EXECUTIVE SUMMARY

BT Environmental Consulting, Inc. (BTEC) was retained by Huron Casting, LLC (Huron Casting) to evaluate fugitive emissions and filterable particulate matter (PM) concentrations and emissions from two baghouse duct collector exhaust stacks (FG-POUR) at the Huron Casting facility located in Pigeon, Michigan. The emissions test program was conducted on July 26th and 27th, 2016.

Testing of the sources consisted of triplicate 72-minute test runs for each pollutant at the two exhaust stacks. The Air Quality Division (AQD) of Michigan's Department of Environmental Quality issued Permit to Install No. 207-02E to Huron Casting (FG-POUR) in Pigeon, Michigan. The results of the emission test program are summarized by Table I.

Table I
FG POUR Overall Emission Summary
Test Date: July 26th- 27th, 2016

Source	Pollutant	Average Emission Rate	Emission Limit
Pourline A	PM	0.002 lb/1,000 lb	0.01 lbs/1,000 lbs on a dry basis.
		0.04 lb/ton of metal charged	NA
	Fugitive Emissions	0%	< 20% (6-minute average), except for one 6-minute average per hour that does not exceed 30 percent.
Pourline B	PM	0.001 lb/1,000 lb	0.01 lbs/1,000 lbs on a dry basis.
		0.03 lb/ton of metal charged	NA
	Fugitive Emissions	0%	< 20% (6-minute average), except for one 6-minute average per hour that does not exceed 30 percent.

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1. Introduction

BT Environmental Consulting, Inc. (BTEC) was retained by Huron Casting, LLC (Huron Casting) to evaluate fugitive emissions and filterable particulate matter (PM) concentrations and emissions from two baghouse duct collector exhaust stacks (FG-POUR) at the Huron Casting facility located in Pigeon, Michigan. The emissions test program was conducted on July 26th-27th, 2016. The purpose of this report is to document the results of the test program.

AQD has published a guidance document entitled "Format for Submittal of Source Emission Test Plans and Reports" (December 2013). The following is a summary of the emissions test program and results in the format suggested by the aforementioned document.

1.a Identification, Location, and Dates of Test

Sampling and analysis for the emission test program was conducted on July 26th-27th, 2016 at the Huron Casting facility located in Pigeon, Michigan. The test program included evaluation of PM and fugitive emissions from FG-POUR.

1.b Purpose of Testing

Particulate matter emissions from the two baghouse dust duct collectors (FG-POUR) are limited to 0.01 lbs/1,000 lbs on a dry basis.

In addition to the particulate matter emission limitations included in 40 CFR 63, Subpart ZZZZZ and Permit No. 207-02E:

(1) Permit No. 207-02E limits visible emissions from FG-POUR to not more than a six-minute average of five percent opacity, and
(2) Pursuant to 40 CFR 63.10895(e), fugitive emissions from foundry operations must not exhibit opacity greater than 20 percent (6-minute average), except for one 6-minute average per hour that does not exceed 30 percent.

Verification of visible emissions from FG-POUR is not required by Permit No. 207-02E. However, verification of the opacity of fugitive emissions from foundry operations is required by 40 CFR 63.10898(h).

This permit limits emissions from each baghouse as summarized by Table 1.

Table 1
Emission Limitations
Huron Casting

Source	Pollutant	Emission Limit
FG-POUR	PM	0.01 lb/1,00 lbs on a dry basis

In addition, fugitive emissions from foundry operations must not exhibit opacity greater than 20 percent (6-minute average), except for one 6-minute average per hour that does not exceed 30 percent.

1.c Source Description

EUPOURINGA: Three electric induction furnaces, Pouring line A and ancillary equipment controlled by Baghouse #3 (30,000 dscfm Waltz-Holts # 790, reverse air type). The baghouse exhausts to the in-plant environment.

