/22/2022

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	08/18/2022 1644	MMM	08/10/2022 1743	50680

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	6.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	3.9		3.5	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	7.1		3.5	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	170	50-150
13C2_6:2FTS	N	175	50-150
13C2_8:2FTS		112	50-150
13C2_PFDoA		107	50-150
13C2_PFTeDA		108	50-150
13C3_PFBS		105	50-150
13C3_PFHxS		115	50-150
13C3-HFPO-DA		105	50-150
13C4_PFBA		86	50-150
13C4_PFHpA		120	50-150
13C5_PFHxA		114	50-150
13C5_PFPeA		109	50-150
13C6_PFDA		111	50-150
13C7_PFUdA		102	50-150

SA %R > 150%
(-) result, UJ

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-004
Description: Area19-PW-10A
Matrix: Aqueous
Date Sampled: 07/19/2022 1640
Date Received: 07/22/2022

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		106	50-150
13C8_PFOS		112	50-150
13C8_PFOSA		102	50-150
13C9_PFNA		107	50-150
d5-EtFOSAA		101	50-150
d3-MeFOSAA		97	50-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	Q = Surrogate failure
ND = Not detected at or above the LOQ	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis		S = MS/MSD failure

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106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\Organics\LL\LCMSMS02.i\081822-nonDOD.b\081822028.d
Injection Date: 18-Aug-2022 16:44:55 Injection Vol: 10.0 uL
Sample Type: Client Auto Sampler: 20
Lab Sample ID: XG22049-004 Lab Prep. Batch: 50680
Client ID: Area19-PW-10A Sample Group: XG22049
Sample Info: XG22049-004 Misc. Info:
Inst. ID: LCMSMS02.i Operator: eqi.svoa

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Matrix: Aqueous
Final Conc.: Amt * DF * CF
Concentration Formula: CF = (VF/1000) * 1/VI = 0.0173010

Name	Value	Units	Description
DF	1		Dilution Factor
VF	5000	ul	Final Volume
VI	289	ml	Initial Sample Volume

Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1000 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.659	1.654	0	1748864	17	>100:1			2000.00	1682.98	85.8	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													J
212.9 > 168.9	46	1.659	1.654	0/0	134109	16	33:1			152.04	2.6305		
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		1.985	1.986	0	2046107	17	>100:1			2000.00	2062.94	109	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													J
262.9 > 218.9	50	1.985	1.986	0/0	96931	12	23:1			90.859	1.5719		
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.034	2.035	0	595309	14	>100:1			2000.00	2092.63	104.6	
7 Perfluoro-1-butanesulfonate (PFBS) CAS: 375-73-5													
298.9 > 80	44	2.034	2.035	0/0	87079	15	>100:1	Target = 3.53		223.66	3.8695		
298.9 > 99	44	2.034	2.035		26016	15	84:1	3.34 (1.76-5.30)	✓				
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													J
349 > 80	44	2.353	2.354	0/0	11792	12	73:1	Target = 2.93		46.167	0.79873		
349 > 99	44	2.353	2.354		3127	14	21:1	3.77 (1.46-4.40)	✓				
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.283	2.284	0	711044	18	>100:1			10000	18166	169.8*	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonate] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.284		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.326	2.327	0	2222756	18	>100:1			2000.00	2178.49	114	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													J
313 > 269	49	2.326	2.327	0/0	75456	14	67:1	Target = 18.12		68.124	1.1786		
313 > 119	49	2.326	2.327		3333	13	17:1	22.63 (9.06-27.18)	✓				
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.433	2.434	0	3244834	17	>100:1			10000	11056	105.4	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.434		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.706	2.708	0	1846434	18	>100:1			2000.00	2232.81	120.3	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													U
363 > 319	47		2.708		ND								
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.725	2.728	0	457062	16	>100:1			2000.00	2251.86	115.2	
14 Perfluorohexanesulfonate (PFHxS) CAS: 355-46-4													J
399 > 80	45	2.725	2.728	0/0	39931	26	>100:1	Target = 3.03	4.34	156.98	2.7160		
399 > 99	45	2.725	2.728		10633	56	32:1	3.75 (1.51-4.55)	3.60				
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.757		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													U
449 > 80	45		3.180		ND								
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.130	3.132	0	638765	21	>100:1			10000	22029	175.3*	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.132		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.162	3.164	0	1869233	21	>100:1			2000.00	2205.60	106.2	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													J
413 > 369	53	3.162	3.164	0/0	107160	37	26:1	Target = 2.80	1.02	117.77	2.0376		M
413 > 169	53	3.162	3.164		41232	49	72:1	2.59 (1.40-4.20)	0.88				M
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.671	3.669	0	420788	26	>100:1			2000.00	2324.47	111.8	
18 Perfluorooctanesulfonate (PFOS) CAS: 1763-23-1													
499 > 80	54	3.671	3.669	0/0	104016	79	>100:1	Target = 3.67	0.46	410.42	7.1006		
499 > 99	54	3.684	3.669		20134	63	95:1	5.16 (1.83-5.51)	0.47				M
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.963		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		4.163		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.621		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.874		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.664	3.669	0	2158169	27	>100:1			2000.00	2265.04	106.6	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.675		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		4.049	4.048	0	767594	25	>100:1			2000.00	2141.80	102	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		4.048		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		4.153	4.157	0	307911	25	>100:1			10000	11881	112.1	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonate] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		4.157		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.165	4.169	0	1935508	23	>100:1			2000.00	2116.78	111.2	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.175		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.394	4.399	0	2055892	22	>100:1			10000	10308	97.2	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.399		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.633	4.631	0	1847482	20	>100:1			10000	11081	101.3	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.641		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.644	4.641	0	1652038	20	>100:1			2000.00	1979.28	102	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.641		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		5.054	5.060	0	1754580	20	>100:1			2000.00	2068.11	106.6	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		5.069		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		5.441		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.775	5.783	-1	2178997	37	>100:1			2000.00	2081.54	108.2	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.783		ND								

Compound Type Legend

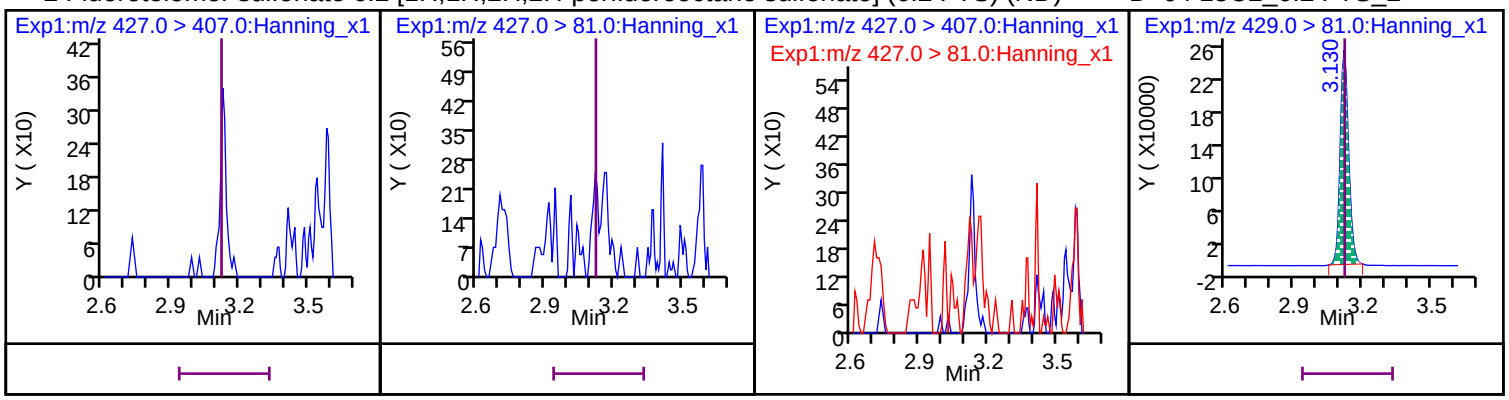
D - Isotopic Dilution Std.

QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
M - Compound Hit/Peak Manually Integrated

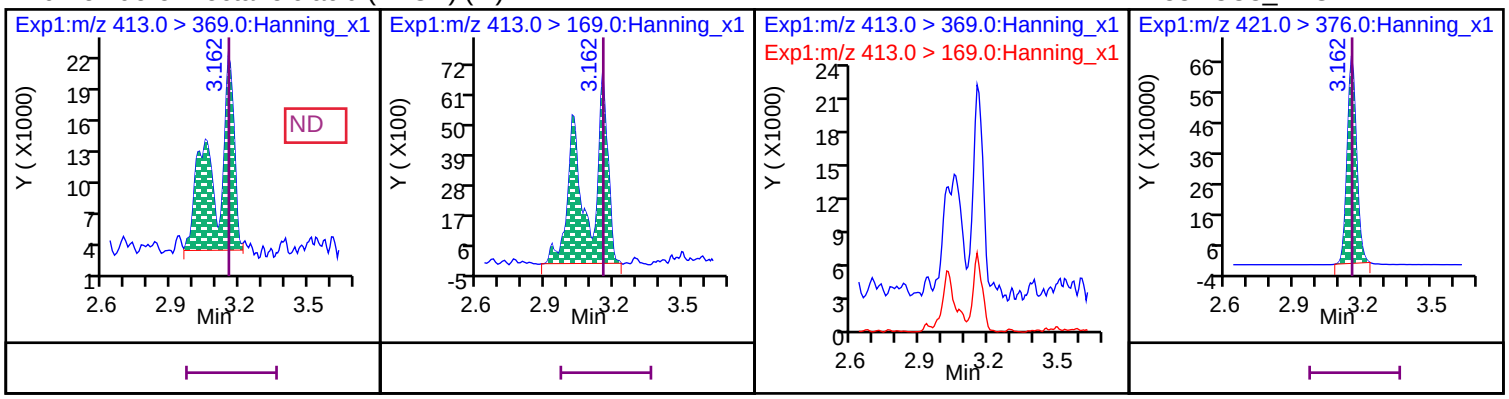
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) (ND)

D 64 13C2_6:2 FTS_2



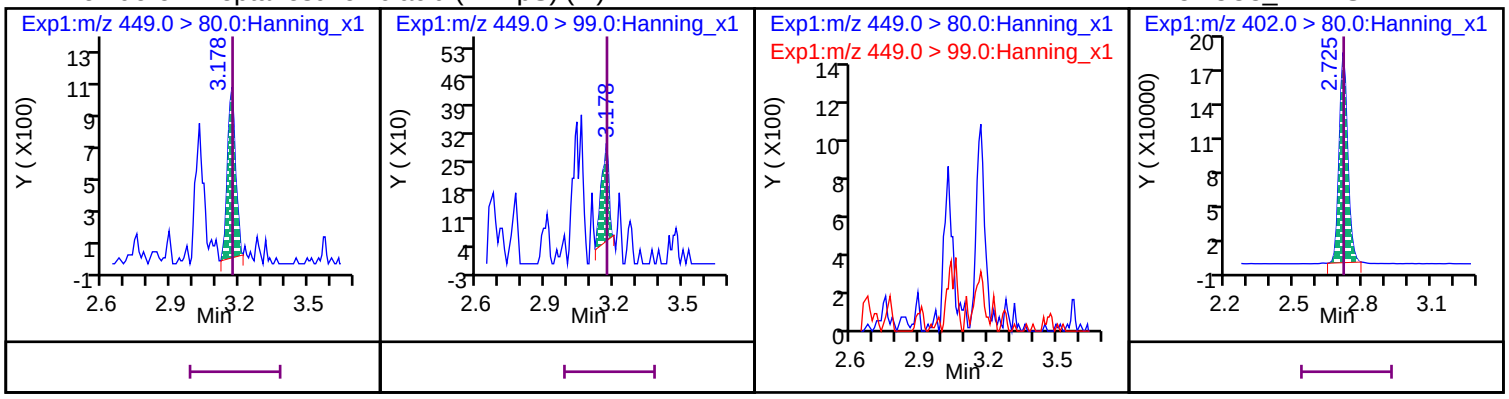
20 Perfluoro-n-octanoic acid (PFOA) (M)

D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS) (M)

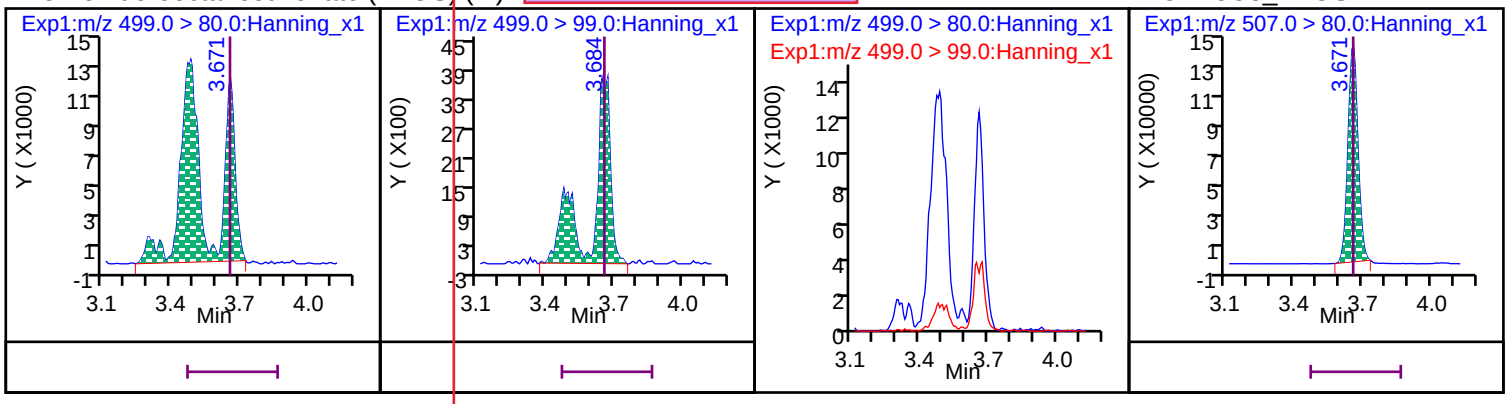
D 45 13C3_PFHxS



18 Perfluorooctanesulfonate (PFOS) (M)

significant branched isomers

D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-005
Description: WVNW-PW-5A
Matrix: Aqueous
Date Sampled: 07/20/2022 1100
Date Received: 07/22/2022

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	08/18/2022 1655	MMM	08/10/2022 1743	50680

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	6.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		6.9	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	4.1		3.5	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	7.3		3.5	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	7.5		3.5	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		149	50-150
13C2_6:2FTS	N	241	50-150
13C2_8:2FTS		106	50-150
13C2_PFDoA		100	50-150
13C2_PFTeDA		97	50-150
13C3_PFBS		102	50-150
13C3_PFHxS		118	50-150
13C3-HFPO-DA		106	50-150
13C4_PFBA		76	50-150
13C4_PFHpA		118	50-150
13C5_PFHxA		111	50-150
13C5_PFPeA		104	50-150
13C6_PFDA		109	50-150
13C7_PFUdA		106	50-150

SA %R > 150%
(-) result, UJ

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-005
Description: WVNW-PW-5A
Matrix: Aqueous
Date Sampled: 07/20/2022 1100
Date Received: 07/22/2022

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		106	50-150
13C8_PFOS		109	50-150
13C8_PFOSA		102	50-150
13C9_PFNA		106	50-150
d5-EtFOSAA		103	50-150
d3-MeFOSAA		105	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\Organics\LL\LCMSMS02.i\081822-nonDOD.b\081822029.d
Injection Date: 18-Aug-2022 16:55:53 Injection Vol: 10.0 uL
Sample Type: Client Auto Sampler: 21
Lab Sample ID: XG22049-005 Lab Prep. Batch: 50680
Client ID: WVNW-PW-5A Sample Group: XG22049
Sample Info: XG22049-005 Misc. Info:
Inst. ID: LCMSMS02.i Operator: eqi.svoa

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Matrix: Aqueous
Final Conc.: Amt * DF * CF
Concentration Formula: CF = (VF/1000) * 1/VI = 0.0173010

Name	Value	Units	Description
DF	1		Dilution Factor
VF	5000	ul	Final Volume
VI	289	ml	Initial Sample Volume

Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1000 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.658	1.654	0	1557434	17	>100:1			2000.00	1498.76	76.4	
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4													
212.9 > 168.9	46	1.658	1.654	0/0	187351	17	>100:1			238.51	4.1264		
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		1.982	1.986	0	1947495	15	>100:1			2000.00	1963.51	103.7	
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													J
262.9 > 218.9	50	1.982	1.986	0/0	65510	12	31:1			64.515	1.1162		
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.030	2.035	0	583001	13	>100:1			2000.00	2049.37	102.4	
7 Perfluoro-1-butanesulfonate (PFBS) CAS: 375-73-5													J
298.9 > 80	44	2.030	2.035	0/0	42860	13	>100:1	Target = 3.53		112.41	1.9448		
298.9 > 99	44	2.030	2.035		11027	12	59:1	3.88 (1.76-5.30)					
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													U
349 > 80	44		2.354		ND								
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.282	2.284	0	622686	18	>100:1			10000	15909	148.7	
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonate] (4:2 FTS) CAS: 757124-72-4													U
327 > 307	63		2.284		ND								
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.317	2.327	-1	2170058	16	>100:1			2000.00	2126.84	111.3	
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													J
313 > 269	49	2.326	2.327	0/1	47290	16	33:1	Target = 18.12		43.732	0.75661		
313 > 119	49	2.317	2.327		2575	14	9.4:1	18.36 (9.06-27.18)					
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.433	2.434	0	3248781	17	>100:1			10000	11070	105.5	
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U
285 > 119	66		2.434		ND								
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.706	2.708	0	1813130	16	>100:1			2000.00	2192.53	118.2	
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													J
363 > 319	47	2.706	2.708	0/0	50036	16	44:1	Target = 3.62		54.225	0.93815		
363 > 169	47	2.706	2.708		13893	13	55:1	3.60 (1.81-5.44)					

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.725	2.728	0	468058	17	>100:1			2000.00	2306.03	118	
14 Perfluorohexanesulfonate (PFHxS) CAS: 355-46-4													J
399 > 80	45	2.725	2.728	0/0	21760	24	70:1	Target = 3.03	5.40	83.537	1.4453		
399 > 99	45	2.725	2.728		7622	43	49:1	2.85 (1.51-4.55)	3.63				
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.757		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													U
449 > 80	45		3.180		ND								
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.128	3.132	0	879017	20	>100:1			10000	30315	241.2*	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.132		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.160	3.164	0	1867056	21	>100:1			2000.00	2203.03	106.1	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.160	3.164	0/0	385537	36	>100:1	Target = 2.80	8.66	424.22	7.3394		
413 > 169	53	3.168	3.164		144870	40	>100:1	2.66 (1.40-4.20)	7.05				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.670	3.669	0	408786	26	>100:1			2000.00	2258.17	108.6	
18 Perfluorooctanesulfonate (PFOS) CAS: 1763-23-1													
499 > 80	54	3.670	3.669	0/0	107422	83	>100:1	Target = 3.67	0.49	436.30	7.5484		
499 > 99	54	3.654	3.669		21889	90	>100:1	4.90 (1.83-5.51)	1.12				M
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.963		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		4.163		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.621		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.874		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.670	3.669	0	2146671	27	>100:1			2000.00	2252.97	106	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													J
463 > 419	56	3.677	3.675	0/0	26643	24	32:1	Target = 5.94		24.588	0.42541		
463 > 169	56	3.659	3.675		4895	24	43:1	5.44 (2.97-8.90)					M
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		4.049	4.048	0	763516	24	>100:1			2000.00	2130.43	101.5	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		4.048		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		4.152	4.157	0	291133	25	>100:1			10000	11233	106	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonate] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		4.157		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.165	4.169	0	1888227	24	>100:1			2000.00	2065.08	108.5	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.175		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.394	4.399	0	2211378	22	>100:1			10000	11088	104.5	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.399		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.633	4.631	0	1872438	20	>100:1			10000	11231	102.7	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.641		ND								
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.633	4.641	-1	1719463	20	>100:1			2000.00	2060.06	106.2	

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.641		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		5.062	5.060	0	1639215	20	>100:1			2000.00	1932.13	99.6	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		5.069		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		5.441		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.774	5.783	-1	1953978	38	>100:1			2000.00	1866.58	97	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.783		ND								

Compound Type Legend

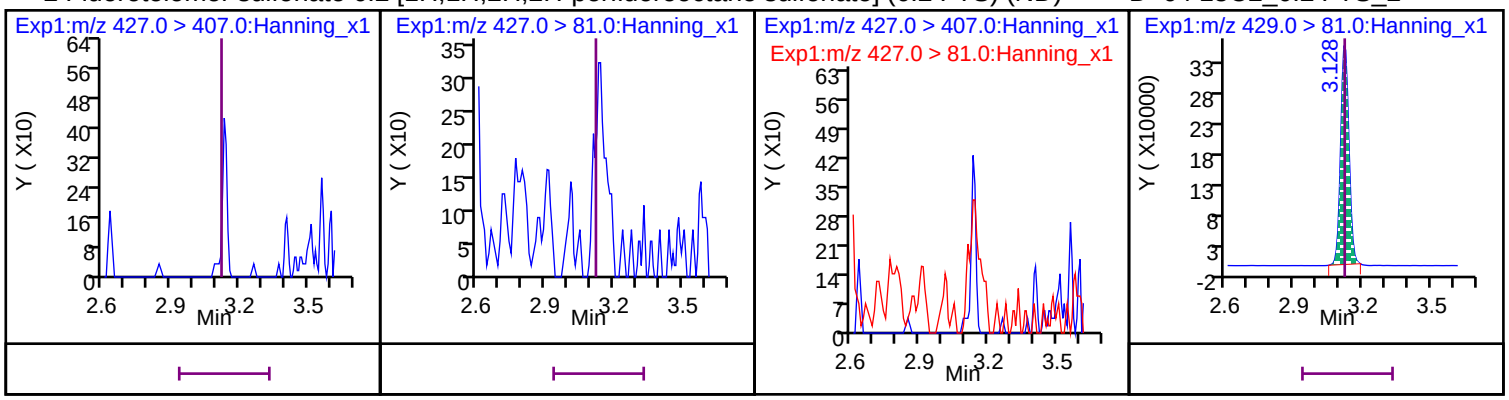
D - Isotopic Dilution Std.

QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
M - Compound Hit/Peak Manually Integrated

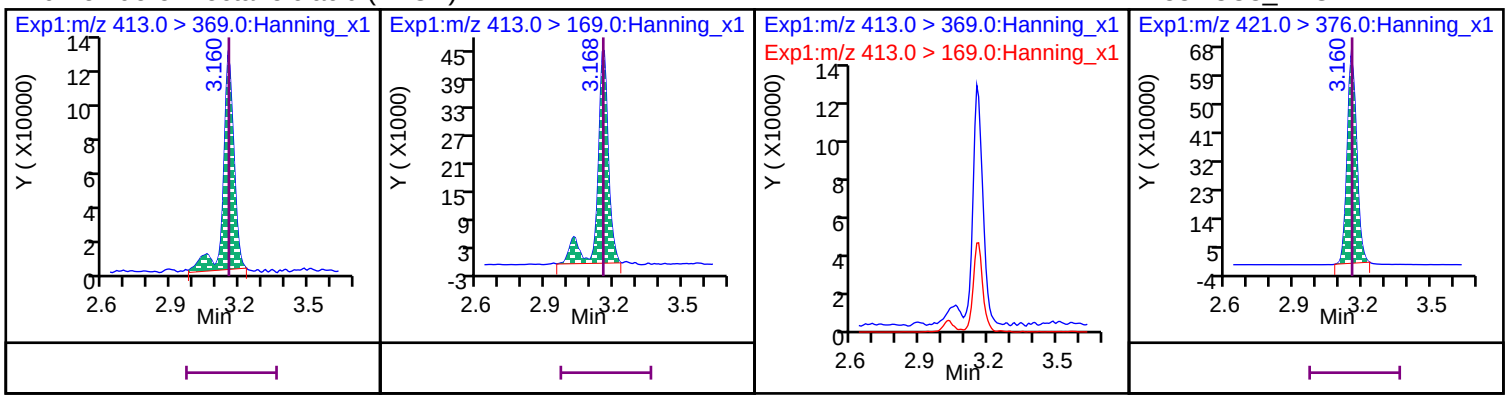
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) (ND)

D 64 13C2_6:2 FTS_2



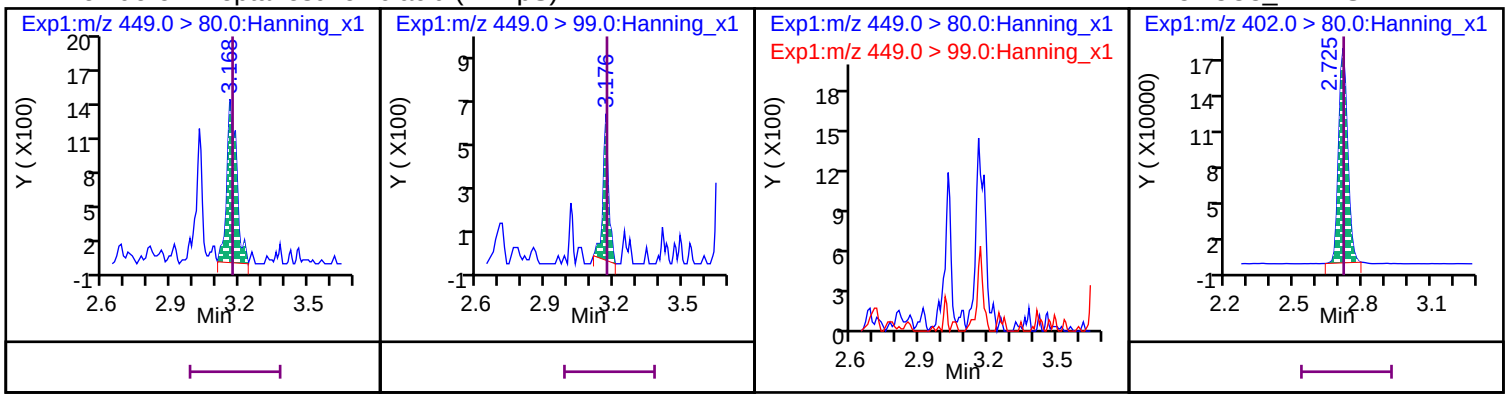
20 Perfluoro-n-octanoic acid (PFOA)

D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS)

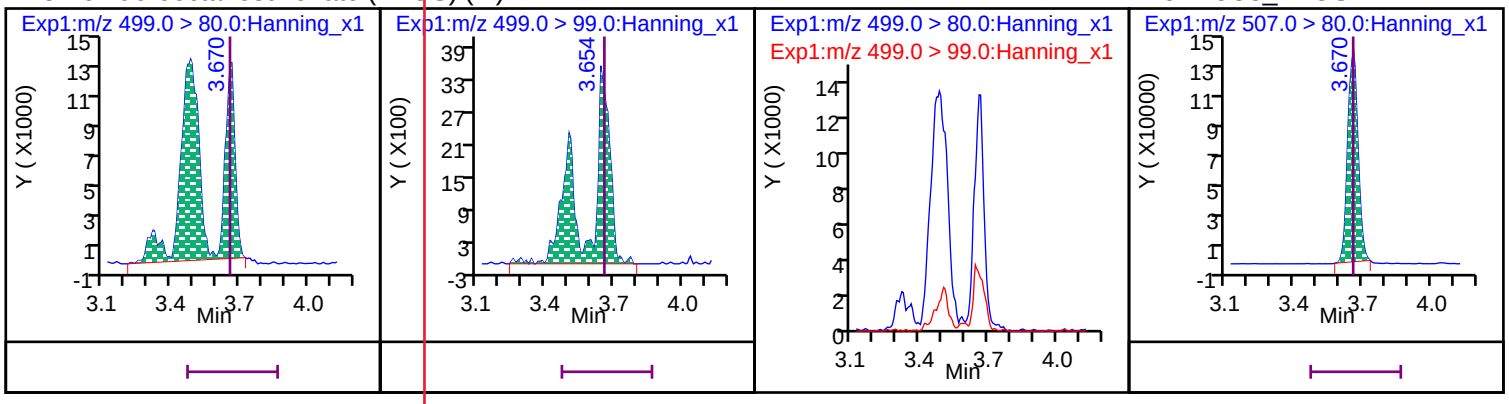
D 45 13C3_PFHxS



significant branched isomers

18 Perfluorooctanesulfonate (PFOS) (M)

D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-006
Description: WVNW-PW-5A DUP
Matrix: Aqueous
Date Sampled: 07/20/2022 1100
Date Received: 07/22/2022

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	08/18/2022 1706	MMM	08/10/2022 1743	50680

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.4	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.4	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	4.3		3.7	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	7.7		3.7	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	8.5		3.7	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	168	50-150
13C2_6:2FTS	N	306	50-150
13C2_8:2FTS		105	50-150
13C2_PFDoA		100	50-150
13C2_PFTeDA		97	50-150
13C3_PFBS		104	50-150
13C3_PFHxS		119	50-150
13C3-HFPO-DA		110	50-150
13C4_PFBA		78	50-150
13C4_PFHpA		115	50-150
13C5_PFHxA		109	50-150
13C5_PFPeA		107	50-150
13C6_PFDA		111	50-150
13C7_PFUdA		105	50-150

SA %R > 150%
(-) result, UJ

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-006
Description: WVNW-PW-5A DUP
Matrix: Aqueous
Date Sampled: 07/20/2022 1100
Date Received: 07/22/2022

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		106	50-150
13C8_PFOS		110	50-150
13C8_PFOSA		102	50-150
13C9_PFNA		107	50-150
d5-EtFOSAA		105	50-150
d3-MeFOSAA		104	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\Organics\LL\LCMSMS02.i\081822-nonDOD.b\081822030.d
Injection Date: 18-Aug-2022 17:06:46 Injection Vol: 10.0 uL
Sample Type: Client Auto Sampler: 22
Lab Sample ID: XG22049-006 Lab Prep. Batch: 50680
Client ID: WVNW-PW-5A DUP Sample Group: XG22049
Sample Info: XG22049-006 Misc. Info:
Inst. ID: LCMSMS02.i Operator: eqi.svoa

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Matrix: Aqueous
Final Conc.: Amt * DF * CF
Concentration Formula: CF = (VF/1000) * 1/VI = 0.0183824

Name	Value	Units	Description
DF	1		Dilution Factor
VF	5000	ul	Final Volume
VI	272	ml	Initial Sample Volume

Reagent: Surrogates Conc. Level: Smp Vol. Added: 0.1000 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags	
D 46 13C4_PFBA CAS: SESI-0111														
217 > 172		1.658	1.654	0	1588121	17	>100:1			2000.00	1528.30	78		
8 Perfluoro-n-butanoic acid (PFBA) CAS: 375-22-4														
212.9 > 168.9	46	1.658	1.654	0/0	188453	16	>100:1			235.28	4.3249			
D 50 13C5_PFPeA CAS: SESI-0112														
267.9 > 223		1.982	1.986	0	2004715	15	>100:1			2000.00	2021.20	106.8		
21 Perfluoro-n-pentanoic acid (PFPeA) CAS: 2706-90-3													J	
262.9 > 218.9	50	1.982	1.986	0/0	58008	9	17:1			55.497	1.0202			M
D 44 13C3_PFBS CAS: SESI-0116														
302 > 80		2.030	2.035	0	592757	14	>100:1			2000.00	2083.66	104.1		
7 Perfluoro-1-butanesulfonate (PFBS) CAS: 375-73-5													J	
298.9 > 80	44	2.030	2.035	0/0	43430	13	>100:1	Target = 3.53		112.03	2.0593			M
298.9 > 99	44	2.030	2.035		14006	15	78:1	3.10 (1.76-5.30)	✓					
22 Perfluoro-1-pentanesulfonic acid (PFPeS) CAS: 2706-91-4													J	
349 > 80	44	2.353	2.354	0/0	7665	16	32:1	Target = 2.93		30.138	0.55401			
349 > 99	44	2.344	2.354		2241	12	13:1	3.42 (1.46-4.40)	✓					
D 63 13C2_4:2 FTS_2 CAS: SESI-0104														
329 >81		2.283	2.284	0	702545	18	>100:1			10000	17949	167.7*		
1 Fluorotelomer sulfonate 4:2 [1H,1H,2H,2H-perfluorohexane sulfonate] (4:2 FTS) CAS: 757124-72-4													U	
327 > 307	63		2.284		ND									
D 49 13C5_PFHxA CAS: SESI-0113														
318 > 273		2.326	2.327	0	2125299	17	>100:1			2000.00	2082.97	109		
15 Perfluoro-n-hexanoic acid (PFHxA) CAS: 307-24-4													J	
313 > 269	49	2.326	2.327	0/0	46555	13	28:1	Target = 18.12		43.959	0.80807			
313 > 119	49	2.326	2.327		2876	13	9.0:1	16.18 (9.06-27.18)	✓					
D 66 13C3_GenX CAS: SESI-0121														
287 > 185		2.433	2.434	0	3371050	17	>100:1			10000	11486	109.5		
28 Hexafluoropropylene oxide dimer acid (GenX) CAS: 13252-13-6													U	
285 > 119	66		2.434		ND									
D 47 13C4_PFHpA CAS: SESI-0114														
367 > 322		2.706	2.708	0	1764943	18	>100:1			2000.00	2134.26	115		

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
13 Perfluoro-n-heptanoic acid (PFHpA) CAS: 375-85-9													J
363 > 319	47	2.706	2.708	0/0	49113	20	49:1	Target = 3.62		54.678	1.0051		
363 > 169	47	2.715	2.708		12515	16	61:1	3.92 (1.81-5.44)					
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.725	2.728	0	470376	16	>100:1			2000.00	2317.45	118.5	
14 Perfluorohexanesulfonate (PFHxS) CAS: 355-46-4													J
399 > 80	45	2.725	2.728	0/0	17877	22	76:1	Target = 3.03	5.52	68.292	1.2554		M
399 > 99	45	2.715	2.728		5926	26	19:1	3.01 (1.51-4.55)	3.38				M
29 4,8-dioxa-3H-perfluorononanoic acid (ADONA) CAS: 919005-14-4													U
377 > 251	45		2.757		ND								
12 Perfluoro-1-heptanesulfonic acid (PFHpS) CAS: 375-92-8													U
449 > 80	45		3.180		ND								
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.130	3.132	0	1115774	20	>100:1			10000	38480	306.1*	
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS) CAS: 27619-97-2													U
427 > 407	64		3.132		ND								
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.162	3.164	0	1857317	21	>100:1			2000.00	2191.54	105.6	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.162	3.164	0/0	380530	37	>100:1	Target = 2.80	8.89	420.90	7.7372		
413 > 169	53	3.162	3.164		139232	45	>100:1	2.73 (1.40-4.20)	8.08				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.671	3.669	0	412164	26	>100:1			2000.00	2276.83	109.5	
18 Perfluorooctanesulfonate (PFOS) CAS: 1763-23-1													
499 > 80	54	3.511	3.669	-9/-9	114486	88	>100:1	Target = 3.67	10.19	461.18	8.4776		M
499 > 99	54	3.671	3.669		22270	62	>100:1	5.14 (1.83-5.51)	1.43				M
30 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) CAS: 756426-58-1													U
531 > 351	54		3.963		ND								
16 Perfluoro-1-nonanesulfonic acid (PFNS) CAS: 68259-12-1													U
549 > 80	54		4.163		ND								
9 Perfluoro-1-decanesulfonic acid (PFDS) CAS: 335-77-3													U
599 > 80	54		4.621		ND								
31 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) CAS: 763051-92-9													U
631 > 451	54		4.874		ND								
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.671	3.669	0	2167932	27	>100:1			2000.00	2275.28	107.1	
17 Perfluoro-n-nonanoic acid (PFNA) CAS: 375-95-1													U
463 > 419	56		3.675		ND								
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		4.049	4.048	0	768761	24	>100:1			2000.00	2145.06	102.2	
19 Perfluoro-1-octanesulfonamide (PFOSA) CAS: 754-91-6													U
498 > 78	55		4.048		ND								
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		4.146	4.157	-1	287118	25	>100:1			10000	11078	104.5	
3 Fluorotelomer sulfonate 8:2 [1H,1H,2H,2H-perfluorodecane sulfonate] (8:2 FTS) CAS: 39108-34-4													U
527 > 507	65		4.157		ND								
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.171	4.169	0	1926592	24	>100:1			2000.00	2107.03	110.7	
10 Perfluoro-n-decanoic acid (PFDA) CAS: 335-76-2													U
513 > 469	51		4.175		ND								
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.394	4.399	0	2203388	22	>100:1			10000	11048	104.1	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													U
570 > 419	58		4.399		ND								
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.633	4.631	0	1921827	19	>100:1			10000	11527	105.4	
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													U
584 > 419	60		4.641		ND								

Signal	Quant Std	RT (min.)	Exp RT (min.)	c RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	OnCol Conc ng/L	Final Conc ng/L	%Rec	Flags
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.633	4.641	0	1705624	19	>100:1			2000.00	2043.48	105.3	
25 Perfluoro-n-undecanoic acid (PFUdA) CAS: 2058-94-8													U
563 > 519	52		4.641		ND								
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		5.062	5.060	0	1649570	20	>100:1			2000.00	1944.34	100.2	
11 Perfluoro-n-dodecanoic acid (PFDoA) CAS: 307-55-1													U
613 > 569	38		5.069		ND								
24 Perfluoro-n-tridecanoic acid (PFTrDA) CAS: 72629-94-8													U
663 > 619	38		5.441		ND								
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.779	5.783	0	1956872	37	>100:1			2000.00	1869.35	97.2	
23 Perfluoro-n-tetradecanoic acid (PFTeDA) CAS: 376-06-7													U
713 > 669	42		5.783		ND								

Compound Type Legend

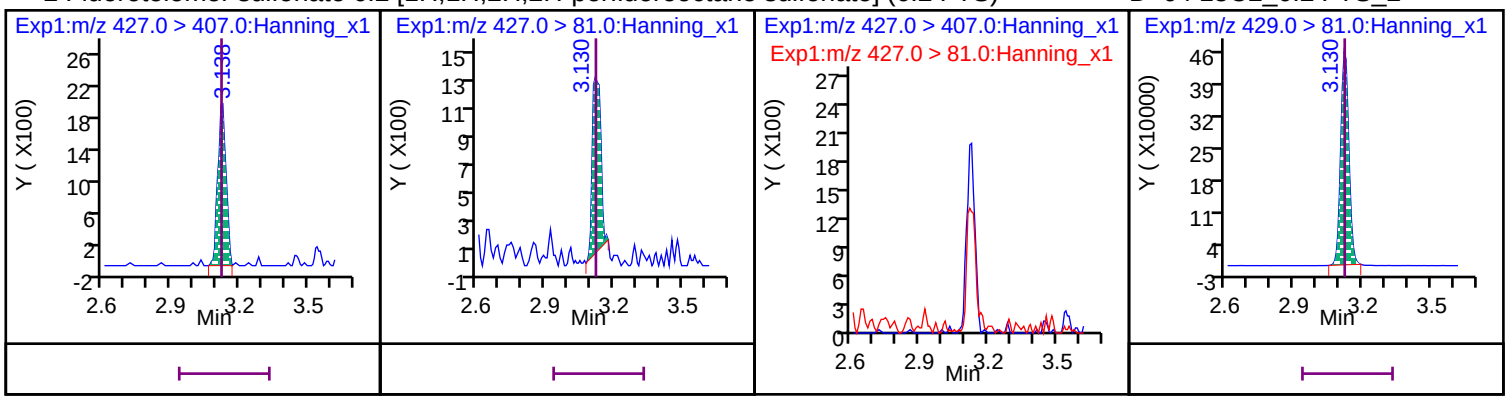
D - Isotopic Dilution Std.

