1. TEST RESULTS SUMMARY (TRS)

Table 1-1: FPM Results Summary

Site	Date	Run	Stack Parameters				
			O_2	CO_2	Moisture	Temperature	Flow Rate
			(%)	(%)	(%)	(F)	(DSCFM)
RM 05 Outlet		1	10.8	7.0	9.6	472	43216
		2	11.3	7.0	9.7	466	43531
		3	11.0	6.8	9.5	467.0	42374
		Average	11.0	6.9	9.6	468	43040

Site	Date	Run	FPM Emissions		
			(lbs/ton glass)	(lbs/hr)	(gr/DSCF)
RM 05 Outlet		1	0.06	1.04	0.0028
		2	0.06	0.93	0.0025
		3	0.05	0.87	0.0024
		Average	**0.06**	**0.95**	**0.0026**
Permit Limit			**0.45**	**n/a**	**n/a**

Table 1-2: Metals Results Summary

Parameter	R1	R2	R3	AVG	Limit
Selenium	0.0248	0.0228	0.0206	**0.023**	**2.03 lbs Se per hour**
Metal HAPS (As, Cd, Cr, Pb, Mg, & Ni)	2.90E-05	0.00002	2.05E-05	**0.000023**	**0.02 lbs Metal HAPS per ton of glass**

Table 1-3: CTM 013 Results Summary Titration

Date	Run	O_2 (%)	CO_2 (%)	Moisture (%)	Temperature (F)	Flow Rate (DSCFM)	H2SO4 (lbs/ton glass)	H2SO4 (lbs/hr)	H2SO4 (ppmvd)
9/16/2020	1	10.8	7.0	10.5	485	43216	0.0066	0.11	0.17
	2	11.3	7.0	16.0	488	43531	0.0048	0.08	0.13
	3	11.0	6.8	10.6	486	42374	0.0066	0.11	0.17
	Average	11.0	6.9	12.37	486	43040	**0.0060**	***0.10***	**0.16**
						Permit Limit	**n/a**	***1.6***	**n/a**

Table 1-4: CTM 013 Results Summary Ion Chromatography

Date	Run	O_2 (%)	CO_2 (%)	Moisture (%)	Temperature (F)	Flow Rate (DSCFM)	H2SO4 (lbs/ton glass)	H2SO4 (lbs/hr)	H2SO4 (ppmvd)
9/16/2020	1	10.8	7.0	10.5	485	43216	0.0096	0.16	0.24
	2	11.3	7.0	16.0	488	43531	0.0066	0.11	0.16
	3	11.0	6.8	10.6	486	42374	0.0078	0.13	0.20
	Average	11.0	6.9	12.37	486	43040	**0.0080**	***0.13***	**0.20**
						Permit Limit	**n/a**	***1.6***	**n/a**

Table 1-5: Production Data Summary

Production Data Summary					
			Production Rate		Pressure Drop
Date	Run	Time	Tons/Day	Tons/hr	in. WC
9/16/2020	1	0822-0937	400.7	16.70	6.6
9/16/2020	2	1028-1143	401.7	16.74	6.6
9/16/2020	3	1231-1346	401.1	16.71	6.6

Table 1-6: Summary of Analytical QA/QC Results

Test Method	Parameter	QA/QC Criteria	QA/QC Status	Within QC Criteria?
RM 2	Pitot Leak Check	Δ 0.0" H_2O / 15 seconds	0.0 @ 7.1" (max)	Yes
RM 5/29	Sample Train Leak Check (post test)	<0.02 cfm	0.001 cfm @ 15.0" H_2O (max)	Yes
	Isokinetics	100% +/- 10%	93.1 – 96.1%	Yes
CTM013	Sample Train Leak Check (post test)	<0.02 cfm	0.019 cfm @ 6.0" H_2O (max)	Yes
	Probe Temperature	> 350 °F	361°F (avg.)	Yes
	Thimble Temperature	> 500 °F	509°F (avg.)	Yes

2. Facility Information & Statement of Certification

Facility Information

Name of Source Operator: **Guardian Industries, LLC.**

Name of Source Owner: **Guardian Industries, LLC.**

Address of Owner: **14600 Romine Road, Carleton, MI 48117**

Source Identification: **Glass Manufacturing**

Location of Source: **14600 Romine Road, Carleton, MI 48117**

Owners Representative: **Michael Smolenski**

STATEMENT OF CERTIFICATION

I certify that "to the best of my knowledge" the state and federal regulations, operating permits, or plan approvals applicable to this source and/or control device to be tested have been reviewed and that all testing requirements therein have been incorporated into the test plan.

