BTEC Inc.

VOC Emissions Test Report

Prepared for:

Acument Global Technologies

Sterling Heights, Michigan

Acument Global Technologies
6125 18 Mile Road
Sterling Heights, Michigan 48314

Project No. 049AS-416282
July 26, 2018

BT Environmental Consulting, Inc.
4949 Fernlee Avenue
Royal Oak, Michigan 48073
(248) 548-8070

EXECUTIVE SUMMARY

BT Environmental Consulting, Inc. (BTEC) was retained by Acument Global Technologies (Acument) to evaluate volatile organic compounds (VOC) emission rates from two exhaust stacks associated with the EU-F2 heat treat furnace at the Acument facility located in Sterling Heights, Michigan. The emissions test program was conducted on May 29, 2018.

Testing of the washer and quench vent consisted of triplicate test runs. The emissions test program was required by MDEQ Air Quality Division PTI 85-17. The results of the emission test program are summarized by Table I.

Table I
Overall Emission Summary
Test Date: May 29, 2018

Pollutant	Average Emission Factor
VOC	0.89 lb VOC/ton of metal

1. Introduction

BT Environmental Consulting, Inc. (BTEC) was retained by Acument Global Technologies (Acument) to evaluate volatile organic compounds (VOC) emission rates from two exhaust stacks associated with the EU-F2 heat treat furnace at the Acument facility located in Sterling Heights, Michigan. The emissions test program was conducted on May 29, 2018.

AQD has published a guidance document entitled "Format for Submittal of Source Emission Test Plans and Reports" (March 2018). The following is a summary of the emissions test program and results in the format suggested by the aforementioned document. All testing was performed in accordance with BTEC test plan 049AS-416282.

1.a Identification, Location, and Dates of Test

Sampling and analysis for the emission test program was conducted on May 29, 2018 at the Acument facility located in Sterling Heights, Michigan. The test program included evaluation of VOC emissions from the washer hood and quench vent associated with the heat treat furnace.

1.b Purpose of Testing

AQD issued PTI 85-17 to Acument. This permit limits emissions from the heat treat furnace as summarized by Table 1.

Table 1
VOC Emission Limitations
Acument Global Technologies

Permit No.	VOC Emission Limit
PTI 85-17	3.3 TPY

1.c Source Description

One metal heat treatment belt line for metal fasteners, rated at 4,000 pounds per hour. The line consists of a loading station, pre-wash station, hardening furnace, oil quench, post-wash station, tempering furnace, soluble oil tank, and unloading station.

1.d Test Program Contacts

The contact for the source and test report is:

Mr. Ross Onge
Acument Global Technologies
6125 18 Mile Rd.
Sterling Heights, MI 48314
(586) 255-2922

Names and affiliations for personnel who were present during the testing program are summarized by Table 2.

Table 2
Test Personnel

Name and Title	Affiliation	Telephone
Mr. Steve Smith Field Project Manager	BTEC 4949 Fernlee Royal Oak, MI 48073	(248) 548-8070
Mr. Mike Nummer Environmental Technician	BTEC 4949 Fernlee Royal Oak, MI 48073	(248) 548-8070
Mr. Josh Boulianne Environmental Technician	BTEC 4949 Fernlee Royal Oak, MI 48073	(248) 548-8070
Mr. Mark Dziadosz	MDEQ Air Quality Division	(586) 753-3745
Mr. Sebastian Kallumkal	MDEQ Air Quality Division	(586) 753-3738

2. Summary of Results

Sections 2.a through 2.d summarize the results of the emissions compliance test program.

2.a Operating Data

Pounds of metal processed during each run.

2.b Applicable Permit

The applicable permit for this emissions test program is PTI 85-17

2.c Results

The overall results of the emission test program are summarized by Table 3 (see Section 5.a). Detailed results are included as Table 4.

3. Source Description

Sections 3.a through 3.e provide a detailed description of the process.

3.a Process Description

The heat treat belt is a continuous process that is rated for 4,000 pounds per hour of parts. There is no air pollution control equipment for this source.

3.b Process Flow Diagram

Due to the simplicity of the heat treat belt, a process flow diagram is not necessary.

3.c Raw and Finished Materials

The raw material from this process are metal fasteners.

3.d Process Capacity

4,000 pounds of metal per hour.

3.e Process Instrumentation

Furnace temperature and pounds of parts processed.

4. Sampling and Analytical Procedures

Sections 4.a through 4.d provide a summary of the sampling and analytical procedures used.