QC Flag Legend

U - Result Less Than Method Detection Limit
J - Compound Concentration Below Quantitation Limit
M - Compound Hit/Peak Manually Integrated

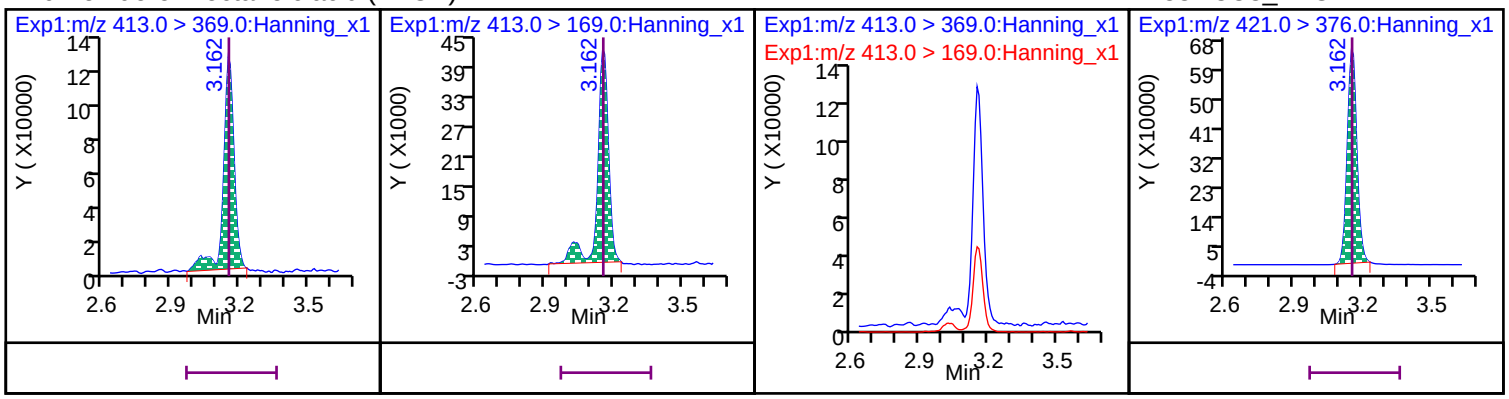
2 Fluorotelomer sulfonate 6:2 [1H,1H,2H,2H-perfluorooctane sulfonate] (6:2 FTS)

D 64 13C2_6:2 FTS_2



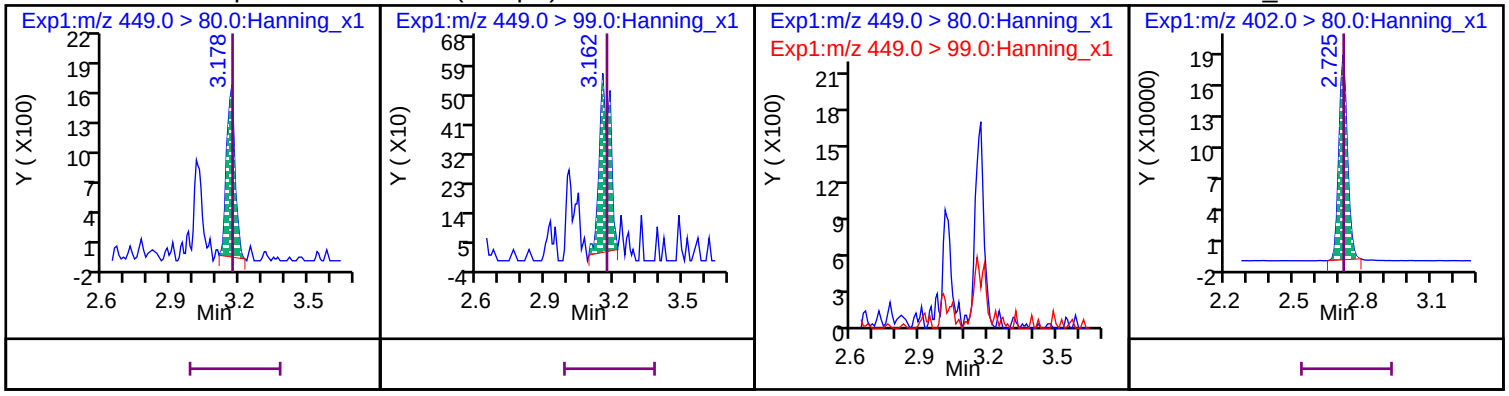
20 Perfluoro-n-octanoic acid (PFOA)

D 53 13C8_PFOA



12 Perfluoro-1-heptanesulfonic acid (PFHpS)

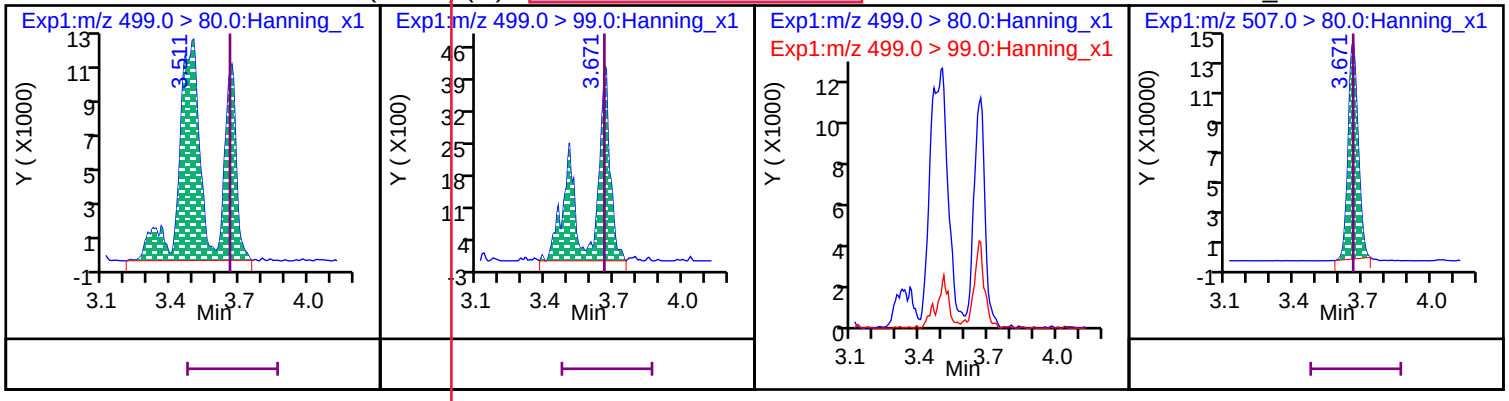
D 45 13C3_PFHxS



18 Perfluorooctanesulfonate (PFOS) (M)

significant branched isomers

D 54 13C8_PFOS



PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-007
Description: WVNW-PW-6A
Matrix: Aqueous
Date Sampled: 07/20/2022 1405
Date Received: 07/22/2022

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	08/18/2022 1717	MMM	08/10/2022 1743	50680

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.5	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.5	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.5	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.5	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.5	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.5	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.5	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.5	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		138	50-150
13C2_6:2FTS	N	282	50-150
13C2_8:2FTS		118	50-150
13C2_PFDoA		110	50-150
13C2_PFTeDA		106	50-150
13C3_PFBS		115	50-150
13C3_PFHxS		117	50-150
13C3-HFPO-DA		116	50-150
13C4_PFBA		92	50-150
13C4_PFHpA		116	50-150
13C5_PFHxA		112	50-150
13C5_PFPeA		118	50-150
13C6_PFDA		113	50-150
13C7_PFUdA		115	50-150

SA %R > 150%
(-) result, UJ

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-007
Description: WVNW-PW-6A
Matrix: Aqueous
Date Sampled: 07/20/2022 1405
Date Received: 07/22/2022

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		109	50-150
13C8_PFOS		113	50-150
13C8_PFOSA		105	50-150
13C9_PFNA		112	50-150
d5-EtFOSAA		108	50-150
d3-MeFOSAA		111	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-008
Description: WVNW-PW-6B
Matrix: Aqueous
Date Sampled: 07/20/2022 1435
Date Received: 07/22/2022

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	08/18/2022 1750	MMM	08/10/2022 1743	50680

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.4	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.4	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		129	50-150
13C2_6:2FTS	N	313	50-150
13C2_8:2FTS		100	50-150
13C2_PFDoA		97	50-150
13C2_PFTeDA		96	50-150
13C3_PFBS		105	50-150
13C3_PFHxS		110	50-150
13C3-HFPO-DA		104	50-150
13C4_PFBA		85	50-150
13C4_PFHpA		107	50-150
13C5_PFHxA		112	50-150
13C5_PFPeA		108	50-150
13C6_PFDA		105	50-150
13C7_PFUdA		105	50-150

SA %R > 150%
(-) result, UJ

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-008
Description: WVNW-PW-6B
Matrix: Aqueous
Date Sampled: 07/20/2022 1435
Date Received: 07/22/2022

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		107	50-150
13C8_PFOS		106	50-150
13C8_PFOSA		98	50-150
13C9_PFNA		104	50-150
d5-EtFOSAA		104	50-150
d3-MeFOSAA		101	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-009
Description: WVNW-PW-7A
Matrix: Aqueous
Date Sampled: 07/20/2022 1525
Date Received: 07/22/2022

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	08/18/2022 1801	MMM	08/10/2022 1743	50680

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.4	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.4	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		115	50-150
13C2_6:2FTS	N	220	50-150
13C2_8:2FTS		107	50-150
13C2_PFDoA		97	50-150
13C2_PFTeDA		92	50-150
13C3_PFBS		107	50-150
13C3_PFHxS		111	50-150
13C3-HFPO-DA		107	50-150
13C4_PFBA		90	50-150
13C4_PFHpA		111	50-150
13C5_PFHxA		107	50-150
13C5_PFPeA		111	50-150
13C6_PFDA		105	50-150
13C7_PFUdA		100	50-150

SA %R > 150%
(-) result, UJ

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-009
Description: WVNW-PW-7A
Matrix: Aqueous
Date Sampled: 07/20/2022 1525
Date Received: 07/22/2022

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		103	50-150
13C8_PFOS		109	50-150
13C8_PFOSA		98	50-150
13C9_PFNA		103	50-150
d5-EtFOSAA		102	50-150
d3-MeFOSAA		105	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-010
Description: EQB-HT
Matrix: Aqueous
Date Sampled: 07/20/2022 1645
Date Received: 07/22/2022

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	08/18/2022 1812	MMM	08/10/2022 1743	50680

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.9	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.9	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.9	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.9	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.9	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.9	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.9	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		105	50-150
13C2_6:2FTS	N	248	50-150
13C2_8:2FTS		105	50-150
13C2_PFDoA		104	50-150
13C2_PFTeDA		90	50-150
13C3_PFBS		100	50-150
13C3_PFHxS		104	50-150
13C3-HFPO-DA		105	50-150
13C4_PFBA		104	50-150
13C4_PFHpA		105	50-150
13C5_PFHxA		106	50-150
13C5_PFPeA		104	50-150
13C6_PFDA		106	50-150
13C7_PFUdA		106	50-150

SA %R > 150%
(-) result, UJ

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-010
Description: EQB-HT
Matrix: Aqueous
Date Sampled: 07/20/2022 1645
Date Received: 07/22/2022

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		97	50-150
13C8_PFOS		108	50-150
13C8_PFOSA		97	50-150
13C9_PFNA		103	50-150
d5-EtFOSAA		99	50-150
d3-MeFOSAA		103	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
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PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-011
Description: FB-7/20
Matrix: Aqueous
Date Sampled: 07/20/2022 1530
Date Received: 07/22/2022

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	08/18/2022 1845	MMM	08/10/2022 1743	50680

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.0	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.0	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.0	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.5	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		117	50-150
13C2_6:2FTS	N	196	50-150
13C2_8:2FTS		109	50-150
13C2_PFDoA		104	50-150
13C2_PFTeDA		96	50-150
13C3_PFBS		108	50-150
13C3_PFHxS		113	50-150
13C3-HFPO-DA		106	50-150
13C4_PFBA		108	50-150
13C4_PFHpA		117	50-150
13C5_PFHxA		107	50-150
13C5_PFPeA		114	50-150
13C6_PFDA		111	50-150
13C7_PFUdA		106	50-150

SA %R > 150%
(-) result, UJ

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: GZA GeoEnvironmental, Inc.
Laboratory ID: XG22049-011
Description: FB-7/20
Matrix: Aqueous
Date Sampled: 07/20/2022 1530
Date Received: 07/22/2022

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		110	50-150
13C8_PFOS		111	50-150
13C8_PFOSA		103	50-150
13C9_PFNA		110	50-150
d5-EtFOSAA		107	50-150
d3-MeFOSAA		104	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS - MB

Sample ID: XQ50680-001
Batch: 50680
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 08/10/2022 1743

Parameter	Result	Q	Dil	LOQ	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	ng/L	08/18/2022 1550
11Cl-PF3OUdS	ND		1	8.0	ng/L	08/18/2022 1550
8:2 FTS	ND		1	8.0	ng/L	08/18/2022 1550
6:2 FTS	ND		1	8.0	ng/L	08/18/2022 1550
4:2 FTS	ND		1	8.0	ng/L	08/18/2022 1550
GenX	ND		1	8.0	ng/L	08/18/2022 1550
ADONA	ND		1	8.0	ng/L	08/18/2022 1550
EtFOSAA	ND		1	8.0	ng/L	08/18/2022 1550
MeFOSAA	ND		1	8.0	ng/L	08/18/2022 1550
PFBS	ND		1	4.0	ng/L	08/18/2022 1550
PFDS	ND		1	4.0	ng/L	08/18/2022 1550
PFHpS	ND		1	4.0	ng/L	08/18/2022 1550
PFNS	ND		1	4.0	ng/L	08/18/2022 1550
PFOSA	ND		1	4.0	ng/L	08/18/2022 1550
PFPeS	ND		1	4.0	ng/L	08/18/2022 1550
PFHxS	ND		1	4.0	ng/L	08/18/2022 1550
PFBA	ND		1	4.0	ng/L	08/18/2022 1550
PFDA	ND		1	4.0	ng/L	08/18/2022 1550
PFDoA	ND		1	4.0	ng/L	08/18/2022 1550
PFHpA	ND		1	4.0	ng/L	08/18/2022 1550
PFHxA	ND		1	4.0	ng/L	08/18/2022 1550
PFNA	ND		1	4.0	ng/L	08/18/2022 1550
PFOA	ND		1	4.0	ng/L	08/18/2022 1550
PFPeA	ND		1	4.0	ng/L	08/18/2022 1550
PFTeDA	ND		1	4.0	ng/L	08/18/2022 1550
PFTrDA	ND		1	4.0	ng/L	08/18/2022 1550
PFUdA	ND		1	4.0	ng/L	08/18/2022 1550
PFOS	ND		1	4.0	ng/L	08/18/2022 1550

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		119	50-150
13C2_6:2FTS	N	351	50-150
13C2_8:2FTS		104	50-150
13C2_PFDoA		98	50-150
13C2_PFTeDA		97	50-150
13C3_PFBS		110	50-150
13C3_PFHxS		113	50-150
13C3-HFPO-DA		113	50-150
13C4_PFBA		111	50-150
13C4_PFHpA		118	50-150
13C5_PFHxA		113	50-150
13C5_PFPeA		110	50-150

response of 6:2 FTS is significantly less than response of low calibration, no detection

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: XQ50680-001
Batch: 50680
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 08/10/2022 1743

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		107	50-150
13C7_PFUdA		101	50-150
13C8_PFOA		112	50-150
13C8_PFOS		108	50-150
13C8_PFOSA		103	50-150
13C9_PFNA		107	50-150
d5-EtFOSAA		106	50-150
d3-MeFOSAA		103	50-150

LOQ = Limit of Quantitation

ND = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

* = RSD is out of criteria

+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

FORM 2
ISOTOPE DILUTION STANDARD RECOVERY

Lab Name: Pace Analytical Services, LLC Lot No.: XG22049

Project No.: 16.0062961.5

AnalyticalMethod: PFAS by ID SOP Matrix: Water

CLIENT SAMPLE ID	IDS1	IDS2	IDS3	IDS4	IDS5	IDS6	IDS7	IDS8	IDS9
Area19-PW-8A	117	181 *	103	104	103	108	109	109	98
Area19-PW-9A	181 *	188 *	103	97	93	100	108	106	71
Area19-PW-9B	172 *	314 *	110	98	94	103	120	105	71
Area19-PW-10A	170 *	175 *	112	107	108	105	115	105	86
WVNW-PW-5A	149	241 *	106	100	97	102	118	106	76
WVNW-PW-5A DUP	168 *	306 *	105	100	97	104	119	110	78
WVNW-PW-6A	138	282 *	118	110	106	115	117	116	92
WVNW-PW-6B	129	313 *	100	97	96	105	110	104	85
WVNW-PW-7A	115	220 *	107	97	92	107	111	107	90
EQB-HT	105	248 *	105	104	90	100	104	105	104
FB-7/20	117	196 *	109	104	96	108	113	106	108
WVNW-PW-6AMSD	125	268 *	99	97	94	105	109	105	87
WVNW-PW-6AMS	122	264 *	108	100	97	103	112	105	86
XQ50680-001	119	351 *	104	98	97	110	113	113	111
XQ50680-002	109	290 *	100	94	74	101	107	103	102

IDS1 = 13C2_4:2FTS
IDS2 = 13C2_6:2FTS
IDS3 = 13C2_8:2FTS
IDS4 = 13C2_PFDoA
IDS5 = 13C2_PFTeDA
IDS6 = 13C3_PFBS
IDS7 = 13C3_PFHxS
IDS8 = 13C3-HFPO-DA
IDS9 = 13C4_PFBA

Refer to sample Form Is for qual

QC LIMITS
50-150
50-150
50-150
50-150
50-150
50-150
50-150
50-150
50-150

* Recoveries outside QC limits
D IDS Diluted Out

FORM 2
ISOTOPE DILUTION STANDARD RECOVERY

Lab Name: Pace Analytical Services, LLC Lot No.: XG22049

Project No.: 16.0062961.5

AnalyticalMethod: PFAS by ID SOP Matrix: Water

CLIENT SAMPLE ID	IDS10	IDS11	IDS12	IDS13	IDS14	IDS15	IDS16	IDS17	
Area19-PW-8A	113	113	108	109	106	110	109	99	
Area19-PW-9A	113	110	105	107	102	103	109	96	
Area19-PW-9B	112	115	102	111	109	107	109	101	
Area19-PW-10A	120	114	109	111	102	106	112	102	
WVNW-PW-5A	118	111	104	109	106	106	109	102	
WVNW-PW-5A DUP	115	109	107	111	105	106	110	102	
WVNW-PW-6A	116	112	118	113	115	109	113	105	
WVNW-PW-6B	107	112	108	105	105	107	106	98	
WVNW-PW-7A	111	107	111	105	100	103	109	98	
EQB-HT	105	106	104	106	106	97	108	97	
FB-7/20	117	107	114	111	106	110	111	103	
WVNW-PW-6AMSD	107	108	108	104	99	105	106	99	
WVNW-PW-6AMS	111	109	109	108	104	103	106	100	
XQ50680-001	118	113	110	107	101	112	108	103	
XQ50680-002	103	106	103	103	104	105	103	96	

	QC LIMITS
IDS10 = 13C4_PFHpA	50-150
IDS11 = 13C5_PFHxA	50-150
IDS12 = 13C5_PFPeA	50-150
IDS13 = 13C6_PFDA	50-150
IDS14 = 13C7_PFUdA	50-150
IDS15 = 13C8_PFOA	50-150
IDS16 = 13C8_PFOS	50-150
IDS17 = 13C8_PFOSA	50-150

* Recoveries outside QC limits
D IDS Diluted Out

FORM 2
ISOTOPE DILUTION STANDARD RECOVERY

Lab Name: Pace Analytical Services, LLC Lot No.: XG22049

Project No.: 16.0062961.5

AnalyticalMethod: PFAS by ID SOP Matrix: Water

CLIENT SAMPLE ID	IDS18	IDS19	IDS20						TOT OUT
Area19-PW-8A	106	106	103						1
Area19-PW-9A	105	100	99						2
Area19-PW-9B	106	105	103						2
Area19-PW-10A	107	101	97						2
WVNW-PW-5A	106	103	105						1
WVNW-PW-5A DUP	107	105	104						2
WVNW-PW-6A	112	108	111						1
WVNW-PW-6B	104	104	101						1
WVNW-PW-7A	103	102	105						1
EQB-HT	103	99	103						1
FB-7/20	110	107	104						1
WVNW-PW-6AMSD	103	101	101						1
WVNW-PW-6AMS	103	101	102						1
XQ50680-001	107	106	103						1
XQ50680-002	100	98	98						1

	QC LIMITS
IDS18 = 13C9_PFNA	50-150
IDS19 = d5-EtFOSAA	50-150
IDS20 = d3-MeFOSAA	50-150

* Recoveries outside QC limits
D IDS Diluted Out

FORM 3
MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Pace Analytical Services, LLC Lot No.: XG22049

Project No.: 16.0062961.5

Analytical Method: PFAS by ID SOP Matrix: Water

Client Sample ID (Matrix Spike/Matrix Spike Duplicate): WVNW-PW-6A

Instrument ID: Sciex_5060884 (QTRAP 4500)_LCMSMS2 Lab Sample ID: XG22049-007MS

Concentration Units (ug/L, mg/L, ug/kg): ng/L

ANALYTE	SPIKE ADDED	SAMPLE CONCENTRATION	MS CONCENTRATION	MS %REC #	QC LIMITS REC.
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	14		13	92	70-150
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	14		11	80	70-150
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	14		14	100	70-150
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	14		12	88	70-150
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	14		14	102	70-150
Hexafluoropropylene oxide dimer acid (GenX)	29		29	100	70-150
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	14		13	94	70-150
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	15		12	85	70-150
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	15		14	95	70-150
Perfluoro-1-butanesulfonic acid (PFBS)	13		14	107	70-150
Perfluoro-1-decanesulfonic acid (PFDS)	14		12	87	70-150
Perfluoro-1-heptanesulfonic acid (PFHpS)	14		13	94	70-150
Perfluoro-1-nonanesulfonic acid (PFNS)	14		12	86	70-150
Perfluoro-1-octanesulfonamide (PFOSA)	15		13	93	70-150
Perfluoro-1-pentanesulfonic acid (PFPeS)	14		14	103	70-150
Perfluorohexanesulfonic acid (PFHxS)	13		14	103	70-150
Perfluoro-n-butanoic acid (PFBA)	15		17	117	70-150
Perfluoro-n-decanoic acid (PFDA)	15		14	99	70-150
Perfluoro-n-dodecanoic acid (PFDoA)	15		14	96	70-150
Perfluoro-n-heptanoic acid (PFHpA)	15		14	97	70-150
Perfluoro-n-hexanoic acid (PFHxA)	15		14	99	70-150
Perfluoro-n-nonanoic acid (PFNA)	15		14	95	70-150
Perfluoro-n-octanoic acid (PFOA)	15		15	101	70-150
Perfluoro-n-pentanoic acid (PFPeA)	15		14	95	70-150
Perfluoro-n-tetradecanoic acid (PFTeDA)	15		14	97	70-150
Perfluoro-n-tridecanoic acid (PFTrDA)	15		13	92	70-150
Perfluoro-n-undecanoic acid (PFUdA)	15		14	98	70-150
Perfluorooctanesulfonic acid (PFOS)	13		15	108	70-150

* Values outside of QC Limits

FORM 3
MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Pace Analytical Services, LLC Lot No.: XG22049

Project No.: 16.0062961.5

Analytical Method: PFAS by ID SOP Matrix: Water

Client Sample ID (Matrix Spike/Matrix Spike Duplicate): WVNW-PW-6A

Instrument ID: Sciex_5060884 (QTRAP 4500)_LCMSMS2 Lab Sample ID: XG22049-007MS

Concentration Units (ug/L, mg/L, ug/kg): ng/L

ANALYTE	SPIKE ADDED	MSD CONCENTRATION	MSD %R #	RPD #	QC LIMITS	
					RPD	%R
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	14	12	88	1.8	0-30	70-150
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	14	11	79	1.3	0-30	70-150
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	14	15	103	6.8	0-30	70-150
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	14	14	96	12	0-30	70-150
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	14	13	92	7.2	0-30	70-150
Hexafluoropropylene oxide dimer acid (GenX)	30	28	94	2.8	0-30	70-150
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	14	14	100	8.9	0-30	70-150
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	15	14	94	13	0-30	70-150
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	15	14	92	0.12	0-30	70-150
Perfluoro-1-butanesulfonic acid (PFBS)	13	14	104	0.44	0-30	70-150
Perfluoro-1-decanesulfonic acid (PFDS)	14	13	87	2.7	0-30	70-150
Perfluoro-1-heptanesulfonic acid (PFHpS)	14	14	100	9.6	0-30	70-150
Perfluoro-1-nonanesulfonic acid (PFNS)	14	13	88	5.4	0-30	70-150
Perfluoro-1-octanesulfonamide (PFOSA)	15	14	92	2.9	0-30	70-150
Perfluoro-1-pentanesulfonic acid (PFPeS)	14	15	103	3.7	0-30	70-150
Perfluorohexanesulfonic acid (PFHxS)	14	15	111	11	0-30	70-150
Perfluoro-n-butanoic acid (PFBA)	15	17	116	2.2	0-30	70-150
Perfluoro-n-decanoic acid (PFDA)	15	15	98	2.5	0-30	70-150
Perfluoro-n-dodecanoic acid (PFDoA)	15	15	98	6.1	0-30	70-150
Perfluoro-n-heptanoic acid (PFHpA)	15	16	104	9.7	0-30	70-150
Perfluoro-n-hexanoic acid (PFHxA)	15	14	93	3.1	0-30	70-150
Perfluoro-n-nonanoic acid (PFNA)	15	14	96	4.4	0-30	70-150
Perfluoro-n-octanoic acid (PFOA)	15	14	94	3.5	0-30	70-150
Perfluoro-n-pentanoic acid (PFPeA)	15	15	98	6.2	0-30	70-150
Perfluoro-n-tetradecanoic acid (PFTeDA)	15	14	96	2.3	0-30	70-150
Perfluoro-n-tridecanoic acid (PFTrDA)	15	14	93	4.0	0-30	70-150
Perfluoro-n-undecanoic acid (PFUdA)	15	15	97	1.8	0-30	70-150
Perfluorooctanesulfonic acid (PFOS)	14	15	106	1.6	0-30	70-150

MS/MSD RPD was observed to be calculated incorrectly. Data reviewer recalculated using form 3 concentrations since the initial volumes were not significantly different (3% RPD)

RPDs calculated correctly; raw data uses more significant figures

* Values outside of QC Limits

FORM 3
LABORATORY CONTROL/LABORATORY CONTROL DUPLICATE SAMPLE RECOVERY

Lab Name: Pace Analytical Services, LLC Lot No.: XG22049

Project No.: 16.0062961.5

Analytical Method: PFAS by ID SOP Matrix: Water

Client Sample ID: XQ50680-002 Lab Sample ID: XQ50680-002

Instrument ID: Sciex_5060884 (QTRAP 4500)_LCMSMS2

Concentration Units (ug/L, mg/L, ug/kg): ng/L

ANALYTE	SPIKE ADDED	LCS CONCENTRATION	LCS %REC #	QC LIMITS REC.
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	15	12	78	70-150
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	15	16	103	70-150
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	15	14	94	70-150
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	15	15	99	70-150
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	15	15	98	70-150
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	15	14	92	70-150
Hexafluoropropylene oxide dimer acid (GenX)	32	32	99	70-150
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	16	16	100	70-150
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	16	15	97	70-150
Perfluoro-1-butanesulfonic acid (PFBS)	14	14	97	70-150
Perfluoro-1-decanesulfonic acid (PFDS)	15	13	85	70-150
Perfluoro-1-heptanesulfonic acid (PFHpS)	15	16	105	70-150
Perfluoro-1-nonanesulfonic acid (PFNS)	15	14	93	70-150
Perfluoro-1-octanesulfonamide (PFOSA)	16	16	99	70-150
Perfluoro-1-pentanesulfonic acid (PFPeS)	15	16	106	70-150
Perfluoro-n-butanoic acid (PFBA)	16	16	102	70-150
Perfluoro-n-decanoic acid (PFDA)	16	16	100	70-150
Perfluoro-n-dodecanoic acid (PFDoA)	16	16	99	70-150
Perfluoro-n-heptanoic acid (PFHpA)	16	17	109	70-150
Perfluoro-n-hexanoic acid (PFHxA)	16	16	99	70-150
Perfluoro-n-nonanoic acid (PFNA)	16	16	101	70-150
Perfluoro-n-octanoic acid (PFOA)	16	16	100	70-150
Perfluoro-n-pentanoic acid (PFPeA)	16	16	101	70-150
Perfluoro-n-tetradecanoic acid (PFTeDA)	16	16	102	70-150
Perfluoro-n-tridecanoic acid (PFTrDA)	16	14	88	70-150
Perfluoro-n-undecanoic acid (PFUdA)	16	16	99	70-150
Perfluorohexanesulfonic acid (PFHxS)	15	14	98	70-150
Perfluorooctanesulfonic acid (PFOS)	15	14	95	70-150

* Values outside of QC Limits

CLIENT SAMPLE ID

XQ50680-001

FORM 4
METHOD BLANK SUMMARY

Lab Name: Pace Analytical Services, LLC

Project No.: 16.0062961.5

Analytical Method: PFAS by ID SOP

Instrument ID: Sciex_5060884 (QTRAP 4500)_LCMSMS2

Extraction Type: SOP SPE

LC Column: Gemini C18 ID: 2.00 (mm)

Lot No.: XG22049

Lab Sample ID: XQ50680-001

Matrix: Water

Lab File ID: XQ50680-001.txt

Date Extracted: 08/10/2022

Date Analyzed: 08/18/2022

Time Analyzed: 15:50

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE/TIME ANALYZED
Area19-PW-8A	XG22049-001	XG22049-001.txt	16:12
Area19-PW-9A	XG22049-002	XG22049-002.txt	16:23
Area19-PW-9B	XG22049-003	XG22049-003.txt	16:33
Area19-PW-10A	XG22049-004	XG22049-004.txt	16:44
WVNW-PW-5A	XG22049-005	XG22049-005.txt	16:55
WVNW-PW-5A DUP	XG22049-006	XG22049-006.txt	17:06
WVNW-PW-6A	XG22049-007	XG22049-007.txt	17:17
WVNW-PW-6B	XG22049-008	XG22049-008.txt	17:50
WVNW-PW-7A	XG22049-009	XG22049-009.txt	18:01
EQB-HT	XG22049-010	XG22049-010.txt	18:12
FB-7/20	XG22049-011	XG22049-011.txt	18:45
WVNW-PW-6AMSD	XG22049-007MD	XG22049-007MD.txt	17:39
WVNW-PW-6AMS	XG22049-007MS	XG22049-007MS.txt	17:28
XQ50680-002	XQ50680-002	XQ50680-002.txt	16:01

SCIEX Triple Quad™ 4500/4500MD Systems

Planned Maintenance Procedure

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Introduction 1

Note: For regulatory and safety information for the mass spectrometer, refer to the *System User Guide*.

The planned maintenance (PM) procedure is designed to help maintain overall system performance.

The PM is not intended to take the place of an Operational Qualification (OQ) nor is it intended to verify the instrument specifications. Separate Installation Qualification (IQ) and OQ services are available. Contact a SCIEX representative.

The procedure must be performed by a trained SCIEX Field Service Employee (FSE).

The procedure has been developed for the SCIEX Triple Quad™ 4500/4500MD System with the Turbo V™ Ion Source. It does not apply to any other products or processes.

The procedure does not address any customer-specific analytical protocol (performance qualification) or method validation.

Note: If an issue is identified and the system requires repair, then the customer is responsible for the repair at the expense of the customer, except to the extent that the system and the required repairs are covered by a SCIEX warranty or service contract. A separate repair service call must be opened and the repair hours must not be charged against this procedure.

Planned Maintenance Tasks 2

Note: Perform all procedures using the Turbo V™ Ion Source, unless otherwise specified.

Pre-Planned Maintenance

Note: Guideline values are for reference only. The pre-PM test results are not required to meet or exceed these values.

Pre-PM Tasks

Task	Complete	N/A
Ask the customer about system performance since the last visit and record comments.	✓	—
If the customer maintains a log for the system, then review it.	○	◉
Review the work to be performed with the customer.	✓	—

PC Health Check

Task	Complete	N/A
Inspect the status of the RAID 1 hard drives.		—

Vacuum System Tests

Task			Complete
Record the turbo pump operational values. **Parameter** / **Results** Temperature (ºC) Current (A) Voltage (V) Power (W) Driving frequency (Hz)			✓
Inspect the vacuum gauge filament using the Analyst® Service Diagnostics (ASD) Software and identify the filament position. If the mass spectrometer is using filament 2, then order a replacement vacuum gauge as a separate service call.	1	◉	✓
	2	○	

Pre-PM Pressure Test

Pre-PM Pressure Test is Complete	✓

Test	Guideline	Result
Vacuum chamber pressure with CAD gas off	0.4×10^{-5} torr $\leq P_{CAD\,0} \leq 1.1 \times 10^{-5}$ torr	0.5e-5
Pressure difference (CAD_{12} minus CAD_0)	1.8×10^{-5} torr $\leq (P_{CAD\,12} - P_{CAD\,0}) \leq 2.8 \times 10^{-5}$ torr	2.1e-5

Inspect for Contamination

Task	Complete	N/A
Inspect for front-end contamination. Refer to Inspect for Contamination.	✓	—

Pre-PM System Tests

Q1 Positive MS Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1,254.925, 1,545.134, 1,952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
175.133	≥ 8.0×10^6	2.4e7	0.6 to 0.8	0.74
500.380	≥ 8.0×10^6	2.2e7	0.6 to 0.8	0.74
906.673	≥ 2.0×10^7	3.3e7	0.6 to 0.8	0.76
1,952.427	≥ 8.8×10^5	6.4e6	0.6 to 0.8	0.69

Q3 Positive MS Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1,254.925, 1,545.134, 1,952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
175.133	≥ 8.0×10^6	3.1e7	0.6 to 0.8	0.76
500.380	≥ 8.0×10^6	2.8e7	0.6 to 0.8	0.76
906.673	≥ 2.0×10^7	4.3e7	0.6 to 0.8	0.77
1,952.427	≥ 8.8×10^5	9.3e6	0.6 to 0.8	0.81

Q1 Negative MS Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1,223.845, 1,572.097, 1,863.306, 1,979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
933.636	≥ 1.8×10^7	1.9e7	0.6 to 0.8	0.71
1,863.306	≥ 1.4×10^6	3.8e6	0.6 to 0.8	0.73

Q3 Negative MS Test is Complete	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1,223.845, 1,572.097, 1,863.306, 1,979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Guideline	Result	Guideline	Result
933.636	≥ 1.8×10^7	3.3e7	0.6 to 0.8	0.81
1,863.306	≥ 2.0×10^6	7.5e6	0.6 to 0.8	0.77

Reserpine MS/MS Transmission Test is Complete	✓

- **Test solution:** Reserpine solution 0.167 pmol/µL
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s (both MS and MS/MS)
- **Scan mode:** Product Ion (MS2)
- **Product Of:** 609.3 (or as calibrated)
- **Product Ion:** 195.1
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 609.3 and 195.1, with peak intensities, peak width, and mass shift results, complete with method file information.