_____
Signature

_____
Title

_____
Date
Source owner/operator

Signature

_____
Title

_____
Date
On-site supervisor for the test team

3. INTRODUCTION

3.1 Introduction

Guardian Industries, LLC. (Guardian) has contracted Empire Stack Testing, LLC. (Empire) to perform Filterable Particulate Matter (FPM), Sulfuric Acid (H_2SO_4), and the Compliance Selenium and Metal HAPS Emission Testing on the line-2 glass furnace in Carleton, Michigan. Testing used RM5/29 at the Trimer outlet stack, and CTM-13 at the outlet ground site of the Trimer control system while the facility is producing 'PrivaGuard'.

Section 5 of this report contains the sampling and analytical procedures used to perform the test program. Section 6 details the quality assurance/quality control (QA/QC) procedures for the test program.

3.2 Test Program Objective

This test program is required annually to quantify the FPM, Selenium and Metal HAPS, and H_2SO_4 emissions from the outlet of the Trimer control system. All testing followed applicable methodologies of the Environmental Protection Agency (EPA), and as defined in Table 2-1, below.

3.3 Test Personnel

Coordinating the test program were:

Benjamin Kroeger
Guardian Industries, LLC.
(734)-654-4283

Ancy Sebastian
ALS Global
(905)-340 0838

Michael T. Karter, QSTI
Empire Stack Testing, LLC.
(716)-481-6749

3.4 Test Plan

Testing for all parameters was completed in triplicate following Reference Methods (RMs). The test program incorporates reference methods outlined in the United States Environmental Protection Agency (USEPA) Code of Federal Regulations Title 40, Part 60 (40CFR60), Appendix A. See Table 2-1 below.

3.5 Test Schedule

Day 1 (September 15): Mobilize to Guardian and setup
Day 2 (September 16): Complete CTM 013 & RM 5/29 Sampling (~ 8 hours)/Demobilize

Table 3-1: Summary of Test Plan

PARAMETER	METHOD	ANALYSIS	SAMPLE DURATION (MINUTES)	TEST LOCATION	PERMIT LIMIT
Flow Rate	RM 1 & 2	S-Type Pitot Tube / Manometer	60	Outlet	n/a
Dry Molecular Weight	RM 3	O_2 and CO_2 Fyrites	various	Outlet & GS	n/a
Moisture	RM 4	Gravimetric	60	Outlet & GS	n/a
FPM	RM 5 (1)	Gravimetric	60	Outlet	0.45 lbs per ton of glass
Selenium & Metal HAPS (As, Cd, Cr, Pb, Mg, & Ni)	RM 29 (1)	ICP-MS	60	Outlet	2.03 lbs Se per hour 0.02 lbs Metal HAPS per ton of glass
H_2SO_4	CTM 013	Titration	60	GS	1.6 lbs per hour

NOTES:
(1): RMs 5 & 29 were combined in a single sample train
CTM: Conditional Test Method
FPM: Filterable Particulate Matter
GS: Ground Site
H_2SO_4: Sulfuric Acid
RM: United States Environmental Protection Agency Reference Method

3.6 Process Description

Flat glass manufacturing Line #2 consisting of a raw material melting Furnace, glass forming and finishing, and glass cutting. Line #2 produces flat glass using the float method. Materials are weighed and mixed with water in the batch-house before entering the natural gas fired Furnace. Glass then enters the tin bath to be formed and drawn. Next, it enters a lehr to reduce its temperature. The emission unit is controlled by a new (Trimer ECS) Control Device consisting of a Dry Scrubber, Particulate Filter, and Selective Catalytic Reduction (SCR). This test program was completed while the facility is producing 'PrivaGuard'.

3.7 Plant data

The plant's SCADA system continuously records the operating data to be included in the test report. The plant provided plant operation and summarized pertinent operating data to represent plant operation. These data and summaries are provided both electronically (MS Excel) and in paper copies.

4. PRESENTATION OF RESULTS / EXECUTIVE SUMMARY

This Executive Summary discusses, in detail, the test results and any anomalies, their resolution, and any effect on the results quality or usability.

4.1 Discussion of Results

Testing was completed on September 16, 2020 for Metals, FPM and H_2SO_4. During this test program, the facility operated at an average production rate of 401 tpd.

The results indicate that the measured emissions are compliant with their permit limits. All field and lab data are included in the appendices of this report.

4.1.1 FPM Test Result (RM 5)

The average FPM emissions were measured to be 0.06 lbs/ton, which is compliant with limit of 0.45 lbs/ton. See Summary Table 1-1.

4.1.2 Metals Test Result (RM 29)

The average Selenium emissions were measured to be 0.023 lbs SE/hr; which is compliant with limit of 2.03 lbs SE/hr. The average Metals emissions were measured to be 0.000023 lbs Metal HAPS per ton of glass, which is compliant with limit of 0.02 lbs Metal HAPS per ton of glass. See Summary Table 1-2.

4.1.3 H_2SO_4 Test Result (CTM 013) Via Titration

The average emission rate of sulfuric acid was 0.10 lbs/hr and 0.0060 lbs/ton of glass. Based on the calculations as described in Appendix G, the results demonstrate that the emissions are compliant with the limit of 1.6 lb/hr. See Table 1-3. These results are included in Appendix B.