EUPOURINGB: Three electric induction furnaces, Pouring line B, West end pouring line B and ancillary equipment controlled by Baghouse #11 (32,000 dscfm Dracco # 553, pulse jet type). The baghouse exhausts to the in-plant environment.

1.d Test Program Contacts

The contact for the source and test report is:

Mr. Mike Peterson
Environmental Engineer
Blue Diamond Steel Casting LLC
125 Sturm Road
Pigeon, Michigan 48755
(989) 453-3933
Ext. 218

Mr. Barry P. Boulianne
Senior Project Manager
BT Environmental Consulting, Inc.
4949 Fernlee Avenue
Royal, Michigan 48073
(313) 449-2361

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. Mike Peterson Environmental Engineer	Blue Diamond Steel Casting LLC 125 Sturm Road Pigeon, Michigan 48755	(989)-453-3933
Mr. Matthew Young Senior Project Manager	BTEC 4949 Fernlee Royal Oak, MI 48073	(248) 744-9133
Mr. Shane Rabideau Environmental Technician	BTEC 4949 Fernlee Royal Oak, MI 48073	(810) 895-1431
Mr. Jake Zott Environmental Technician	BTEC 4949 Fernlee Royal Oak, MI 48073	(586) 453-3153
David Patterson	MDEQ Air Quality Division	(517) 284-6782

2. Summary of Results

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

2.a Operating Data

Eight tons each-200 tons/day.

2.b Applicable Permit

The applicable permit for this emissions test program is Permit to Install No. 207-02E.

2.c Results

The overall results of the emission test program are summarized by Table 3 (see Section 5.a). The particulate matter emissions from the shell line were below the corresponding limit of 0.01 lb/1,000 lbs on a dry basis. The fugitive emissions were determined to be zero for the entire 60-minute observation.

3. Source Description

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

3.a Process Description

EUPOURINGA: Three electric induction furnaces, Pouring line A and ancillary equipment controlled by Baghouse #3 (30,000 dscfm Waltz-Holts # 790, reverse air type). The baghouse exhausts to the in-plant environment.

EUPOURINGB: Three electric induction furnaces, Pouring line B, West end pouring line B and ancillary equipment controlled by Baghouse #11 (32,000 dscfm Dracco # 553, pulse jet type). The baghouse exhausts to the in-plant environment.

3.b Process Flow Diagram

Due to the simplicity of the furnace, a process flow diagram is not necessary.

3.c Raw and Finished Materials

See Appendix E.

3.d Process Capacity

The furnaces were operated at maximum capacity during the emissions test program.

3.e Process Instrumentation

Process data recorded during the emissions test program includes the amount of metal poured and is available in Appendix E.

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

Sampling and analytical methodologies for the emissions test program can be separated into three categories as follows:

(1) Measurement of exhaust gas velocity, molecular weight, and moisture content;
(2) Measurement of exhaust gas filterable PM concentration using USEPA Method 5
(3) Measurement of fugitive emissions using USEPA Method 22

Sampling and analytical methodologies by category are summarized below.

Exhaust Gas Velocity, Molecular Weight, and Moisture Content

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. A diagram of the sample points is provided in Figures 2 and 3.

Cyclonic flow checks were performed at each 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 20 degrees at each sampling point.

The Molecular Weight of the gas stream was evaluated according to procedures outlined in Title 40, Part 60, Appendix A, Method 3A. The O_2 /CO_2 content of the gas stream was measured using a Fyrite combustion analyzer.

Exhaust gas was extracted as part of the PM sampling train. Exhaust gas moisture content was then determined gravimetrically.

Filterable PM (USEPA Method 5)

40 CFR 60, Appendix A, Method 5, *"Determination of Particulate Emissions from Stationary Sources"* was used to measure PM concentrations and calculate appropriate emission rates (see Figure 1 for a schematic of the sampling train).