4.a Sampling Train and Field Procedures

Exhaust Gas Velocity, Molecular Weight, and Moisture Content

Measurement of exhaust gas velocity, molecular weight, and moisture content was conducted using the following reference test methods codified at Title 40, Part 60, Appendix A of the Code of Federal Regulations (40 CFR 60, Appendix A):

- Method 1 - *"Location of the Sampling Site and Sampling Points"*
- Method 2 - *"Determination of Stack Gas Velocity and Volumetric Flowrate"*
- Method 3 - *"Determination of Molecular Weight of Dry Stack Gas"(Fyrite)*

- Method 4 - *"Determination of Moisture Content in Stack Gases"*

Stack gas velocity traverses were conducted in accordance with the procedures outlined in Method 1 and Method 2. S-type pitot tubes with thermocouple assemblies, calibrated in accordance with Method 2, Section 4.1.1, were used to measure exhaust gas velocity pressures (using a manometer) and temperatures during testing. The s-type pitot tube dimensions outlined in Sections 2-6 through 2-8 were within specified limits, therefore, a baseline pitot tube coefficient of 0.84 (dimensionless) was assigned.

Cyclonic flow checks were performed at the sampling location. The existence of cyclonic flow is determined by measuring the flow angle at each sample point. The flow angle is the angle between the direction of flow and the axis of the stack. If the average of the absolute values of the flow angles is greater than 20 degrees, cyclonic flow exists. The null angle was determined to be less than 10 degrees at each sampling point.

Molecular weight determinations were evaluated according to USEPA Method 3, "Gas Analysis for the Determination of Dry Molecular Weight." The equipment used for this evaluation consisted of a one-way squeeze bulb with connecting tubing and a set of Fyrite® combustion gas analyzers. Carbon dioxide and oxygen content were analyzed using the Fyrite® procedure.

Exhaust gas moisture content was evaluated using Method 4. Exhaust gas was extracted as part of the moisture sampling (see Section 3.2) and passed through (i) two impingers, each with 100 ml deionized water, (ii) an empty impinger, and (iii) an impinger filled with silica gel. Exhaust gas moisture content is then determined gravimetrically. Exhaust gas moisture was also verified using wet bulb/dry bulb techniques at both locations.

Volatile Organic Compounds (USEPA Method 25A)

Volatile Organic compound (VOC) concentrations were measured according to 40 CFR 60, Appendix A, Method 25A. A sample of the gas stream was drawn through a stainless steel probe with an in-line glass fiber filter to remove any particulate, and a heated Teflon® sample line to prevent the condensation of any moisture from the sample before it enters the analyzer. Data was recorded at 4-second intervals on a PC equipped with Labview® II data acquisition software. BTEC used a VIG Model 20 and JUM THC hydrocarbon analyzers to determine the VOC concentrations.

The VIG and JUM hydrocarbon analyzers channel a fraction of the gas sample through a capillary tube that directs the sample to the flame ionization detector (FID), where the hydrocarbons present in the sample are ionized into carbon. The carbon concentration is then determined by the detector in parts per million (ppm). This concentration is transmitted to the data acquisition system (DAS) at 4-second intervals in the form of an analog signal, specifically voltage, to produce data that can be averaged over the duration of the testing program. This data is then used to determine the average ppm for total hydrocarbons (THC) using the equivalent units of propane (calibration gas). The analyzers were calibrated for a range of 0 to 100 ppm.

In accordance with Method 25A, a 4-point (zero, low, mid, and high) calibration check was performed on the THC analyzer. Calibration drift checks were performed at the completion of each run.

4.b Recovery and Analytical Procedures

This test program did not include laboratory samples, consequently, sample recovery and analysis is not applicable to this test program.

4.c Sampling Ports

A diagram of the stack showing sampling ports in relation to upstream and downstream disturbances is included as Figures 3 and 4.

4.d Traverse Points

A diagram of the stack indicating traverse point locations and stack dimensions is included as Figures 2 and 3.

5. Test Results and Discussion

Sections 5.a through 5.k provide a summary of the test results.

5.a Results Tabulation

The overall results of the emissions test program are summarized by Table 3. Detailed results for the emissions test program are summarized by Table 4.

Table 3
Overall Emission Summary
Test Date: May 29, 2018

Pollutant	Average Emission Factor
VOC	0.89 lb VOC/ton of metal

5.b Discussion of Results

The overall results of the emission test program are summarized by Table 3 (see Section 5.a).