4.1.4 H_2SO_4 Test Result (CTM 013) Via IC

The average emission rate of sulfuric acid was 0.13 lbs/hr and 0.0080 lbs/ton of glass. Based on the calculations as described in Appendix G, the results demonstrate that the emissions are compliant with the limit of 1.6 lb/hr. See Table 1-4. These results are included in Appendix C.

4.1.5 Audit Sample (CTM 013)

As required by MIDEQ, Empire obtained certified H_2SO_4 audit material. The audit material was obtained from a certified vendor and supplied to the laboratory along with the samples and is included on the Chain of Custody. The titration results indicated that "there were Not Acceptable evaluations for this study". These results are included in Appendix E. A second audit sample as well as the original samples were analyzed by ion chromatography. These audit results were acceptable, and the emission results are reported for both the titration and ion chromatography analyses. See Appendix C.

4.2 Anomalies

4.2.1 H_2SO_4 Audit Result (CTM 013)

The titration results of the audit sample were outside the acceptable limits. Upon investigation, the lab discovered an error processing the samples. This led to reanalysis of all H_2SO_4 samples as well as obtaining a new audit sample. A second audit was analyzed by ion chromatography (IC) as requested by EGLE. These results are included in this test report. The test results that are presented are the new analysis and the audit sample is within the acceptable limits.

No other anomalies were recorded during testing nor report production.

5. SAMPLING AND ANALYTICAL PROCEDURES

This section provides a brief overview of the specific test methods that were used to determine the Sulfuric Acid emissions from each the glass furnace. All test method procedures were performed in accordance with the USEPA Reference Methods given in 40CFR60, Appendix A. The details of each method are given in the following sections.

5.1 Reference Method Test Location

The emission point exhausts the gases from the furnace that produces float glass. Emissions are discharged to atmosphere after passing through the Trimer control system. The inlet test location is horizontal duct with an internal diameter (ID) of 6'-3". The vertical exhaust stack has an ID of 6'-6.5".

The exhaust stack is fixed with two 10-inch diameter ports. The test ports are located approximately 13 equivalent diameters downstream of a disturbance and 2.3 equivalent diameters upstream of another disturbance. See Figure 5-1.

The ground site of the exhaust is fixed with two 6-inch diameter ports. The test ports are located approximately 8 equivalent diameters downstream of a disturbance and 1 equivalent diameter upstream of another disturbance. See Figure 5-2.

5.2 Sampling Point Location

5.2.1 Volumetric Flow

Representative measurement of pollutant emissions and total volumetric flow rate from a stationary source requires a measurement site where the effluent stream is flowing in a known direction and cyclonic flow is not present. See section 3.3.1, below.

According to Reference Method 1, the cross section of the stack is divided into equal areas and a traverse point is then located within each of these areas. The number of duct diameters upstream and downstream from the test location to a flow disturbance determines the number of traverse points in a cross section.

As these stacks have diameters >24 inches the outermost traverse points were at least 1 inch from the stack walls.

Sampling was performed at 6 traverse points per traverse for a total of 12 sampling points, as set forth by RM 1. See Figures 5-3 and 5-4.

5.3 Stack Gas Velocity and Volumetric Flow Rate

According to Reference Method 2, the gas velocity in a stack was determined from the average velocity head with a type S Pitot tube, gas density, stack temperature, and stack pressure.

The average velocity head was determined by using an inclined manometer and a type S Pitot tube with a known coefficient of 0.84 that is determined geometrically by standards set forth in Reference Method 2. Stack temperature was taken at each traverse point using a type K thermocouple. Static pressure was determined by using a straight tap and an inclined manometer.

5.3.1 Cyclonic Flow Check

The cyclonic flow check was performed during previous testing in 2016 and demonstrated non-cyclonic, laminar flow. This data remains acceptable as the stack and duct configurations remain unchanged. These data were included in the test report. This test was not repeated, at this time.

5.4 Oxygen & Carbon Dioxide Concentration (RM 3)

The Oxygen and Carbon Dioxide concentrations used in the calculation of the stack gases molecular weight were measured according to RM-3 with grab samples and Fyrite gas analyzers.

5.5 Moisture Determination (RM 4)

The determination of effluent moisture was performed as part of the wet-chemistry sampling, as detailed below in RM 5 and CTM013.