BTEC's Nutech® Model 2010 modular isokinetic stack sampling system consisted of (1) a stainless steel nozzle, (2) a glass probe, (3) a set of four Greenburg-Smith (GS) impingers with the first two with 100 ml of H_2O (ii) an empty impinger, (iii) and an impinger filled with approximately 300 grams of silica gel, (4) a length of sample line, and (5) a Nutech® control case equipped with a pump, dry gas meter, and calibrated orifice.

Upon completion of the final leak test for each test run, the filter was recovered, and the nozzle, probe, and the front half of the filter holder assembly were brushed and triple rinsed with acetone which was collected in a pre-cleaned sample container.

BTEC labeled each container with the test number, test location, and test date, then marked the level of liquid on the outside of the container. Blank samples of the filter and acetone were collected. BTEC personnel transported all samples to BTEC's laboratory in Royal Oak, Michigan, for analysis.

4.b Recovery and Analytical Procedures

Descriptions of the recovery procedures are provided in section 4.a for each sampling method.

4.c Sampling Ports

A diagram of the stack showing sampling ports in relation to upstream and downstream disturbances is included as figure No. 2 and 3.

4.d Traverse Points

A diagram of the stack indicating traverse point locations and stack dimensions is included as figure No. 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 Tables 4 and 5.

Table 3
FG POUR Overall Emission Summary
Test Date: July 26th- 27th, 2016

Source	Pollutant	Average Emission Rate	Emission Limit
Pourline A	PM	0.002 lb/1,000 lb	0.01 lbs/1,000 lbs on a dry basis.
		0.04 lb/ton of metal charged	NA
	Fugitive Emissions	0%	< 20% (6-minute average), except for one 6-minute average per hour that does not exceed 30 percent.
Pourline B	PM	0.001 lb/1,000 lb	0.01 lbs/1,000 lbs on a dry basis.
		0.03 lb/ton of metal charged	NA
	Fugitive Emissions	0%	< 20% (6-minute average), except for one 6-minute average per hour that does not exceed 30 percent.

5.b Discussion of Results

The overall results of the emission test program are summarized by Table 3 (see Section 5.a). The particulate matter emissions from the shell line were below the corresponding limit of 0.01 lb/1,000 lbs on a dry basis. The fugitive emissions were determined to be zero for the entire 60-minute observation.

5.c Sampling Procedure Variations

During Run 1 of the testing on Pour Line A the probe became dislodged from the independent hot box. The test was paused at 10:34 AM (30 minutes and 48 seconds into test), the DGM reading was noted, and the probe was reinstalled. A leak check was performed and testing was resumed at 11:03 AM. The total sample volume for Run 1 has been corrected to account for volume lost during the mid-test leak check.

During the port change on Pour Line A Run 2 the pump was accidently run for 40 seconds resulting in sampling of ambient air. The total sample volume for Run 2 has been corrected to account for ambient air volume that was sampled.

5.d Process or Control Device Upsets

No upset conditions occurred during testing.

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 B.

5.i Sample Calculations

Sample calculations are provided in Appendix C.

5.j Field Data Sheets

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

5.k Laboratory Data

Laboratory analytical results are provided in Appendix D.