5.c Sampling Procedure Variations

BTEC and MDEQ personnel determined that Run 1 would be voided due to lack of process data, and that Run 2 (lot 6) would count as a valid run.

There was insufficient time between the end of lot 6 and beginning of lot 7 to perform calibrations on the analyzers, so Run 3 was started without performing calibrations. The calibrations performed before Run 2 and after Run 3 were used to drift correct the VOC concentrations for both Runs 2 and 3. All calibration results were within the limits specified in Method 25A.

Run 4 consisted of lot 10 and 11 which added up to a total of 51 minutes. Mr. Mark Dziadosz with the MDEQ verbally approved the shortened sampling time for Run 4.

5.d Process or Control Device Upsets

See section 5.c

5.e Control Device Maintenance

There was no control equipment maintenance performed during the emissions test program.

5.f Re-Test

The emissions test program was not a re-test.

5.g Audit Sample Analyses

No audit samples were collected as part of the test program.

5.h Calibration Sheets

Relevant equipment calibration documents are provided in Appendix C.

5.i Sample Calculations

Sample calculations are provided in Appendix D.

5.j Field Data Sheets

Field documents relevant to the emissions test program are presented in Appendix B

5.k Laboratory Data

There are no laboratory results for this test program. Raw CEM data is provided electronically in Appendix E.

MEASUREMENT UNCERTAINTY STATEMENT

Both qualitative and quantitative factors contribute to field measurement uncertainty and should be taken into consideration when interpreting the results contained within this report. Whenever possible, Montrose Air Quality Services, LLC, (MAQS) personnel reduce the impact of these uncertainty factors through the use of approved and validated test methods. In addition, MAQS personnel perform routine instrument and equipment calibrations and ensure that the calibration standards, instruments, and equipment used during test events meet, at a minimum, test method specifications as well as the specifications of our Quality Manual and ASTM D 7036-04. The limitations of the various methods, instruments, equipment, and materials utilized during this test have been reasonably considered, but the ultimate impact of the cumulative uncertainty of this project is not fully identified within the results of this report.

Limitations

All testing performed was done in conformance to the ASTM D7036-04 standard. The information and opinions rendered in this report are exclusively for use by Acument Global Technologies. BTEC will not distribute or publish this report without Acument Global Technologies' consent except as required by law or court order. BTEC accepts responsibility for the competent performance of its duties in executing the assignment and preparing reports in accordance with the normal standards of the profession, but disclaims any responsibility for consequential damages.

This report was prepared by: _____
Steve Smith
Field Project Manager

This report was reviewed by: _____
Brandon Chase
QA/QC Manager

Table 4
Heat Treat Furnace Detailed VOC Emission Test Results Summary
Acument Global Technologies
Sterling Heights, Michigan

Parameter	Run 2	Run 3	Run 4	Average
Sampling Date	5/29/2018	5/29/2018	5/29/2018	
Sampling Time	10:50-11:50	12:22-12:52	14:44-15:00	
		13:06-13:36	15:11-15:45	
Metal Processed (ton/hr)	1.74	1.12	1.14	
Washer Hood Flowrate (scfm) *	1,044	1,037	1,028	1,036
Quench Vent Flowrate (scfm) *	3,829	3,843	3,798	3,823
Washer Hood VOC Concentration (ppmv propane)	8.79	8.50	12.90	10.06
Washer Hood VOC Concentration (ppmv, corrected as per USEPA 7E)	7.02	6.71	11.76	8.49
Washer Hood VOC Mass Flowrate (lb/hr)	0.05	0.05	0.08	0.06
Quench Vent VOC Concentration (ppmv propane)	41.07	39.87	43.06	41.33
Quench Vent VOC Concentration (ppmv, corrected as per USEPA 7E)	40.94	39.68	42.63	41.08
Quench Vent VOC Mass Emission Rate (lb/hr)	1.07	1.04	1.11	1.07
VOC Emission Rate as Propane (lb VOC/ton metal processed)	**0.65**	**0.97**	**1.04**	**0.89**

Washer VOC Correction			
Co	2.15	2.15	1.68
Cma	29.99	29.99	29.99
Cm	30.53	30.53	30.31

Quench VOC Correction			
Co	1.67	1.67	1.81
Cma	29.99	29.99	29.99
Cm	30.54	30.54	30.83

scfm: standard cubic feet per minute
ppmv: parts per million on a volume to volume basis
lb/hr: pounds per hour
VOC: volatile organic compound
MW = molecular weight (C_3H_8 = 44.10)
24.14: molar volume of air at standard conditions (70°F, 29.92" Hg)
35.31: ft^3 per m^3
453600: mg per lb
* Flow rate is the average of the pre run flow and post run flow