Guideline	Result
Transmission efficiency $\frac{Intensity\ for\ ion\ at\ m/z\ 195.1}{Intensity\ for\ ion\ at\ m/z\ 609.3\ (or\ as\ calibrated)} \times 100 \geq 10\%$	8.1%

Planned Maintenance

Mass Spectrometer Maintenance

Task	Complete	N/A
Shut down the system and then disconnect the mains supply power cable.	✓	—
If required, replace the roughing pump oil. The recommended interval is every 3 years. **Note:** If an oil change is not required, then inspect the oil level and top up, if necessary. **CAUTION: Potential System Damage. Do not mix different types of oil. Mixing mineral oil with synthetic oil can cause pump failure.**	✓	—
If required, replace the roughing pump oil exhaust filter. The recommended interval is every 3 years.	○	◒
Confirm that there is no excessive roughing pump oil leakage. Clean up any oil.	✓	—
Make sure that the roughing pump exhaust is properly routed to the ventilation system.	✓	—

Task	Complete	N/A
Inspect the exhaust system: • Make sure that all of the gas fittings at the rear bulkhead are tight. • Make sure that all of the exhaust hoses are free of kinks. • Make sure that all of the hoses at the waste bottle are secure, and there are no signs of leaks. • Make sure that the waste bottle is in an upright position. • Make sure that the exhaust hose is secured to the lab ventilation system. • Confirm that no liquid is trapped in the exhaust lines.	✓	—
Clean or replace the four air filters in the base of the mass spectrometer chassis.	✓	—
(If applicable) Clean the turbo pump filter screen.	○	◉
(If applicable) Verify the operation of the SCIEX-supplied bench cooling fans.	◉	○
Clean the curtain plate.	✓	—
Clean the orifice plate.	✓	—
Clean the QJet® Ion Guide and IQ0 lens.	✓	—
(If contamination is detected) Clean the Q0 region and the IQ1 lens.	◉	○
Inspect the cable connections: • Make sure that the power cables for the mass spectrometer, LC system, roughing pump, syringe pump, gas generator, and UPS are securely connected. • Make sure that the communications cables for the GPIB/Ethernet ports, LC connections, and roughing pump are securely connected.	✓	—

Task	Complete	N/A
Verify system support functions — gas: • Confirm the input gas pressures at the regulators are within specifications. • Confirm that there is no liquid present in the gas lines.	✓	—
Verify the expiry date on the battery system for the UPS (sold by SCIEX), and then recommend replacement of the battery tray, if required.	○	◉
Start up the system.	✓	—

Turbo V™ Ion Source Maintenance

Task	Complete	N/A
If necessary, replace the electrode in the TurboIonSpray® and APCI Probes.	◉	○
With the TurboIonSpray® probe installed, verify that the temperature (TEM) reaches the recommended set point of 500 °C.	✓	—
(If applicable) With the APCI probe installed, verify that the temperature (TEM) reaches the recommended set point of 400 °C.	○	◉
Inspect the ion source and, if visible signs of contamination are present, clean the inner surfaces using lint-free wipes and a 50:50 methanol:water solution. **Note:** Remove the corona discharge needle before cleaning.	◉	○

Software Maintenance

Note: This task is not applicable to MD systems.

Task	Complete	N/A
(Obtain customer approval first) Install any applicable Analyst® Software HotFixes. **Note:** Make sure that the compatible instrument firmware is installed.	○	◉

Post-Planned Maintenance

Voltage Tests

Task	Complete
Inspect the RF tuning voltages at the QPS amplifier module and then, if required, tune the coil boxes.	✓
Inspect the detector voltage. Optimize, if required. Detector voltage: +2100/-2200	✓

Post-PM Pressure Test

Post-PM Pressure Test is Complete	✓

Test	Specification	Result
Vacuum chamber pressure with CAD gas off	0.4×10^{-5} torr $\leq P_{CAD\,0} \leq 1.1 \times 10^{-5}$ torr	0.8e-5
Pressure difference (CAD_{12} minus CAD_0)	1.8×10^{-5} torr $\leq (P_{CAD\,12} - P_{CAD\,0}) \leq 2.8 \times 10^{-5}$ torr	2.4e-5

Inspect for Contamination

Task	Complete	N/A
Inspect for front-end contamination. Refer to Inspect for Contamination.	✓	—

Post-PM System Tests

Q1 Positive MS Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1,254.925, 1,545.134, 1,952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
175.133	≥ 8.0×10^6	3.1e7	0.6 to 0.8	0.69
500.380	≥ 8.0×10^6	3.1e7	0.6 to 0.8	0.73
906.673	≥ 2.0×10^7	4.2e7	0.6 to 0.8	0.77
1,952.427	≥ 8.8×10^5	1.0e7	0.6 to 0.8	0.71

Q1 Positive MS Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1,254.925, 1,545.134, 1,952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
59.050, 175.133, 500.380, 616.464, 906.673, 1,254.925, 1,545.134, 1,952.427	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1,000	50	0.6 to 0.8	
	2,000	100	0.6 to 0.8	

Q3 Positive MS Test is Complete: Intensity and Peak Width	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1,254.925, 1,545.134, 1,952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
175.133	≥ 8.0×10^6	3.8e7	0.6 to 0.8	0.77
500.380	≥ 8.0×10^6	3.7e7	0.6 to 0.8	0.76
906.673	≥ 2.0×10^7	5.5e7	0.6 to 0.8	0.76
1,952.427	≥ 8.8×10^5	1.3e7	0.6 to 0.8	0.71

Q3 Positive MS Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** POS PPG, 2e-6 M
- **Flow rate:** 5 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 59.050, 175.133, 500.380, 616.464, 906.673, 1,254.925, 1,545.134, 1,952.427, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
59.050, 175.133, 500.380, 616.464, 906.673, 1,254.925, 1,545.134, 1,952.427	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1,000	50	0.6 to 0.8	
	2,000	100	0.6 to 0.8	

Q1 Negative MS Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1,223.845, 1,572.097, 1,863.306, 1,979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
933.636	≥ 1.8×10^7	2.7e7	0.6 to 0.8	0.74
1,863.306	≥ 1.4×10^6	4.9e6	0.6 to 0.8	0.74

Q1 Negative MS Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1,223.845, 1,572.097, 1,863.306, 1,979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
44.998, 411.259, 585.385, 933.636, 1,223.845, 1,572.097, 1,863.306, 1,979.389	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1,000	50	0.6 to 0.8	
	2,000	100	0.6 to 0.8	

Q3 Negative MS Test is Complete: Intensity and Peak Width	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **Scan rate**: 10 Da/s
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1,223.845, 1,572.097, 1,863.306, 1,979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Intensity (cps)		Peak Width (Da)	
	Specification	Result	Specification	Result
933.636	≥ 1.8×10^7	3.4e7	0.6 to 0.8	0.70
1,863.306	≥ 2.0×10^6	6.2e6	0.6 to 0.8	0.71

Q3 Negative MS Test is Complete: Peak Width for Identified Masses	✓

- **Test solution:** NEG PPG, 3e-4 M
- **Flow rate:** 10 µL/min
- **MCA:** On
- **Printouts required:** Spectra for masses 44.998, 411.259, 585.385, 933.636, 1,223.845, 1,572.097, 1,863.306, 1,979.389, with peak intensities, peak width, and mass shift results, complete with method file information.

Note: After calibration, the mass shift result must be within 0.1 Da for all assigned masses.

Mass (Da)	Scan Rate (Da/s)	Cycles	Specification (Da)	Result (Passed)
44.998, 411.259, 585.385, 933.636, 1,223.845, 1,572.097, 1,863.306, 1,979.389	10	10	0.6 to 0.8	✓
	200	50	0.6 to 0.8	
	1,000	50	0.6 to 0.8	
	2,000	100	0.6 to 0.8	

Reserpine MS/MS Transmission Test is Complete	✓

- **Test solution:** Reserpine solution 0.167 pmol/µL
- **Flow rate:** 5 µL/min
- **Scan rate:** 10 Da/s (both MS and MS/MS)
- **Scan mode:** Product Ion (MS2)
- **Product Of:** 609.3 (or as calibrated)
- **Product Ion:** 195.1
- **Cycles:** 10
- **MCA:** On
- **Printouts required:** Spectra for masses 609.3 and 195.1, with peak intensities, peak width, and mass shift results, complete with method file information.

Specification	Result
Transmission efficiency $\frac{Intensity\ for\ ion\ at\ m/z\ 195.1}{Intensity\ for\ ion\ at\ m/z\ 609.3\ (or\ as\ calibrated)} \times 100 \geq 10\%$	10.4%

Post-PM Tasks

Task	Complete	N/A
Delete any unnecessary files.	✓	—
Back up the Analyst Data folder.	✓	—
(If applicable) Defragment the hard drive.	○	◉
(Not applicable for MD instrument families) If the customer has a Software Support Plan, then perform the Software Health Check: • (Obtain customer approval first) Install any compatible HotFixes and updates for SCIEX add-on software.	○	◉

StatusScope® Remote Monitoring Service Tasks

The StatusScope® Remote Monitoring Service is not applicable for MD systems.

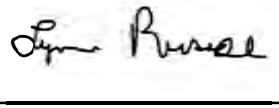
Task	Complete	N/A
Note: Installation of the StatusScope® Remote Monitoring Service is available only to warranty and eligible contract customers. Refer to sciex.com/instrument-service-and-support/statusscope-remote-monitoring for a list of eligible contracts. If the StatusScope® Remote Monitoring Service is not installed, then perform these tasks: • If the customer does not want the StatusScope® Remote Monitoring Service installed, then skip the remaining steps in this section. • If the customer wants the StatusScope® Remote Monitoring Service installed, then complete the steps in this section.	○	◉
Verify the connection to the server for the StatusScope® Remote Monitoring Service. **Note:** Use the **StatusScopePortCheck.exe**. The utility is included with the StatusScope® installer.	○	◉
Install the agent for the StatusScope® Remote Monitoring Service.	○	◉
Ask the customer to log on to SCIEX Now™ to verify that the instrument is connected to the server for the StatusScope® Remote Monitoring Service. **Note:** The instrument is shown under the account of the Primary Contact.	○	◉

Wrap-up

Task	Complete	N/A
Review the work performed with the customer.	✓	—
Record the test results in this document and then attach all of the test data.	✓	—
Review the routine maintenance schedule and the procedures with the customer.	✓	—
Complete this document: • Review the test results with the customer. • Provide the customer with the completed document and the test data. • If an electronic copy of the document is supplied to the customer, then save a copy on the Service drive.	✓	—

Signoff

3

Organization	Pace Analytical South Carolina		
Mass spectrometer serial number	EB250231807	Service request number	
FSE name	Lynne Russell	Date (yyyy-mm-dd)	2021-12-03
FSE signature			

Comments and Exceptions

Inspect for Contamination A

Perform a Q1 and Q3 charging test to determine whether front end contamination is present.

1. Run the **Pos PPG** method for 10 minutes, monitoring the Total Ion Count (TIC) for degradation of the signal or a decrease in sensitivity.
2. Change the polarity to Negative, and then scan for one minute.
3. Change the polarity to Positive, and then make sure that the **IS** parameter returns to the original value.
4. Run the method.

   If the signal sensitivity is restored temporarily but the Total Ion Count (TIC) again degrades by more than 5% over a 10 minute run, then a possible front-end contamination is indicated.
5. Repeat the test in Negative polarity using the Q1 Neg PPG method.

Guidelines for Cleaning the Front End

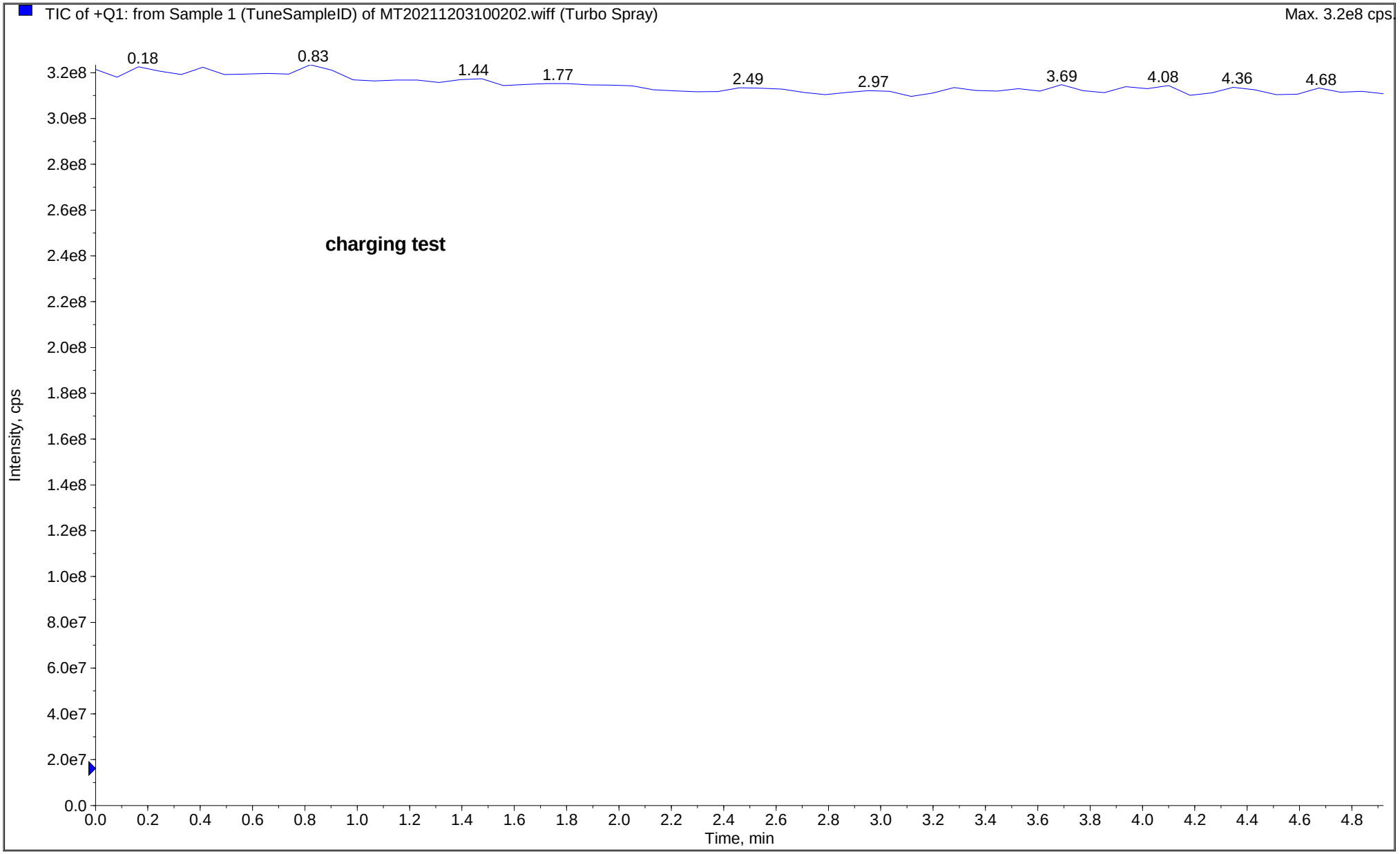
If charging tests indicate that cleaning is necessary, then clean the front-end components, including the QJet® Ion Guide, IQ0 lens, Q0 quadrupole, and IQ1 lens.

Removing the ion optics is considered a repair activity. FSEs must open a separate service repair call.

Note: This procedure does not provide troubleshooting for all technical root causes of signal degradation or charging effect. Signal degradation might also result from a contaminated TurboIonSpray® Probe or electrode, method parameters that are not optimized, or other factors.

Acq. Time: 10:02
Acq. Date: Friday, December 03, 2021

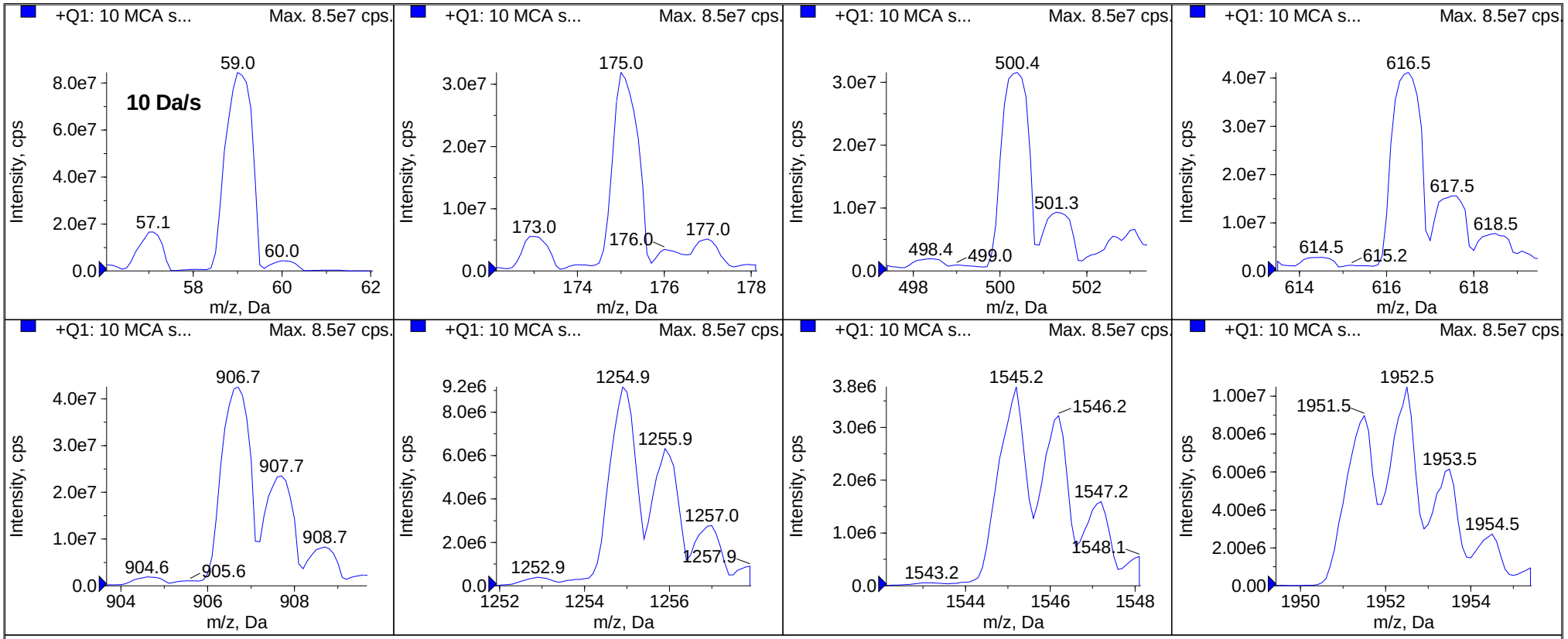
Analyst Version: 1.7.0
*SN: EB250231807



*Post-PM
*FSAS: Lynne Russell

Acq. Time: 10:10
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



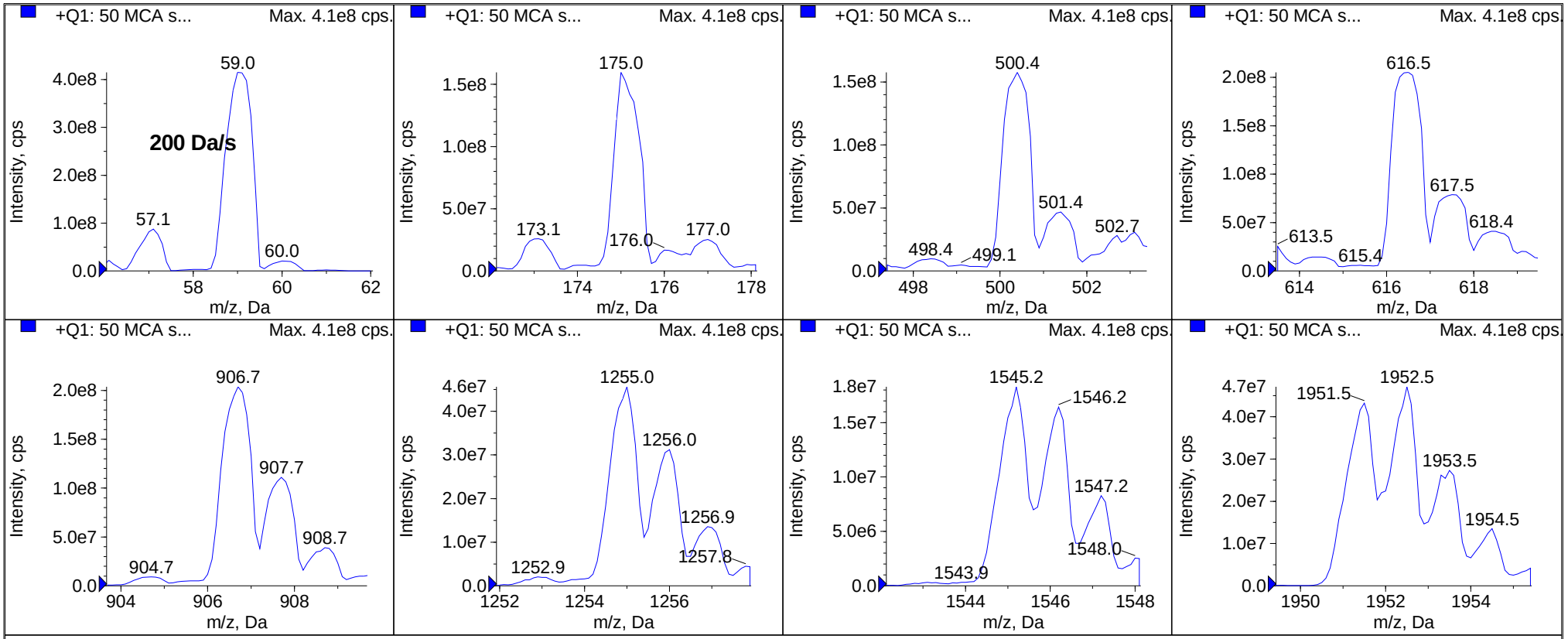
Peak List for " +Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20211203101036.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0421	8.4552e7	0.7225	7.9316e-3
2	175.1330	175.1057	3.1902e7	0.6900	0.0273
3	500.3800	500.3566	3.1546e7	0.7339	0.0234
4	616.4640	616.4621	4.1149e7	0.7817	1.9469e-3
5	906.6730	906.6613	4.2582e7	0.7725	0.0117
6	1254.9250	1254.9159	9.1682e6	0.7182	9.1448e-3
7	1545.1340	1545.1191	3.7667e6	0.7571	0.0149
8	1952.4270	1952.4173	1.0494e7	0.7139	9.7152e-3

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 10:12
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



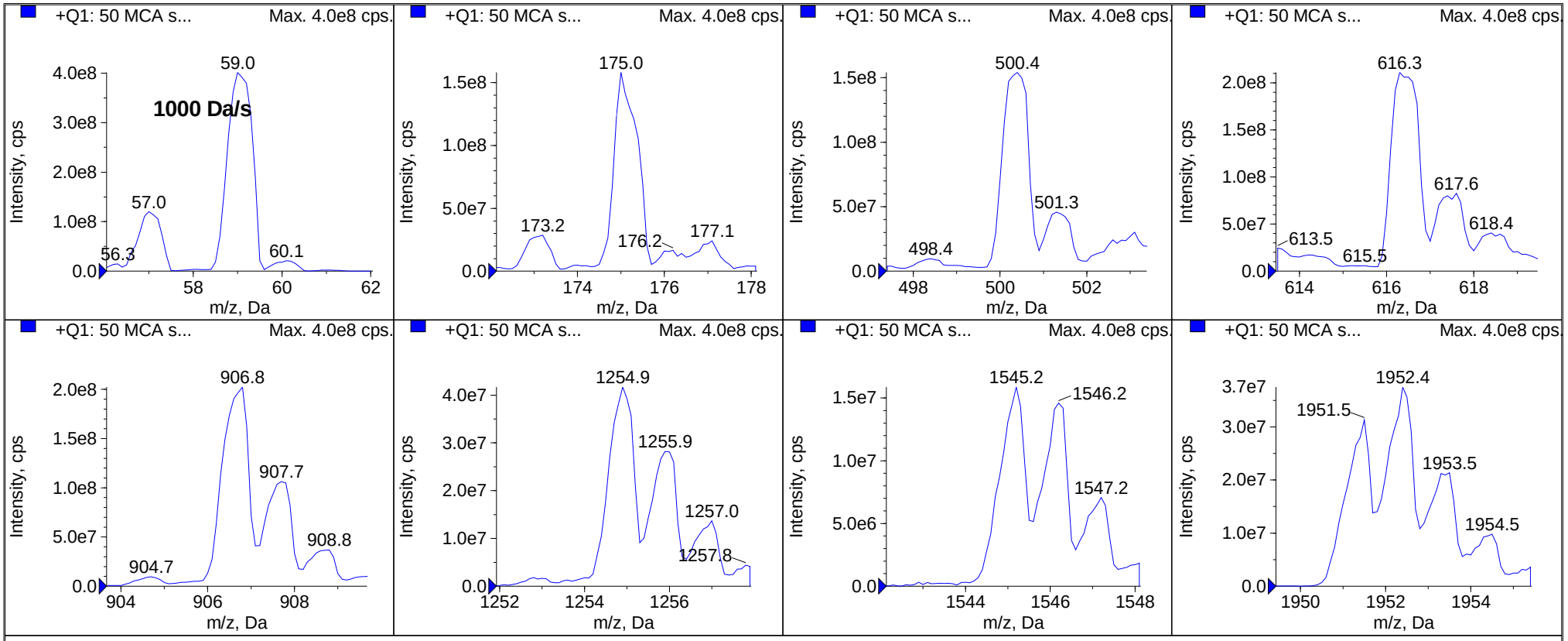
Peak List for " +Q1: 50 MCA scans from Sample 1 (TuneSampleID) of MT20211203101238.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0472	4.1495e8	0.7041	2.8407e-3
2	175.1330	175.1400	1.5958e8	0.7052	-7.0203e-3
3	500.3800	500.3886	1.5756e8	0.7203	-8.6199e-3
4	616.4640	616.4630	2.0506e8	0.7786	1.0190e-3
5	906.6730	906.6729	2.0369e8	0.7696	7.7963e-5
6	1254.9250	1254.9294	4.5608e7	0.7156	-4.3932e-3
7	1545.1340	1545.1450	1.8288e7	0.7352	-0.0110
8	1952.4270	1952.4421	4.7098e7	0.7244	-0.0151

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 10:13
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



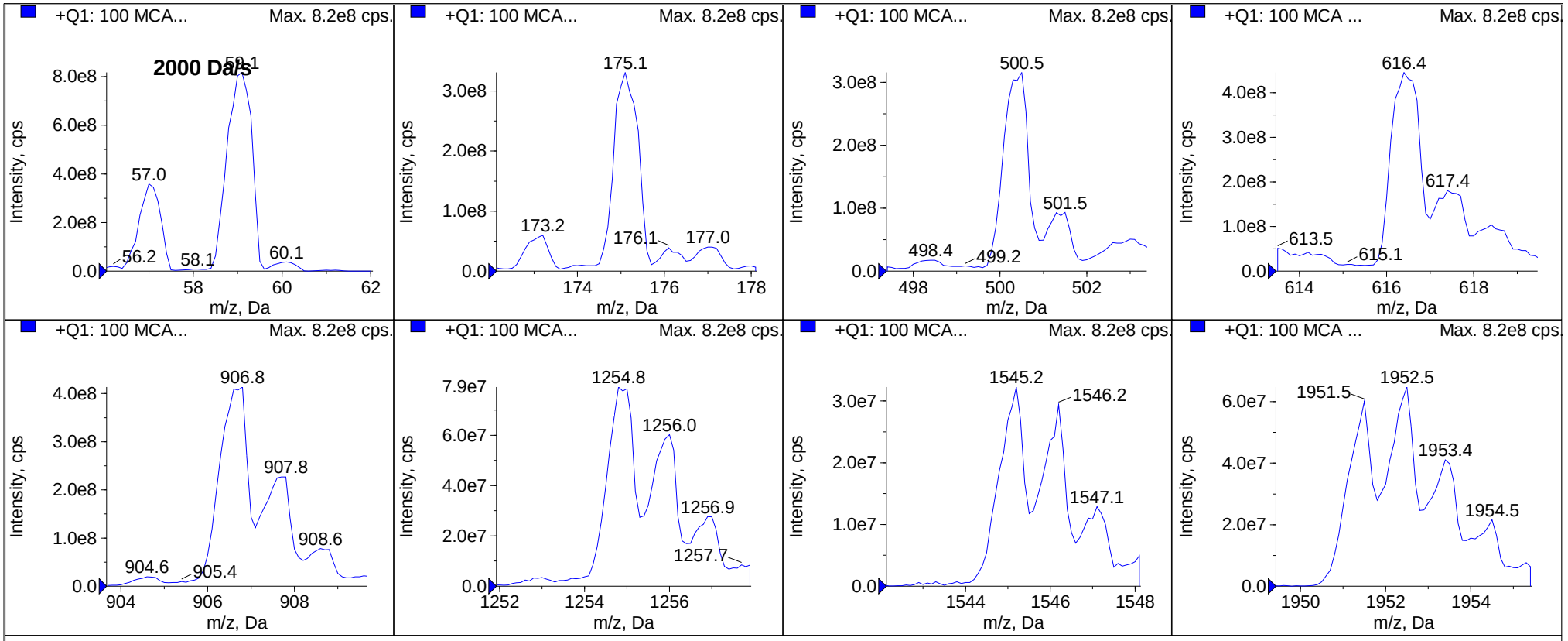
Peak List for " +Q1: 50 MCA scans from Sample 1 (TuneSampleID) of MT20211203101325.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0627	4.0115e8	0.6591	-0.0127
2	175.1330	175.1147	1.5812e8	0.6521	0.0183
3	500.3800	500.3651	1.5401e8	0.6706	0.0149
4	616.4640	616.4255	2.1089e8	0.7218	0.0385
5	906.6730	906.6573	2.0233e8	0.6931	0.0157
6	1254.9250	1254.8835	4.1680e7	0.6684	0.0415
7	1545.1340	1545.1430	1.5870e7	0.6895	-8.9885e-3
8	1952.4270	1952.3653	3.7490e7	0.7181	0.0617

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 10:14
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



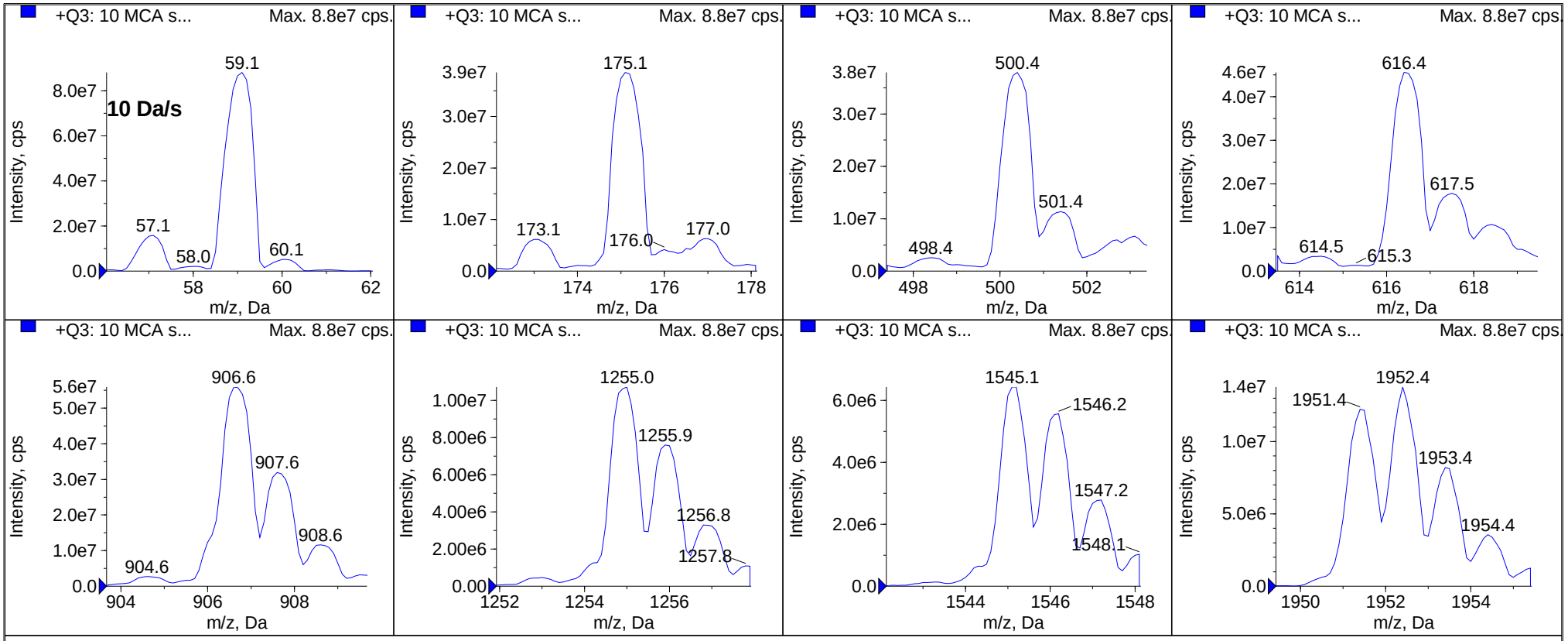
Peak List for " +Q1: 100 MCA scans from Sample 1 (TuneSampleID) of MT20211203101415.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0625	8.1678e8	0.6566	-0.0125
2	175.1330	175.1266	3.3064e8	0.6480	6.4439e-3
3	500.3800	500.3729	3.1558e8	0.6325	7.1481e-3
4	616.4640	616.4322	4.4522e8	0.7627	0.0318
5	906.6730	906.6774	4.1344e8	0.7354	-4.4259e-3
6	1254.9250	1254.8748	7.9180e7	0.6916	0.0502
7	1545.1340	1545.1309	3.2260e7	0.6761	3.0802e-3
8	1952.4270	1952.4174	6.4740e7	0.7375	9.5593e-3

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 10:18
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



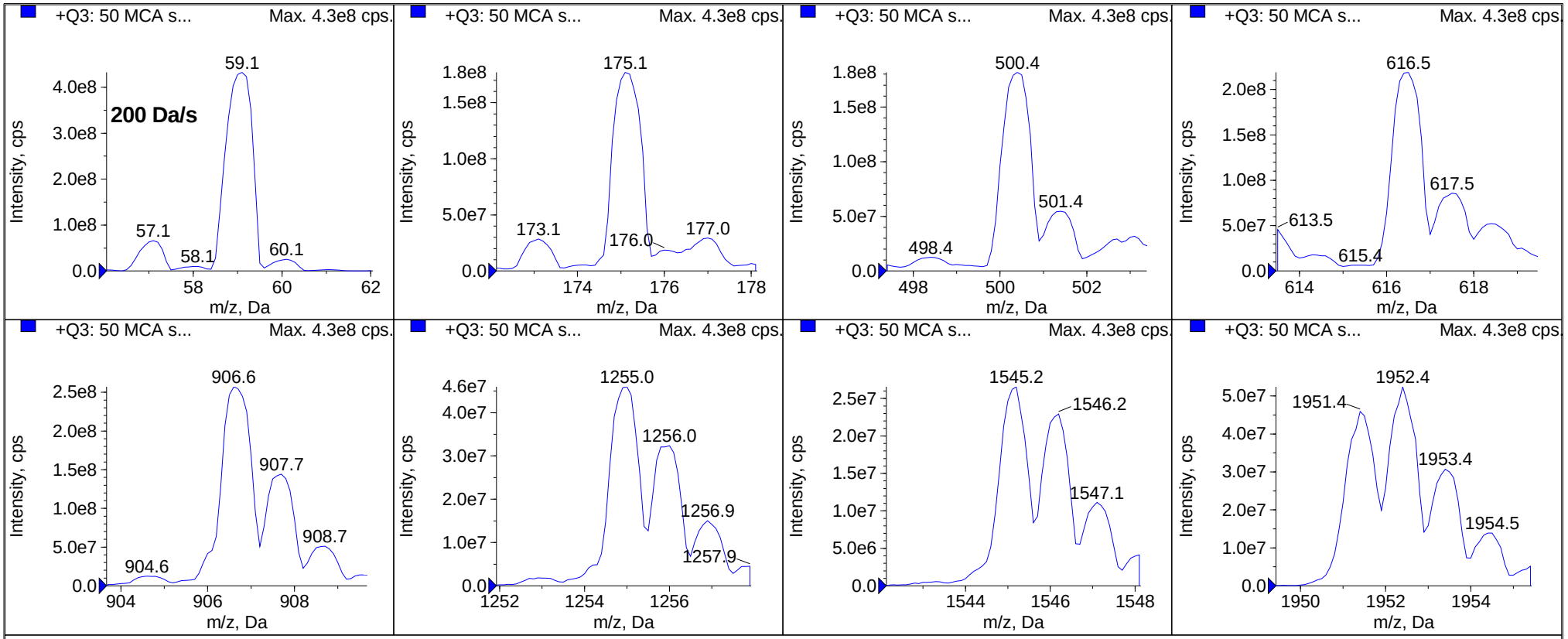
Peak List for " +Q3: 10 MCA scans from Sample 1 (TuneSampleID) of MT20211203101844.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0467	8.8153e7	0.7281	3.2504e-3
2	175.1330	175.1305	3.8558e7	0.7710	2.4691e-3
3	500.3800	500.3847	3.7907e7	0.7603	-4.6719e-3
4	616.4640	616.4715	4.5574e7	0.7658	-7.5033e-3
5	906.6730	906.6769	5.5906e7	0.7655	-3.9123e-3
6	1254.9250	1254.9329	1.0718e7	0.7369	-7.9069e-3
7	1545.1340	1545.1339	6.4317e6	0.7291	1.3292e-4
8	1952.4270	1952.4202	1.3766e7	0.7180	6.7621e-3