Table 4
Pourline A Particulate Matter Emission Rates

Company	**Huron Casting**			
Source Designation	**Pourline A**			
Test Date	**7/26/2016**	**7/26/2016**	**7/26/2016**	
Meter/Nozzle Information	Run 1	Run 2	Run 3	Average
Meter Temperature Tm (F)	74.3	83.5	91.6	83.1
Meter Pressure - Pm (in. Hg)	29.5	29.6	29.6	29.6
Measured Sample Volume (Vm)	61.9	74.4	76.7	71.0
Sample Volume (Vm-Std ft3)	60.3	71.3	72.5	68.0
Sample Volume (Vm-Std m3)	1.71	2.02	2.05	1.93
Condensate Volume (Vw-std)	1.150	1.315	1.320	1.262
Gas Density (Ps(std) lbs/ft3) (wet)	0.0740	0.0740	0.0740	0.0740
Gas Density (Ps(std) lbs/ft3) (dry)	0.0745	0.0745	0.0745	0.0745
Total weight of sampled gas (m g lbs) (wet)	4.54	5.38	5.46	5.13
Total weight of sampled gas (m g lbs) (dry)	4.49	5.32	5.40	5.07
Nozzle Size - An (sq. ft.)	0.000158	0.000195	0.000195	0.000182
Isokinetic Variation - I	99.7	100.4	99.6	99.9
Test Duration (minutes)	72	72	72	72
Stack Data				
Average Stack Temperature - Ts (F)	106.5	113.6	115.0	111.7
Molecular Weight Stack Gas- dry (Md)	28.8	28.8	28.8	28.8
Molecular Weight Stack Gas-wet (Ms)	28.6	28.6	28.6	28.6
Stack Gas Specific Gravity (Gs)	0.989	0.989	0.989	0.989
Percent Moisture (Bws)	1.87	1.81	1.79	1.82
Water Vapor Volume (fraction)	0.0187	0.0181	0.0179	0.0182
Pressure - Ps ("Hg)	29.2	29.2	29.2	29.2
Average Stack Velocity -Vs (ft/sec)	99.3	95.5	98.1	97.6
Area of Stack (ft2)	7.1	7.1	7.1	7.1
Exhaust Gas Flowrate				
Flowrate ft^3(Actual)	42,073	40,489	41,596	41,386
Flowrate ft^3 (Standard Wet)	38,332	36,428	37,337	37,365
Flowrate ft^3 (Standard Dry)	37,613	35,768	36,669	36,684
Flowrate m^3 (standard dry)	1,065	1,013	1,038	1,039
Process Data				
Lbs of metal charged	17,016	17,008	13,080	15,701
Total Particulate Weights (mg)				
Nozzle/Probe/Filter	5.2	2.8	2.1	3.4
Total Particulate Concentration				
lb/1000 lb (wet)	0.003	0.001	0.001	0.002
lb/1000 lb (dry)	0.003	0.001	0.001	0.002
mg/dscm (dry)	3.0	1.4	1.0	1.8
gr/dscf	0.0013	0.0006	0.0004	0.0008
Total Particulate Emission Rate				
lb/ hr	0.43	0.19	0.14	0.25
lb/ ton of metal charged	0.06	0.03	0.03	0.04