5.6 Filterable Particulate Matter & Metals (RMs 5/29)

5.6.1 Background

Reference Methods 5 and 29 were combined to determine the FPM and multiple metals concentrations. The filterable particulate was quantified gravimetrically from the probe and filter catch. Sampling for metals (selenium, arsenic, cadmium, chromium, lead, manganese, and nickel) was accomplished by use of Reference Method 29. Gaseous metal emissions were withdrawn isokinetically from the source and collected on a heated filter and in a series of chilled impingers containing solutions of dilute nitric acid (HNO_3) in hydrogen peroxide (H_2O_2). The sampling train components were recovered and then digested in combined front and back half fractions. Materials collected in the sampling train were digested with acid solutions to dissolve inorganics and to remove organic constituents that could have created an analytical interference. Acid digestion

was performed using microwave digestion techniques. Analysis and speciation of the metals was completed by Inductively Coupled Plasma Mass-Spectroscopy (ICP-MS). Based upon the lab's MDLs for the metals, a 60-minute sample duration is sufficient to guarantee that non-detectable (ND) results are below the permit limits. See Figure 5-7.

5.6.1.1 Reagents

Low metals quartz or Teflon® fiber filters with an efficiency of 99.95%, nitric acid, distilled water, hydrogen peroxide and concentrated sulfuric acid of trace metals grade or better were utilized. Blanks for all reagents were collected and analyzed.

5.6.2 Sampling

An isokinetic sample was collected at a rate of approximately 0.7 cubic feet per minute (cfm) for 60 minutes. The sampling train consisted of a glass nozzle and heated glass probe, which was maintained at the temperature of 248 °F, +/- 25 °F. The glass probe was then connected to the filter holder housed in an oven box that was also maintained at the temperature of 248° F, +/- 25° F. The filter holder was constructed of borosilicate glass, with a Teflon® frit filter support and a silicone rubber gasket. Quartz or Teflon® fiber, high purity filters were used.

A condensing system followed the filter holder that consisted of five modified Greenburg-Smith impingers and one standard tip Greenburg-Smith impinger. Due to the low moisture content of the effluent, the optional empty first impinger was not used. The first two impingers each contained 100 ml of 5% HNO_3/10% H_2O_2, (prepared within one week of use). The third impinger was empty. The last impinger contained a known quantity of silica gel. A temperature gauge (thermocouple) was present at the outlet of the last impinger and the temperature was maintained below 68° F. A schematic of the sampling train is presented in Figure 5-5.

5.6.3 Sample Recovery

Recovery of all sample train components was performed in Empire's Mobile Laboratory.

Container 1(Filter)**:**
The filter was carefully removed from the filter holder with the use of tweezers and disposable surgical gloves and placed into its Petri dish labeled with the filter ID number and identified as "Container No. 1" for the proper run and location. Any particulate matter and/or fiber filters that adhered to the filter holder or filter holder gasket was carefully transferred to the Petri dish with the use of a dry nylon bristle brush or a sharp-edged blade. The Petri dish was then sealed with parafilm. The probe nozzle, probe liner, and front half of the filter holder were rinsed at least three times with

acetone, and the rinses collected in a sample jar labeled "Container No. 2". The container was then sealed, and the fluid level marked.

Container 2 (Front ½ acetone Rinse):
The particulate matter was recovered from the probe nozzle, union, probe liner, front half of the filter holder, and (if applicable) the cyclone, as follows.

a. The nozzle was rinsed with acetone, brushed with a non-metallic bristle brush, and rinsed with acetone until no visible particles remained. A final acetone rinse was performed.
b. The probe liner was rinsed and brushed at least three times, followed by a final rinse of the brush with acetone.
c. After completing the rinses, the lid on the sample container was tightened and the height of the fluid level marked.

Container No. 3 (Front ½ Nitric Rinse)
The same front-half glassware as Container No. 2 was rinsed with a total of 100 ml of 0.1N HNO_3 into a clean glass sample container. After completing the rinse, the lid on the sample container was secured, the level marked, and labeled.

Container No. 4 (Impingers 1 & 2 contents and rinses)
The liquid in the first two impingers was measured gravimetrically and the gross weight recorded on the recovery data sheet. Each of the first two impingers, the filter support, the back half of the filter housing, and connecting glassware were cleaned by thoroughly rinsing with 100 ml of 0.1N HNO_3. These rinses and impinger contents were combined into this glass sample container. The sample volume was recorded. After completing the rinse, the lid on the sample container was secured, the level marked, and labeled.

Container No. 5a (Impinger 3 contents and rinses)
The liquid in the third impinger was measured gravimetrically and the gross weight recorded on the recovery data sheet. The impinger was cleaned with 100 ml of 0.1N HNO_3. These rinses and impinger contents were combined into this glass sample container. The sample volume was recorded. After completing the rinse, the lid on the sample container was secured, the level marked, and labeled.

Container No. 5b (Impinger 4 & 5 contents and rinses)
Not required as Hg was not quantified from this sample train.

Container No. 5c (Impinger 4 & 5 8N HCl rinse)
Not required as Hg was not quantified from this sample train.

Container No. 6 (Silica Gel)
The gross weight of the silica gel impinger was measured gravimetrically and recorded on the recovery data sheet.

Container No. 7 (Acetone Blank)
A portion of the acetone used in the sample recovery process was saved into a glass container, sealed, marked, and labeled.