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 10:22
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



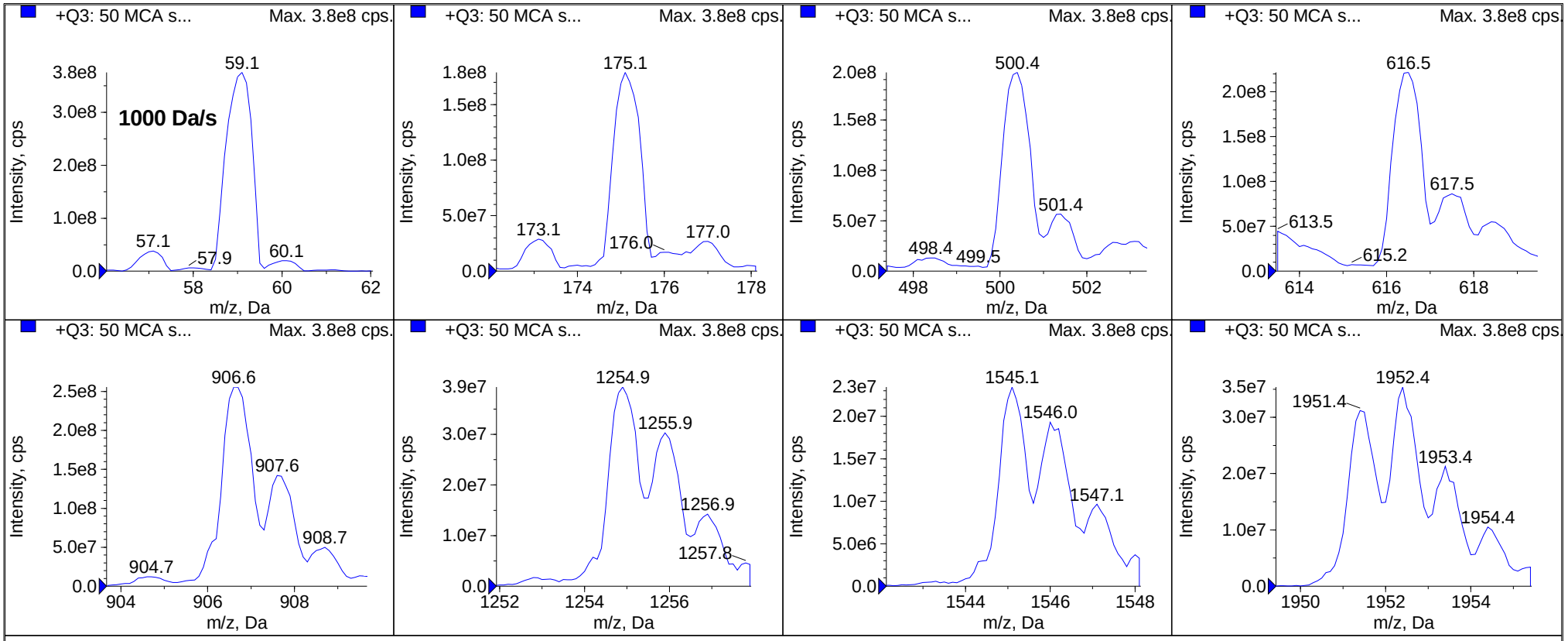
Peak List for " +Q3: 50 MCA scans from Sample 1 (TuneSampleID) of MT20211203102209.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0470	4.3220e8	0.7087	2.9907e-3
2	175.1330	175.1371	1.7698e8	0.7668	-4.0909e-3
3	500.3800	500.3853	1.8165e8	0.7626	-5.2551e-3
4	616.4640	616.4715	2.1885e8	0.7618	-7.5406e-3
5	906.6730	906.6755	2.5706e8	0.7526	-2.5364e-3
6	1254.9250	1254.9399	4.5972e7	0.7621	-0.0149
7	1545.1340	1545.1359	2.6560e7	0.7525	-1.9200e-3
8	1952.4270	1952.4033	5.2420e7	0.7831	0.0237

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 10:24
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



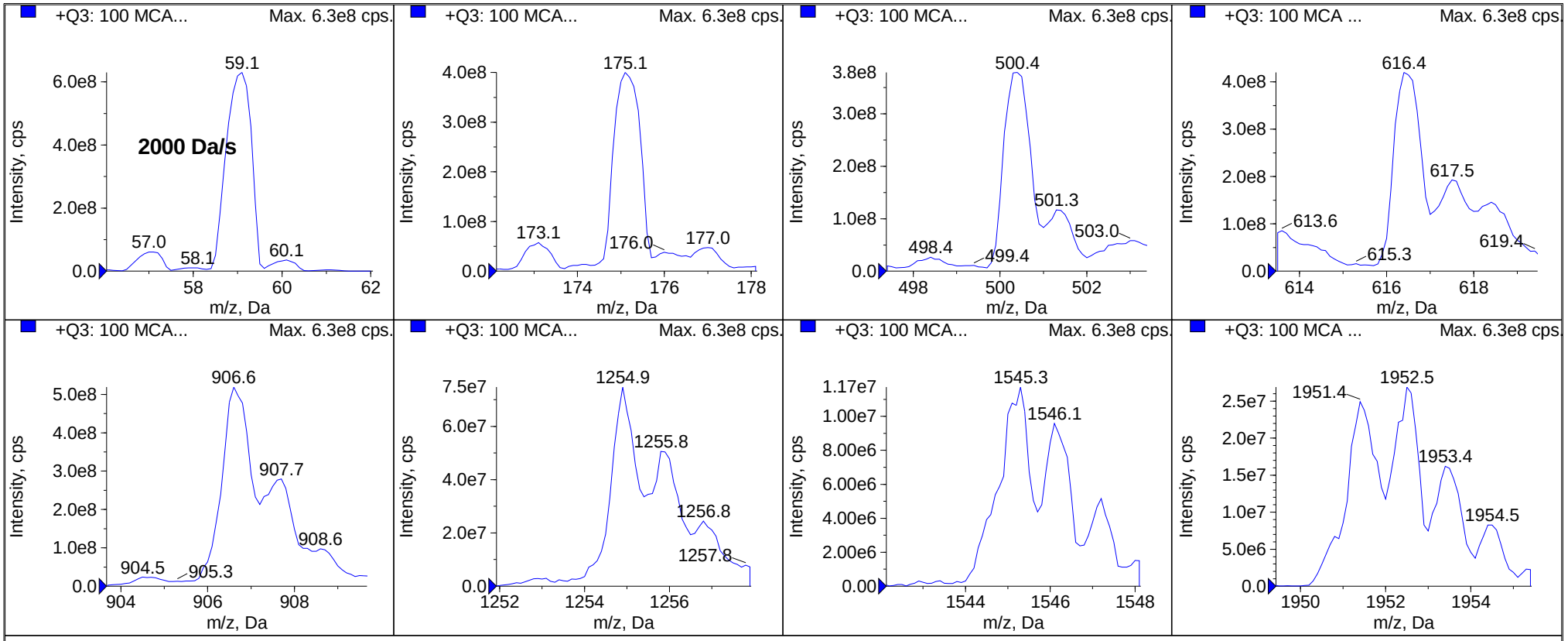
Peak List for " +Q3: 50 MCA scans from Sample 1 (TuneSampleID) of MT20211203102425.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0434	3.7536e8	0.7027	6.6494e-3
2	175.1330	175.1332	1.7891e8	0.7300	-1.5554e-4
3	500.3800	500.3741	1.9710e8	0.7253	5.8867e-3
4	616.4640	616.4709	2.2158e8	0.7635	-6.9412e-3
5	906.6730	906.6758	2.5559e8	0.7527	-2.7573e-3
6	1254.9250	1254.9187	3.9350e7	0.7872	6.3458e-3
7	1545.1340	1545.1190	2.3440e7	0.7183	0.0150
8	1952.4270	1952.4328	3.5370e7	0.7484	-5.8333e-3

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 10:26
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



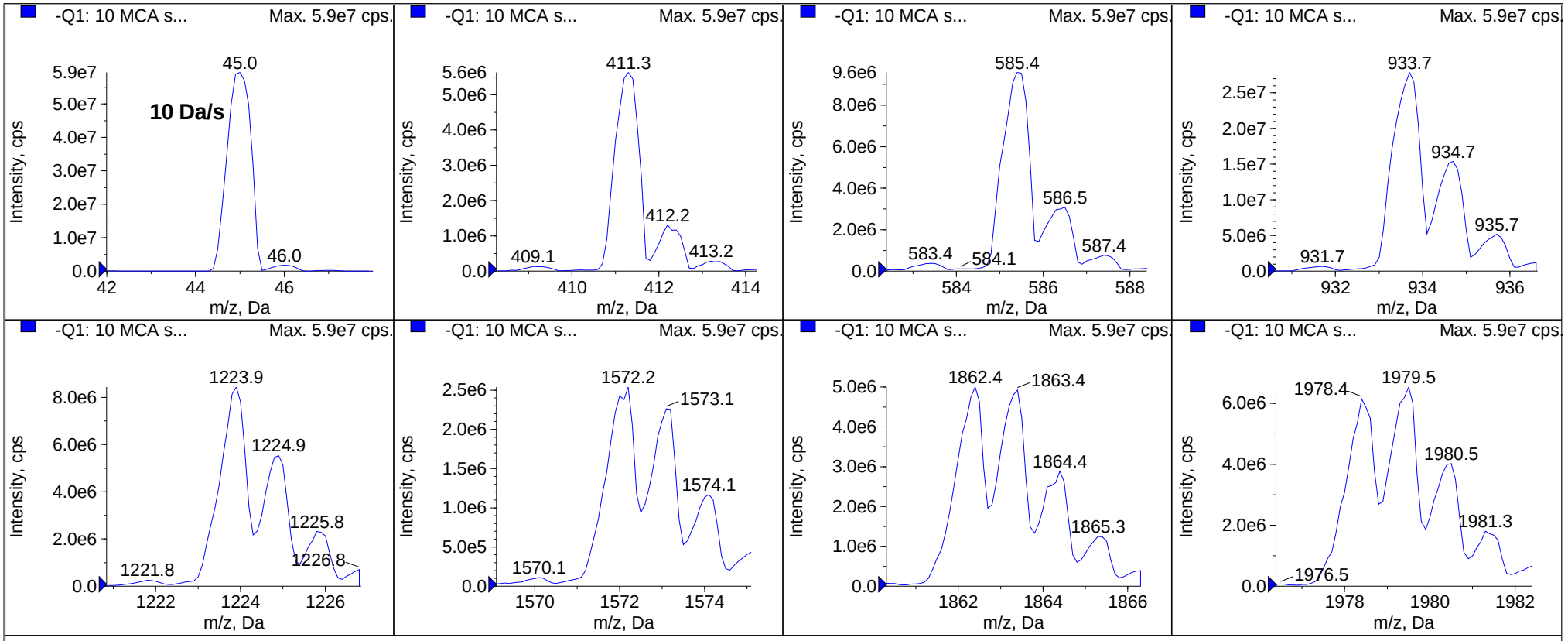
Peak List for " +Q3: 100 MCA scans from Sample 1 (TuneSampleID) of MT20211203102648.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	59.0500	59.0449	6.2988e8	0.6738	5.0940e-3
2	175.1330	175.1416	4.0010e8	0.7294	-8.6000e-3
3	500.3800	500.3851	3.7858e8	0.7048	-5.0694e-3
4	616.4640	616.4728	4.1986e8	0.7137	-8.7806e-3
5	906.6730	906.6679	5.1914e8	0.7358	5.1341e-3
6	1254.9250	1254.9278	7.4720e7	0.6685	-2.7539e-3
7	1545.1340	1545.2079	1.1720e7	0.7517	-0.0739
8	1952.4270	1952.4841	2.6900e7	0.7645	-0.0571

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 10:40
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



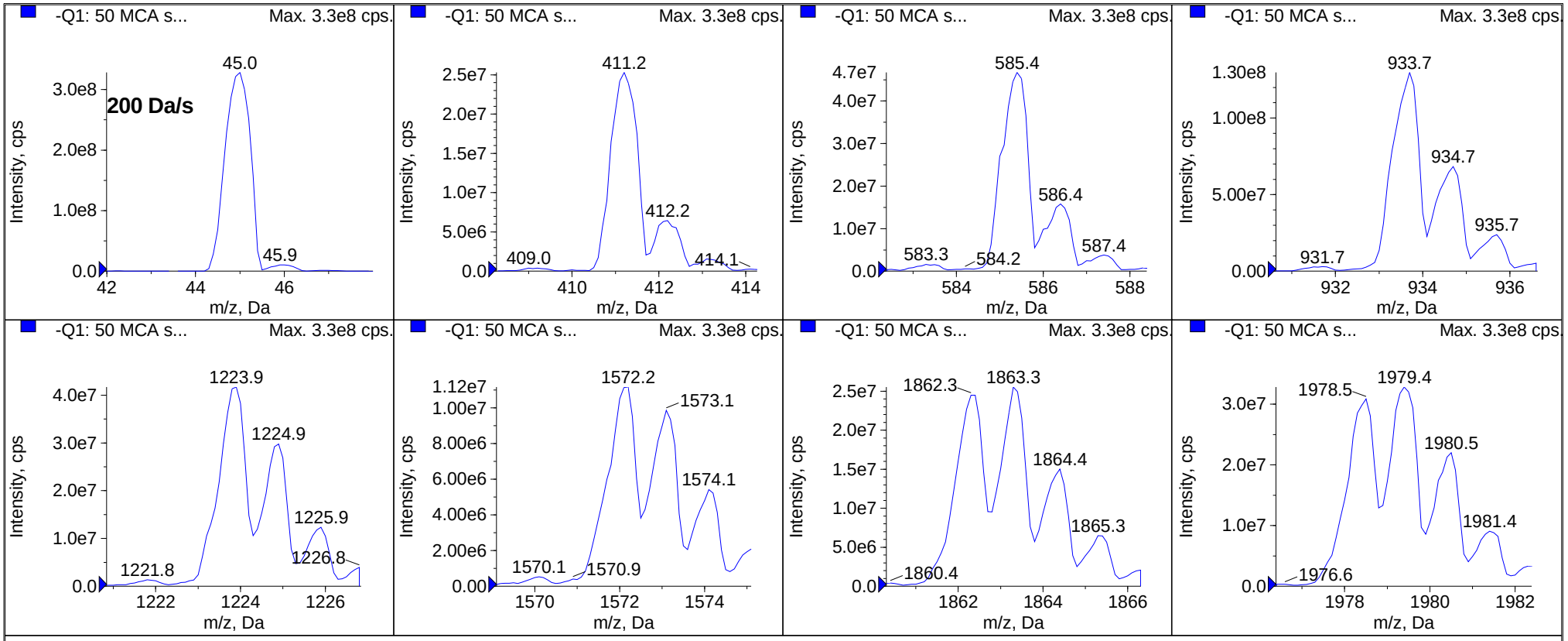
Peak List for " -Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20211203104015.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9919	5.9417e7	0.6370	6.0584e-3
2	411.2590	411.2712	5.6290e6	0.6528	-0.0122
3	585.3850	585.3881	9.5756e6	0.7263	-3.0622e-3
4	933.6360	933.6382	2.7854e7	0.7401	-2.1787e-3
5	1223.8450	1223.8610	8.4358e6	0.6736	-0.0160
6	1572.0970	1572.0957	2.5399e6	0.7623	1.3070e-3
7	1863.3060	1863.2889	4.9290e6	0.7428	0.0171
8	1979.3890	1979.3985	6.5362e6	0.7712	-9.5481e-3

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 10:43
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



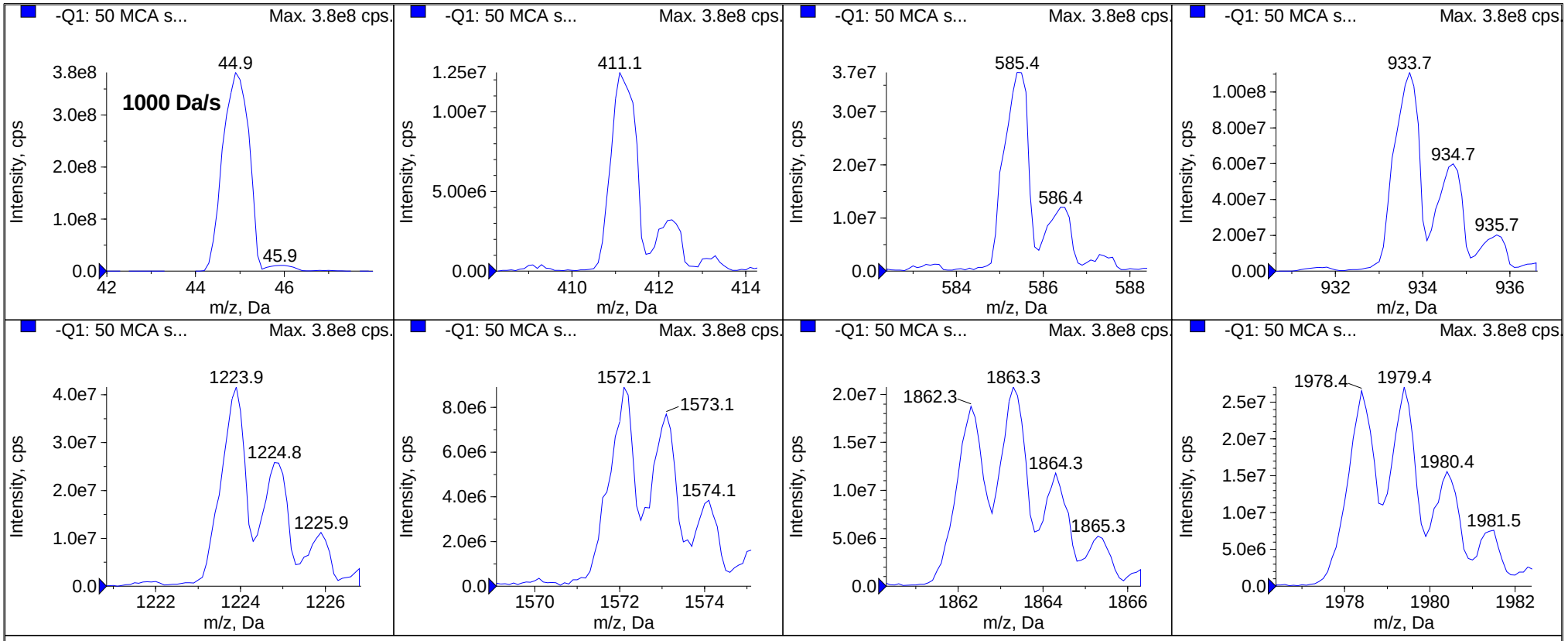
Peak List for " -Q1: 50 MCA scans from Sample 1 (TuneSampleID) of MT20211203104300.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9607	3.2816e8	0.6760	0.0373
2	411.2590	411.2077	2.5300e7	0.7048	0.0513
3	585.3850	585.3650	4.6708e7	0.7087	0.0200
4	933.6360	933.6339	1.2977e8	0.7166	2.0710e-3
5	1223.8450	1223.8425	4.1688e7	0.6704	2.5454e-3
6	1572.0970	1572.1156	1.1170e7	0.7554	-0.0186
7	1863.3060	1863.3130	2.5528e7	0.7057	-7.0449e-3
8	1979.3890	1979.3926	3.2814e7	0.7623	-3.6201e-3

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 10:44
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



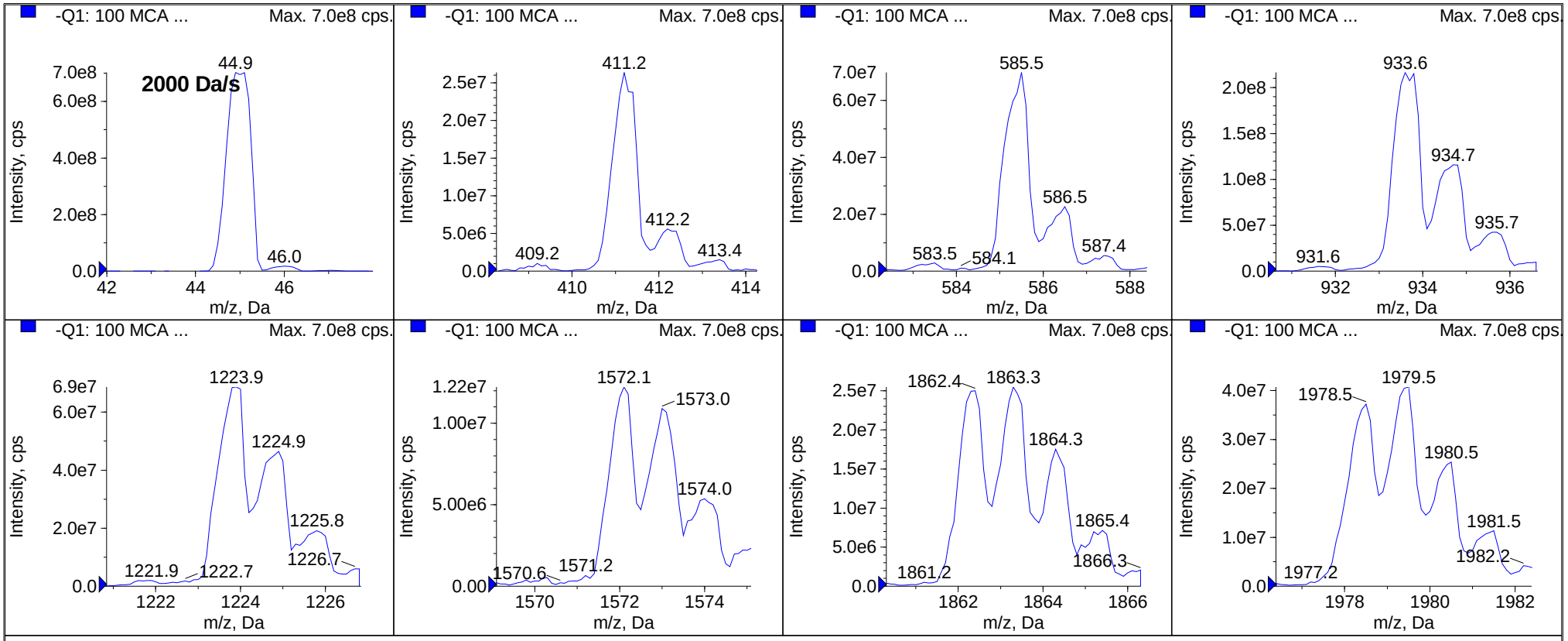
Peak List for " -Q1: 50 MCA scans from Sample 1 (TuneSampleID) of MT20211203104439.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9202	3.8200e8	0.7092	0.0778
2	411.2590	411.2014	1.2470e7	0.6680	0.0576
3	585.3850	585.4039	3.7400e7	0.6740	-0.0189
4	933.6360	933.6542	1.1090e8	0.6797	-0.0182
5	1223.8450	1223.8611	4.1610e7	0.6163	-0.0161
6	1572.0970	1572.0885	8.9100e6	0.6394	8.4897e-3
7	1863.3060	1863.3088	2.0770e7	0.7307	-2.7872e-3
8	1979.3890	1979.3818	2.7040e7	0.6723	7.1626e-3

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 10:48
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



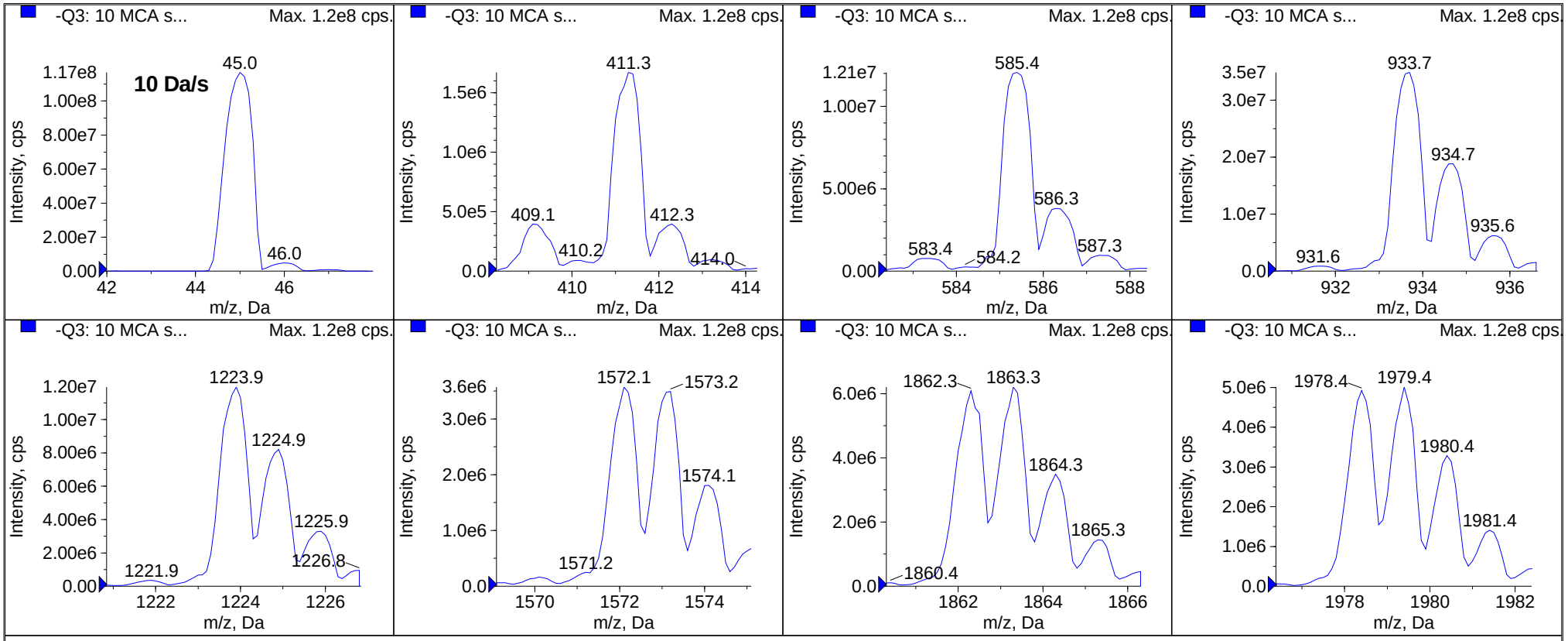
Peak List for " -Q1: 100 MCA scans from Sample 1 (TuneSampleID) of MT20211203104843.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9806	7.0224e8	0.6376	0.0174
2	411.2590	411.2285	2.6360e7	0.6241	0.0305
3	585.3850	585.3945	6.9820e7	0.6469	-9.5080e-3
4	933.6360	933.6451	2.1650e8	0.6803	-9.0785e-3
5	1223.8450	1223.8313	6.8640e7	0.7322	0.0137
6	1572.0970	1572.0629	1.2220e7	0.6572	0.0341
7	1863.3060	1863.3017	2.5480e7	0.7404	4.3151e-3
8	1979.3890	1979.3767	4.0720e7	0.7783	0.0123

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 10:55
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



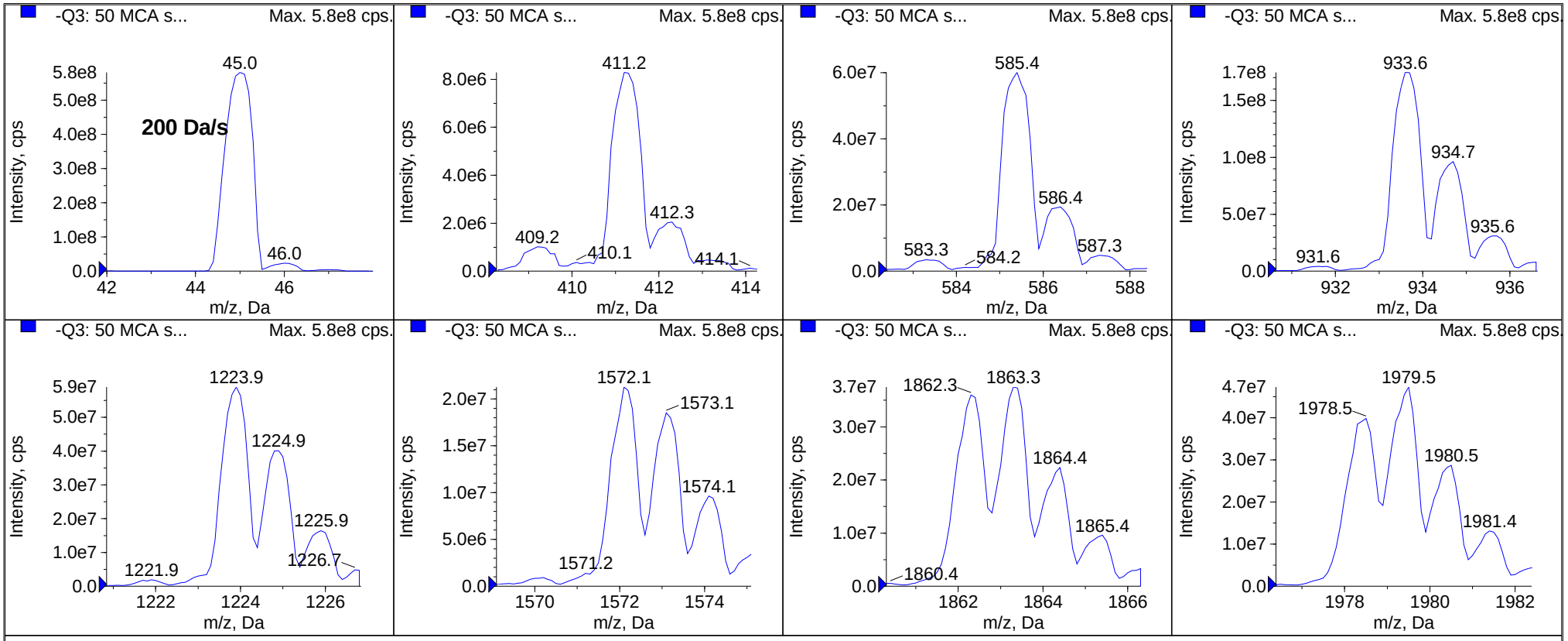
Peak List for " -Q3: 10 MCA scans from Sample 1 (TuneSampleID) of MT20211203105549.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9945	1.1677e8	0.7286	3.5475e-3
2	411.2590	411.2782	1.6706e6	0.7156	-0.0192
3	585.3850	585.3909	1.2058e7	0.7208	-5.9435e-3
4	933.6360	933.6500	3.4850e7	0.7000	-0.0140
5	1223.8450	1223.8462	1.1951e7	0.7308	-1.1667e-3
6	1572.0970	1572.1064	3.5704e6	0.7090	-9.3904e-3
7	1863.3060	1863.2827	6.2047e6	0.7156	0.0233
8	1979.3890	1979.3765	5.0093e6	0.6720	0.0125

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 10:59
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



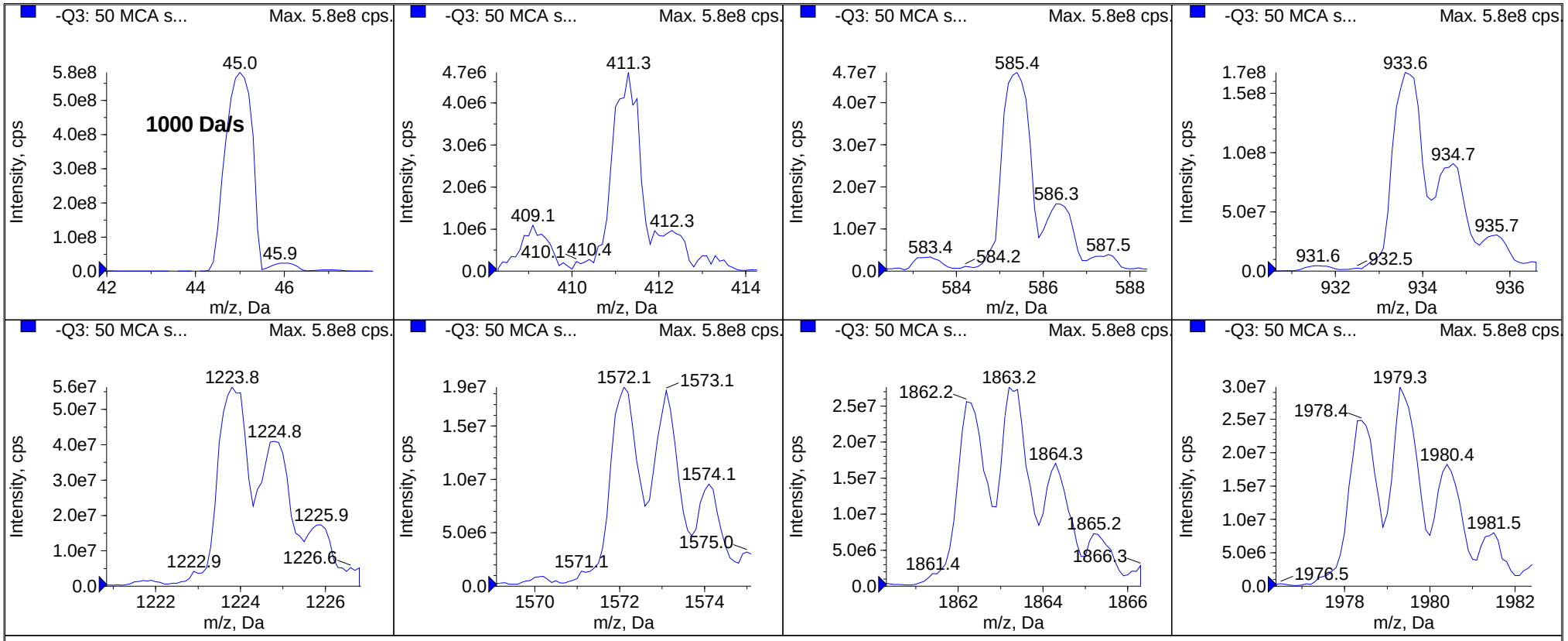
Peak List for " -Q3: 50 MCA scans from Sample 1 (TuneSampleID) of MT20211203105905.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9950	5.8100e8	0.7297	2.9940e-3
2	411.2590	411.2470	8.2840e6	0.7580	0.0120
3	585.3850	585.3810	6.0076e7	0.7393	3.9805e-3
4	933.6360	933.6331	1.7450e8	0.7130	2.9322e-3
5	1223.8450	1223.8760	5.8958e7	0.7079	-0.0310
6	1572.0970	1572.1173	2.1278e7	0.7110	-0.0203
7	1863.3060	1863.3156	3.7482e7	0.7347	-9.6171e-3
8	1979.3890	1979.4022	4.7302e7	0.7874	-0.0132

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 11:00
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