Table 5
Pourline B Particulate Matter Emission Rates

Company	**Huron Casting**			
Source Designation	**Pourline B**			
Test Date	**7/27/2016**	**7/27/2016**	**7/27/2016**	
Meter/Nozzle Information	Run 1	Run 2	Run 3	Average
Meter Temperature Tm (F)	77.4	84.1	85.4	82.3
Meter Pressure - Pm (in. Hg)	29.5	29.5	29.5	29.5
Measured Sample Volume (Vm)	74.9	78.7	76.8	76.8
Sample Volume (Vm-Std ft3)	72.5	75.3	73.3	73.7
Sample Volume (Vm-Std m3)	2.05	2.13	2.07	2.09
Condensate Volume (Vw-std)	1.410	1.679	1.669	1.586
Gas Density (Ps(std) lbs/ft3) (wet)	0.0740	0.0739	0.0739	0.0739
Gas Density (Ps(std) lbs/ft3) (dry)	0.0745	0.0745	0.0745	0.0745
Total weight of sampled gas (m g lbs) (wet)	5.47	5.69	5.54	5.56
Total weight of sampled gas (m g lbs) (dry)	5.40	5.61	5.46	5.49
Nozzle Size - An (sq. ft.)	0.000314	0.000314	0.000314	0.000314
Isokinetic Variation - I	99.6	101.5	100.8	100.6
Test Duration (minutes)	72	72	72	72
Stack Data				
Average Stack Temperature - Ts (F)	109.0	110.9	113.2	111.0
Molecular Weight Stack Gas- dry (Md)	28.8	28.8	28.8	28.8
Molecular Weight Stack Gas-wet (Ms)	28.6	28.6	28.6	28.6
Stack Gas Specific Gravity (Gs)	0.989	0.988	0.987	0.988
Percent Moisture (Bws)	1.91	2.18	2.23	2.11
Water Vapor Volume (fraction)	0.0191	0.0218	0.0223	0.0211
Pressure - Ps ("Hg)	29.2	29.2	29.2	29.2
Average Stack Velocity -Vs (ft/sec)	60.3	61.8	60.9	61.0
Area of Stack (ft2)	12.6	12.6	12.6	12.6
Exhaust Gas Flowrate				
Flowrate ft^3(Actual)	45,427	46,571	45,857	45,951
Flowrate ft^3 (Standard Wet)	41,207	42,106	41,292	41,535
Flowrate ft^3 (Standard Dry)	40,421	41,187	40,372	40,660
Flowrate m^3 (standard dry)	1,145	1,166	1,143	1,151
Process Data				
Lbs of metal charged	17,280	18,690	21,362	19,111
Total Particulate Weights (mg)				
Nozzle/Probe/Filter	3.8	3.0	2.1	3.0
Total Particulate Concentration				
lb/1000 lb (wet)	0.002	0.001	0.001	0.001
lb/1000 lb (dry)	0.002	0.001	0.001	0.001
mg/dscm (dry)	1.9	1.4	1.0	1.4
gr/dscf	0.0008	0.0006	0.0004	0.0006
Total Particulate Emission Rate				
lb/ hr	0.28	0.22	0.15	0.22
lb/ ton of metal charged	0.04	0.03	0.02	0.03