Equations

lb/hr = ppmv * MW/24.14 * 1/35.31 * 1/453,600 * scfm* 60
lb/ton of metal processed = (lb/hr) / (ton of metal processed/hr)

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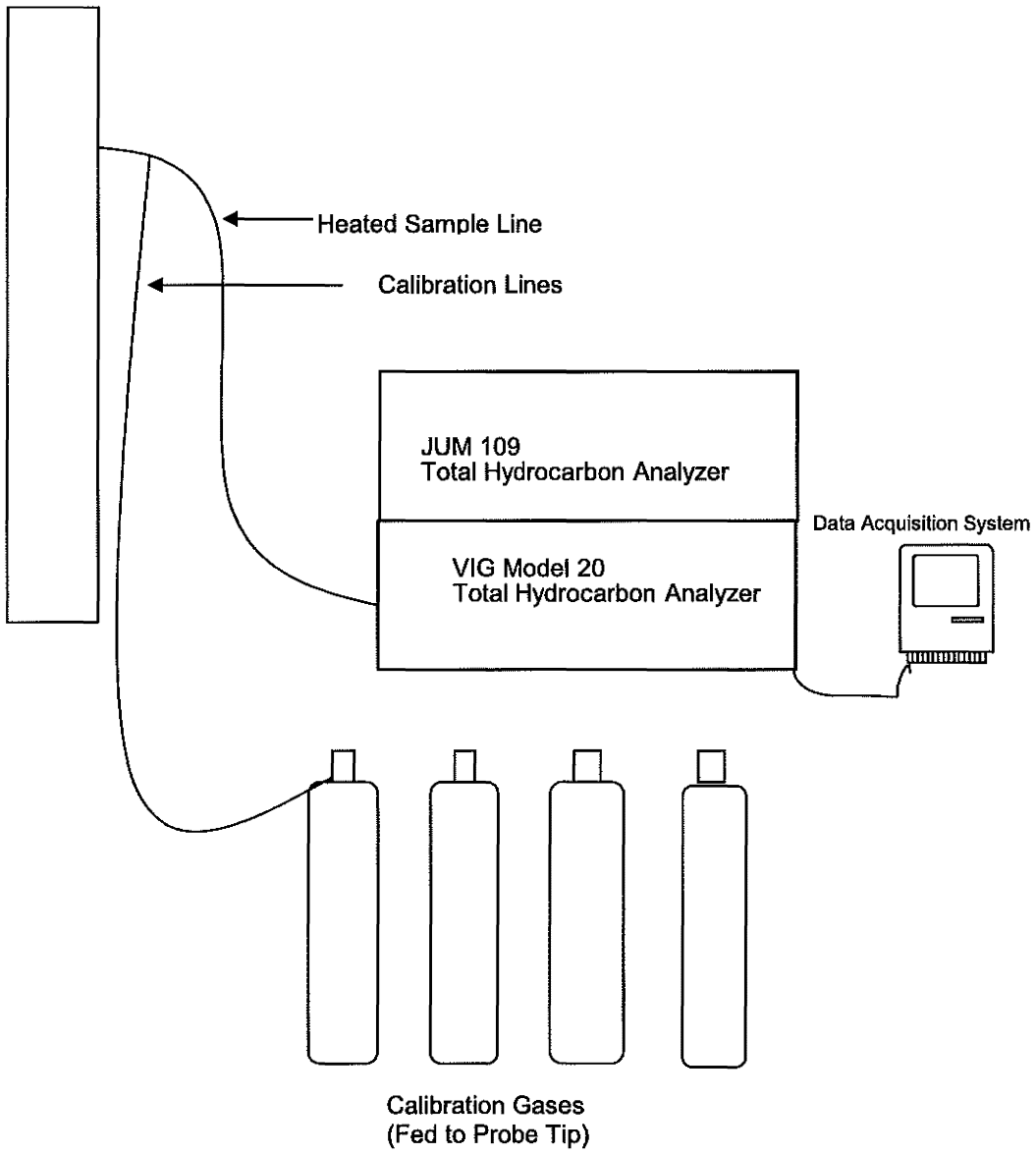

Figure 1

Site: **Sampling Date:** **USEPA Method 25A** **May 29, 2018** **Acument Global Technologies** **Sterling Heights, Michigan**	**BT Environmental Consulting, Inc.** **4949 Fernlee Avenue** **Royal Oak, Michigan 48073**