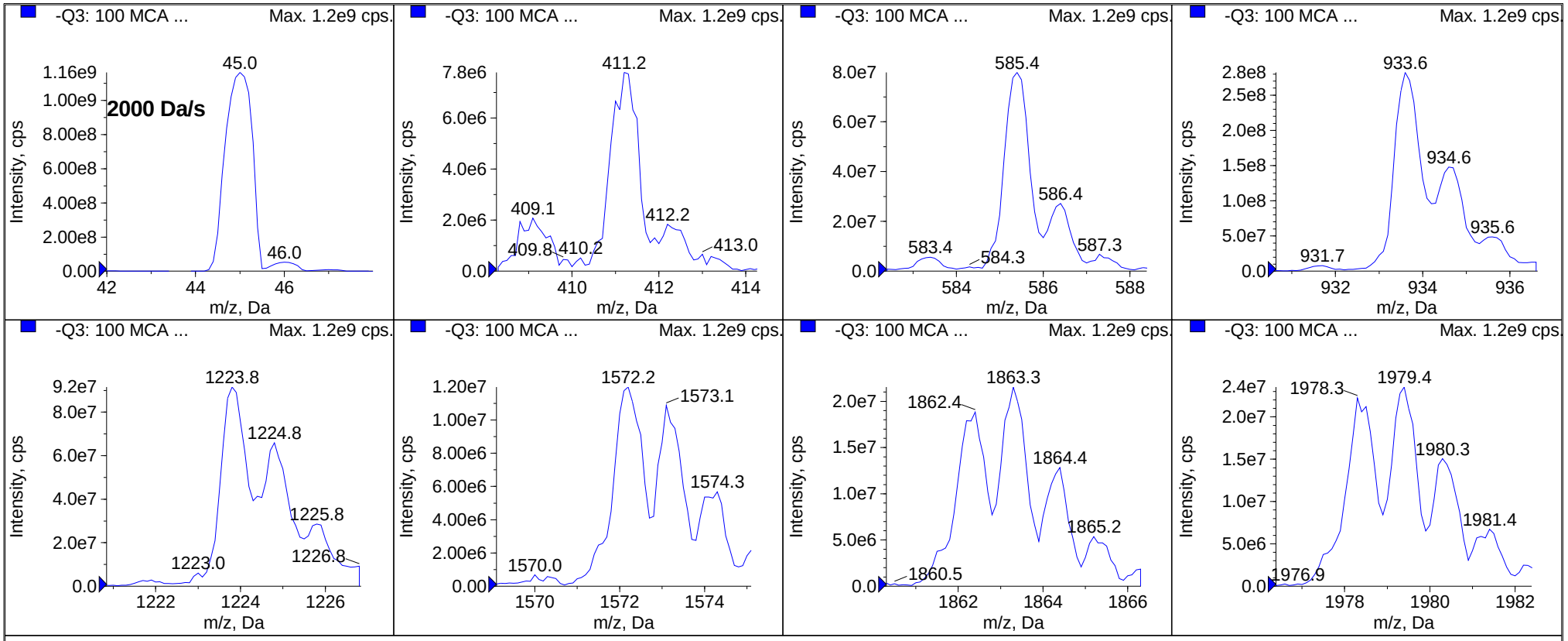
Peak List for " -Q3: 50 MCA scans from Sample 1 (TuneSampleID) of MT20211203110028.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	45.0000	5.8201e8	0.7297	-1.9621e-3
2	411.2590	411.2489	4.7200e6	0.7030	0.0101
3	585.3850	585.3759	4.7190e7	0.7296	9.1031e-3
4	933.6360	933.6437	1.6752e8	0.7570	-7.6923e-3
5	1223.8450	1223.8179	5.6320e7	0.7971	0.0271
6	1572.0970	1572.0999	1.8630e7	0.7597	-2.8634e-3
7	1863.3060	1863.2841	2.7630e7	0.7513	0.0219
8	1979.3890	1979.4097	2.9820e7	0.6925	-0.0207

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 11:04
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



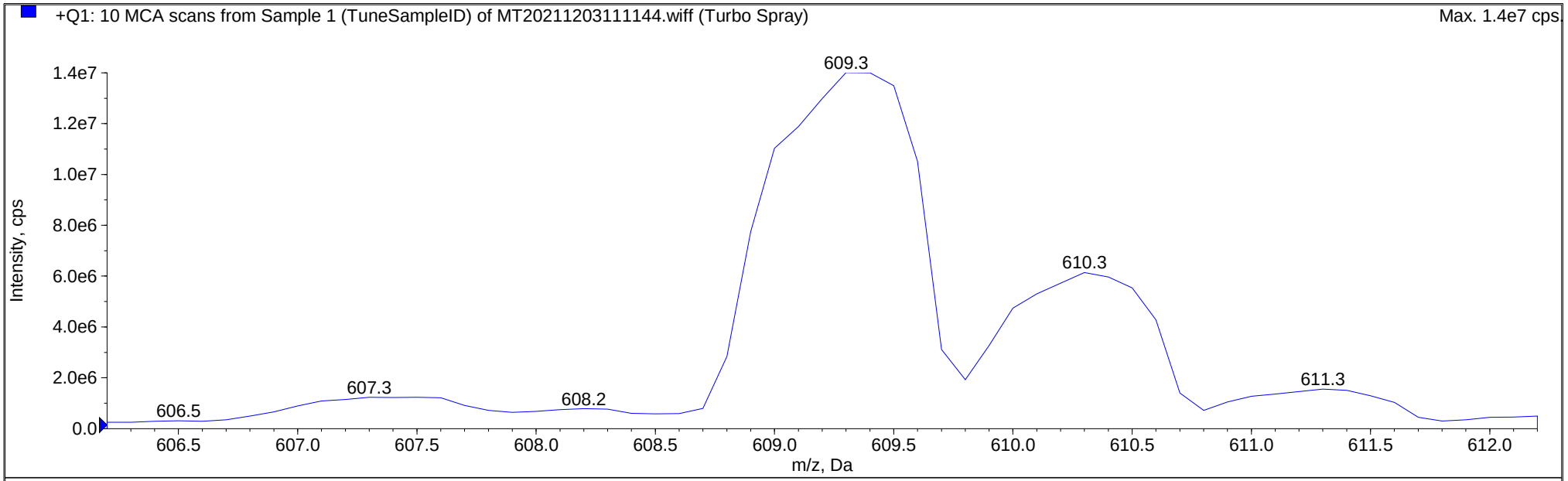
Peak List for " -Q3: 100 MCA scans from Sample 1 (TuneSampleID) of MT20211203110358.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	44.9980	44.9936	1.1639e9	0.7295	4.3785e-3
2	411.2590	411.2187	7.7800e6	0.7297	0.0403
3	585.3850	585.3852	7.9780e7	0.6244	-2.0093e-4
4	933.6360	933.6335	2.8224e8	0.6558	2.4693e-3
5	1223.8450	1223.8357	9.1520e7	0.6876	9.3201e-3
6	1572.0970	1572.2133	1.1980e7	0.7570	-0.1163
7	1863.3060	1863.3044	2.1540e7	0.7100	1.6057e-3
8	1979.3890	1979.3900	2.3520e7	0.6995	-9.8257e-4

*Post-PM
*FSAS: Lynne Russell

Acq. Time: 11:11
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



Peak List for " +Q1: 10 MCA scans from Sample 1 (TuneSampleID) of MT20211203111144.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	174.1000	n/a	n/a	n/a	n/a
2	195.1000	n/a	n/a	n/a	n/a
3	397.2000	n/a	n/a	n/a	n/a
4	448.1000	n/a	n/a	n/a	n/a
5	609.2810	609.2993	1.4010e7	0.7626	-0.0183

*Post-PM
*FSAS: Lynne Russell

Acq. Time: N/A
Acq. Date: N/A

Analyst Version: 1.7.0
*SN: EB250231807

State Parameter Editor

Ion Source:	Turbo Spray
Ion Source Temperature Reached	
Curtain Gas (CUR):	25.0
IonSpray Voltage (IS):	3200.0
Temperature (TEM):	0.0
Ion Source Gas 1 (GS1):	30.0
Ion Source Gas 2 (GS2):	0.0
Declustering Potential (DP):	100.0
Entrance Potential (EP):	10.0
Q1 Resolution:	Unit
Ion Energy 1 (IE1):	1.0
Deflector (DF):	-200.0

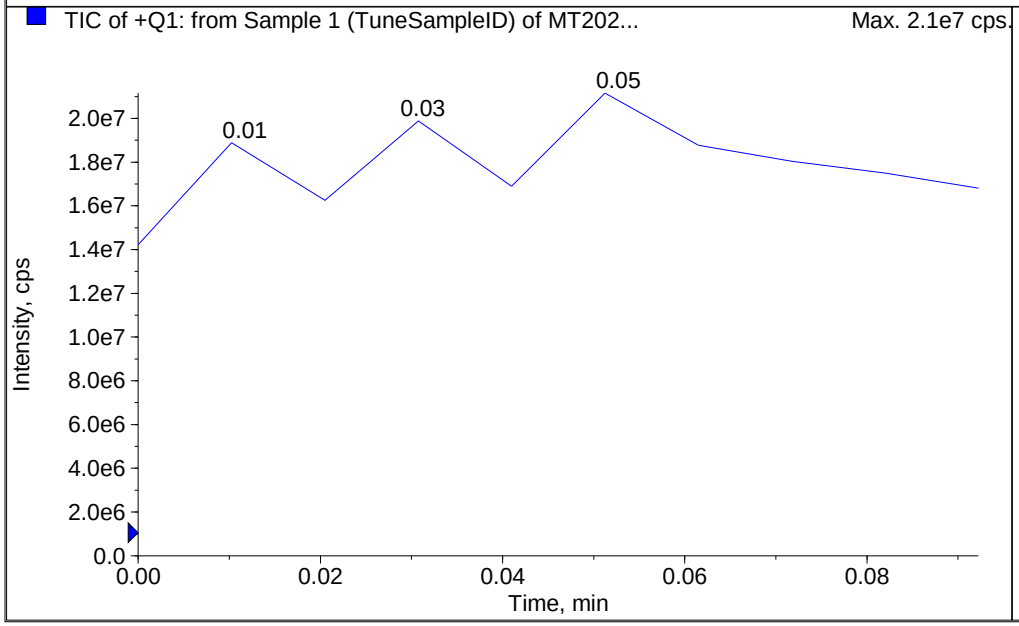
Mass Spectrometer Method Properties

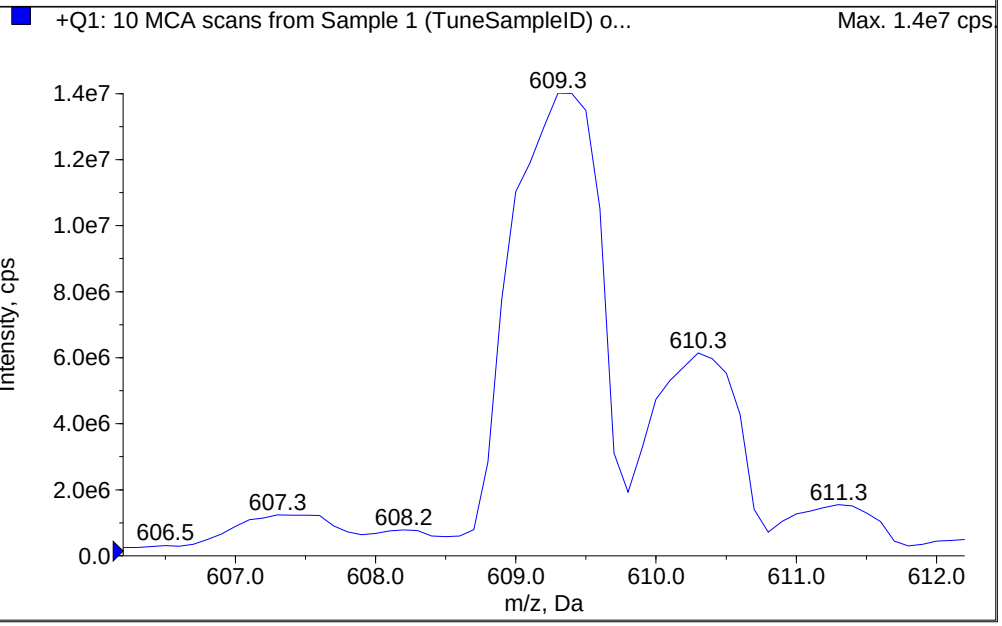
Period 1:

Scans in Period: 10
Relative Start Time: 0.00 msec
Scheduled Ionization: Off
Experiments in Period: 1

Period 1 Experiment 1:

Scan Type: Q1 MS (Q1)
Polarity: Positive
Scan Mode: Profile
Ion Source: Turbo Spray
Scans to Sum: 1

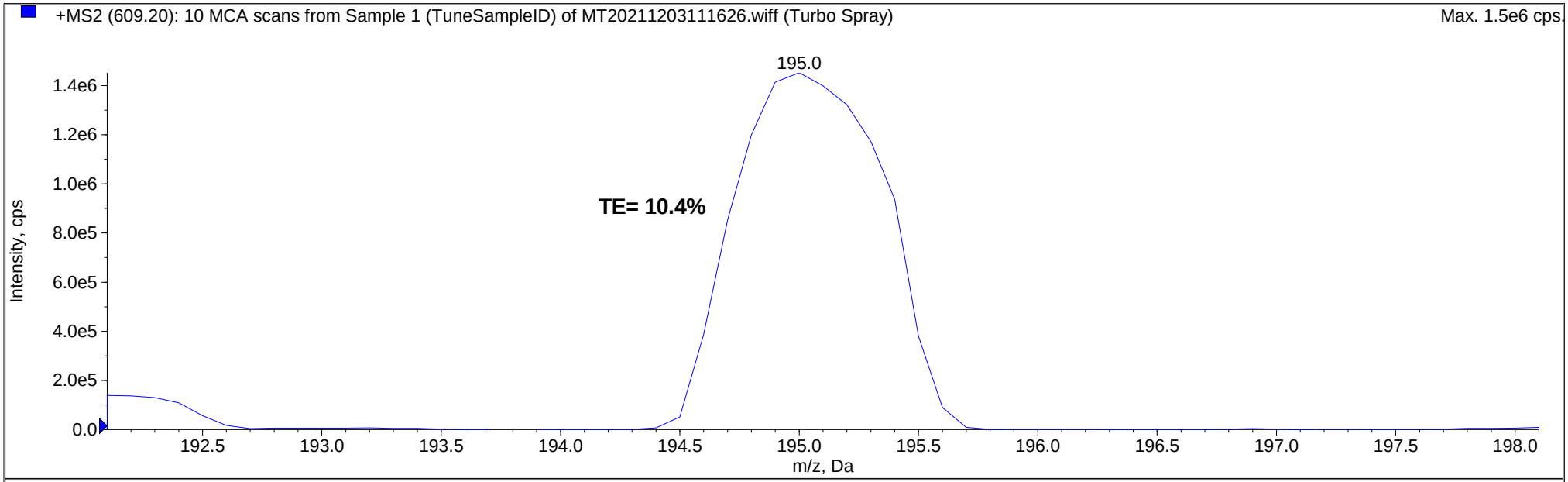




*Post-PM
*FSAS: Lynne Russell

Acq. Time: 11:16
Acq. Date: Friday, December 03, 2021

Analyst Version: 1.7.0
*SN: EB250231807



Peak List for " +MS2 (609.20): 10 MCA scans from Sample 1 (TuneSampleID) of MT20211203111626.wiff (Turbo Spray)"

	Target Mass (Da)	Found At (Da)	Intensity (cps)	Width (Da)	Mass Shift (Da)
1	174.1000	n/a	n/a	n/a	n/a
2	195.1000	195.0516	1.4530e6	0.7651	0.0484
3	397.2000	n/a	n/a	n/a	n/a
4	448.1000	n/a	n/a	n/a	n/a
5	609.2810	n/a	n/a	n/a	n/a

*Post-PM
*FSAS: Lynne Russell

Acq. Time: N/A
Acq. Date: N/A

Analyst Version: 1.7.0
*SN: EB250231807

State Parameter Editor

Ion Source: Turbo Spray
Ion Source Temperature Reached
Curtain Gas (CUR): 25.0
Collision Gas (CAD): 8
IonSpray Voltage (IS): 3200.0
Temperature (TEM): 0.0
Ion Source Gas 1 (GS1): 30.0
Ion Source Gas 2 (GS2): 0.0

Entrance Potential (EP): 10.0

Q1 Resolution: Unit Q3 Resolution: Unit
Ion Energy 1 (IE1): 1.0
Ion Energy 3 (IE3): 1.4

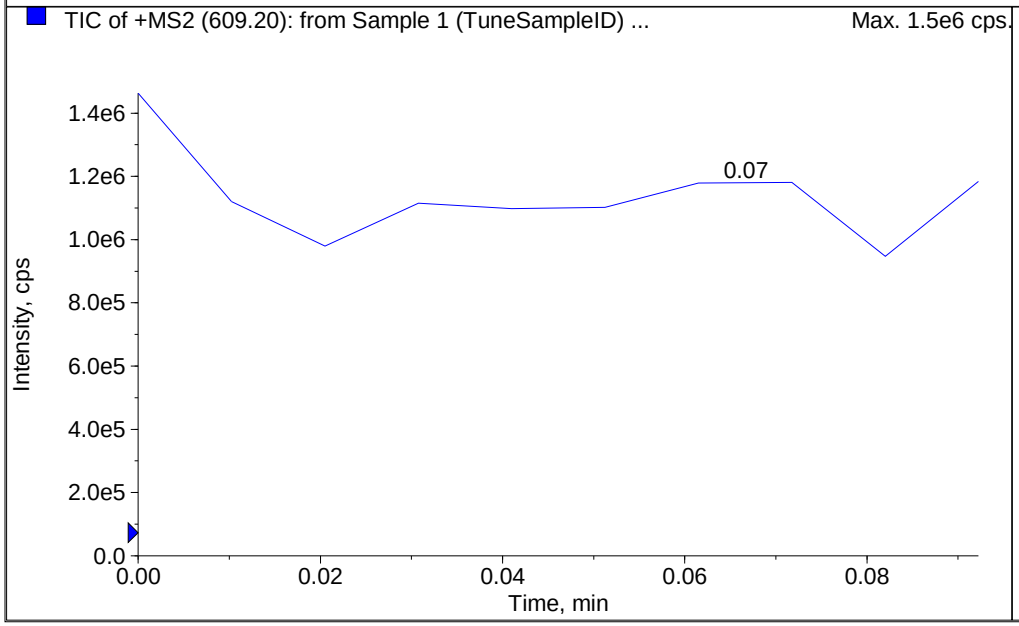
Mass Spectrometer Method Properties

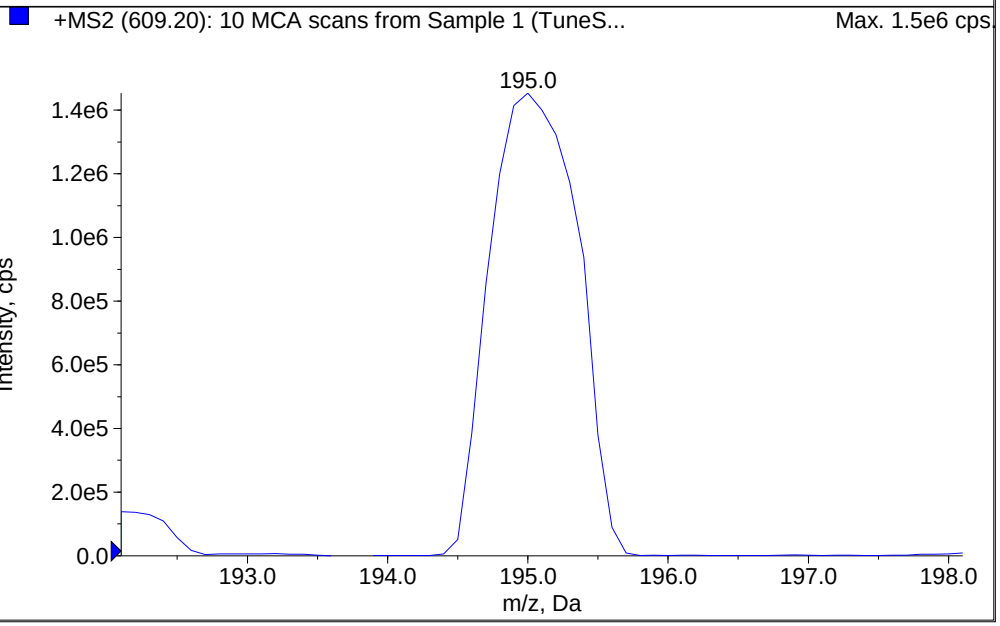
Period 1:

Scans in Period: 10
Relative Start Time: 0.00 msec
Scheduled Ionization: Off
Experiments in Period: 1

Period 1 Experiment 1:

Scan Type: Product Ion (MS2)
Polarity: Positive
Scan Mode: Profile
Ion Source: Turbo Spray
Scans to Sum: 1





*Post-PM
*FSAS: Lynne Russell

Report Date: 16-Aug-2022 15:44:40 AIM Revision: 2.0.2021.1130

Pace Environmental Services, LLC

Initial Calibration Signal Ratios Report

Batch: \\Organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b
Method: LCMSMS02_PFAS-ID2.M Version: V16 30-Jun-2022 10:54:24
Instrument: LCMSMS02.i Integrator: picker
Cal Start Date: 15-Aug-2022 18:27:01 Cal End Date: 15-Aug-2022 19:54:40
Method Lock: Unknown Lock Date:
Calib Method: PFAS-ID2 No.Compounds: 66
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes
Batch: \\organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b

Level	Cal File	Cal Sample ID	Cal Date
2	081522B008.d	ICAL 100_SVLC-2105	15-Aug-2022 18:27:01
3	081522B009.d	ICAL 200_SVLC-2163	15-Aug-2022 18:37:56
4	081522B010.d	ICAL 500_SVLC-2107	15-Aug-2022 18:48:51
5	081522B011.d	ICAL 1000_SVLC-2165	15-Aug-2022 18:59:46
6	081522B012.d	ICAL 2000_SVLC-2108	15-Aug-2022 19:10:43
7	081522B013.d	ICAL 5000_SVLC-2109	15-Aug-2022 19:21:41
8	081522B014.d	ICAL 10000_SVLC-2120	15-Aug-2022 19:32:42
9	081522B015.d	ICAL 15000_SVLC-2111	15-Aug-2022 19:43:41
10	081522B016.d	ICAL 20000_SVLC-2112	15-Aug-2022 19:54:40

Column: 1 Detector: LCMS-Q3

Compound	Ratio Level 2	Ratio Level 3	Ratio Level 4	Ratio Level 5	Ratio Level 6	Ratio Level 7	Ratio Level 8	Ratio Level 9	Ratio Level 10	Average Ratio	Avg. +/-3 SD Ratio Limits	StdD Limit	50% Limit
7 PFBS	3.337	3.202	3.741	3.701	3.475	3.616	3.564	3.535	3.642	3.534	3.040-4.029	0.16489	1.767
1 4:2 FTS	0.803	1.229	1.475	1.666	1.781	1.769	1.847	1.751	1.772	1.565	0.496-2.634	0.35631	0.782
15 PFHxA	13.961	18.780	21.421	19.208	18.897	17.891	17.473	17.930	17.572	18.125	12.436-23.815	1.89657	9.062
22 PFPeS	3.282	2.824	2.755	2.832	2.880	3.035	2.920	2.901	3.020	2.938	2.480-3.396	0.15260	1.469
28 GenX	0.889	0.842	0.832	0.845	0.806	0.846	0.828	0.821	0.851	0.840	0.765-0.914	0.02491	0.420
13 PFHpA	3.442	3.504	3.639	3.719	3.695	3.720	3.718	3.765	3.452	3.628	3.194-4.062	0.14473	1.814
14 PFHxS	2.866	3.053	2.951	3.225	2.903	3.094	3.063	3.187	3.015	3.039	2.694-3.384	0.11511	1.519
29 ADONA	3.207	3.041	3.014	3.133	3.226	3.195	3.107	2.953	2.873	3.083	2.727-3.438	0.11844	1.541
2 6:2 FTS	2.018	1.650	1.750	1.613	1.567	1.915	1.845	1.837	1.780	1.775	1.314-2.235	0.15366	0.887
20 PFOA	2.797	2.681	2.777	2.973	2.836	2.830	2.837	2.890	2.626	2.805	2.505-3.105	0.10005	1.402
12 PFHpS	3.118	2.927	3.234	3.371	3.023	3.104	3.018	3.008	3.007	3.090	2.691-3.488	0.13283	1.545
17 PFNA	5.527	6.019	5.882	6.043	6.006	5.908	6.316	5.944	5.816	5.940	5.321-6.558	0.20628	2.970
18 PFOS	4.635	3.649	3.634	3.591	3.615	3.641	3.444	3.540	3.691	3.715	2.688-4.743	0.34250	1.857
19 PFOSA	32.615	30.023	29.421	27.009	29.871	31.923	30.756	30.991	32.663	30.585	25.238-35.933	1.78255	15.292
3 8:2 FTS	1.638	1.451	1.883	2.050	1.847	1.820	1.844	1.878	1.833	1.804	1.265-2.344	0.17988	0.902
16 PFNS	2.616	2.712	2.543	2.831	2.653	2.815	2.600	2.720	2.711	2.689	2.416-2.961	0.09095	1.344
10 PFDA	13.420	13.780	13.644	13.394	13.036	14.111	13.278	13.596	12.670	13.436	12.042-14.830	0.46473	6.718
6 N-MeFOSAA	1.309	1.194	1.319	1.308	1.381	1.354	1.300	1.412	1.377	1.328	1.105-1.550	0.07415	0.664
9 PFDS	2.721	2.549	2.671	2.450	2.695	2.746	2.681	2.827	2.721	2.673	2.352-2.994	0.10701	1.336
5 N-EtFOSAA	1.842	1.434	1.447	1.648	1.531	1.537	1.463	1.561	1.519	1.553	1.133-1.974	0.14015	0.776
25 PFUdA	12.125	15.428	14.077	15.239	13.267	14.077	14.342	13.661	13.969	14.020	11.207-16.833	0.93752	7.010
26 MeFOSA	0.925	1.012	1.011	1.003	1.003	1.153	1.038	1.062	1.076	1.031	0.833-1.229	0.06595	0.515
27 EtFOSA	0.794	0.992	1.131	1.037	1.046	1.010	0.989	1.014	1.030	1.004	0.734-1.275	0.09010	0.502
11 PFDoA	11.152	9.827	9.988	9.753	11.080	10.177	10.219	10.577	9.934	10.300	8.304-12.297	0.66541	5.150
4 10:2 FTS	3.885	2.977	3.402	3.692	3.184	3.253	3.404	3.293	3.250	3.371	2.581-4.160	0.26310	1.685
34 PFDOS	2.632	3.331	3.273	3.027	3.090	3.110	3.107	3.156	3.118	3.093	2.500-3.687	0.19786	1.546
24 PFTrDA	8.448	8.170	8.706	8.462	8.907	8.621	8.527	8.511	8.429	8.531	7.938-9.124	0.19772	4.265
23 PFTeDA	12.473	12.005	12.652	11.917	12.066	12.139	11.919	11.578	11.204	11.994	10.561-13.428	0.47778	5.997
35 PFHxDA	10.593	10.609	10.145	10.009	10.198	10.163	10.043	9.955	9.948	10.184	9.417-10.951	0.25573	5.092
36 PFODA	14.234	13.100	13.393	14.250	14.522	14.196	14.400	14.150	13.918	14.018	12.489-15.547	0.50963	7.009

Report Date: 16-Aug-2022 15:44:40 AIM Revision: 2.0.2021.1130

Pace Environmental Services, LLC

Initial Calibration RF Report

Batch: \\Organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b
Method: LCMSMS02_PFAS-ID2.M Version: V16 30-Jun-2022 10:54:24
Instrument: LCMSMS02.i Integrator: picker
Cal Start Date: 15-Aug-2022 18:27:01 Cal End Date: 15-Aug-2022 19:54:40
Method Lock: Unknown Lock Date:
Calib Method: PFAS-ID2 No.Compounds: 66
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes
Batch: \\organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b

Level	Cal File	Cal Sample ID	Cal Date
2	081522B008.d	ICAL 100_SVLC-2105	15-Aug-2022 18:27:01
3	081522B009.d	ICAL 200_SVLC-2163	15-Aug-2022 18:37:56
4	081522B010.d	ICAL 500_SVLC-2107	15-Aug-2022 18:48:51
5	081522B011.d	ICAL 1000_SVLC-2165	15-Aug-2022 18:59:46
6	081522B012.d	ICAL 2000_SVLC-2108	15-Aug-2022 19:10:43
7	081522B013.d	ICAL 5000_SVLC-2109	15-Aug-2022 19:21:41
8	081522B014.d	ICAL 10000_SVLC-2120	15-Aug-2022 19:32:42
9	081522B015.d	ICAL 15000_SVLC-2111	15-Aug-2022 19:43:41
10	081522B016.d	ICAL 20000_SVLC-2112	15-Aug-2022 19:54:40

Curve Legend: Ex. Avg:H Wt:C2 Org:F Dep:R

Curve Type: Avg, Ln, Qd Response Type: H-Height, A-Area
Wt: Curve Weighting, C-1/Conc, C2-1/Conc^2, R-1/Rsp, R2-1/Rsp^2, N-None
Org: Origin, F-Force, I-Include, N-Neither
Dep: Dependent Variable, C-Concentration, R-Response

%Rec = (Measured Amount / True Amount) * 100

Column: 1 Detector: LCMS-Q3

Compound	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
D 46 13C4_PFBA	1022	1010	1043	1144	1047	1044	932	1030	1080	Avg:A Wt:C2	1039		RSD=5.4	
	98.3	97.2	100.4	110.1	100.8	100.5	89.7	99.1	104	Org:N Dep:R				
8 PFBA	0.976382	1.001675	1.077178	0.923107	1.045635	1.028923	1.072374	0.971925	0.981320	Avg:A Wt:C2	1.008725		RSD=5.1	
	96.8	99.3	106.8	91.5	103.7	102	106.3	96.4	97.3	Org:N Dep:R				
D 50 13C5_PFPeA	964	972	976	1077	1020	987	880	1002	1049	Avg:A Wt:C2	992		RSD=5.7	
	97.2	98	98.5	108.5	102.8	99.5	88.7	101	105.7	Org:N Dep:R				
21 PFPeA	1.056506	1.032244	1.127840	0.969191	1.054593	1.058488	1.113743	0.987989	0.991568	Avg:A Wt:C2	1.043573		RSD=5.2	
	101.2	98.9	108.1	92.9	101.1	101.4	106.7	94.7	95	Org:N Dep:R				
D 44 13C3_PFBS	271	270	286	310	289	286	260	290	299	Avg:A Wt:C2	284		RSD=5.4	
	95.3	94.8	100.7	108.9	101.5	100.6	91.4	101.8	105	Org:N Dep:R				
7 PFBS	1.172190	1.374855	1.370803	1.202111	1.290073	1.320085	1.391897	1.261248	1.380015	Avg:A Wt:C2	1.307031		RSD=6.2	
	89.7	105.2	104.9	92	98.7	101	106.5	96.5	105.6	Org:N Dep:R				

Compound	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
1 4:2 FTS	1.888866	1.872952	2.103453	1.727182	2.167296	2.041456	2.126776	2.136461	2.139399	Avg:A Wt:C2	2.022649		RSD=7.7	
	93.4	92.6	104	85.4	107.2	100.9	105.1	105.6	105.8	Org:N Dep:R				
D 63 13C2_4:2 FTS_2	37.6091	40.6411	37.1898	45.3518	38.1044	38.7220	36.0820	36.7102	41.8630	Avg:A Wt:C2	39.1415		RSD=7.6	
	96.1	103.8	95	115.9	97.4	98.9	92.2	93.8	107	Org:N Dep:R				
D 49 13C5_PFHxA	989	1007	1029	1130	1003	988	929	1029	1080	Avg:A Wt:C2	1020		RSD=5.7	
	96.9	98.6	100.9	110.7	98.3	96.9	91	100.9	105.8	Org:N Dep:R				
15 PFHxA	0.971766	0.987042	1.086576	0.902759	1.009929	1.055292	1.027492	0.944208	0.984524	Avg:A Wt:C2	0.996621		RSD=5.6	
	97.5	99	109	90.6	101.3	105.9	103.1	94.7	98.8	Org:N Dep:R				
22 PFPeS	0.957828	0.816238	0.857352	0.744044	0.862717	0.853593	0.887148	0.832275	0.911866	Avg:A Wt:C2	0.858118		RSD=7.0	
	111.6	95.1	99.9	86.7	100.5	99.5	103.4	97	106.3	Org:N Dep:R				
28 GenX	0.773445	0.659965	0.802210	0.710923	0.732843	0.753076	0.864974	0.751749	0.780591	Avg:A Wt:C2	0.758864		RSD=7.6	
	101.9	87	105.7	93.7	96.6	99.2	114	99.1	102.9	Org:N Dep:R				
D 66 13C3_GenX	283	306	289	335	294	290	262	285	298	Avg:A Wt:C2	293		RSD=6.8	
	96.5	104.3	98.5	114.2	100.2	98.8	89.1	97	101.4	Org:N Dep:R				
13 PFHpA	1.002050	1.025037	1.050109	0.897112	1.027749	1.043233	1.116299	1.007228	0.991874	Avg:A Wt:C2	1.017854		RSD=5.7	
	98.4	100.7	103.2	88.1	101	102.5	109.7	99	97.4	Org:N Dep:R				
D 47 13C4_PFHpA	778	813	845	915	830	819	720	824	897	Avg:A Wt:C2	827		RSD=7.0	
	94.1	98.3	102.2	110.7	100.4	99	87.1	99.7	108.5	Org:N Dep:R				
D 45 13C3_PFHxS	194	205	209	220	207	200	185	203	202	Avg:A Wt:C2	203		RSD=4.8	
	95.8	101.2	103	108.5	102.2	98.8	91.1	100.2	99.3	Org:N Dep:R				
14 PFHxS	1.136980	1.066720	1.107683	1.063477	1.074854	1.111890	1.143670	1.090469	1.221551	Avg:A Wt:C2	1.113033		RSD=4.5	
	102.2	95.8	99.5	95.5	96.6	99.9	102.8	98	109.7	Org:N Dep:R				
29 ADONA	6.941367	6.697662	7.222912	6.339568	7.237433	7.545892	7.453252	6.814233	7.416173	Avg:A Wt:C2	7.074277		RSD=5.7	
	98.1	94.7	102.1	89.6	102.3	106.7	105.4	96.3	104.8	Org:N Dep:R				
2 6:2 FTS	2.645583	1.957588	2.330538	1.863328	2.059324	2.224341	2.281504	2.149322	2.368566	Avg:A Wt:C2	2.208899		RSD=10.7	
	119.8	88.6	105.5	84.4	93.2	100.7	103.3	97.3	107.2	Org:N Dep:R				
D 64 13C2_6:2 FTS_2	27.0812	29.8363	28.8474	34.4349	29.6498	28.4610	25.8465	27.9805	28.8267	Avg:A Wt:C2	28.9960		RSD=8.2	
	93.4	102.9	99.5	118.8	102.3	98.2	89.1	96.5	99.4	Org:N Dep:R				
D 53 13C8_PFOA	852	831	900	946	854	854	714	815	862	Avg:A Wt:C2	847		RSD=7.4	
	100.5	98.1	106.2	111.6	100.8	100.7	84.3	96.2	101.7	Org:N Dep:R				
20 PFOA	0.941503	0.991205	0.983278	0.891807	1.006495	0.936535	1.047657	0.976333	0.986953	Avg:A Wt:C2	0.973530		RSD=4.6	
	96.7	101.8	101	91.6	103.4	96.2	107.6	100.3	101.4	Org:N Dep:R				
12 PFHpS	0.983424	0.881225	0.952582	0.897802	0.942837	0.971227	0.927050	0.865265	0.985149	Avg:A Wt:C2	0.934062		RSD=4.7	
	105.3	94.3	102	96.1	100.9	104	99.2	92.6	105.5	Org:N Dep:R				
D 54 13C8_PFOS	184	173	180	190	183	186	163	177	193	Avg:A Wt:C2	181		RSD=5.1	
	101.9	95.6	99.2	105.2	100.8	102.9	89.8	98	106.6	Org:N Dep:R				
17 PFNA	0.969928	1.010291	1.023133	0.922589	1.006381	1.046313	1.116196	0.981864	1.009012	Avg:A Wt:C2	1.009523		RSD=5.3	
	96.1	100.1	101.3	91.4	99.7	103.6	110.6	97.3	99.9	Org:N Dep:R				
18 PFOS	1.140541	1.267807	1.297590	1.140967	1.202802	1.145498	1.240771	1.210051	1.274534	Avg:A Wt:C2	1.213396		RSD=5.0	
	94	104.5	106.9	94	99.1	94.4	102.3	99.7	105	Org:N Dep:R				
D 56 13C9_PFNA	924	921	988	1028	968	930	840	957	1020	Avg:A Wt:C2	953		RSD=6.1	
	97	96.7	103.7	107.9	101.6	97.6	88.1	100.4	107.1	Org:N Dep:R				