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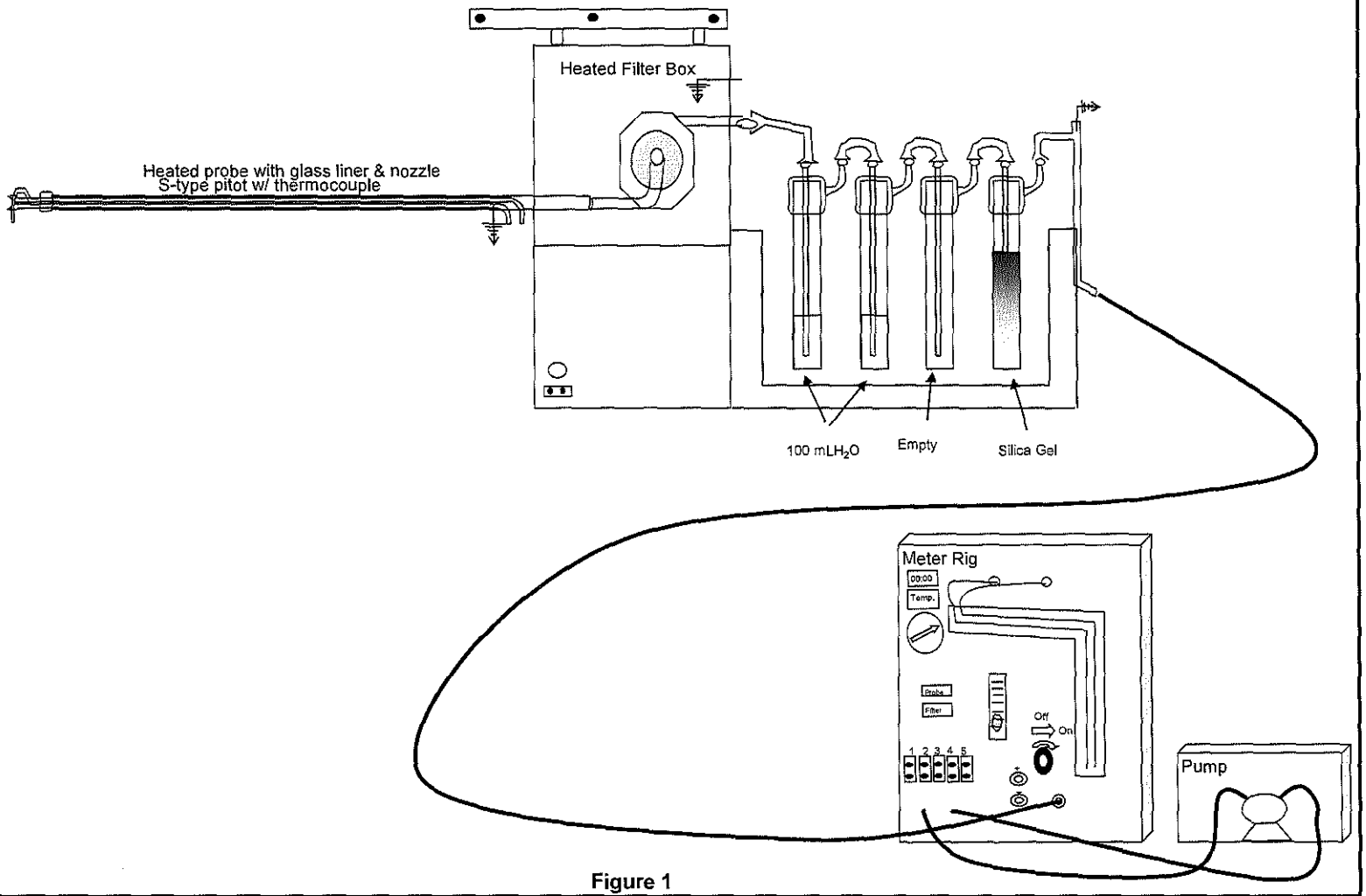
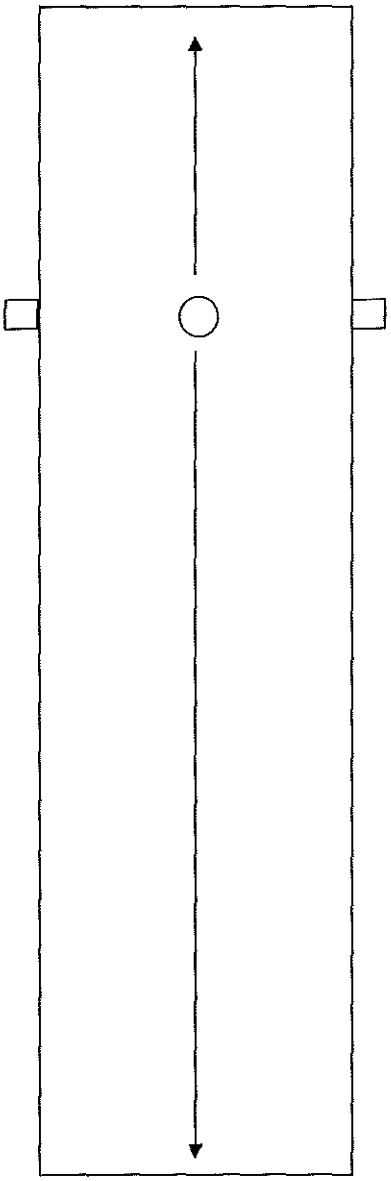


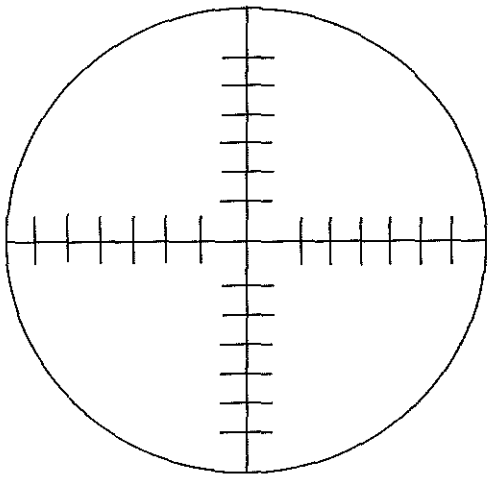
Figure 1

Site:	Sampling Dates:	
USEPA Method 5 Huron Casting Pigeon, MI	July 26 and 27, 2016	BT Environmental Consulting, Inc. 4949 Fernlee Avenue Royal Oak, MI 48073