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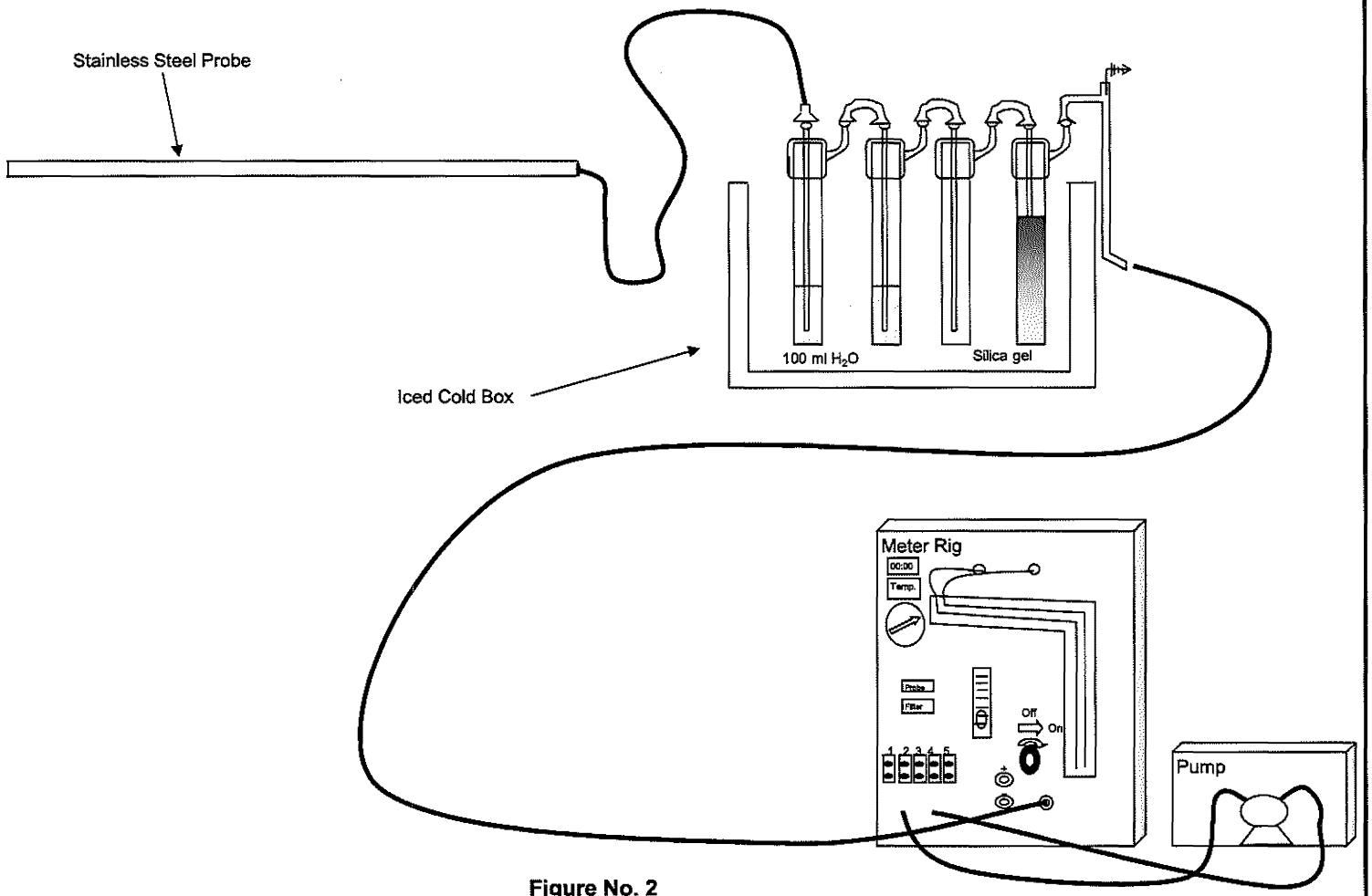
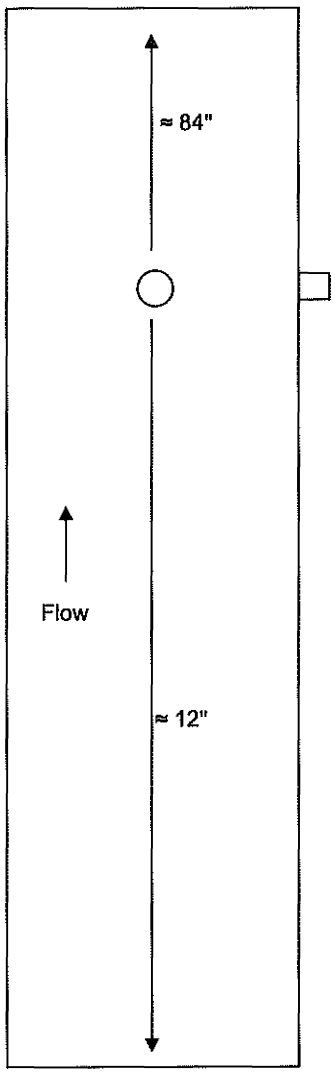


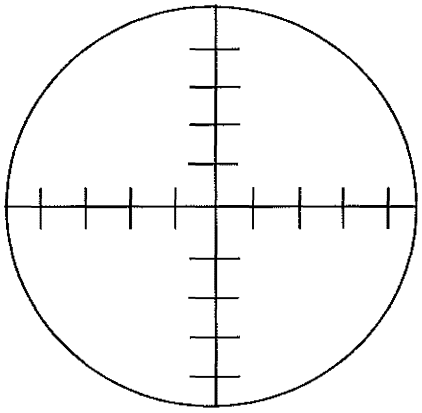
Figure No. 2

Site: **USEPA Method 4** **Acument Global Technologies** **Sterling Heights, Michigan**	**Sampling Date:** **May 29, 2018**	**BT Environmental Consulting, Inc.** **4949 Fernlee Avenue** **Royal Oak, Michigan**

BTEC Inc.

diameter = 18 inches





Not to Scale

Points	Distance "
1	0.6
2	1.9
3	3.5
4	5.8
5	12.2
6	14.5
7	16.1
8	17.4

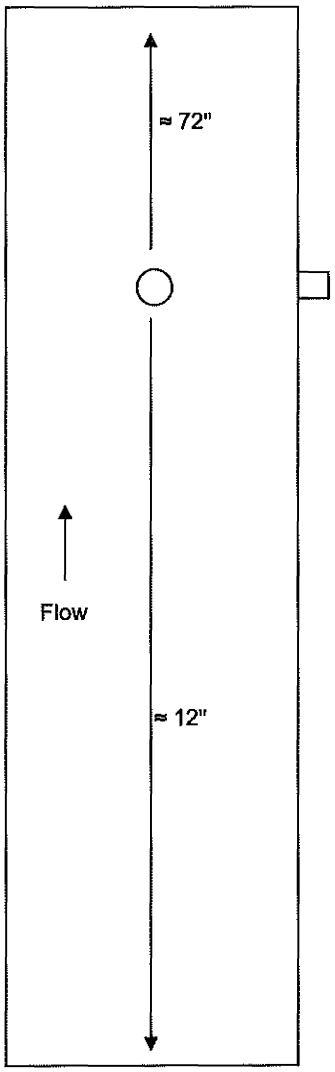
Figure No. 3

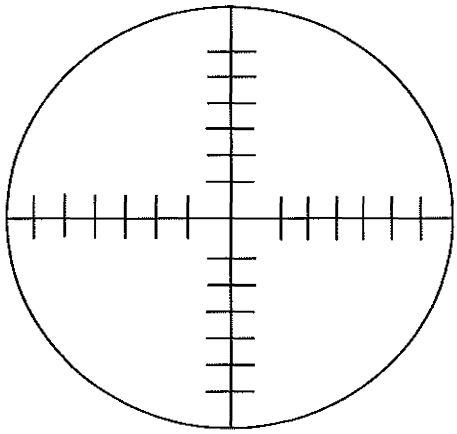
Site: **Washer** **Acument Global Technologies** **Sterling Heights, Michigan**	**Sampling Date:** **May 29, 2018**

BT Environmental Consulting, Inc.
4949 Fernlee Avenue
Royal Oak, Michigan 48073

BTEC Inc.

diameter = 20 inches





Not to Scale

Points	Distance "
1	0.4
2	1.3
3	2.4
4	3.5
5	5.0
6	7.1
7	12.9
8	15.0
9	16.5
10	17.6
11	18.7
12	19.6

Figure No. 4

Site: **Quench** **Acument Global Technologies** **Sterling Heights, Michigan**	**Sampling Date:** **May 29, 2018**	**BT Environmental Consulting, Inc.** **4949 Fernlee Avenue** **Royal Oak, Michigan 48073**