Container No. 8 (0.1N HNO_3 Blank)
A 300 ml portion of the 0.1N HNO_3 used in the sample recovery process was saved into a glass container, sealed, marked, and labeled.

Container No. 9 (5% HNO_3/10% H_2O_2)
A 200 ml portion of the 5% / 10% solution used in charging the train process was saved into a glass container, sealed, marked, and labeled.

Container No. 10 (Acidified $KMnO_4$ Blank)
Not required as Hg was not quantified from this sample train.

Container No. 11 (8 N HCl Blank)
Not Applicable

Container No. 12 (Filter Blank)
Three unused sample filters from the same lot as those used in sampling process were saved into their petri dishes, sealed and labeled.

Acetone Blank:
An acetone blank with a volume roughly equal to the rinse volume was saved as a blank.

5.6.4 Analysis

The samples were shipped to ALS Global for FPM analysis following RMs 5 and 29. The filters are desiccated to a constant weight. The gravimetric analysis of the filters and acetone samples was repeated every six to twenty-four hours until stable analyses are obtained.

ALS uses a 40 mL vial to analyze the acetone rinses, in lieu of evaporation in a 250 mL beaker. This minimizes the tare weight of the vessel; as the vials have a tare weight of approximately 21g compared to a tare weight of approximately 100g with a 250 mL glass beaker. The 250 mL glass beaker has a greater chance of variability; also the NJ-DEP (the primary NELAC accreditor) has certified ALS to perform this analysis with the modification listed.

The procedure used is as follows:

- The vials are kept in the balance room at all times prior to use. Lab numbers are put on the vials with a black magic marker and the vial is then desiccated for one hour prior to doing the pre-weight
- Place bottle of solvent onto Navigator balance, enter the weight into the "Bottle and Solvent Weight" column
- Place a ribbed watch glass on the sample container and set in a fume to evaporate to <10 mL
- Transfer the remaining solvent to a pre-cleaned, pre-weighed and pre-numbered 40 mL glass vial
- Place the empty bottle of solvent onto Navigator balance, enter weight into the "Empty Bottle Weight" column
- Reduce to dryness with a gentle stream of N2 using the N-Evap system
- Place vials in desiccators for 24 hours minimum and record the time in the spreadsheet
- Note the appearance of the residue on the worksheet, (light, dark, minimal, copious as l/d/m/c)
- Proceed to 7.4 (Balance use and weighing samples)
- When all weightings are complete a second analyst must select and reweigh 1 of every 10 vials (the vial is to be selected at random)
  Second analyst's result must be ±2 mg of the first analyst's result.

Following the gravimetric analysis, the FPM portions were re-solubilized and analyzed per RM 29 for selenium, arsenic, cadmium, chromium, lead, manganese, and nickel.

5.7 Sulfuric Acid (CTM-013)

5.7.1 Background

This method was developed as an alternative to EPA Method 8 for determining sulfuric acid emissions from Kraft recovery furnaces. When testing recovery furnaces, EPA Method 8 is subject to significant interference from sulfates, which are present in the particulate matter, and sulfur dioxide. The alternative method uses a quartz in-line thimble to remove particulate matter from the gas stream prior to capturing sulfuric acid. The use of a controlled condensation technique eliminates the potential for interference from sulfur dioxide.

A gas sample is extracted from the sampling point in the recovery furnace stack. The sulfuric acid vapor or mist (including sulfur trioxide) and the sulfur dioxide are separated, and both fractions are measured separately by **Titration**.

5.7.2 Sampling

The sampling train consists of a glass nozzle and heated glass probe, which was maintained at the temperature of >177°C (350°F). The probe was then connected to the thimble holder housed in an oven box that was also maintained at the temperature of >500 °F. The thimble holder was constructed of quartz with a quartz thimble filter.

Sampling was performed for a minimum of **60 minutes** at a constant rate (±10%) of ~10.0 lpm (~0.35 cfm).

A condenser connects the thimble to the train. The condenser is filled with water and its temperature is maintained between 75 and 85°C (167 to 185°F). The condenser was connected to the impinger train with a minimal length of unheated Teflon tubing. The first and third impingers consist of Greenburg-Smith design, the remaining impingers are modified Greenburg-Smith designed impingers. The first two impingers contained 100 ml of 3% hydrogen peroxide (H_2O_2). The third impinger contained 100 ml of distilled deionized water (RODI). The fourth impinger contained approximately 500 g of silica gel desiccant.

A vacuum line connects the outlet of the last impinger to the control module. The control module consists of a vacuum gauge, rotary pump, by-pass and main valve, dry gas meter, orifice, and an inclined manometer. The sample train is illustrated in Figure 5-6.

Coinciding with the sampling were velocity, moisture, and dry molecular weight determinations.

5.7.3 Sample Purge

At the completion of the test run, the probe was separated from the thimble, and a 15-minute purge with clean air (ambient) was performed at the same rate at the test run, as required by the method.