BTEC Inc.

diameter = 36"





Not to Scale

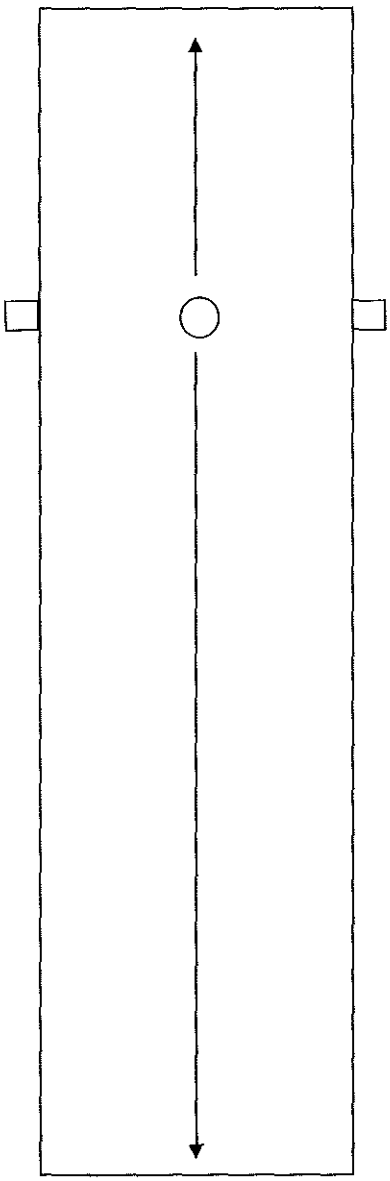
Points	Distance "
1	0.8
2	2.4
3	4.2
4	6.4
5	9.0
6	12.8
7	23.2
8	27.0
9	29.6
10	31.8
11	33.6
12	35.2

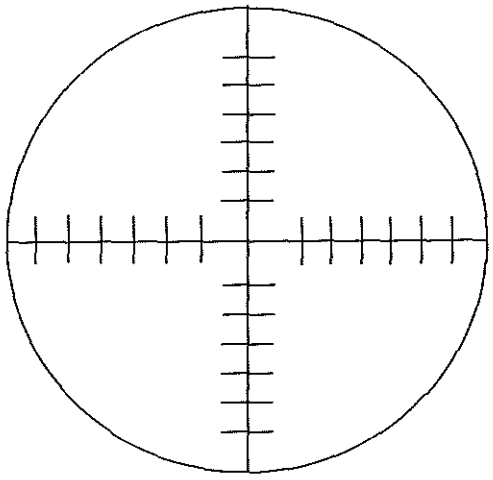
Figure 2

Site: **Pourline A** **Huron Casting** **Pigeon, Michigan**	**Sampling Dates:** **July 26, 2016**	**BT Environmental Consulting, Inc.** **4949 Fernlee** **Royal Oak, Michigan**

BTEC Inc.

diameter = 48"





Not to Scale

Points	Distance "
1	1.0
2	3.2
3	5.7
4	8.5
5	12.0
6	17.1
7	30.9
8	36.0
9	39.5
10	42.3
11	44.8
12	47.0

Figure 3

Site: **Pourline B** **Huron Casting** **Pigeon, Michigan**	**Sampling Dates:** **July 27, 2016**	**BT Environmental Consulting, Inc.** **4949 Fernlee** **Royal Oak, Michigan**