Compound	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
30 9Cl-PF3ONS	2.871171	3.552159	3.686016	3.240452	3.416895	3.405546	3.718621	3.570218	3.644568	Avg:A Wt:C2	3.456183		RSD=7.7	
	83.1	102.8	106.6	93.8	98.9	98.5	107.6	103.3	105.5	Org:N Dep:R				
D 55 13C8_PFOSA	332	353	349	402	355	354	329	361	391	Avg:A Wt:C2	358		RSD=6.7	
	92.7	98.6	97.3	112.1	99	98.9	91.7	100.7	109	Org:N Dep:R				
19 PFOSA	0.995961	1.012687	1.066946	0.866236	1.039774	1.073452	1.093690	1.072556	1.107661	Avg:A Wt:C2	1.036552		RSD=7.1	
	96.1	97.7	102.9	83.6	100.3	103.6	105.5	103.5	106.9	Org:N Dep:R				
D 65 13C2_8:2 FTS_2	25.4761	25.2041	26.7620	26.7859	26.2934	25.9774	23.8307	25.2069	27.7159	Avg:A Wt:C2	25.9169		RSD=4.4	
	98.3	97.2	103.3	103.4	101.5	100.2	92	97.3	106.9	Org:N Dep:R				
3 8:2 FTS	1.659831	1.896625	1.899056	1.984693	2.018673	1.979238	2.010025	2.029263	2.034743	Avg:A Wt:C2	1.945794		RSD=6.1	
	85.3	97.5	97.6	102	103.7	101.7	103.3	104.3	104.6	Org:N Dep:R				
16 PFNS	0.692748	0.724228	0.854289	0.770805	0.818328	0.791152	0.829996	0.811416	0.821609	Avg:A Wt:C2	0.790508		RSD=6.7	
	87.6	91.6	108.1	97.5	103.5	100.1	105	102.6	103.9	Org:N Dep:R				
D 51 13C6_PFDA	907	895	916	1006	938	903	809	885	970	Avg:A Wt:C2	914		RSD=6.1	
	99.2	97.9	100.1	110	102.6	98.7	88.5	96.8	106.1	Org:N Dep:R				
10 PFDA	0.997376	0.999281	1.113005	0.919051	1.047130	1.081676	1.102809	1.040132	1.007949	Avg:A Wt:C2	1.034268		RSD=5.9	
	96.4	96.6	107.6	88.9	101.2	104.6	106.6	100.6	97.5	Org:N Dep:R				
D 58 d3-MeFOSAA	189	196	195	218	195	196	186	201	218	Avg:A Wt:C2	199		RSD=5.7	
	94.7	98.5	97.8	109.3	98	98.5	93.3	100.6	109.4	Org:N Dep:R				
6 N-MeFOSAA	0.767747	0.742150	0.860210	0.697757	0.829060	0.782021	0.787431	0.807739	0.823780	Avg:A Wt:C2	0.788655		RSD=6.2	
	97.3	94.1	109.1	88.5	105.1	99.2	99.8	102.4	104.5	Org:N Dep:R				
9 PFDS	0.699942	0.778772	0.762318	0.678613	0.778893	0.733102	0.808354	0.761018	0.763114	Avg:A Wt:C2	0.751570		RSD=5.4	
	93.1	103.6	101.4	90.3	103.6	97.5	107.6	101.3	101.5	Org:N Dep:R				
D 60 d5-EtFOSAA	168	166	171	188	167	163	149	162	164	Avg:A Wt:C2	167		RSD=6.1	
	101	99.6	102.7	113	100.1	98	89.6	97.4	98.6	Org:N Dep:R				
5 N-EtFOSAA	1.137346	0.959097	1.018338	0.900089	1.001421	1.040716	1.023079	1.005004	1.062220	Avg:A Wt:C2	1.016368		RSD=6.5	
	111.9	94.4	100.2	88.6	98.5	102.4	100.7	98.9	104.5	Org:N Dep:R				
25 PFUdA	0.878065	0.930916	0.995951	0.841088	0.926189	0.950652	1.081529	0.930841	0.945032	Avg:A Wt:C2	0.942252		RSD=7.2	
	93.2	98.8	105.7	89.3	98.3	100.9	114.8	98.8	100.3	Org:N Dep:R				
D 52 13C7_PFUdA	814	816	835	960	857	819	722	817	870	Avg:A Wt:C2	835		RSD=7.5	
	97.6	97.8	100.1	115.1	102.7	98.1	86.5	97.9	104.2	Org:N Dep:R				
D 61 d7-MeFOSE	101	111	105	122	105	107	110	113	116	Avg:A Wt:C2	110		RSD=5.7	
	92.1	101	95.9	110.7	95.3	97.4	99.7	102.5	105.3	Org:N Dep:R				
32 MeFOSE	1.096989	1.100932	1.256404	1.163146	1.245449	1.158429	1.336150	1.136113	1.202639	Avg:A Wt:C2	1.188473		RSD=6.7	
	92.3	92.6	105.7	97.9	104.8	97.5	112.4	95.6	101.2	Org:N Dep:R				
D 57 d3-MeFOSA	54.0975	59.8640	59.8490	66.6970	58.7375	61.4230	55.5780	62.3115	67.2950	Avg:A Wt:C2	60.6503		RSD=7.3	
	89.2	98.7	98.7	110	96.8	101.3	91.6	102.7	111	Org:N Dep:R				
26 MeFOSA	1.035168	0.926851	1.045030	1.034334	1.064907	1.070566	1.245322	1.048725	1.081300	Avg:A Wt:C2	1.061356		RSD=7.8	
	97.5	87.3	98.5	97.5	100.3	100.9	117.3	98.8	101.9	Org:N Dep:R				
31 11Cl-PF3OUDS	2.976823	3.176122	3.323208	2.809066	3.116016	3.032950	3.308396	3.179637	3.312449	Avg:A Wt:C2	3.137185		RSD=5.6	
	94.9	101.2	105.9	89.5	99.3	96.7	105.5	101.4	105.6	Org:N Dep:R				
D 62 d9-EtFOSE	121	127	130	136	123	132	124	134	147	Avg:A Wt:C2	130		RSD=6.2	
	92.6	97.2	99.5	104.2	94.6	101.1	95.3	102.5	113	Org:N Dep:R				

Compound	Level 2 / %Rec	Level 3 / %Rec	Level 4 / %Rec	Level 5 / %Rec	Level 6 / %Rec	Level 7 / %Rec	Level 8 / %Rec	Level 9 / %Rec	Level 10 / %Rec	Curve	M1	B	Curve Errors	Flags
33 EtFOSE	0.875559	0.876405	1.012595	0.928720	1.083445	1.002127	1.034441	0.990686	0.998242	Avg:A Wt:C2	0.978024		RSD=7.2	
	89.5	89.6	103.5	95	110.8	102.5	105.8	101.3	102.1	Org:N Dep:R				
D 59 d5-EtFOSA	55.9845	57.1300	58.2335	59.9290	55.2705	58.6430	55.0135	59.1960	64.8440	Avg:A Wt:C2	58.2493		RSD=5.2	
	96.1	98.1	100	102.9	94.9	100.7	94.4	101.6	111.3	Org:N Dep:R				
27 EtFOSA	0.862382	0.960704	1.148377	1.088388	1.164853	1.046174	1.213971	1.092576	1.103695	Avg:A Wt:C2	1.075680		RSD=10.0	
	80.2	89.3	106.8	101.2	108.3	97.3	112.9	101.6	102.6	Org:N Dep:R				
D 38 13C2_PFDoA	817	834	845	910	846	846	781	865	892	Avg:A Wt:C2	848		RSD=4.5	
	96.3	98.2	99.6	107.3	99.8	99.7	92.1	101.9	105.1	Org:N Dep:R				
11 PFDoA	1.035130	1.017996	1.081747	0.913561	1.032985	1.030758	1.063259	0.984968	1.028306	Avg:A Wt:C2	1.020968		RSD=4.8	
	101.4	99.7	106	89.5	101.2	101	104.1	96.5	100.7	Org:N Dep:R				
4 10:2 FTS	1.985426	1.456367	1.791572	2.063969	1.768031	1.879379	2.110496	1.837265	1.871585	Avg:A Wt:C2	1.862677		RSD=10.3	
	106.6	78.2	96.2	110.8	94.9	100.9	113.3	98.6	100.5	Org:N Dep:R				
34 PFDOS	0.684390	0.762330	0.845078	0.805749	0.801080	0.773732	0.908805	0.837525	0.841119	Avg:A Wt:C2	0.806645		RSD=7.9	
	84.8	94.5	104.8	99.9	99.3	95.9	112.7	103.8	104.3	Org:N Dep:R				
24 PFTrDA	1.033809	0.965406	1.041529	0.901433	1.013943	0.997231	1.008798	0.948018	0.982247	Avg:A Wt:C2	0.988046		RSD=4.5	
	104.6	97.7	105.4	91.2	102.6	100.9	102.1	95.9	99.4	Org:N Dep:R				
D 42 13C2_PFTeDA	1028	985	1036	1100	1052	1047	932	1073	1169	Avg:A Wt:C2	1047		RSD=6.4	
	98.2	94.1	99	105.1	100.5	100	89.1	102.5	111.6	Org:N Dep:R				
23 PFTeDA	0.891754	0.950622	0.982699	0.868146	0.928684	0.941222	0.980588	0.877718	0.866121	Avg:A Wt:C2	0.920839		RSD=5.0	
	96.8	103.2	106.7	94.3	100.9	102.2	106.5	95.3	94.1	Org:N Dep:R				
35 PFHxDA	0.563550	0.496488	0.507403	0.431563	0.474982	0.488439	0.493929	0.464385	0.477719	Avg:A Wt:C2	0.488718		RSD=7.3	
	115.3	101.6	103.8	88.3	97.2	99.9	101.1	95	97.7	Org:N Dep:R				
D 40 13C2_PFHxDA	817	852	857	945	864	833	797	864	922	Avg:A Wt:C2	861		RSD=5.4	
	94.8	98.9	99.6	109.7	100.3	96.7	92.6	100.3	107	Org:N Dep:R				
36 PFODA	0.758995	0.700813	0.788665	0.693902	0.816794	0.831616	0.793822	0.767165	0.805604	Avg:A Wt:C2	0.773042		RSD=6.3	
	98.2	90.7	102	89.8	105.7	107.6	102.7	99.2	104.2	Org:N Dep:R				

Report Date: 16-Aug-2022 15:44:40 AIM Revision: 2.0.2021.1130

Pace Environmental Services, LLC

Initial Calibration Ion Suppression Report

Batch: \\Organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b
Method: LCMSMS02_PFAS-ID2.M Version: V16 30-Jun-2022 10:54:24
Instrument: LCMSMS02.i Integrator: picker
Cal Start Date: 15-Aug-2022 18:27:01 Cal End Date: 15-Aug-2022 19:54:40
Method Lock: Unknown Lock Date:
Calib Method: PFAS-ID2 No.Compounds: 66
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes
Batch: \\organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b

Level	Cal File	Cal Sample ID	Cal Date
2	081522B008.d	ICAL 100_SVLC-2105	15-Aug-2022 18:27:01
3	081522B009.d	ICAL 200_SVLC-2163	15-Aug-2022 18:37:56
4	081522B010.d	ICAL 500_SVLC-2107	15-Aug-2022 18:48:51
5	081522B011.d	ICAL 1000_SVLC-2165	15-Aug-2022 18:59:46
6	081522B012.d	ICAL 2000_SVLC-2108	15-Aug-2022 19:10:43
7	081522B013.d	ICAL 5000_SVLC-2109	15-Aug-2022 19:21:41
8	081522B014.d	ICAL 10000_SVLC-2120	15-Aug-2022 19:32:42
9	081522B015.d	ICAL 15000_SVLC-2111	15-Aug-2022 19:43:41
10	081522B016.d	ICAL 20000_SVLC-2112	15-Aug-2022 19:54:40

Column: 1 Detector: LCMS-Q3

Compound	Response Level 2	Response Level 3	Response Level 4	Response Level 5	Response Level 6	Response Level 7	Response Level 8	Response Level 9	Response Level 10	RPD
* 37 13C2_PFDA	437	537	922	1721	1729	5083	11162	13988	20603	47.92
* 39 13C2_PFHxA	1626	1048	1587	1293	4216	5552	9234	10436	15525	40.51
* 41 13C2_PFOA	372	371	371	822	1865	2782	7552	10206	17014	47.86
* 43 13C3_PFBA	10314	9457	11533	13193	12643	11480	12299	10029	12026	3.83
* 48 13C4_PFOS	2934	3205	3703	4206		3314	1584	3345	3421	3.83

13C2_PFDA ((|20603 - 437| / (20603 + 437)) / 2) * 100 = 47.92
13C2_PFHxA ((|15525 - 1626| / (15525 + 1626)) / 2) * 100 = 40.52
13C2_PFOA ((|17014 - 372| / (17014 + 372)) / 2) * 100 = 47.86
13C3_PFBA ((|12026 - 10314| / (12026 + 10314)) / 2) * 100 = 3.83
13C4_PFOS ((|3421 - 2934| / (3421 + 2934)) / 2) * 100 = 3.83

not used, not evaluated

Report Date: 16-Aug-2022 15:44:40 AIM Revision: 2.0.2021.1130

Pace Environmental Services, LLC

Initial Calibration Response Report

Batch: \\Organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b
Method: LCMSMS02_PFAS-ID2.M Version: V16 30-Jun-2022 10:54:24
Instrument: LCMSMS02.i Integrator: picker
Cal Start Date: 15-Aug-2022 18:27:01 Cal End Date: 15-Aug-2022 19:54:40
Method Lock: Unknown Lock Date:
Calib Method: PFAS-ID2 No.Compounds: 66
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes
Batch: \\organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b

Level	Cal File	Cal Sample ID	Cal Date
2	081522B008.d	ICAL 100_SVLC-2105	15-Aug-2022 18:27:01
3	081522B009.d	ICAL 200_SVLC-2163	15-Aug-2022 18:37:56
4	081522B010.d	ICAL 500_SVLC-2107	15-Aug-2022 18:48:51
5	081522B011.d	ICAL 1000_SVLC-2165	15-Aug-2022 18:59:46
6	081522B012.d	ICAL 2000_SVLC-2108	15-Aug-2022 19:10:43
7	081522B013.d	ICAL 5000_SVLC-2109	15-Aug-2022 19:21:41
8	081522B014.d	ICAL 10000_SVLC-2120	15-Aug-2022 19:32:42
9	081522B015.d	ICAL 15000_SVLC-2111	15-Aug-2022 19:43:41
10	081522B016.d	ICAL 20000_SVLC-2112	15-Aug-2022 19:54:40

Quantitation Standards (* - Istd) (D - Iso Dil Std)

* 37 13C2_PFDA	* 39 13C2_PFHxA	* 41 13C2_PFOA
* 43 13C3_PFBA	* 48 13C4_PFOS	D 38 13C2_PFDoA
D 40 13C2_PFHxDA	D 42 13C2_PFTeDA	D 44 13C3_PFBS
D 45 13C3_PFHxS	D 46 13C4_PFBA	D 47 13C4_PFHpA
D 49 13C5_PFHxA	D 50 13C5_PFPeA	D 51 13C6_PFDA
D 52 13C7_PFUdA	D 53 13C8_PFOA	D 54 13C8_PFOS
D 55 13C8_PFOSA	D 56 13C9_PFNA	D 57 d3-MeFOSA
D 58 d3-MeFOSAA	D 59 d5-EtFOSA	D 60 d5-EtFOSAA
D 61 d7-MeFOSE	D 62 d9-EtFOSE	D 63 13C2_4:2 FTS_2
D 64 13C2_6:2 FTS_2	D 65 13C2_8:2 FTS_2	D 66 13C3_GenX

Column: 1 Detector: LCMS-Q3

Compound	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp
D 46 13C4_PFBA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	2043052	2019247	2086660	2288215	2094053	2087997	1864264	2060321	2160801
8 PFBA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	99740	202263	561926	1056134	2189616	5370971	9995939	15018585	21204377
D 50 13C5_PFPeA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	1928073	1943398	1952968	2153278	2039362	1974259	1760447	2004281	2097089
21 PFPeA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	101851	200606	550659	1043469	2150697	5224326	9803430	14851550	20794053
D 44 13C3_PFBS	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	542049	539333	572855	619318	577208	572597	520287	579298	597672
7 PFBS	88.400	176.80	442.00	884.00	1768.00	4420.00	8840.00	13260	17680
	28084	65549	173545	329064	658262	1670488	3200902	4844133	7291201
1 4:2 FTS	93.400	186.80	467.00	934.00	1868.00	4670.00	9340.00	14010	18680
	6635	14219	36532	73161	154266	369160	716736	1098803	1673012
D 63 13C2_4:2 FTS_2	10000	10000	10000	10000	10000	10000	10000	10000	10000
	376091	406411	371898	453518	381044	387220	360820	367102	418630
D 49 13C5_PFHxA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	1977205	2013025	2058304	2259550	2005492	1976764	1857410	2058083	2159936
* 39 13C2_PFHxA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	1626	1048	1587	1293	4216	5552	9234	10436	15525

Compound	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp
15 PFHxA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	96069	198694	559126	1019915	2025405	5215157	9542374	14574443	21265079
22 PFPeS	93.800	187.60	469.00	938.00	1876.00	4690.00	9380.00	14070	18760
	24350	41293	115172	216115	467093	1146154	2164771	3391820	5112071
28 GenX	200.00	400.00	1000.00	2000.00	4000.00	10000	20000	30000	40000
	43812	80785	231790	476606	861723	2184688	4524157	6422730	9292473
D 66 13C3_GenX	10000	10000	10000	10000	10000	10000	10000	10000	10000
	2832262	3060202	2889394	3352023	2939659	2901021	2615197	2847906	2976103
13 PFHpA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	77946	166640	443902	821013	1706122	4272158	8042128	12456371	17800844
D 47 13C4_PFHpA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	1555731	1625698	1690880	1830347	1660057	1638046	1440856	1648931	1794668
D 45 13C3_PFHxS	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	388691	410656	418178	440504	414982	400919	369882	406650	403021
14 PFHxS	91.000	182.00	455.00	910.00	1820.00	4550.00	9100.00	13650	18200
	20108	39863	105380	213152	405901	1014145	1924755	3026473	4480029
29 ADONA	94.200	188.40	471.00	942.00	1884.00	4710.00	9420.00	14130	18840
	127078	259091	711319	1315317	2829207	7124561	12984640	19577171	28155189
2 6:2 FTS	94.800	189.60	474.00	948.00	1896.00	4740.00	9480.00	14220	18960
	6792	11074	31867	60827	115767	300075	559025	855178	1294550
D 64 13C2_6:2 FTS_2	10000	10000	10000	10000	10000	10000	10000	10000	10000
	270812	298363	288474	344349	296498	284610	258465	279805	288267
D 53 13C8_PFOA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	1703552	1662472	1800410	1891181	1708501	1707045	1428123	1630451	1723145
20 PFOA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	80195	164785	442576	843284	1719598	3996768	7480917	11938978	17006632
* 41 13C2_PFOA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	372	371	371	822	1865	2782	7552	10206	17014
12 PFHpS	95.200	190.40	476.00	952.00	1904.00	4760.00	9520.00	14280	19040
	18195	34451	94807	188251	372480	926732	1632200	2512280	3779782
D 54 13C8_PFOS	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	368851	346087	359207	380976	365042	372387	325191	354883	385836
* 48 13C4_PFOS	2000.00	2000.00	2000.00	2000.00		2000.00	2000.00	2000.00	2000.00
	2934	3205	3703	4206		3314	1584	3345	3421
17 PFNA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	89602	186171	505283	948255	1948319	4864020	9372840	14092917	20590474
18 PFOS	92.800	185.60	464.00	928.00	1856.00	4640.00	9280.00	13920	18560
	19520	40718	108136	201692	407460	989639	1872183	2988808	4563542
D 56 13C9_PFNA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	1847601	1842747	1975434	2055639	1935966	1859489	1679425	1913763	2040657
30 9Cl-PF3ONS	93.200	186.40	466.00	932.00	1864.00	4660.00	9320.00	13980	18640
	49351	114576	308502	575293	1162493	2954862	5635161	8856397	13105834
D 55 13C8_PFOSA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	664785	706783	697441	803326	709507	708877	657170	721821	781249
19 PFOSA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	33105	71575	186033	347935	737727	1902364	3593702	5806452	8653594
D 65 13C2_8:2 FTS_2	10000	10000	10000	10000	10000	10000	10000	10000	10000
	254761	252041	267620	267859	262934	259774	238307	252069	277159
* 37 13C2_PFDA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	437	537	922	1721	1729	5083	11162	13988	20603
3 8:2 FTS	95.800	191.60	479.00	958.00	1916.00	4790.00	9580.00	14370	19160
	4051	9159	24344	50929	101697	246280	458885	735046	1080523
16 PFNS	96.000	192.00	480.00	960.00	1920.00	4800.00	9600.00	14400	19200
	12265	24062	73648	140956	286775	707075	1295555	2073295	3043260
D 51 13C6_PFDA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	1814602	1789427	1831298	2012082	1876313	1805415	1618960	1769953	1940471

Compound	Level 2 Conc/Rsp	Level 3 Conc/Rsp	Level 4 Conc/Rsp	Level 5 Conc/Rsp	Level 6 Conc/Rsp	Level 7 Conc/Rsp	Level 8 Conc/Rsp	Level 9 Conc/Rsp	Level 10 Conc/Rsp
10 PFDA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	90492	178814	509561	924603	1964743	4882184	8927015	13807389	19558964
D 58 d3-MeFOSAA	10000	10000	10000	10000	10000	10000	10000	10000	10000
	1889555	1963552	1949664	2179657	1954328	1963625	1860127	2006627	2182469
6 N-MeFOSAA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	14507	29145	83856	152087	324051	767798	1464721	2431245	3595747
9 PFDS	96.400	192.80	482.00	964.00	1928.00	4820.00	9640.00	14460	19280
	12444	25982	65993	124614	274093	657924	1267031	1952624	2838370
D 60 d5-EtFOSAA	10000	10000	10000	10000	10000	10000	10000	10000	10000
	1684536	1660624	1712438	1883414	1668818	1634708	1494093	1623611	1643223
5 N-EtFOSAA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	19159	31854	87192	169524	334238	850633	1528575	2447603	3490928
25 PFUdA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	71507	152006	416038	807839	1587705	3891776	7811757	11408871	16443345
D 52 13C7_PFUdA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	1628741	1632865	1670918	1920937	1714235	1637518	1444576	1634202	1739977
D 61 d7-MeFOSE	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	202445	222021	210792	243211	209392	214084	219172	225335	231466
32 MeFOSE	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	11104	24443	66210	141445	260787	620003	1464233	1920046	2783701
D 57 d3-MeFOSA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	108195	119728	119698	133394	117475	122846	111156	124623	134590
26 MeFOSA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	5600	11097	31272	68987	125100	328787	692125	980214	1455322
31 11Cl-PF3OUDS	94.200	188.40	471.00	942.00	1884.00	4710.00	9420.00	14130	18840
	51716	103546	281121	504058	1071503	2659810	5067303	7972141	12039345
D 62 d9-EtFOSE	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	241560	253570	259634	271744	246880	263864	248606	267427	294707
33 EtFOSE	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	10575	22223	65726	126187	267481	661063	1285841	1987022	2941888
D 59 d5-EtFOSA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	111969	114260	116467	119858	110541	117286	110027	118392	129688
27 EtFOSA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	4828	10977	33437	65226	128764	306754	667848	970142	1431360
D 38 13C2_PFDoA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	1634364	1667070	1689685	1819813	1692584	1691633	1562202	1729639	1784166
11 PFDoA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	84589	169707	456953	831255	1748414	4359160	8305127	12777296	18346693
4 10:2 FTS	96.400	192.80	482.00	964.00	1928.00	4820.00	9640.00	14460	19280
	4876	7077	23110	53295	89628	235319	484840	669668	1000105
34 PFDOS	96.800	193.60	484.00	968.00	1936.00	4840.00	9680.00	14520	19360
	12218	25539	73461	148574	283070	697269	1430391	2157843	3141489
24 PFTrDA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	84481	160940	439964	820220	1716184	4217373	7879735	12297962	17524920
D 42 13C2_PFTeDA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	2055320	1969406	2072178	2200746	2104083	2093143	1864428	2146335	2337154
23 PFTeDA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	91642	187216	509082	955284	1954028	4925282	9141177	14129071	20242590
35 PFHxDA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	46028	84604	217536	407664	820682	2033560	3938145	6018709	8806996
D 40 13C2_PFHxDA	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00
	1633502	1704050	1714898	1889243	1727816	1665355	1594619	1728081	1843552
36 PFODA	100.00	200.00	500.00	1000.00	2000.00	5000.00	10000	15000	20000
	61991	119422	338120	655475	1411269	3462338	6329216	9942925	14851734

Report Date: 16-Aug-2022 15:44:40 AIM Revision: 2.0.2021.1130

Pace Environmental Services, LLC

Initial Calibration RT Report

Batch: \\Organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b
Method: LCMSMS02_PFAS-ID2.M Version: V16 30-Jun-2022 10:54:24
Instrument: LCMSMS02.i Integrator: picker
Cal Start Date: 15-Aug-2022 18:27:01 Cal End Date: 15-Aug-2022 19:54:40
Method Lock: Unknown Lock Date:
Calib Method: PFAS-ID2 No.Compounds: 66
Calibration Concentration Units: ng/L

Initial Calibration Samples: Primary Reagent: Analytes
Batch: \\organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b

Level	Cal File	Cal Sample ID	Cal Date
2	081522B008.d	ICAL 100_SVLC-2105	15-Aug-2022 18:27:01
3	081522B009.d	ICAL 200_SVLC-2163	15-Aug-2022 18:37:56
4	081522B010.d	ICAL 500_SVLC-2107	15-Aug-2022 18:48:51
5	081522B011.d	ICAL 1000_SVLC-2165	15-Aug-2022 18:59:46
6	081522B012.d	ICAL 2000_SVLC-2108	15-Aug-2022 19:10:43
7	081522B013.d	ICAL 5000_SVLC-2109	15-Aug-2022 19:21:41
8	081522B014.d	ICAL 10000_SVLC-2120	15-Aug-2022 19:32:42
9	081522B015.d	ICAL 15000_SVLC-2111	15-Aug-2022 19:43:41
10	081522B016.d	ICAL 20000_SVLC-2112	15-Aug-2022 19:54:40

Column: 1 Detector: LCMS-Q3

Compound	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10	Avg. RT	%Rsd RT
D 46 13C4_PFBA	1.660	1.660	1.660	1.659	1.659	1.664	1.659	1.660	1.661	1.660	0.100
8 PFBA	1.667	1.666	1.666	1.666	1.666	1.664	1.666	1.666	1.667	1.665	0.052
D 50 13C5_PFPeA	1.995	1.994	1.994	1.994	1.994	2.001	1.994	1.995	1.996	1.995	0.099
21 PFPeA	1.995	1.994	1.994	1.994	1.994	2.001	1.994	1.995	1.996	1.995	0.099
D 44 13C3_PFBS	2.046	2.045	2.045	2.045	2.045	2.051	2.045	2.045	2.046	2.045	0.111
7 PFBS	2.046	2.045	2.045	2.045	2.045	2.051	2.045	2.045	2.046	2.045	0.111
1 4:2 FTS	2.300	2.308	2.300	2.299	2.299	2.300	2.299	2.300	2.301	2.300	0.113
D 63 13C2_4:2 FTS_2	2.300	2.300	2.300	2.299	2.299	2.300	2.299	2.300	2.301	2.299	0.032
D 49 13C5_PFHxA	2.336	2.335	2.335	2.335	2.335	2.335	2.335	2.335	2.336	2.334	0.031
* 39 13C2_PFHxA	2.345	2.326	2.335	2.335	2.335	2.335	2.335	2.335	2.336	2.334	0.206
15 PFHxA	2.336	2.335	2.335	2.335	2.335	2.335	2.335	2.335	2.336	2.334	0.031
22 PFPeS	2.363	2.362	2.362	2.362	2.362	2.362	2.362	2.362	2.363	2.361	0.031
28 GenX	2.452	2.451	2.451	2.451	2.451	2.451	2.451	2.452	2.453	2.451	0.018
D 66 13C3_GenX	2.452	2.451	2.451	2.451	2.451	2.451	2.451	2.452	2.453	2.451	0.018
13 PFHpA	2.721	2.720	2.720	2.720	2.720	2.720	2.720	2.721	2.721	2.720	0.012
D 47 13C4_PFHpA	2.721	2.720	2.720	2.720	2.720	2.720	2.720	2.721	2.721	2.720	0.012
D 45 13C3_PFHxS	2.740	2.739	2.739	2.739	2.739	2.739	2.739	2.739	2.739	2.738	0.018
14 PFHxS	2.740	2.739	2.739	2.739	2.739	2.739	2.739	2.739	2.739	2.738	0.018
29 ADONA	2.767	2.766	2.767	2.766	2.766	2.766	2.766	2.767	2.767	2.766	0.016
2 6:2 FTS	3.142	3.136	3.143	3.143	3.151	3.151	3.143	3.149	3.144	3.144	0.144
D 64 13C2_6:2 FTS_2	3.142	3.143	3.143	3.143	3.151	3.143	3.143	3.149	3.144	3.144	0.092
D 53 13C8_PFOA	3.171	3.172	3.172	3.172	3.179	3.172	3.179	3.177	3.173	3.174	0.111
20 PFOA	3.178	3.172	3.179	3.179	3.179	3.179	3.179	3.177	3.180	3.178	0.073
* 41 13C2_PFOA	3.178	3.165	3.179	3.179	3.179	3.186	3.172	3.170	3.180	3.176	0.206
12 PFHpS	3.185	3.179	3.186	3.186	3.186	3.186	3.186	3.185	3.187	3.185	0.073
D 54 13C8_PFOS	3.673	3.673	3.679	3.674	3.673	3.679	3.679	3.679	3.674	3.676	0.086
* 48 13C4_PFOS	3.673	3.673	3.686	3.674		3.679	3.667	3.673	3.674	3.674	0.152
17 PFNA	3.686	3.679	3.679	3.680	3.686	3.686	3.686	3.686	3.680	3.682	0.083
18 PFOS	3.673	3.679	3.679	3.680	3.679	3.679	3.679	3.679	3.680	3.678	0.056
D 56 13C9_PFNA	3.673	3.673	3.679	3.680	3.679	3.673	3.679	3.679	3.680	3.677	0.084
30 9Cl-PF3ONS	3.973	3.972	3.973	3.973	3.972	3.972	3.979	3.979	3.980	3.975	0.091
D 55 13C8_PFOSA	4.048	4.048	4.054	4.048	4.060	4.060	4.060	4.060	4.054	4.054	0.134
19 PFOSA	4.048	4.054	4.060	4.048	4.060	4.060	4.060	4.054	4.061	4.055	0.129

Compound	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10	Avg. RT	%Rsd RT
D 65 13C2_8:2 FTS_2	4.161	4.154	4.161	4.155	4.161	4.160	4.160	4.160	4.161	4.159	0.066
* 37 13C2_PFDA	4.187	4.174	4.180	4.161	4.167	4.173	4.180	4.180	4.168	4.174	0.192
3 8:2 FTS	4.148	4.148	4.154	4.161	4.154	4.160	4.160	4.160	4.161	4.156	0.139
16 PFNS	4.174	4.161	4.167	4.161	4.161	4.167	4.167	4.167	4.168	4.165	0.101
D 51 13C6_PFDA	4.174	4.174	4.174	4.174	4.173	4.173	4.180	4.173	4.174	4.174	0.047
10 PFDA	4.174	4.174	4.180	4.174	4.173	4.173	4.180	4.180	4.174	4.175	0.073
D 58 d3-MeFOSAA	4.399	4.394	4.394	4.395	4.394	4.398	4.394	4.403	4.399	4.396	0.083
6 N-MeFOSAA	4.399	4.398	4.408	4.399	4.394	4.403	4.408	4.408	4.404	4.402	0.113
9 PFDS	4.613	4.622	4.621	4.615	4.621	4.621	4.621	4.621	4.622	4.619	0.072
D 60 d5-EtFOSAA	4.630	4.630	4.638	4.631	4.638	4.638	4.638	4.638	4.638	4.635	0.082
5 N-EtFOSAA	4.646	4.638	4.646	4.640	4.646	4.646	4.646	4.646	4.647	4.644	0.067
25 PFUdA	4.646	4.638	4.638	4.640	4.638	4.646	4.646	4.646	4.647	4.642	0.088
D 52 13C7_PFUdA	4.638	4.638	4.646	4.640	4.646	4.646	4.646	4.646	4.638	4.642	0.083
D 61 d7-MeFOSE	4.687	4.695	4.695	4.689	4.695	4.703	4.703	4.703	4.696	4.696	0.130
32 MeFOSE	4.712	4.704	4.712	4.705	4.712	4.711	4.720	4.720	4.720	4.712	0.129
D 57 d3-MeFOSA	4.720	4.712	4.720	4.713	4.720	4.728	4.728	4.728	4.729	4.721	0.137
26 MeFOSA	4.720	4.720	4.728	4.730	4.728	4.728	4.728	4.736	4.729	4.727	0.105
31 11Cl-PF3OUDS	4.868	4.869	4.868	4.862	4.868	4.868	4.868	4.868	4.869	4.867	0.048
D 62 d9-EtFOSE	4.950	4.949	4.960	4.952	4.959	4.959	4.959	4.959	4.959	4.956	0.091
33 EtFOSE	4.969	4.969	4.969	4.971	4.979	4.979	4.979	4.979	4.978	4.974	0.094
D 59 d5-EtFOSA	4.979	4.978	4.988	4.981	4.988	4.988	4.988	4.988	4.988	4.985	0.094
27 EtFOSA	4.998	4.988	4.998	4.990	4.998	4.998	4.998	4.998	4.998	4.995	0.078
D 38 13C2_PFDoA	5.056	5.055	5.065	5.057	5.065	5.065	5.065	5.065	5.055	5.060	0.099
11 PFDoA	5.056	5.055	5.065	5.057	5.065	5.065	5.065	5.065	5.065	5.061	0.092
4 10:2 FTS	5.065	5.065	5.065	5.057	5.065	5.065	5.065	5.065	5.074	5.065	0.085
34 PFDOS	5.401	5.401	5.401	5.402	5.400	5.401	5.401	5.401	5.401	5.401	0.012
24 PFTrDA	5.435	5.435	5.443	5.436	5.434	5.443	5.443	5.435	5.443	5.438	0.078
D 42 13C2_PFTeDA	5.774	5.773	5.773	5.769	5.773	5.774	5.774	5.774	5.774	5.773	0.024
23 PFTeDA	5.774	5.773	5.778	5.774	5.773	5.774	5.774	5.774	5.774	5.774	0.028
35 PFHxDA	6.377	6.376	6.377	6.377	6.377	6.377	6.385	6.377	6.377	6.378	0.044
D 40 13C2_PFHxDA	6.377	6.376	6.377	6.377	6.377	6.377	6.377	6.377	6.377	6.377	0.008
36 PFODA	6.913	6.912	6.909	6.913	6.913	6.908	6.912	6.908	6.913	6.911	0.030

Pace Environmental Services, LLC

Initial Calibration Verification Report

Data File: \\Organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b\081522B018.d
Injection Date: 15-Aug-2022 20:16:30 Injection Vol: 10.0 uL
Sample Type: ICV Auto Sampler: 60
Sample Info: ICV 500_SVLC-2195 Misc. Info:
Inst. ID: LCMSMS02.i Operator: Matthew M. Miller

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: ICV Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	2288215	2417635			105.7	50 - 150
8 PFBA			500.00	438.72	87.7	70 - 130
21 PFPeA			500.00	446.47	89.3	70 - 130
D 50 13C5_PFPeA	2153278	2264311			105.2	50 - 150
D 44 13C3_PFBS	619318	661374			106.8	50 - 150
7 PFBS			442.50	380.82	86.1	70 - 130
1 4:2 FTS			467.50	390.92	83.6	70 - 130
D 63 13C2_4:2 FTS_2	453518	455347			100.4	50 - 150
D 49 13C5_PFHxA	2259550	2329016			103.1	50 - 150
15 PFHxA			500.00	439.63	87.9	70 - 130
22 PFPeS			470.00	412.06	87.7	70 - 130
28 GenX			2500.00	1952.03	78.1	70 - 130
D 66 13C3_GenX	3352023	3822988			114.1	50 - 150
D 47 13C4_PFHpA	1830347	1949249			106.5	50 - 150
13 PFHpA			500.00	435.08	87	70 - 130
D 45 13C3_PFHxS	440504	477839			108.5	50 - 150
14 PFHxS			456.00	383.02	84	70 - 130
29 ADONA			2355.00	2022.38	85.9	70 - 130
D 64 13C2_6:2 FTS_2	344349	359309			104.3	50 - 150
2 6:2 FTS			475.00	367.06	77.3	70 - 130
D 53 13C8_PFOA	1891181	1952966			103.3	50 - 150
20 PFOA			500.00	445.81	89.2	70 - 130
12 PFHpS			475.00	415.46	87.5	70 - 130
D 54 13C8_PFOS	380976	428781			112.5	50 - 150
18 PFOS			462.75	393.96	85.1	70 - 130
17 PFNA			500.00	435.50	87.1	70 - 130
D 56 13C9_PFNA	2055639	2248072			109.4	50 - 150
30 9Cl-PF3ONS			2330.00	1927.46	82.7	70 - 130
D 55 13C8_PFOSA	803326	870137			108.3	50 - 150
19 PFOSA			500.00	423.58	84.7	70 - 130
D 65 13C2_8:2 FTS_2	267859	307668			114.9	50 - 150
16 PFNS			480.00	408.76	85.2	70 - 130
3 8:2 FTS			480.00	427.91	89.1	70 - 130
D 51 13C6_PFDA	2012082	2220776			110.4	50 - 150
10 PFDA			500.00	417.71	83.5	70 - 130
D 58 d3-MeFOSAA	2179657	2429753			111.5	50 - 150