5.7.4 Sample Recovery

Recovery was performed onsite in Empire's mobile laboratory at the completion of each test run.

Container 1:

Rinse separately the probe, quartz thimble holder and the H_2SO_4 condenser with deionized water using multiple rinse. After completing the rinses, the lid on the sample container was tightened and the height of the fluid level marked. The thimble was discarded.

Container 2:
The liquid from the first two impingers was quantitatively transferred into a clean sample bottle (glass or plastic).

Container 3:
The water from the third impinger was weighed in the field, and then discarded.

Blank H_2O_2:
Take ~100 ml of H_2O_2 and place it in a recovery bottle. The liquid level on the bottle was marked.

Blank H_2O:
Take ~100 ml of H_2O and place it in a recovery bottle. The liquid level on the bottle was marked.

5.7.5 Analysis

The samples were shipped to ALS Global of Mississauga, Ontario, Canada for analysis **Titration**.

Figure 5-1: Test Port Location (Outlet)

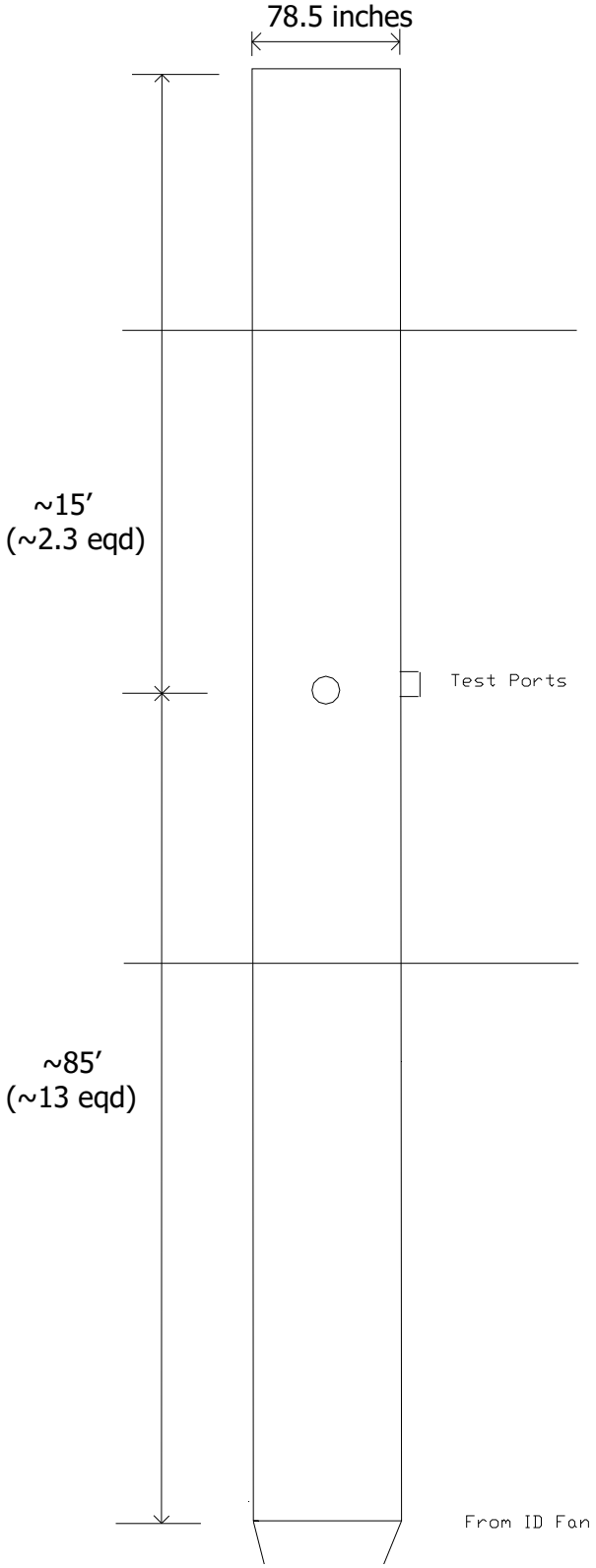


Figure 5-2: Test Port Location (Outlet Ground Site)

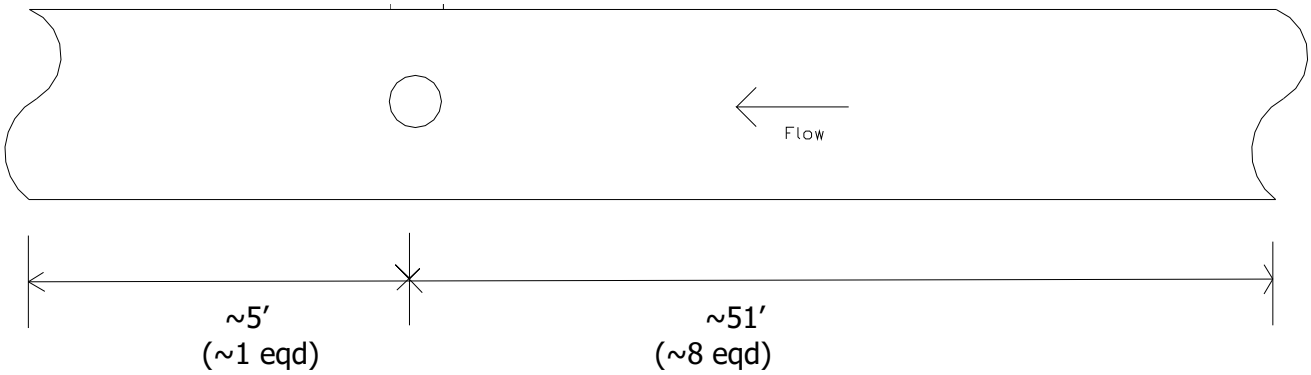
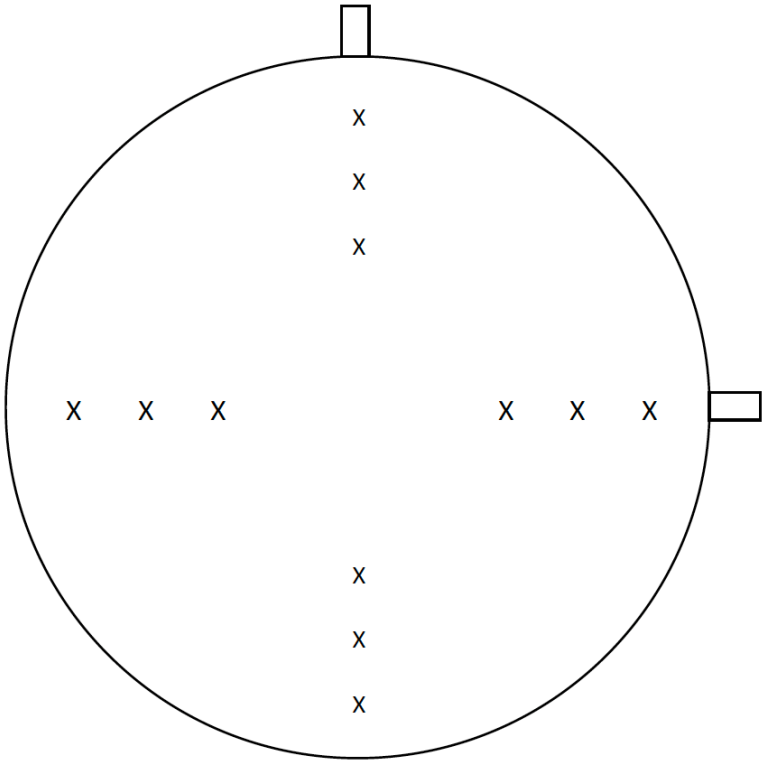


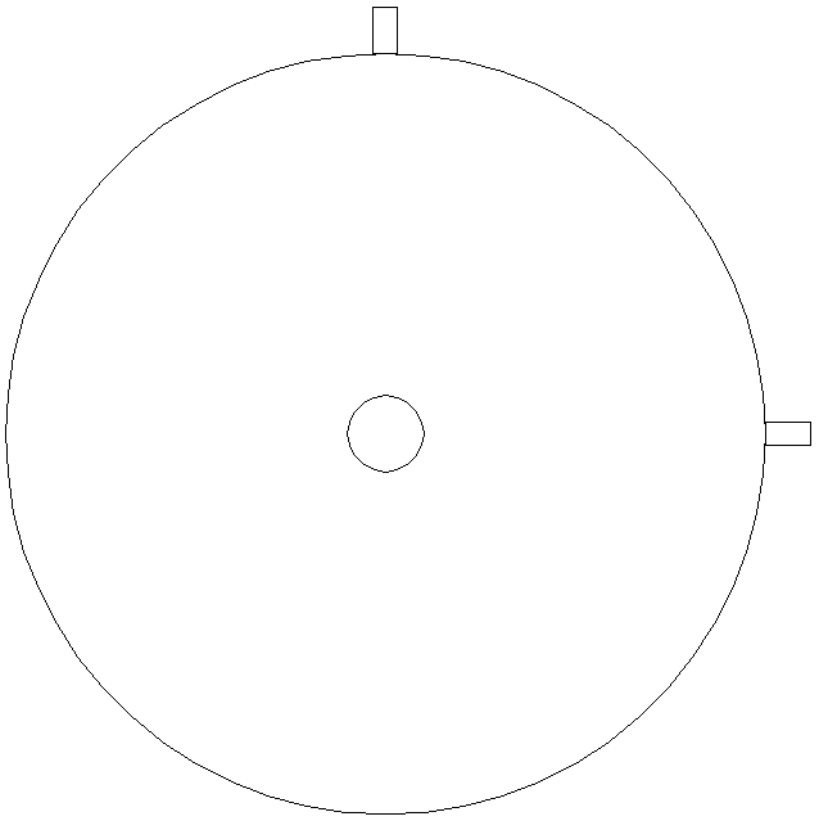
Figure 5-3: Sampling Point Locations (Outlet)



Traverse Point Number	Distance from Inner Wall (%)	Distance from Port Edge (inches)
1	4.4	13.5
2	14.6	21.5
3	29.6	33.2
4	70.4	65.3
5	85.4	77.0
6	95.6	85.0

Diameter: 78.5″
Nipple: 10″

Figure 5-4: Sampling Point Locations (Outlet Ground Site)



Note: Only a single port is present

Traverse Point Number	**Distance from Port Edge (inches)**
Centroid:	26.0 – 50.0″
Internal Dimensions:	76″
Port Length:	6″

Figure 5-5: RM 5/29 Sampling Train

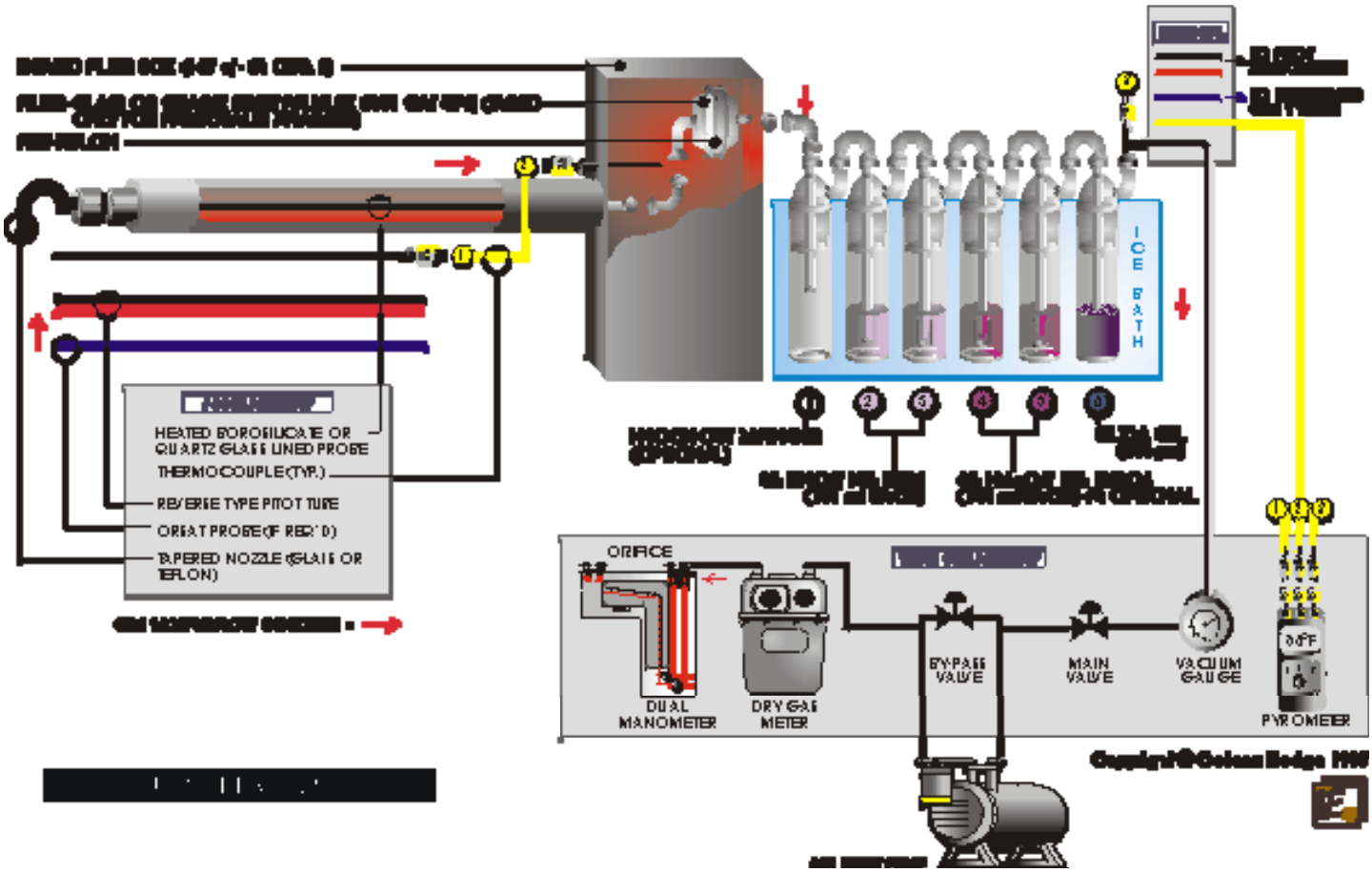


Figure 5-6: CTM 013 Sampling Train