Report Date: 16-Aug-2022 15:43:44 AIM Revision: 2.0.2021.1130
Data File: \\organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b\081522B018.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			500.00	479.27	95.9	70 - 130
9 PFDS			482.50	427.04	88.5	70 - 130
D 60 d5-EtFOSAA	1883414	2081539			110.5	50 - 150
25 PFUdA			500.00	452.95	90.6	70 - 130
5 N-EtFOSAA			500.00	462.98	92.6	70 - 130
D 52 13C7_PFUdA	1920937	1877579			97.7	50 - 150
D 61 d7-MeFOSE	243211	271396			111.6	50 - 150
D 57 d3-MeFOSA	133394	139325			104.4	50 - 150
31 11Cl-PF3OUDS			2355.00	1889.99	80.3	70 - 130
D 62 d9-EtFOSE	271744	312053			114.8	50 - 150
D 59 d5-EtFOSA	119858	142330			118.7	50 - 150
4 10:2 FTS			2410.00	2193.68	91	70 - 130
11 PFDoA			500.00	459.48	91.9	70 - 130
D 38 13C2_PFDoA	1819813	1870694			102.8	50 - 150
24 PFTrDA			500.00	475.68	95.1	70 - 130
D 42 13C2_PFTeDA	2200746	2370176			107.7	50 - 150
23 PFTeDA			500.00	463.69	92.7	70 - 130
D 40 13C2_PFHxDA	1889243	2037062			107.8	50 - 150

Pace Environmental Services, LLC
Analyte Quantitation Report

Data File: \\Organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b\081522B019.d
Injection Date: 15-Aug-2022 20:27:28 Injection Vol: 10.0 uL
Sample Type: CheckStd Auto Sampler: 61
Sample Info: ISOMERS_SVLC-2102 Misc. Info:
Inst. ID: LCMSMS02.i Operator: Matthew M. Miller

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: IsomerCheck Conc. Level: Smp Vol. Added: 1.00 ml

Signal	Quant Std	RT (min.)	Exp RT (min.)	T RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	Cal Conc ng/L	OnCol Conc ng/L	%Rec	Flags
D 46 13C4_PFBA CAS: SESI-0111													
217 > 172		1.661	1.659	0	2842106	23	>100:1			2000.00	2735.04	124.2	
D 50 13C5_PFPeA CAS: SESI-0112													
267.9 > 223		1.995	1.994	0	2760816	17	>100:1			2000.00	2783.52	128.2	
D 44 13C3_PFBS CAS: SESI-0116													
302 > 80		2.046	2.045	0	778600	17	>100:1			2000.00	2736.94	125.7	
D 63 13C2_4:2 FTS_2 CAS: SESI-0104													
329 >81		2.292	2.299	0	536694	20	>100:1			10000	13712	118.3	
D 49 13C5_PFHxA CAS: SESI-0113													
318 > 273		2.336	2.335	0	2908850	19	>100:1			2000.00	2850.92	128.7	
D 66 13C3_GenX CAS: SESI-0121													
287 > 185		2.452	2.451	0	4040123	19	>100:1			10000	13766	120.5	
D 47 13C4_PFHpA CAS: SESI-0114													
367 > 322		2.721	2.720	0	2357852	20	>100:1			2000.00	2851.24	128.8	
D 45 13C3_PFHxS CAS: SESI-0096													
402 > 80		2.740	2.739	0	552619	19	>100:1			2000.00	2722.65	125.5	
D 64 13C2_6:2 FTS_2 CAS: SESI-0105													
429 > 81		3.135	3.143	-1	408548	24	>100:1			10000	14090	118.6	
D 53 13C8_PFOA CAS: SESI-0097													
421 > 376		3.171	3.172	0	2197460	23	>100:1			2000.00	2592.89	116.2	
20 Perfluoro-n-octanoic acid (PFOA) CAS: 335-67-1													
413 > 369	53	3.178	3.179	0/0	11159067	41	>100:1	Target = 2.80	5.65	10000	10432		
413 > 169	53	3.171	3.179		4076706	39	>100:1	2.73 (1.40-4.20)	4.72				
D 54 13C8_PFOS CAS: SESI-0098													
507 > 80		3.673	3.674	0	488500	24	>100:1			2000.00	2698.51	128.2	
D 56 13C9_PFNA CAS: SESI-0099													
472 > 427		3.673	3.680	0	2667194	26	>100:1			2000.00	2799.27	129.8	
D 55 13C8_PFOSA CAS: SESI-0107													
506 > 78		4.054	4.048	0	1003511	25	>100:1			2000.00	2800.08	124.9	
D 65 13C2_8:2 FTS_2 CAS: SESI-0106													
529 > 81		4.160	4.155	0	428670	25	>100:1			10000	16540	160*	
D 51 13C6_PFDA CAS: SESI-0115													
519 > 474		4.173	4.174	0	2640240	24	>100:1			2000.00	2887.52	131.2	
D 58 d3-MeFOSAA CAS: SESI-0102													
573 > 419		4.394	4.395	0	3139495	36	>100:1			10000	15742	144	
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) CAS: 2355-31-9													
570 > 419	58	4.403	4.399	0/0	2886906	64	>100:1	Target = 1.32	7.86	10000	11660		M
570 > 483	58	4.403	4.399		2034376	51	>100:1	1.41 (0.66-1.99)	4.34				
D 60 d5-EtFOSAA CAS: SESI-0110													
589 > 419		4.628	4.631	0	2954394	22	>100:1			10000	17720	156.9*	

Signal	Quant Std	RT (min.)	Exp RT (min.)	T RT (secs.)	Response	Peak Pts	S/N	Ion Ratio	Isomer Ratio	Cal Conc ng/L	OnCol Conc ng/L	%Rec	Flags
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA) CAS: 2991-50-6													
584 > 419	60	4.645	4.640	0/0	3510055	58	>100:1	Target = 1.55	7.72	10000	11689		
584 > 526	60	4.645	4.640		2319187	55	>100:1	1.51 (0.77-2.32)	4.44				
D 52 13C7_PFUdA CAS: SESI-0117													
570 > 525		4.637	4.640	0	2614001	22	>100:1			2000.00	3131.80	136.1	
D 61 d7-MeFOSE CAS: SESI-0129													
623 > 59		4.694	4.689	0	322280	20	>100:1			2000.00	2932.90	132.5	
D 57 d3-MeFOSA CAS: SESI-0109													
515 > 169		4.727	4.713	1	176867	21	>100:1			2000.00	2916.18	132.6	
D 62 d9-EtFOSE CAS: SESI-0130													
639 > 59		4.958	4.952	0	377152	19	>100:1			2000.00	2891.29	138.8	
D 59 d5-EtFOSA CAS: SESI-0108													
531 > 169		4.987	4.981	0	177662	17	>100:1			2000.00	3050.03	148.2	
D 38 13C2_PFDoA CAS: SESI-0118													
615 > 570		5.054	5.057	0	3148367	19	>100:1			2000.00	3710.96	173*	
D 42 13C2_PFTeDA CAS: SESI-0119													
715 > 670		5.763	5.769	0	3614776	40	>100:1			2000.00	3453.10	164.3*	
D 40 13C2_PFHxDA CAS: SESI-0103													
815 > 770		6.369	6.377	-1	2292288	21	>100:1			2000.00	2661.82	121.3	
*** 37 13C2_PFDA**													
515 > 470		4.167	4.161	0	361	17	5.0:1			2000.00			
*** 39 13C2_PFHxA CAS: SESI-0120**													
315 > 270		2.336	2.335	0	1999	20	23:1			2000.00			
*** 41 13C2_PFOA CAS: 864071-08-9**													
415 > 370		3.178	3.179	0	8000	21	>100:1			2000.00			
*** 43 13C3_PFBA**													
216 > 172		1.661	1.666	0	13951	17	22:1			2000.00			
*** 48 13C4_PFOS CAS: 2795-39-3**													
503 > 80		3.685	3.674	1	3278	18	54:1			2000.00			

Compound Type Legend

D - Isotopic Dilution Std.
* - ISTD

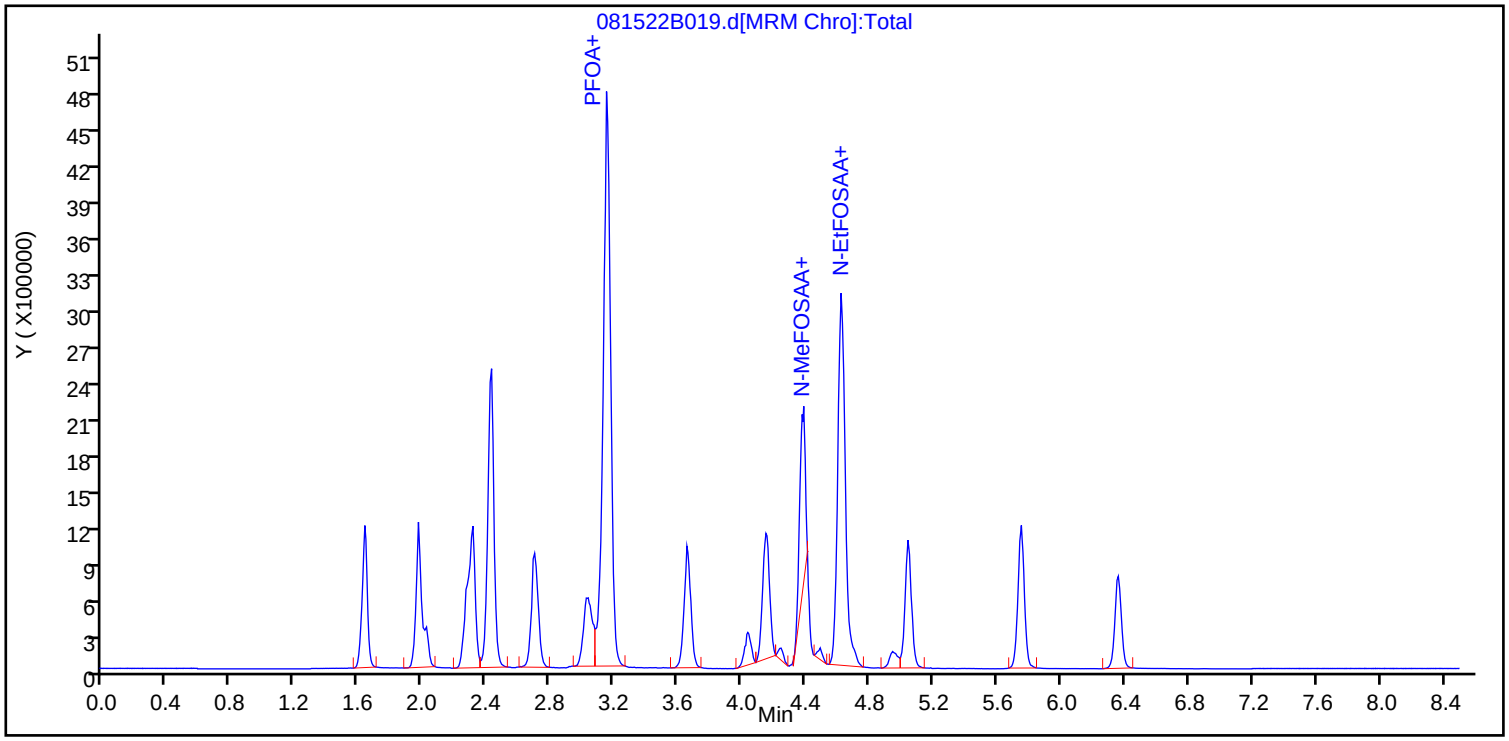
QC Flag Legend

M - Compound Hit/Peak Manually Integrated

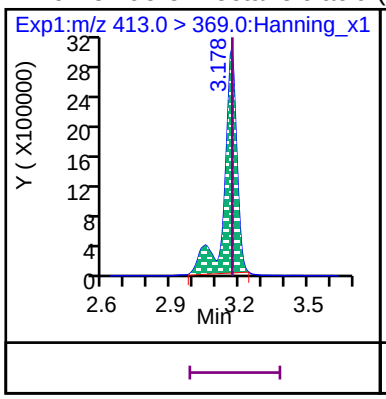
Report Date: 16-Aug-2022 15:43:46 AIM Revision: 2.0.2021.1130

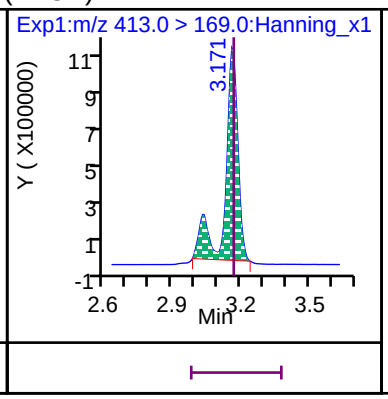
Pace Environmental Services, LLC

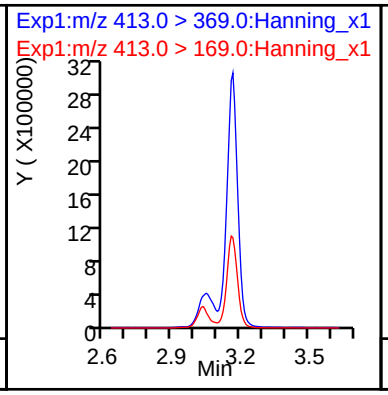
Data File:	\\Organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b\081522B019.d		
Injection Date:	15-Aug-2022 20:27:28	Inst. ID:	LCMSMS02.i
Client ID:		Lab ID:	ISOMERS_SVLC-2102
Sample Info:	ISOMERS_SVLC-2102		
Dil. Factor:	1	Operator:	Matthew M. Miller



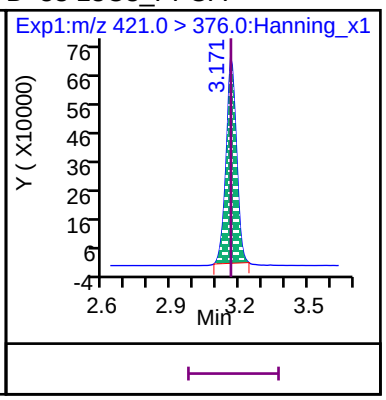
20 Perfluoro-n-octanoic acid (PFOA)



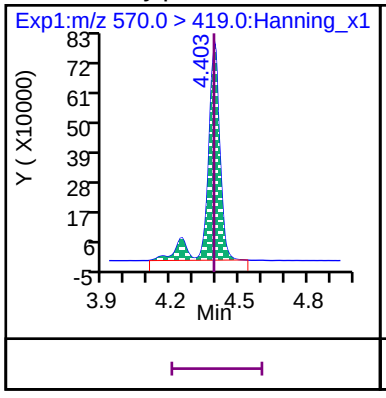


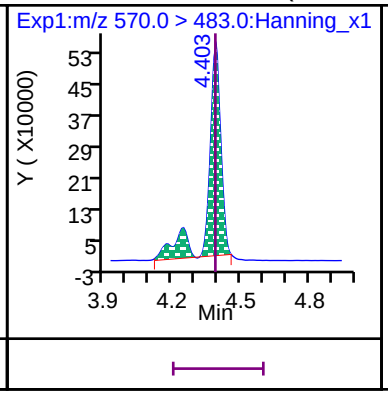


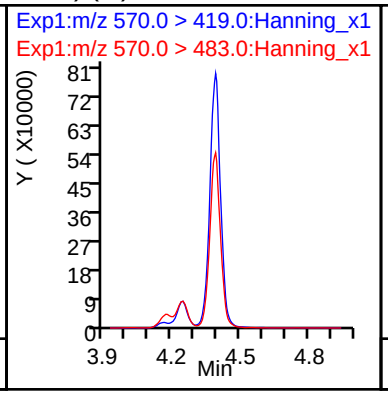
D 53 13C8_PFOA



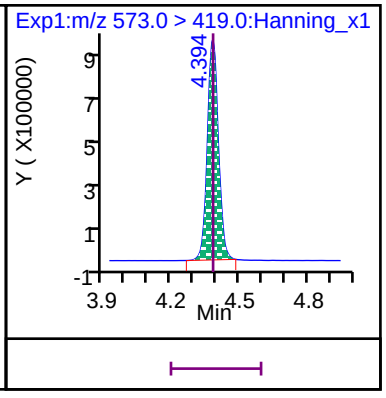
6 N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA) (M)



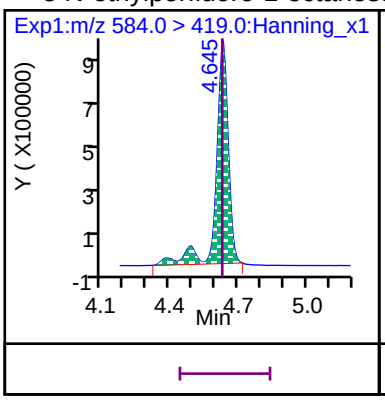


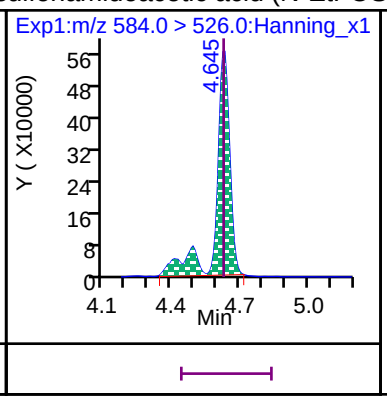


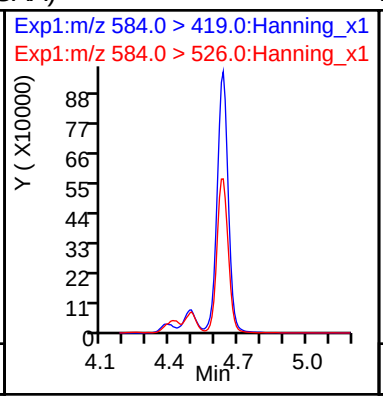
D 58 d3-MeFOSAA



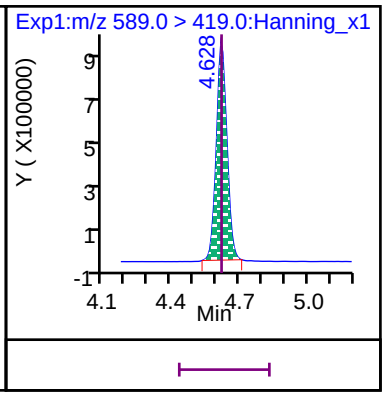
5 N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA)



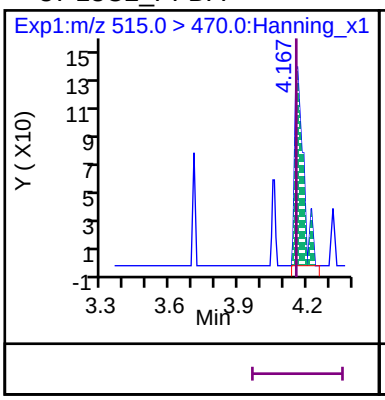




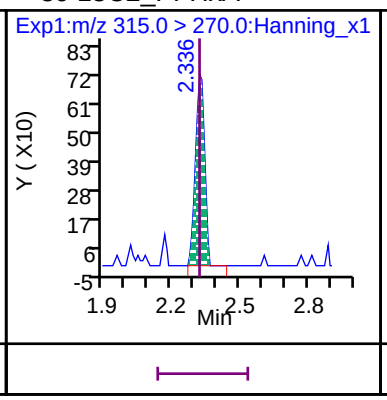
D 60 d5-EtFOSAA



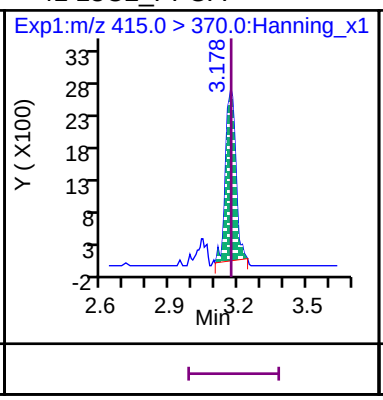
* 37 13C2_PFDA



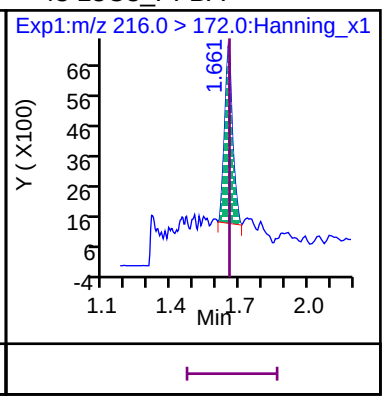
* 39 13C2_PFHxA



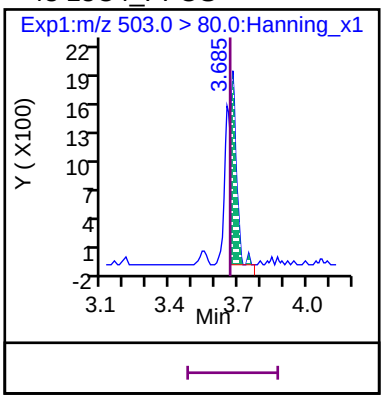
* 41 13C2_PFOA



* 43 13C3_PFBA



* 48 13C4_PFOS



Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\Organics\LL\LCMSMS02.i\081822-nonDOD.b\081822005.d
Injection Date: 18-Aug-2022 12:33:35 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 95
Sample Info: CCV 200_SVLC-2163 Misc. Info:
Inst. ID: LCMSMS02.i Operator: eqi.svoa

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-3 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	2288215	2037300			89	50 - 150
8 PFBA			200.00	194.87	97.4	70 - 130
21 PFPeA			200.00	201.53	100.8	70 - 130
D 50 13C5_PFPeA	2153278	1877678			87.2	50 - 150
D 44 13C3_PFBS	619318	569219			91.9	50 - 150
7 PFBS			176.80	164.57	93.1	70 - 130
1 4:2 FTS			186.80	193.69	103.7	70 - 130
D 63 13C2_4:2 FTS_2	453518	418861			92.4	50 - 150
D 49 13C5_PFHxA	2259550	1950014			86.3	50 - 150
15 PFHxA			200.00	212.89	106.4	70 - 130
22 PFPeS			187.60	180.65	96.3	70 - 130
28 GenX			400.00	370.23	92.6	70 - 130
D 66 13C3_GenX	3352023	3079440			91.9	50 - 150
D 47 13C4_PFHpA	1830347	1534459			83.8	50 - 150
13 PFHpA			200.00	214.91	107.5	70 - 130
D 45 13C3_PFHxS	440504	396787			90.1	50 - 150
14 PFHxS			182.00	187.96	103.3	70 - 130
29 ADONA			188.40	194.13	103	70 - 130
D 64 13C2_6:2 FTS_2	344349	364474			105.8	50 - 150
2 6:2 FTS			189.60	172.86	91.2	70 - 130
D 53 13C8_PFOA	1891181	1759579			93	50 - 150
20 PFOA			200.00	198.44	99.2	70 - 130
12 PFHpS			190.40	194.69	102.3	70 - 130
D 54 13C8_PFOS	380976	376282			98.8	50 - 150
18 PFOS			185.60	190.80	102.8	70 - 130
17 PFNA			200.00	191.17	95.6	70 - 130
D 56 13C9_PFNA	2055639	2024215			98.5	50 - 150
30 9Cl-PF3ONS			186.40	182.93	98.1	70 - 130
D 55 13C8_PFOSA	803326	752226			93.6	50 - 150
19 PFOSA			200.00	182.63	91.3	70 - 130
D 65 13C2_8:2 FTS_2	267859	274716			102.6	50 - 150
16 PFNS			192.00	171.51	89.3	70 - 130
3 8:2 FTS			191.60	182.66	95.3	70 - 130
D 51 13C6_PFDA	2012082	1740183			86.5	50 - 150
10 PFDA			200.00	207.88	103.9	70 - 130
D 58 d3-MeFOSAA	2179657	2115828			97.1	50 - 150

Report Date: 19-Aug-2022 14:26:12 AIM Revision: 2.0.2021.1130
Data File: \\Organics\LL\LCMSMS02.i\081822-nonDOD.b\081822005.d

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			200.00	199.40	99.7	70 - 130
9 PFDS			192.80	180.78	93.8	70 - 130
D 60 d5-EtFOSAA	1883414	1823486			96.8	50 - 150
25 PFUdA			200.00	191.82	95.9	70 - 130
5 N-EtFOSAA			200.00	213.00	106.5	70 - 130
D 52 13C7_PFUdA	1920937	1619240			84.3	50 - 150
D 61 d7-MeFOSE	243211	225574			92.7	50 - 150
32 MeFOSE			200.00	188.81	94.4	70 - 130
D 57 d3-MeFOSA	133394	120824			90.6	50 - 150
26 MeFOSA			200.00	193.05	96.5	70 - 130
31 11Cl-PF3OUDS			188.40	161.72	85.8	70 - 130
D 62 d9-EtFOSE	271744	256898			94.5	50 - 150
33 EtFOSE			200.00	191.05	95.5	70 - 130
D 59 d5-EtFOSA	119858	118319			98.7	50 - 150
27 EtFOSA			200.00	209.33	104.7	70 - 130
4 10:2 FTS			192.80	194.47	100.9	70 - 130
11 PFDoA			200.00	201.42	100.7	70 - 130
D 38 13C2_PFDoA	1819813	1646410			90.5	50 - 150
34 PFDOS			193.60	169.49	87.5	70 - 130
24 PFTrDA			200.00	192.57	96.3	70 - 130
D 42 13C2_PFTeDA	2200746	2013646			91.5	50 - 150
23 PFTeDA			200.00	204.44	102.2	70 - 130
35 PFHxDA			200.00	211.80	105.9	70 - 130
D 40 13C2_PFHxDA	1889243	1891535			100.1	50 - 150
36 PFODA			200.00	197.66	98.8	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\Organics\LL\LCMSMS02.i\081822-nonDOD.b\081822021.d
Injection Date: 18-Aug-2022 15:28:10 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 14
Sample Info: CCV 1000_SVLC-2165 Misc. Info:
Inst. ID: LCMSMS02.i Operator: eqi.svoa

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-5 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	2037300	2460636			120.8	50 - 150
8 PFBA			1000.00	919.88	92	70 - 130
21 PFPeA			1000.00	927.65	92.8	70 - 130
D 50 13C5_PFPeA	1877678	2259597			120.3	50 - 150
D 44 13C3_PFBS	569219	668578			117.5	50 - 150
7 PFBS			884.00	784.98	88.8	70 - 130
1 4:2 FTS			934.00	799.21	85.6	70 - 130
D 63 13C2_4:2 FTS_2	418861	544937			130.1	50 - 150
D 49 13C5_PFHxA	1950014	2421950			124.2	50 - 150
15 PFHxA			1000.00	917.07	91.7	70 - 130
22 PFPeS			938.00	836.41	89.2	70 - 130
28 GenX			2000.00	1784.05	89.2	70 - 130
D 66 13C3_GenX	3079440	3735696			121.3	50 - 150
D 47 13C4_PFHpA	1534459	1993791			129.9	50 - 150
13 PFHpA			1000.00	895.02	89.5	70 - 130
D 45 13C3_PFHxS	396787	493402			124.3	50 - 150
14 PFHxS			910.00	849.47	93.3	70 - 130
29 ADONA			942.00	851.81	90.4	70 - 130
D 64 13C2_6:2 FTS_2	364474	415598			114	50 - 150
2 6:2 FTS			948.00	805.71	85	70 - 130
D 53 13C8_PFOA	1759579	2013908			114.5	50 - 150
20 PFOA			1000.00	958.56	95.9	70 - 130
12 PFHpS			952.00	874.11	91.8	70 - 130
D 54 13C8_PFOS	376282	460120			122.3	50 - 150
18 PFOS			928.00	823.91	88.8	70 - 130
17 PFNA			1000.00	946.82	94.7	70 - 130
D 56 13C9_PFNA	2024215	2372495			117.2	50 - 150
30 9Cl-PF3ONS			932.00	810.99	87	70 - 130
D 55 13C8_PFOSA	752226	907462			120.6	50 - 150
19 PFOSA			1000.00	865.07	86.5	70 - 130
D 65 13C2_8:2 FTS_2	274716	333026			121.2	50 - 150
16 PFNS			960.00	837.36	87.2	70 - 130
3 8:2 FTS			958.00	889.03	92.8	70 - 130
D 51 13C6_PFDA	1740183	2149521			123.5	50 - 150
10 PFDA			1000.00	932.70	93.3	70 - 130
D 58 d3-MeFOSAA	2115828	2549303			120.5	50 - 150

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			1000.00	904.84	90.5	70 - 130
9 PFDS			964.00	852.93	88.5	70 - 130
D 60 d5-EtFOSAA	1823486	2242263			123	50 - 150
25 PFUdA			1000.00	940.64	94.1	70 - 130
5 N-EtFOSAA			1000.00	916.25	91.6	70 - 130
D 52 13C7_PFUdA	1619240	1966238			121.4	50 - 150
D 61 d7-MeFOSE	225574	271835			120.5	50 - 150
32 MeFOSE			1000.00	972.28	97.2	70 - 130
D 57 d3-MeFOSA	120824	149927			124.1	50 - 150
26 MeFOSA			1000.00	922.90	92.3	70 - 130
31 11Cl-PF3OUDS			942.00	776.11	82.4	70 - 130
D 62 d9-EtFOSE	256898	310764			121	50 - 150
33 EtFOSE			1000.00	914.09	91.4	70 - 130
D 59 d5-EtFOSA	118319	131385			111	50 - 150
27 EtFOSA			1000.00	996.02	99.6	70 - 130
4 10:2 FTS			964.00	978.13	101.5	70 - 130
11 PFDoA			1000.00	939.30	93.9	70 - 130
D 38 13C2_PFDoA	1646410	1968478			119.6	50 - 150
34 PFDOS			968.00	896.36	92.6	70 - 130
24 PFTrDA			1000.00	854.76	85.5	70 - 130
D 42 13C2_PFTeDA	2013646	2353572			116.9	50 - 150
23 PFTeDA			1000.00	970.03	97	70 - 130
35 PFHxDA			1000.00	934.52	93.5	70 - 130
D 40 13C2_PFHxDA	1891535	2229808			117.9	50 - 150
36 PFODA			1000.00	900.05	90	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\Organics\LL\LCMSMS02.i\081822-nonDOD.b\081822037.d
Injection Date: 18-Aug-2022 18:23:17 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 29
Sample Info: CCV 1000A_SVLC-2165 Misc. Info:
Inst. ID: LCMSMS02.i Operator: eqi.svoa

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-5 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	2037300	2263749			111.1	50 - 150
8 PFBA			1000.00	907.25	90.7	70 - 130
21 PFPeA			1000.00	945.62	94.6	70 - 130
D 50 13C5_PFPeA	1877678	2096573			111.7	50 - 150
D 44 13C3_PFBS	569219	629304			110.6	50 - 150
7 PFBS			884.00	793.36	89.7	70 - 130
1 4:2 FTS			934.00	803.97	86.1	70 - 130
D 63 13C2_4:2 FTS_2	418861	482742			115.3	50 - 150
D 49 13C5_PFHxA	1950014	2215271			113.6	50 - 150
15 PFHxA			1000.00	912.23	91.2	70 - 130
22 PFPeS			938.00	846.37	90.2	70 - 130
28 GenX			2000.00	1801.52	90.1	70 - 130
D 66 13C3_GenX	3079440	3414037			110.9	50 - 150
D 47 13C4_PFHpA	1534459	1781135			116.1	50 - 150
13 PFHpA			1000.00	921.58	92.2	70 - 130
D 45 13C3_PFHxS	396787	455690			114.8	50 - 150
14 PFHxS			910.00	791.27	87	70 - 130
29 ADONA			942.00	886.28	94.1	70 - 130
D 64 13C2_6:2 FTS_2	364474	390003			107	50 - 150
2 6:2 FTS			948.00	771.44	81.4	70 - 130
D 53 13C8_PFOA	1759579	1874373			106.5	50 - 150
20 PFOA			1000.00	930.10	93	70 - 130
12 PFHpS			952.00	931.90	97.9	70 - 130
D 54 13C8_PFOS	376282	452117			120.2	50 - 150
18 PFOS			928.00	795.08	85.7	70 - 130
17 PFNA			1000.00	881.16	88.1	70 - 130
D 56 13C9_PFNA	2024215	2306199			113.9	50 - 150
30 9Cl-PF3ONS			932.00	753.55	80.9	70 - 130
D 55 13C8_PFOSA	752226	852129			113.3	50 - 150
19 PFOSA			1000.00	870.77	87.1	70 - 130
D 65 13C2_8:2 FTS_2	274716	309727			112.7	50 - 150
16 PFNS			960.00	771.09	80.3	70 - 130
3 8:2 FTS			958.00	870.10	90.8	70 - 130
D 51 13C6_PFDA	1740183	2026264			116.4	50 - 150
10 PFDA			1000.00	888.47	88.8	70 - 130
D 58 d3-MeFOSAA	2115828	2413875			114.1	50 - 150

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			1000.00	868.82	86.9	70 - 130
9 PFDS			964.00	797.35	82.7	70 - 130
D 60 d5-EtFOSAA	1823486	2063279			113.2	50 - 150
25 PFUdA			1000.00	901.18	90.1	70 - 130
5 N-EtFOSAA			1000.00	906.95	90.7	70 - 130
D 52 13C7_PFUdA	1619240	1823611			112.6	50 - 150
D 61 d7-MeFOSE	225574	244025			108.2	50 - 150
32 MeFOSE			1000.00	980.94	98.1	70 - 130
D 57 d3-MeFOSA	120824	136299			112.8	50 - 150
26 MeFOSA			1000.00	1013.55	101.4	70 - 130
31 11Cl-PF3OUDS			942.00	708.82	75.2	70 - 130
D 62 d9-EtFOSE	256898	286835			111.7	50 - 150
33 EtFOSE			1000.00	889.99	89	70 - 130
D 59 d5-EtFOSA	118319	129580			109.5	50 - 150
27 EtFOSA			1000.00	901.28	90.1	70 - 130
4 10:2 FTS			964.00	982.90	102	70 - 130
11 PFDoA			1000.00	928.62	92.9	70 - 130
D 38 13C2_PFDoA	1646410	1845721			112.1	50 - 150
34 PFDOS			968.00	831.86	85.9	70 - 130
24 PFTrDA			1000.00	873.35	87.3	70 - 130
D 42 13C2_PFTeDA	2013646	2128225			105.7	50 - 150
23 PFTeDA			1000.00	943.69	94.4	70 - 130
35 PFHxDA			1000.00	938.68	93.9	70 - 130
D 40 13C2_PFHxDA	1891535	2083539			110.2	50 - 150
36 PFODA			1000.00	892.24	89.2	70 - 130

Pace Environmental Services, LLC
Continuing Calibration Verification Report

Data File: \\Organics\LL\LCMSMS02.i\081822-nonDOD.b\081822049.d
Injection Date: 18-Aug-2022 20:34:38 Injection Vol: 10.0 uL
Sample Type: CCV Auto Sampler: 40
Sample Info: CCV 1000B_SVLC-2165 Misc. Info:
Inst. ID: LCMSMS02.i Operator: eqi.svoa

Method: LCMSMS02_PFAS-ID2 Version: V16 30-Jun-2022 10:54:24
Calib Method: PFAS-ID2 Lock State: Unlocked
Quant Method: IsoDil Integrator: picker

Reagent: Analytes Conc. Level: L-5 Vol. Added: 1.00 ml

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
D 46 13C4_PFBA	2037300	2413376			118.5	50 - 150
8 PFBA			1000.00	912.77	91.3	70 - 130
21 PFPeA			1000.00	932.65	93.3	70 - 130
D 50 13C5_PFPeA	1877678	2310290			123	50 - 150
D 44 13C3_PFBS	569219	670910			117.9	50 - 150
7 PFBS			884.00	811.46	91.8	70 - 130
1 4:2 FTS			934.00	818.51	87.6	70 - 130
D 63 13C2_4:2 FTS_2	418861	532976			127.2	50 - 150
D 49 13C5_PFHxA	1950014	2365729			121.3	50 - 150
15 PFHxA			1000.00	973.17	97.3	70 - 130
22 PFPeS			938.00	874.00	93.2	70 - 130
28 GenX			2000.00	1892.94	94.6	70 - 130
D 66 13C3_GenX	3079440	3711874			120.5	50 - 150
D 47 13C4_PFHpA	1534459	1982891			129.2	50 - 150
13 PFHpA			1000.00	911.93	91.2	70 - 130
D 45 13C3_PFHxS	396787	495069			124.8	50 - 150
14 PFHxS			910.00	820.58	90.2	70 - 130
29 ADONA			942.00	842.12	89.4	70 - 130
D 64 13C2_6:2 FTS_2	364474	423809			116.3	50 - 150
2 6:2 FTS			948.00	765.78	80.8	70 - 130
D 53 13C8_PFOA	1759579	2086806			118.6	50 - 150
20 PFOA			1000.00	881.11	88.1	70 - 130
12 PFHpS			952.00	827.81	87	70 - 130
D 54 13C8_PFOS	376282	488252			129.8	50 - 150
18 PFOS			928.00	806.56	86.9	70 - 130
17 PFNA			1000.00	975.78	97.6	70 - 130
D 56 13C9_PFNA	2024215	2398339			118.5	50 - 150
30 9Cl-PF3ONS			932.00	748.01	80.3	70 - 130
D 55 13C8_PFOSA	752226	918659			122.1	50 - 150
19 PFOSA			1000.00	875.03	87.5	70 - 130
D 65 13C2_8:2 FTS_2	274716	339041			123.4	50 - 150
16 PFNS			960.00	797.45	83.1	70 - 130
3 8:2 FTS			958.00	920.73	96.1	70 - 130
D 51 13C6_PFDA	1740183	2186990			125.7	50 - 150
10 PFDA			1000.00	935.82	93.6	70 - 130
D 58 d3-MeFOSAA	2115828	2624712			124.1	50 - 150

Compound	Std Area	CCV Area	Exp. Conc ng/L	Conc ng/L	%Rec	%Rec Limits
6 N-MeFOSAA			1000.00	915.36	91.5	70 - 130
9 PFDS			964.00	777.82	80.7	70 - 130
D 60 d5-EtFOSAA	1823486	2317165			127.1	50 - 150
25 PFUdA			1000.00	917.65	91.8	70 - 130
5 N-EtFOSAA			1000.00	883.61	88.4	70 - 130
D 52 13C7_PFUdA	1619240	1978519			122.2	50 - 150
D 61 d7-MeFOSE	225574	266698			118.2	50 - 150
32 MeFOSE			1000.00	1009.09	100.9	70 - 130
D 57 d3-MeFOSA	120824	150846			124.8	50 - 150
26 MeFOSA			1000.00	965.70	96.6	70 - 130
31 11Cl-PF3OUDS			942.00	725.11	77	70 - 130
D 62 d9-EtFOSE	256898	313383			122	50 - 150
33 EtFOSE			1000.00	924.76	92.5	70 - 130
D 59 d5-EtFOSA	118319	143614			121.4	50 - 150
27 EtFOSA			1000.00	988.89	98.9	70 - 130
4 10:2 FTS			964.00	950.02	98.5	70 - 130
11 PFDoA			1000.00	910.17	91	70 - 130
D 38 13C2_PFDoA	1646410	2024821			123	50 - 150
34 PFDOS			968.00	843.40	87.1	70 - 130
24 PFTrDA			1000.00	905.89	90.6	70 - 130
D 42 13C2_PFTeDA	2013646	2380818			118.2	50 - 150
23 PFTeDA			1000.00	917.36	91.7	70 - 130
35 PFHxDA			1000.00	932.01	93.2	70 - 130
D 40 13C2_PFHxDA	1891535	2302269			121.7	50 - 150
36 PFODA			1000.00	899.19	89.9	70 - 130

Extract Dilution Preparations

DILUTION	1X	5X	10X	20X	50X	100X	200X
537.1 DILUTION PREP							
EXTRACT (µL)	ALIQUOT	200	100	50	20	10	5
IS (µL)	0	40	45	47.5	49	49.5	49.75
96% MeOH (µL)	0	760	855	902.5	931	940.5	945.25
TOTAL (µL)	75	1000	1000	1000	1000	1000	1000
REFORTIFIED ID-AQ/ID-SOLID DILUTION PREP							
EXTRACT (µL)	ALIQUOT	200	100	50	20	10	5
ES-100ppb (µL)	0	16	18	19	19.6	19.8	19.9
MeOH (µL)	0	753	847	894	922	931	936
WATER (µL)	0	31	35	37	38.4	38.8	39
TOTAL (µL)	75	1000	1000	1000	1000	999.6	999.9
UNFORTIFIED ID-AQ/ID-SOLID DILUTION PREP							
EXTRACT (µL)	ALIQUOT	200	100	50	20	10	5
ES-100ppb (µL)	0	0	0	0	0	0	0
MeOH (µL)	0	768	864	912	941	950	955
WATER (µL)	0	32	36	38	39	40	40
TOTAL (µL)	75	1000	1000	1000	1000	1000	1000
In-vial 50X ID Screen							
In-vial 50X ID Screen		240µL 96%MeOH	+	5µL SUR 100ppb	+	5µL sample extract	
DAI DILUTION PREP							
SAMPLE (µL)	500	100	50	25	10	5	
ES (µL)	25	25	25	25	25	25	
MeOH (µL)	475	475	475	475	475	475	
Water (µL)	0	400	450	475	490	495	
TOTAL (µL)	1000	1000	1000	1000	1000	1000	
533 DILUTION PREP							
EXTRACT (µL)	950	200	100	50	20	10	5
IS (µL)	50	40	45	47.5	49	49.5	49.75
ES (µL)	0	40	45	47.5	49	49.5	49.75
80% MeOH (µL)	0	720	810	855	882	891	895.5
TOTAL (µL)	1000	1000	1000	1000	1000	1000	1000

NOTE: Serial dilution will be performed for dilutions higher than 200X.

Report Date: 16-Aug-2022 15:44:39 AIM Revision: 2.0.2021.1130

Pace Environmental Services, LLC

Batch Run Log Report

Batch: \\Organics\LL\LCMSMS02.i\081522B-nonDOD+ICAL.b

Method: LCMSMS02_PFAS-ID2.M Version: V16 30-Jun-2022 10:54:24

Instrument: LCMSMS02.i Integrator: picker

Cal Start Date: 15-Aug-2022 18:27:01 Cal End Date: 15-Aug-2022 19:54:40

Method Lock: Unknown Lock Date:

Calib Method: PFAS-ID2 No.Compounds: 66

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
51	ICAL 100_SVLC-2105	15-Aug-2022 18:27:01	081522B008.d	ICal					Analytes	L-2	1.00		
52	ICAL 200_SVLC-2163	15-Aug-2022 18:37:56	081522B009.d	ICal					Analytes	L-3	1.00		
53	ICAL 500_SVLC-2107	15-Aug-2022 18:48:51	081522B010.d	ICal					Analytes	L-4	1.00		
54	ICAL 1000_SVLC-2165	15-Aug-2022 18:59:46	081522B011.d	ICal					Analytes	L-5	1.00		
55	ICAL 2000_SVLC-2108	15-Aug-2022 19:10:43	081522B012.d	ICal					Analytes	L-6	1.00		
56	ICAL 5000_SVLC-2109	15-Aug-2022 19:21:41	081522B013.d	ICal					Analytes	L-7	1.00		
57	ICAL 10000_SVLC-2120	15-Aug-2022 19:32:42	081522B014.d	ICal					Analytes	L-8	1.00		
58	ICAL 15000_SVLC-2111	15-Aug-2022 19:43:41	081522B015.d	ICal					Analytes	L-9	1.00		
59	ICAL 20000_SVLC-2112	15-Aug-2022 19:54:40	081522B016.d	ICal					Analytes	L-10	1.00		
94	ID BLK B3	15-Aug-2022 20:05:39	081522B017.d	InstBlk					Surrogates	Smp	0.1000		
60	ICV 500_SVLC-2195	15-Aug-2022 20:16:30	081522B018.d	ICV					Analytes	ICV	1.00		
61	ISOMERS_SVLC-2102	15-Aug-2022 20:27:28	081522B019.d	CheckStd					IsomerCheck	Smp	1.00		surs hi-ok/qualitative
62	ID IBLK A	15-Aug-2022 20:38:30	081522B020.d	InstBlk					Surrogates	Smp	0.1000		SURS HI-NCM/ND
1	XG20032-003	15-Aug-2022 20:49:27	081522B021.d	Client	SB-86-29 (10-15)_071922	Aqueous	1	49811	Surrogates	Smp	0.1000		SUR HI-NCM/ND (>1/2LOQ)
2	XG20032-003MS	15-Aug-2022 21:00:19	081522B022.d	MS		Aqueous	1	49811	Analytes	100x PDS	0.2000		
3	XG20032-005	15-Aug-2022 21:11:12	081522B023.d	Client	SB-86-31 (4-9)_071922	Aqueous	1	49811	Surrogates	Smp	0.1000		SUR-NCM/MTX
11	CCV 1000A_SVLC-2165	15-Aug-2022 22:38:39	081522B031.d	CCV					Analytes	L-5	1.00		
100	CCB C1	15-Aug-2022 22:49:32	081522B032.d	InstBlk					Surrogates	Smp	0.1000		SURS LOW-OK/ND
19	CCV 1000B_SVLC-2165	16-Aug-2022 00:29:12	081522B042.d	CCV					Analytes	L-5	1.00		
100	CCB C2	16-Aug-2022 00:40:02	081522B043.d	InstBlk					Surrogates	Smp	0.1000		SURS LOW-OK/ND
20	XQ50954-001	16-Aug-2022 00:51:01	081522B044.d	MBlk		Bottle Rinse	1	50954	Surrogates	Smp	0.0200		6:2 sur hi-ncm/nd. BA, PEA, HXA, HPA det/NCM10X
21	XG08039-001	16-Aug-2022 01:01:59	081522B045.d	Client	Sample 1	Bottle Rinse	1	50954	Surrogates	Smp	0.0200		RR-50X
22	XQ50909-001	16-Aug-2022 01:12:51	081522B046.d	MBlk		Soil	1	50909	Surrogates	Smp	0.1000		SUR HI-NCM/ND
23	XG19028-002	16-Aug-2022 01:23:44	081522B047.d	LCS	SB-86-30 (4-6)_071322	Soil	1	50909	Surrogates	Smp	0.1000		RR-NOT SPIKED?
24	XQ50909-002	16-Aug-2022 01:34:37	081522B048.d	LCS	SB-86-30 (4-6)_071322	Soil	1	50909	Analytes	100x PDS	0.1000		RR-50X?
25	XG19028-006	16-Aug-2022 01:45:32	081522B049.d	Client	SB-86-30 (23-25)_071322	Soil	1	50909	Surrogates	Smp	0.1000		
26	XG19028-010	16-Aug-2022 01:56:28	081522B050.d	Client	SB-86-31 (10-12)_071322	Soil	1	50909	Surrogates	Smp	0.1000		SUR HI-NCM/ND
27	XG21014-001	16-Aug-2022 02:07:24	081522B051.d	Client	ID PFAS Solid (extra com	Soil	1	50909	Surrogates	Smp	0.1000		
28	XH11095-006	16-Aug-2022 02:18:20	081522B052.d	Client	SB-070491-01-000.2-CS	Soil	1	50909	Surrogates	Smp	0.1000		SUR HI-NCM/ND
29	XH11095-007	16-Aug-2022 02:29:16	081522B053.d	Client	SB-042896-02-000.2-CS	Soil	1	50909	Surrogates	Smp	0.1000		SUR HI-NCM/ND
30	XH11095-008	16-Aug-2022 02:40:13	081522B054.d	Client	SB-080686-01-000.2-CS	Soil	1	50909	Surrogates	Smp	0.1000		SUR HI-NCM/ND
31	XH11095-009	16-Aug-2022 02:51:11	081522B055.d	Client	SB-080686-06-000.2-CS	Soil	1	50909	Surrogates	Smp	0.1000		SUR HI-NCM/ND
32	XH11095-010	16-Aug-2022 03:02:04	081522B056.d	Client	SB-VDELTA-11-000.2-CS	Soil	1	50909	Surrogates	Smp	0.1000		SUR HI-NCM/ND
33	CCV 1000C-SVLC-2165	16-Aug-2022 03:12:59	081522B057.d	CCV					Analytes	L-5	1.00		
100	CCB C3	16-Aug-2022 03:23:53	081522B058.d	InstBlk					Surrogates	Smp	0.1000		SURS LOW-OK/ND
34	XH11095-011	16-Aug-2022 03:34:52	081522B059.d	Client	SB-VDELTA-15-000.2-CS	Soil	1	50909	Surrogates	Smp	0.1000		
35	XH11095-012	16-Aug-2022 03:45:48	081522B060.d	Client	SB-VDELTA-01-005.0-CS	Soil	1	50909	Surrogates	Smp	0.1000		RX-SUR HI/DET
36	XG13002-004	16-Aug-2022 03:56:44	081522B061.d	Client	LAG-SED-SE-TRTD-MIX-02-0	Soil	1	50909	Surrogates	Smp	0.1000		
37	CCV 1000D-SVLC-2165	16-Aug-2022 04:07:44	081522B062.d	CCV					Analytes	L-5	1.00		
100	CCB C4	16-Aug-2022 04:18:41	081522B063.d	InstBlk					Surrogates	Smp	0.1000		SURS LOW-OK/ND
38	XH08082-001	16-Aug-2022 04:29:40	081522B064.d	Client	LAG-SE-BTTM-BE-01_072920	Soil	50R	50909	Surrogates	Smp	0.1000		RR-5X
39	XH08082-002	16-Aug-2022 04:40:38	081522B065.d	Client	LAG-SE-BTTM-AE-01_072920	Soil	50R	50909	Surrogates	Smp	0.1000		RR-1X
40	XH08082-003	16-Aug-2022 04:51:36	081522B066.d	Client	LAG-SE-BTTM-HE-01_072920	Soil	50R	50909	Surrogates	Smp	0.1000		RR-1X
41	XH08082-004	16-Aug-2022 05:02:34	081522B067.d	Client	LAG-W-BTTM-BE-01_0803202	Soil	50R	50909	Surrogates	Smp	0.1000		RR-1X

Report Date: 19-Aug-2022 14:26:55 AIM Revision: 2.0.2021.1130

Pace Environmental Services, LLC

Batch Run Log Report

Batch: \\Organics\LL\LCMSMS02.i\081822-nonDOD.b

Method: LCMSMS02_PFAS-ID2.M Version: V16 30-Jun-2022 10:54:24

Instrument: LCMSMS02.i Integrator: picker

Cal Start Date: 15-Aug-2022 18:27:01 Cal End Date: 15-Aug-2022 19:54:40

Method Lock: Unknown Lock Date:

Calib Method: PFAS-ID2 No.Compounds: 66

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
95	CCV 200_SVLC-2163	18-Aug-2022 12:33:35	081822005.d	CCV					Analytes	L-3	1.00		
96	ID IBLK A	18-Aug-2022 12:44:27	081822006.d	InstBlk					Surrogates	Smp	0.1000		
14	CCV 1000_SVLC-2165	18-Aug-2022 15:28:10	081822021.d	CCV					Analytes	L-5	1.00		
100	CCB C1	Nt Rqd by QAPP ug-2022 15:39:05	081822022.d	InstBlk					Surrogates	Smp	0.1000		
15	XQ50680-001	18-Aug-2022 15:50:08	081822023.d	MBlk		Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
16	XQ50680-002	18-Aug-2022 16:01:03	081822024.d	LCS		Aqueous	1	50680	Analytes	100x PDS	0.2000		SUR HI-NCM/TARGET PASS
17	XG22049-001	18-Aug-2022 16:12:05	081822025.d	Client	Area19-PW-8A	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
18	XG22049-002	18-Aug-2022 16:23:00	081822026.d	Client	Area19-PW-9A	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
19	XG22049-003	18-Aug-2022 16:33:56	081822027.d	Client	Area19-PW-9B	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
20	XG22049-004	18-Aug-2022 16:44:55	081822028.d	Client	Area19-PW-10A	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
21	XG22049-005	18-Aug-2022 16:55:53	081822029.d	Client	WVNW-PW-5A	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
22	XG22049-006	18-Aug-2022 17:06:46	081822030.d	Client	WVNW-PW-5A DUP	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
23	XG22049-007	18-Aug-2022 17:17:39	081822031.d	Client	WVNW-PW-6A	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
24	XG22049-007MS	18-Aug-2022 17:28:34	081822032.d	MS		Aqueous	1	50680	Analytes	100x PDS	0.2000		
25	XG22049-007MD	18-Aug-2022 17:39:30	081822033.d	MSD		Aqueous	1	50680	Analytes	100x PDS	0.2000		
26	XG22049-008	18-Aug-2022 17:50:26	081822034.d	Client	WVNW-PW-6B	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
27	XG22049-009	18-Aug-2022 18:01:25	081822035.d	Client	WVNW-PW-7A	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
28	XG22049-010	18-Aug-2022 18:12:21	081822036.d	Client	EQB-HT	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
29	CCV 1000A_SVLC-2165	18-Aug-2022 18:23:17	081822037.d	CCV					Analytes	L-5	1.00		
100	CCB C2	Nt Rqd by QAPP -2022 18:34:15	081822038.d	InstBlk					Surrogates	Smp	0.1000		
30	XG22049-011	18-Aug-2022 18:45:15	081822039.d	Client	FB-7/20	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
31	XG23005-001	18-Aug-2022 18:56:14	081822040.d	Client	HS-PMW-RI-106 (40-45)	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
32	XG23005-002	18-Aug-2022 19:07:08	081822041.d	Client	HS-PMW-RI-106 (50-55)	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
33	XG23005-003	18-Aug-2022 19:18:01	081822042.d	Client	HS-PMW-RI-106 (60-65)	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
34	XG23005-004	18-Aug-2022 19:28:55	081822043.d	Client	HS-PMW-RI-106 (100-105)	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
35	XG23005-005	18-Aug-2022 19:39:52	081822044.d	Client	HS-PMW-RI-106 (110-115)	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
36	XG23005-006	18-Aug-2022 19:50:48	081822045.d	Client	HS-PMW-RI-106 (120-125)	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
37	XG23005-007	18-Aug-2022 20:01:45	081822046.d	Client	HS-PMW-RI-106 (130-135)	Aqueous	1	50680	Surrogates	Smp	0.1000		SURS -NCM/MTX
38	XG23005-008	18-Aug-2022 20:12:42	081822047.d	Client	HS-PMW-RI-106 (130-135)	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
39	XG23005-010	18-Aug-2022 20:23:40	081822048.d	Client	HS-PMW-RI-106 (150-155)	Aqueous	1	50680	Surrogates	Smp	0.1000		SUR HI-NCM/ND
40	CCV 1000B_SVLC-2165	18-Aug-2022 20:34:38	081822049.d	CCV					Analytes	L-5	1.00		
100	CCB C3	Nt Rqd by QAPP ug-2022 20:45:40	081822050.d	InstBlk					Surrogates	Smp	0.1000		
41	XQ51406-001	18-Aug-2022 20:56:39	081822051.d	MBlk		Soil	1	51406	Surrogates	Smp	0.1000		SUR HI-NCM/ND
42	XF30001-001	18-Aug-2022 21:07:32	081822052.d	LCS	MAE ID Soil IDOC	Soil	1	51406	Analytes	100x PDS	0.1000		SUR HI-NCM/TARGET PASS
43	XF30001-002	18-Aug-2022 21:18:27	081822053.d	LCS	MAE ID Soil IDOC	Soil	1	51406	Analytes	100x PDS	0.1000		SUR HI-NCM/TARGET PASS
44	XF30001-003	18-Aug-2022 21:29:23	081822054.d	LCS	MAE ID Soil IDOC	Soil	1	51406	Analytes	100x PDS	0.1000		SUR HI-NCM/TARGET PASS
45	XF30001-004	18-Aug-2022 21:40:19	081822055.d	LCS	MAE ID Soil IDOC	Soil	1	51406	Analytes	100x PDS	0.1000		
46	XG16007-001	18-Aug-2022 21:51:15	081822056.d	Client	SB-86-18(9-14)_071422	Aqueous	1	49910	Surrogates	Smp	0.1000		SUR-NCM/MTX
47	XG16007-002	18-Aug-2022 22:02:12	081822057.d	Client	RFI-81-09_071422	Aqueous	5U	49910	Surrogates	Smp	0.1000		SUR HI-NCM/ND
48	XG16007-002MS	18-Aug-2022 22:13:12	081822058.d	MS		Aqueous	5U	49910	Analytes	100x PDS	0.2000		
49	XG16007-003	18-Aug-2022 22:24:10	081822059.d	Client	RFI-86-05_071422	Aqueous	1	49910	Surrogates	Smp	0.1000		SUR HI-NCM/ND (>1/2LOQ)
50	XG16007-003DU	18-Aug-2022 22:35:08	081822060.d	Client		Aqueous	1	49910	Surrogates	Smp	0.1000		
51	XG20032-001	18-Aug-2022 22:46:06	081822061.d	Client	RFI-85-07_071822	Aqueous	1	49910	Surrogates	Smp	0.1000		SUR HI-NCM/ND, RX-SUR HI/DET
52	XG20032-002	18-Aug-2022 22:57:01	081822062.d	Client	SB-86-23_071822	Aqueous	1	49910	Surrogates	Smp	0.1000		SUR HI-NCM/ND

ALS Vial	LIMS Sample ID	Injection Date/Time	Data File	Sample Type	Client Sample ID	Matrix/ Level	Dil Fact	Prep Batch	Primary Reagent	Conc Level	Vol. Added	Inst QC	Comments
53	CCV 1000C_SVLC-2165	18-Aug-2022 23:07:56	081822063.d	CCV					Analytes	L-5	1.00		
100	CCB C4	18-Aug-2022 23:18:51	081822064.d	InstBlk					Surrogates	Smp	0.1000		

10 field samples analyzed between CCVs

Analyst: JRG2 **Level 2 Analyst:** RDB

Status: Level 2 review released

Matrix: Aqueous

Printed: 08/19/22 16:19

Prep Batch: 50680

PFAS Prep by ID GZA - PFAS Aqueous Preparation

Start Date: 08/10/2022 1743
End Date: 08/10/2022 2351

Conc Analyst: JRG2
Conc Start Date: 08/10/2022 2257
Conc End Date: 08/10/2022 2339

Surrogate: SVLC-2167
Surrogate Vol. (mL): 0.100

Ext Solvent: MECH>96%/MECH/4%/H2O
Reagents Vol. (mL): 10
Chem ID: 22-1356>22-1356/PFAS-22-015

Balance ID: Balance # 20-1123

Sample ID	QC Code	Client Sample ID	Run	Analysis Method	Container + Sample (g)	Container Empty (g)	Initial Vol. (mL)	Spike ID	Spike Vol. (mL)	Final Vol. (mL)	Comments
XQ50680-001	MB		1	PFAS by ID SOP	250		250		0.000	5.0	MB init:293.99g,fin:32.84g
XQ50680-002	LCS		1	PFAS by ID SOP	250		250	SVLC-2168	0.200	5.0	MB init:286.84g,fin:32.13g
XG22049-001	Sample	Area19-PW-8A	1	PFAS by ID SOP	306.86	32.83	274		0.000	5.0	
XG22049-002	Sample	Area19-PW-9A	1	PFAS by ID SOP	314.32	33.13	281		0.000	5.0	
XG22049-003	Sample	Area19-PW-9B	1	PFAS by ID SOP	299.45	33.03	266		0.000	5.0	Sorbent dry start/end:1st: 2037/2042 ,2nd: 2241/2246; Buffer:LCMS22-020; Amm+MeCH:LCMS22-021(4mL); QC Water: PFAS-22-015
XG22049-004	Sample	Area19-PW-10A	1	PFAS by ID SOP	321.59	32.13	289		0.000	5.0	Bottletop: 329; Pipettes: 21-1707, 21-1821; QC Bottles: M-2-158-02BB
XG22049-005	Sample	WWNW-PW-5A	1	PFAS by ID SOP	321.5	32.72	289		0.000	5.0	GCB/WAX 500/50:22-1377; Turbo Vap LV#1, 66°C
XG22049-006	Sample	WWNW-PW-5A DUP	1	PFAS by ID SOP	305.2	32.73	272		0.000	5.0	Reservoirs: 22-882; Falcon tubes: 22-1476; Centrifuge #7; Centrifuge tubes: 22-121; MeCH Ext: 4mL, Filt: 2mL
XG22049-007	Sample	WWNW-PW-6A	1	PFAS by ID SOP	300.28	32.25	268		0.000	5.0	Witness:ALM
XG22049-007MS	MS		1	PFAS by ID SOP	308.07	33.47	275	SVLC-2168	0.200	5.0	NCM#:82747, 82748
XG22049-007MD	MSD		1	PFAS by ID SOP	299.31	33.1	266	SVLC-2168	0.200	5.0	
XG22049-008	Sample	WWNW-PW-6B	1	PFAS by ID SOP	301.32	32.32	269		0.000	5.0	
XG22049-009	Sample	WWNW-PW-7A	1	PFAS by ID SOP	304.56	32.41	272		0.000	5.0	
XG22049-010	Sample	EQB-HT	1	PFAS by ID SOP	286.87	32.65	254		0.000	5.0	
XG22049-011	Sample	FB-7/20	1	PFAS by ID	317.74	33.06	285		0.000	5.0	

Analyst: JRG2 **Level 2 Analyst:** RDB

Status: Level 2 review released

Matrix: Aqueous

Printed: 08/19/22 16:19

Prep Batch: 50680

PFAS Prep by ID GZA - PFAS Aqueous Preparation

Start Date: 08/10/2022 17:43
End Date: 08/10/2022 23:51

Conc Analyst: JRG2
Conc Start Date: 08/10/2022 22:57
Conc End Date: 08/10/2022 23:39

Surrogate: SVLC-2167
Surrogate Vol. (mL): 0.100

Ext Solvent: MECH>96%/MECH/4%/H2O
Reagents Vol. (mL): 10
Chem ID: 22-1356>22-1356/PFAS-22-015

Balance ID: Balance # 20-1123

Sample ID	QC Code	Client Sample ID	Run	Analysis Method	Container + Sample (g)	Container Empty (g)	Initial Vol. (mL)	Spike ID	Spike Vol. (mL)	Final Vol. (mL)	Comments
				SOP							
XG23005-001	Sample	HS-RMW-RI-106 (40-45)	1	PFAS by ID SOP	302.12	33.86	268		0.000	5.0	
XG23005-002	Sample	HS-RMW-RI-106 (50-55)	1	PFAS by ID SOP	318.11	33.53	285		0.000	5.0	
XG23005-003	Sample	HS-RMW-RI-106 (60-65)	1	PFAS by ID SOP	314.83	33.95	281		0.000	5.0	
XG23005-004	Sample	HS-RMW-RI-106 (100-105)	1	PFAS by ID SOP	320.71	33.79	287		0.000	5.0	
XG23005-005	Sample	HS-RMW-RI-106 (110-115)	1	PFAS by ID SOP	314.83	33.66	281		0.000	5.0	
XG23005-006	Sample	HS-RMW-RI-106 (120-125)	1	PFAS by ID SOP	321.98	34.07	288		0.000	5.0	
XG23005-007	Sample	HS-RMW-RI-106 (130-135)	1	PFAS by ID SOP	295.42	33.76	262		0.000	5.0	
XG23005-008	Sample	HS-RMW-RI-106 (130-135) DUP	1	PFAS by ID SOP	317.43	33.6	284		0.000	5.0	
XG23005-010	Sample	HS-RMW-RI-106 (150-155)	1	PFAS by ID SOP	325.75	32.36	293		0.000	5.0	

(end of report) **Total Samples: 20**

SECTION 4

CASE NARRATIVE AND CHAIN-OF-CUSTODY RECORD

Sample Summary

GZA GeoEnvironmental, Inc.

Lot Number: XG22049

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	Area19-PW-8A	Aqueous	07/19/2022 1105	07/22/2022
002	Area19-PW-9A	Aqueous	07/19/2022 1420	07/22/2022
003	Area19-PW-9B	Aqueous	07/19/2022 1505	07/22/2022
004	Area19-PW-10A	Aqueous	07/19/2022 1640	07/22/2022
005	WVNW-PW-5A	Aqueous	07/20/2022 1100	07/22/2022
006	WVNW-PW-5A DUP	Aqueous	07/20/2022 1100	07/22/2022
007	WVNW-PW-6A	Aqueous	07/20/2022 1405	07/22/2022
008	WVNW-PW-6B	Aqueous	07/20/2022 1435	07/22/2022
009	WVNW-PW-7A	Aqueous	07/20/2022 1525	07/22/2022
010	EQB-HT	Aqueous	07/20/2022 1645	07/22/2022
011	FB-7/20	Aqueous	07/20/2022 1530	07/22/2022

(11 samples)

HT met

Case Narrative
GZA GeoEnvironmental, Inc.
Lot Number: XG22049

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the Pace Quality Assurance Management Plan (QAMP), applicable Shealy standard operating procedures (SOPs), the 2003 NELAC standard, and Shealy policies. Additionally, the DoD QSM version 5.3 has been followed for these samples, and specifically Table B-15 was followed for all PFAS samples. Any exceptions to the QAMP, SOPs, NELAC standards, the DoD QSM, or policies are qualified on the results page or discussed below.

All QC associated with these samples were compliant with DOD QSM 5.3 table B-15 and our PFAS SOP.

Correction factors (CF) are used to calculate the original sample concentration. The CF is the inverse of the concentration factor (sample volume / extract final volume) times the dilution factor (DF). The CF is calculated as follows:

CF = DF * FV / Vo

FV is volume of extract (mL)
Vo is initial sample volume (mL)
DF is dilution factor. For undiluted analysis, DF = 1.

Sample concentration for aqueous samples:
Concentration (ng/L) = Cs*CF,

$$C_s = \frac{\left(\frac{(A_s x C_{is})}{A_{is}}\right) - B}{M1}$$

Where

C_s is on column concentration of target analyte in the sample (ng/L)
C_{is} is concentration of internal standard in the sample (ng/L)
A_s is peak response of target analyte in the sample
A_{is} is peak response of internal standard in the sample
M1 is the average RF from ICAL or the slope from linear regression ICAL
B is the y-intercept from the ICAL

Pace is a TNI accredited laboratory; however, the following analyses are currently not listed on our TNI scope of accreditation: Drinking Water: VOC (excluding BTEX, MTBE, Naphthalene, & 1,2-dichloroethane) EPA 524.2, E. coli and Total coliforms SM 9223 B-2004, Solid Chemical Material: TOC Walkley-Black, Biological Tissue: All, Non-Potable Water: SGT-HEM EPA 1664B, Silica EPA 200.7, Boron, Calcium, Silicon, Strontium EPA 200.8, Bicarbonate, Carbonate, and Hydroxide Alkalinity SM 2320 B-2011, SM 9221 C E-2006 & SM 9222D-2006, Strontium SW-846 6010D, VOC SM 6200 B-2011, Fecal Coliform Colilert-18.

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

Sample XG22049-003 required centrifugation prior to extraction, due to excessive solids present in the samples. Centrifugation was performed following the PFAS Aqueous Centrifuge Protocol; samples were spiked with Surrogate (SUR; Extracted Internal Standard/EIS) and shaken vigorously before being poured into a conical bottle and centrifuged. The centrifuged aqueous sample was decanted back into the original sample bottle, off of the condensed solids remaining in the centrifuge bottle. Original sample bottle was rinsed as normal and centrifuge bottle was rinsed with 4mL of MeOH. Centrifuge bottle rinsate was added to the elution. Samples concentrated to <5mL and reconstituted to 5mL using MeOH by transfer pipet.

The method blank, laboratory control sample (LCS) and / or laboratory control sample duplicate (LCSD) for prep batch 50680 exceeded acceptance criteria for the following analytes: 6:2 FTS EIS. The data has been reported.

Surrogate recovery for the following samples was outside the upper control limit: XG22049-001, XG22049-002, XG22049-003, XG22049-004, XG22049-005, XG22049-006, XG22049-007, XG22049-008, XG22049-009, XG22049-010, XG22049-011. The samples did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Shealy Environmental Services, Inc.
106 Vantage Point Drive
West Columbia, South Carolina 29172
Telephone No. (803) 791-9700 Fax No. (803) 791-9111
www.shealylab.com

Chain of Custody Record

Number

Client	Report to Contact	Telephone No. / E-mail	Quote No.
Rose and Westra / GZA	Lori Powers	616-956-6123 lorrita.powers@gza.com	

Address	Sampler's Signature	Analysis (Attach list if more space is needed)	Page
601 Fifth Street NW, Suite 102	x Makayla Myers		1 of 1

City	State	Zip Code
Grand Rapids	MI	49504

Project Name: 16.0062951.52 T1

Project Number: 16.0062951.52 T1

P.O No.:

XG22049

WSS2

Sample ID / Description (Containers for each sample may be combined on one line)	Date	Time	G=Grab C=Composite	Matrix: Aqueous	Matrix: Solid	Matrix: Non-Aqueous	No of Containers by Preservative Type: Unpres	H2SO4	HNO3	HCl	NaOH	H2O	MeOH	PFAS DoD QSM 5.3 - ID	Remarks / Cooler I.D.
Area19-PW-8A	7/19/2022	11:05	G	x			2							X	report results to AECOM / EGLE
Area-19-PW-9A	7/19/2022	14:20	G	x			2							X	report results to AECOM / EGLE
Area-19-PW-9B	7/19/2022	15:05	G	x			2							X	report results to AECOM / EGLE
Area-19-PW-10A	7/19/2022	16:40	G	x			2							X	report results to AECOM / EGLE
WVNW-PW-5A	7/20/2022	11:00	G	x			2							X	report results to AECOM / EGLE
WVNW-PW-5A DUP	7/20/2022	11:00	G	x			2							X	report results to AECOM / EGLE
WVNW-PW-6A	7/20/2022	14:05	G	x			2							X	report results to AECOM / EGLE
WVNW-PW-6A MS/MSD	7/20/2022	14:05	G	x			2							X	report results to AECOM / EGLE
WVNW-PW-6B	7/20/2022	14:35	G	x			2							X	report results to AECOM / EGLE
WVNW-PW-7A	7/20/2022	15:25	G	x			2							X	report results to AECOM / EGLE

Turn Around Time Required (Prior lab approval required for expedited TAT)
☐ Standard ☒ Rush (Please Specify) 2 week

Sample Disposal
☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification (List any known hazards in the remarks)
☒ Non-Hazardous ☐ Flammable ☐ Skin Irritant ☐ SDS provided ☐ Unknown

QC Requirements

	Date	Time		Date	Time
1. Relinquished by: Makayla Myers	7/21/2022	10:00	1. Received by		
2. Relinquished by			2. Received by		
3. Relinquished by			3. Received by		
4. Relinquished by: FedEx	7-22-22	0950	4. Laboratory Received by	7-22-22	0950

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Check) ☒ Y ☐ N ☐ Ice Pack
Receipt Temp 3.7 °C

Document Number: ME002CW-01

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

Chain of Custody Record

Shealy Environmental Services, Inc.
105 Vantage Point Drive
West Columbia, South Carolina 29172
Telephone No. (803) 791-9700 Fax No. (803) 791-9111
www.shealylab.com

Number

| | | |

Pace Analytical

Samples Receipt Checklist (SRC) (ME0018C-15)
Issuing Authority: Pace ENV - WCOL

Revised:9/29/2020
Page 1 of 1

Sample Receipt Checklist (SRC)

Client: GZA
Cooler Inspected by/date: KDRW / 07/22/2022
Lot #: XG22049

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other:

☑ Yes	☐ No		1. Were custody seals present on the cooler?
☑ Yes	☐ No	☐ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA

3.7 / 3.7 °C NA / NA °C NA / NA °C NA / NA °C

Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 6 IR Gun Correction Factor: 0 °C

Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☐ Yes	☐ No	☑ NA	3. If temperature of any cooler exceeded 6.0°C, was Project Manager Notified? PM was Notified by: phone / email / face-to-face (circle one).
☐ Yes	☐ No	☑ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC?
☑ Yes	☐ No		7. Were sample IDs listed on all sample containers?
☑ Yes	☐ No		8. Was collection date & time listed on the COC?
☑ Yes	☐ No		9. Was collection date & time listed on all sample containers?
☑ Yes	☐ No		10. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		11. Were tests to be performed listed on the COC?
☑ Yes	☐ No		12. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)?
☑ Yes	☐ No		13. Was adequate sample volume available?
☐ Yes	☑ No		14. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☐ Yes	☑ No		15. Were any samples containers missing/excess (circle one) samples Not listed on COC?
☐ Yes	☐ No	☑ NA	16. For VOA and RSK-175 samples, were bubbles present >"pea-size" (¼"or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	17. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	18. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	19. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☐ No	☑ NA	20. Were client remarks/requests (i.e. requested dilutions, MS/MSD designations, etc…) correctly transcribed from the COC into the comment section in LIMS?
☐ Yes	☑ No		21. Was the quote number listed on the container label? If yes, Quote #

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H_2SO_4, HNO_3, HCl, NaOH using SR # NA.
Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA were received with bubbles >6 mm in diameter.

Samples(s) NA were received with TRC > 0.5 mg/L (If #19 is ***no***) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Shealy ID: NA.

SR barcode labels applied by: KDRW Date: 07/22/2022

Comments:

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT