BTEC Inc.

US Steel No. 1 Argon Stir Station Emissions Test Summary Report

Prepared for:

United States Steel Corporation

Ecorse, Michigan

United States Steel Corporation
Great Lakes Works
No. 1 Quality Drive
Ecorse, Michigan 48229

Project No. 16-4859.00
July 15, 2016

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

EXECUTIVE SUMMARY

BT Environmental Consulting, Inc. (BTEC) was retained by United States Steel Corporation (U. S. Steel) to evaluate Particulate Matter (PM) emission rates from the EGARGON-STIR baghouse serving the No. 1 Argon Stir Station operations located at the U. S. Steel Great Lakes Works facility in Ecorse, Michigan. The testing is being performed as a compliance demonstration for permit No. 199600132d. The compliance test program was conducted on May 17, 2016. The purpose of this report is to document the results of the test program.

The results of the emission test program are summarized by Tables E-1 through E-3. Two overall averages are presented due to a Baghouse malfunction during run No. 3 of the testing program.

Table E-1
Test Program PM Emission Rate Summary Two Run Average

Source	Pollutant	Permit Limit	Result
No. 1 Argon Stir Station	PM	0.02 gr/dscf	0.0010 gr/dscf
		1.4 lb/hr	0.18 lb/hr
		0.543 lb/heat	0.16 lb/heat

Table E-2
Test Program PM Emission Rate Summary Three Run Average

Source	Pollutant	Permit Limit	Result
No. 1 Argon Stir Station	PM	0.02 gr/dscf	0.0070 gr/dscf
		1.4 lb/hr	1.36 lb/hr
		0.543 lb/heat	1.40 lb/heat

Table E-3
Test Program PM Emission Rate Summary

Source	Pollutant	Permit Limit	Result		
			Run 1	Run 2	Run 3
No. 1 Argon Stir Station	PM	0.02 gr/dscf	0.0012 gr/dscf	0.0008 gr/dscf	0.0189 gr/dscf
		1.4 lb/hr	0.23 lb/hr	0.14 lb/hr	3.72 lb/hr
		0.543 lb/heat	0.16 lb/heat	0.16 lb/heat	3.89 lb/heat

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

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RENEWABLE OPERATING PERMIT REPORT CERTIFICATION

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating (RO) Permit program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as described in General Condition No. 22 in the RO Permit and be made available to the Department of Environmental Quality, Air Quality Division upon request.

Source Name: United States Steel Corporation Great Lakes Works — County: Wayne

Source Address: #1 Quality Drive — City: Ecorse

AQD Source ID (SRN): A7809 — RO Permit No.: 199600132d — RO Permit Section No.: 1 & 5

Please check the appropriate box(es):

☐ **Annual Compliance Certification (General Condition No. 28 and No. 29 of the RO Permit)**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, this source was in compliance with **ALL** terms and conditions contained in the RO Permit, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the RO Permit.

☐ 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the RO Permit, each term and condition of which is identified and included by this reference, **EXCEPT** for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the RO Permit, unless otherwise indicated and described on the enclosed deviation report(s).

☐ **Semi-Annual (or More Frequent) Report Certification (General Condition No. 23 of the RO Permit)**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, **ALL** monitoring and associated recordkeeping requirements in the RO Permit were met and no deviations from these requirements or any other terms or conditions occurred.

☐ 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the RO Permit were met and no deviations from these requirements or any other terms or conditions occurred, **EXCEPT** for the deviations identified on the enclosed deviation report(s).

☒ **Other Report Certification**

Reporting period (provide inclusive dates): From May 18, 2016 To June 16, 2016

Additional monitoring reports or other applicable documents required by the RO Permit are attached as described:

Submittal of No. 1 Argon Baghouse Stack Test Results from the May 18, 2016 Test.

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete.

James R. Gray (Out of town)	General Manager	313-749-2210
Name of Responsible Official (print or type)	Title	Phone Number

Alexis Piscitelli — 15 July 2016

Signature of Responsible Official — Date

* Photocopy this form as needed.

EQP 5736 (Rev 9/01)

Introduction

BT Environmental Consulting, Inc. (BTEC) was retained by United States Steel Corporation (U. S. Steel) to evaluate Particulate Matter (PM) emission rates from the EGARGON-STIR baghouse serving the No. 1 Argon Stir Station operations located at the U. S. Steel Great Lakes Works facility in Ecorse, Michigan. The testing is being performed as a compliance demonstration for permit No. 199600132d. The compliance test program was conducted on May 17, 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 report in the format suggested by the AQD test plan format guide.

1.a Identification, Location, and Dates of Test

Sampling and analysis for the emission test program was conducted on May 17, 2016 at the U.S. Steel facility in Ecorse, Michigan. The test program included evaluation of particulate matter (PM) from the EGARGON-STIR baghouse serving the No. 1 Argon Stir Station operations.

1.b Purpose of Testing

The testing was performed as a compliance demonstration for permit No. 199600132d. Table 1 summarizes the limitations included in this permit.

Table 1
AQD Permit No. 199600132d Emission Limitations Summary

Source	Pollutant	Permit Limit
No. 1 Argon Stir Station	PM	0.02 gr/dscf
		1.4 lb/hr
		3.04 ton/yr
		0.543 lb/heat

1.c Source Description

The No.2 Basic Oxygen Processing (BOP) is a facility that converts liquid iron to liquid steel. The No.2 BOP has two top-blown conversion vessels along with other ancillary equipment. The liquid iron and steel scrap is charged in the vessels and oxygen is blown into the mixture for mixing, removal of carbon and other impurities. The now liquid steel is sometimes further process in the No.2 BOP, which may include argon stirring. After any further process is completed, steel is conveyed to the Casters where the liquid steel is cast into a continuous solid steel slab.

Argon stirring occurs after the conversion process, when it is necessary to distribute heat evenly in the liquid steel or alloy addition to the liquid steel prior to Casting. The argon stirring produces a higher quality liquid steel product. Argon stirring is also necessary when the Caster is not ready to receive liquid steel.

The ladle is placed into the Argon Stirring Station by overhead crane, and an exhaust capture hood is moved into place over the ladle. An argon-stirring lance is then lowered, and argon is injected as required.

1.d Test Program Contact

The contact for the source and test plan is:

Mr. Todd Wessel
Senior Project Manager
BT Environmental Consulting, Inc.
4949 Fernlee Avenue
Royal Oak, Michigan 48073
Phone (616) 885-4013

Mrs. Melinda Keillor
U. S. Steel Environmental
United States Steel Corporation
Great Lakes Works
No. 1 Quality Drive
Ecorse, Michigan 48229
(313) 749-3855

1.e Testing Personnel

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
Mrs. Melinda Keillor Environmental Department	U.S. Steel No. 1 Quality Drive Ecorse, Michigan 48229	(313) 749-3855
Mr. Todd Wessel Project Manager	BTEC 4949 Fernlee Avenue Royal Oak, MI 48073	(616) 885-4013
Mr. David Trahan Environmental Technician	BTEC 4949 Fernlee Avenue Royal Oak, MI 48073	(248) 548-8072

2. Summary of Results

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

2.a Operating Data

Relevant operating data is available in Appendix E.

2.b Applicable Permit

Michigan Renewable Operating Permit Number 199600132d.

2.c Results

The overall results of the emission test program are summarized by Tables 3 and 4 (see Section 5.a). Detailed results for each run can be found in tables 5 and 6.

2.d Emission Regulation Comparison

The results are summarized by Tables 3 and 4 (section 5.a). Emission limits are summarized by Table 1 (section 1.b) and also in Tables 3 and 4 (section 5.a).

3. Source Description

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

3.a Process Description

See section 1.c.

3.b Raw and Finished Materials

Typical batches consist of 240-250 tons of liquid steel. Additional alloys and flux is added as needed.

3.c Process Capacity

The No.1 Argon Stir Station can process a maximum of 13,505 heats per year of operation.

3.d Process Instrumentation

The process stack data will consist of the sequence number and the timing of process.

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

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 - *"Sample and Velocity Traverses for Stationary Sources"*
- Method 2 - *"Determination of Stack Gas Velocity and Volumetric Flowrate"*
- Method 3 - *"Gas Analysis for the Determination of Dry Molecular Weight" (Fyrite Analysis)*
- Method 4 - "Determination of Moisture Content in Stack Gases"
- Method 17 - *"Determination of Particulate Emissions from Stationary Sources"*

Stack gas velocity traverses were conducted in accordance with the procedures outlined in Methods 1 and 2. Figure 1 presents the test port and traverse/sampling point locations used. An S-type pitot tube and thermocouple assembly calibrated in accordance with Method 2, Section 4.1.1 was used to measure exhaust gas velocity pressures and temperatures during testing. Because the pitot tube dimensions outlined in Sections 2-6 through 2-8 were within the specified limits, the baseline pitot tube coefficient of 0.84 (dimensionless) was assigned for this testing.

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 PM sampling train 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.

40 CFR 60, Appendix A, Method 17, *"Determination of Particulate Emissions from Stationary Sources"* was used to measure PM concentrations and calculate PM emission

rates (see Figure 2 for a schematic of the sampling train). Triplicate 60-minute test runs were conducted on the No. 1 Argon Stir Station Stack.

BTEC's Nutech® Model 2010 modular isokinetic stack sampling system consisted of (1) a stainless-steel nozzle, (2) an in stack stainless-steel filter housing, (3) a steel probe, (4) a set of four Greenburg-Smith (GS) impingers with the first modified and second standard GS impingers each containing 100 ml of deionized water, and with a third dry modified GS impinger and a fourth modified GS impinger containing approximately 300 g of silica gel desiccant, (5) a length of sample line, and (6) a Nutech® control case equipped with a pump, dry gas meter, and calibrated orifice.

A sampling train leak test was conducted before and after each test run. After completion of the final leak test for each test run, the filter was recovered, and the nozzle and the front half of the filter holder assembly were brushed and triple rinsed with acetone. The acetone rinses were collected in a pre-cleaned sample container.

BTEC labeled each container with the test number, test location, and test date, and marked the level of liquid on the outside of the container. In addition blank samples of the acetone and filter were collected. BTEC personnel carried all samples to BTEC's laboratory (for filter and acetone gravimetric analysis) in Royal Oak, Michigan.

4.b Recovery and Analytical Procedures

Recovery and analytical procedures were described in Section 4.a.

4.c Sampling Ports

Sampling ports are located on the No. 1 Argon Stir Station exhaust duct and meet method 1 criteria.

4.d Traverse Points

Sampling port and traverse point locations for the No. 1 Argon Stir Station exhaust stack is illustrated by Figure 1.

5. Test Results and Discussion

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

5.a Results Tabulation

The results of the emissions test program are summarized by Tables 3-5.

Table 3
Test Program PM Emission Rate Summary Two Run Average

Source	Pollutant	Permit Limit	Result
No. 1 Argon Stir Station	PM	0.02 gr/dscf	0.0010 gr/dscf
		1.4 lb/hr	0.18 lb/hr
		0.543 lb/heat	0.16 lb/heat

Table 4
Test Program PM Emission Rate Summary Three Run Average

Source	Pollutant	Permit Limit	Result
No. 1 Argon Stir Station	PM	0.02 gr/dscf	0.0070 gr/dscf
		1.4 lb/hr	1.36 lb/hr
		0.543 lb/heat	1.40 lb/heat

Table 5
Test Program PM Emission Rate Summary

Source	Pollutant	Permit Limit	Result		
			Run 1	Run 2	Run 3
No. 1 Argon Stir Station	PM	0.02 gr/dscf	0.0012 gr/dscf	0.0008 gr/dscf	0.0189 gr/dscf
		1.4 lb/hr	0.23 lb/hr	0.14 lb/hr	3.72 lb/hr
		0.543 lb/heat	0.16 lb/heat	0.16 lb/heat	3.89 lb/heat

Detailed data for each test run can be found in Tables 6 and 7.

5.b Discussion of Results

Emission limitations for Permit No. 199600132d are summarized by Table 1 (see section 1.b) and Tables 3-5 (see section 5.a). The results of the emissions test program are summarized by Tables 3-5 (see section 5.a). Two tables are presented due to the baghouse malfunctioning during test run number three (3). During test run number 3 the baghouse was locked in a cleaning cycle.

During test number three (3) it was discovered that the baghouse malfunctioned and was locked in a cleaning cycle. This condition does not represent normal operation for the baghouse.

On Monday, May 30, 2016 at approximately 10:15 pm, the south chamber to the No. 1 Argon baghouse caught fire. The No. 1 Argon baghouse was shut down and electrical isolated by 10:19pm. The cause of the fire is unknown. U. S. Steel will be scheduling

another No. 1 Argon Baghouse Stack Test due to the repairs made to the baghouse because of the fire.

Unfortunately, the draft results were not available until after the date of the fire. The timing of these events limited the options available for investigation of the No. 1 Argon Baghouse malfunction which occurred during the 3rd test run; however U.S. Steel is continuing to investigate both potential cause(s) of the malfunction and operational control(s) prevent re-occurrence. U.S. Steel believes that the regulations allow U.S. Steel to average the first 2 test runs due to the baghouse malfunction.

40 CFR 60.8(f):

"(f) Unless otherwise specified in the applicable subpart, each performance test shall consist of three separate runs using the applicable test method. Each run shall be conducted for the time and under the conditions specified in the applicable standard. For the purpose of determining compliance with an applicable standard, the arithmetic means of results of the three runs shall apply. In the event that a sample is accidentally lost or conditions occur in which one of the three runs must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sample train, extreme meteorological conditions, or other circumstances, beyond the owner or operator's control, compliance may, upon the Administrator's approval, be determined using the arithmetic mean of the results of the two other runs."

40 CFR 63.7(e)(3):

"(3) Unless otherwise specified in a relevant standard or test method, each performance test shall consist of three separate runs using the applicable test method. Each run shall be conducted for the time and under the conditions specified in the relevant standard. For the purpose of determining compliance with a relevant standard, the arithmetic mean of the results of the three runs shall apply. Upon receiving approval from the Administrator, results of a test run may be replaced with results of an additional test run in the event that—
(i) A sample is accidentally lost after the testing team leaves the site; or
(ii) Conditions occur in which one of the three runs must be discontinued because of forced shutdown; or
(iii) Extreme meteorological conditions occur; or
(iv) Other circumstances occur that are beyond the owner or operator's control."

Michigan Rule R 336.2003(2):

"(2) A performance test shall consist of a minimum of 3 separate samples of a specific air contaminant conducted within a 36-hour period, unless otherwise authorized by the department. Each of the 3 separate samples shall be obtained while Page 3 Courtesy of www.michigan.gov/orr the source is operating at a similar production level. For the purpose of determining compliance with an

applicable emission limit, rule, or permit condition, the arithmetic mean of results of the 3 samples shall apply. If a sample is accidentally lost or conditions occur in which 1 of the 3 samples must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sampling train, extreme meteorological conditions, or other circumstances beyond the owner's or operator's control, then compliance may, upon the approval of the department, be determined using the arithmetic mean of the results of 2 samples."

5.c Sampling Procedure Variations

There were no sampling procedure variations used during the emission compliance test program.

5.d Process or Control Device Upsets

See 5.b. -

5.e Control Device Maintenance

No maintenance was performed during the test program.

5.f Audit Sample Analyses

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

5.g Calibration Sheets

Relevant equipment calibration documents are provided as Appendix B.

5.h Sample Calculations

Sample calculations are provided in Appendix C.

5.i Field Data Sheets

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

5.j Laboratory Data

Laboratory results for this test program are provided in Appendix D.

Tables

Table 6
No. 1 Argon Stir Station PM Emission Rate Summary Two Run Average

Company	**US Steel**		
Source Designation	**#1 Argon Stir**		
Test Date	**5/17/2016**	**5/17/2016**	
Meter/Nozzle Information	Run 1	Run 2	Average
Meter Temperature Tm (F)	64.3	69.6	67.0
Meter Pressure - Pm (in. Hg)	29.6	29.6	29.6
Measured Sample Volume (Vm)	37.3	35.7	36.5
Sample Volume (Vm-Std ft3)	37.2	35.2	36.2
Sample Volume (Vm-Std m3)	1.05	1.00	1.02
Condensate Volume (Vw-std)	0.283	0.330	0.306
Gas Density (Ps(std) lbs/ft3) (wet)	0.0743	0.0743	0.0743
Gas Density (Ps(std) lbs/ft3) (dry)	0.0745	0.0745	0.0745
Total weight of sampled gas (m g lbs) (wet)	2.78	2.64	2.71
Total weight of sampled gas (m g lbs) (dry)	2.77	2.62	2.70
Nozzle Size - An (sq. ft.)	0.000177	0.000177	0.000177
Isokinetic Variation - I	100.7	100.2	100.4
Total Time Elapsed During Test Period (minutes)[1]	86	97	91.5
Production Time During Test Period (minutes)[1]	57	63	60.0
Non Production Time During Test Period (minutes)[1]	29	34	31.5
Production Data			
Heats / Run[2]	2.079	1.429	1.754
Stack Data			
Average Stack Temperature - Ts (F)	117.1	129.8	123.4
Molecular Weight Stack Gas- dry (Md)	28.8	28.8	28.8
Molecular Weight Stack Gas-wet (Ms)	28.8	28.7	28.7
Stack Gas Specific Gravity (Gs)	0.993	0.992	0.993
Percent Moisture (Bws)	0.76	0.93	0.84
Water Vapor Volume (fraction)	0.0076	0.0093	0.0084
Pressure - Ps ("Hg)	29.5	29.5	29.5
Average Stack Velocity -Vs (ft/sec)	64.9	63.2	64.0
Area of Stack (ft2)	9.2	9.2	9.2
Exhaust Gas Flowrate			
Flowrate ft^3(Actual)	35,658	34,725	35,192
Flowrate ft^3 (Standard Wet)	32,153	30,639	31,396
Flowrate ft^3 (Standard Dry)	31,910	30,354	31,132
Flowrate m^3 (standard dry)	904	860	882
Total Particulate Weights (mg)			
Nozzle/Probe/Filter	3.0	1.9	2.5
Total Particulate Concentration			
lb/1000 lb (wet)	0.002	0.002	0.002
lb/1000 lb (dry)	0.002	0.002	0.002
mg/dscm (dry)	2.8	1.9	2.4
lb/dscf (dry)	1.78E-07	1.19E-07	1.48E-07
gr/dscf	0.0012	0.0008	0.0010
Total Particulate Emission Rate			
lb/ operating hr - during test	0.34	0.22	0.28
lb/ hr - Overall Including Non-operational Time	0.23	0.14	0.18
lb/ heat[3]	0.16	0.16	0.16

1: Test period = Time from initial time stamp to final time stamp and includes both sampling time and non sampling tim
2: Please see Production data in Appendix E for a summary of Heats/Run
3: lb/ heat calculated using "lb / operating hr - during test"
(lb/operating hr) * (1 operating hr / 60 minutes) * (Production time during test period) / (Heats/Run) = lb/heat

Table 7
No. 1 Argon Stir Station PM Emission Rate Summary Three Run Average

Company	**US Steel**			
Source Designation	**#1 Argon Stir**			
Test Date	**5/17/2016**	**5/17/2016**	**5/17/2016**	
Meter/Nozzle Information	Run 1	Run 2	Run 3	Average
Meter Temperature Tm (F)	64.3	69.6	72.8	68.9
Meter Pressure - Pm (in. Hg)	29.6	29.6	29.6	29.6
Measured Sample Volume (Vm)	37.3	35.7	36.6	36.6
Sample Volume (Vm-Std ft3)	37.2	35.2	35.9	36.1
Sample Volume (Vm-Std m3)	1.05	1.00	1.02	1.02
Condensate Volume (Vw-std)	0.283	0.330	0.519	0.377
Gas Density (Ps(std) lbs/ft3) (wet)	0.0743	0.0743	0.0741	0.0742
Gas Density (Ps(std) lbs/ft3) (dry)	0.0745	0.0745	0.0745	0.0745
Total weight of sampled gas (m g lbs) (wet)	2.78	2.64	2.70	2.71
Total weight of sampled gas (m g lbs) (dry)	2.77	2.62	2.68	2.69
Nozzle Size - An (sq. ft.)	0.000177	0.000177	0.000177	0.000177
Isokinetic Variation - I	100.7	100.2	99.7	100.2
Total Time Elapsed During Test Period (minutes)[1]	86	97	68	83.7
Production Time During Test Period (minutes)[1]	57	63	50	56.7
Non Production Time During Test Period (minutes)[1]	29	34	18	27.0
Production Data				
Heats / Run[2]	2.079	1.429	1.086	1.531
Stack Data				
Average Stack Temperature - Ts (F)	117.1	129.8	126.5	124.4
Molecular Weight Stack Gas- dry (Md)	28.8	28.8	28.8	28.8
Molecular Weight Stack Gas-wet (Ms)	28.8	28.7	28.7	28.7
Stack Gas Specific Gravity (Gs)	0.993	0.992	0.990	0.992
Percent Moisture (Bws)	0.76	0.93	1.42	1.04
Water Vapor Volume (fraction)	0.0076	0.0093	0.0142	0.0104
Pressure - Ps ("Hg)	29.5	29.5	29.5	29.5
Average Stack Velocity -Vs (ft/sec)	64.9	63.2	64.7	64.2
Area of Stack (ft2)	9.2	9.2	9.2	9.2
Exhaust Gas Flowrate				
Flowrate ft^3(Actual)	35,658	34,725	35,581	35,322
Flowrate ft^3 (Standard Wet)	32,153	30,639	31,568	31,453
Flowrate ft^3 (Standard Dry)	31,910	30,354	31,119	31,128
Flowrate m^3 (standard dry)	904	860	881	881
Total Particulate Weights (mg)				
Nozzle/Probe/Filter	3.0	1.9	44.0	16.3
Total Particulate Concentration				
lb/1000 lb (wet)	0.002	0.002	0.036	0.013
lb/1000 lb (dry)	0.002	0.002	0.036	0.013
mg/dscm (dry)	2.8	1.9	43.3	16.0
lb/dscf (dry)	1.78E-07	1.19E-07	2.70E-06	1.00E-06
gr/dscf	0.0012	0.0008	0.0189	0.0070
Total Particulate Emission Rate				
lb/ operating hr - during test	0.34	0.22	5.06	1.87
lb/ hr - Overall Including Non-operational Time	0.23	0.14	3.72	1.36
lb/ heat[3]	0.16	0.16	3.89	1.40

1: Test period = Time from initial time stamp to final time stamp and includes both sampling time and non sampling time
2: Please see Production data in Appendix E for a summary of Heats/Run
3: lb/ heat calculated using "lb / operating hr - during test"
(lb/operating hr) * (1 operating hr / 60 minutes) * (Production time during test period) / (Heats/Run) = lb/heat

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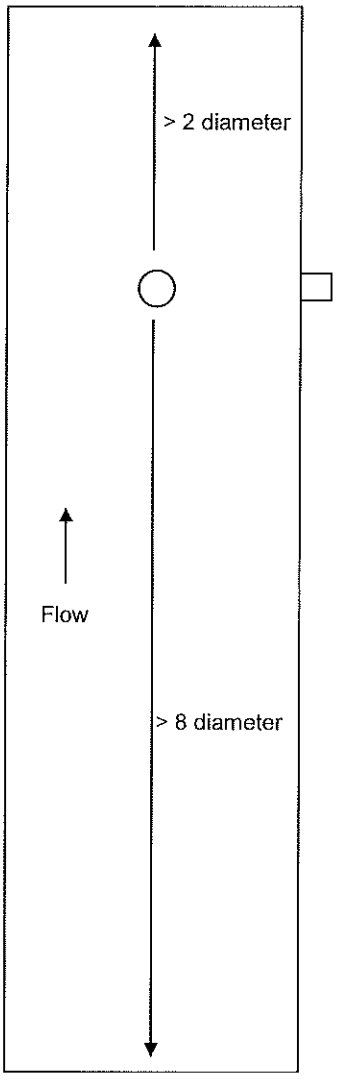
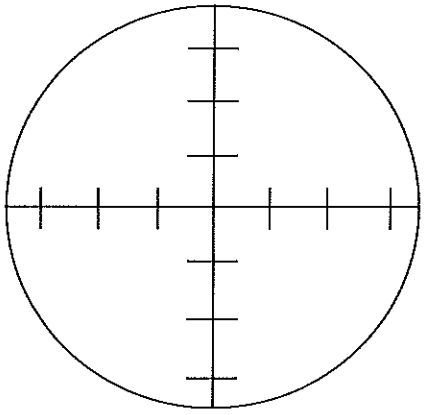
Figures

BTEC Inc.

diameter = 42 inches





Not to Scale

Points	Distance "
1	1.8
2	6.1
3	12.4
4	29.6
5	35.9
6	40.2

Figure No. 1

Site: **No. 1 Argon** **US Steel** **Ecorse, Michigan**	**Sampling Date:** **May 17, 2016**

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

BTEC Inc.

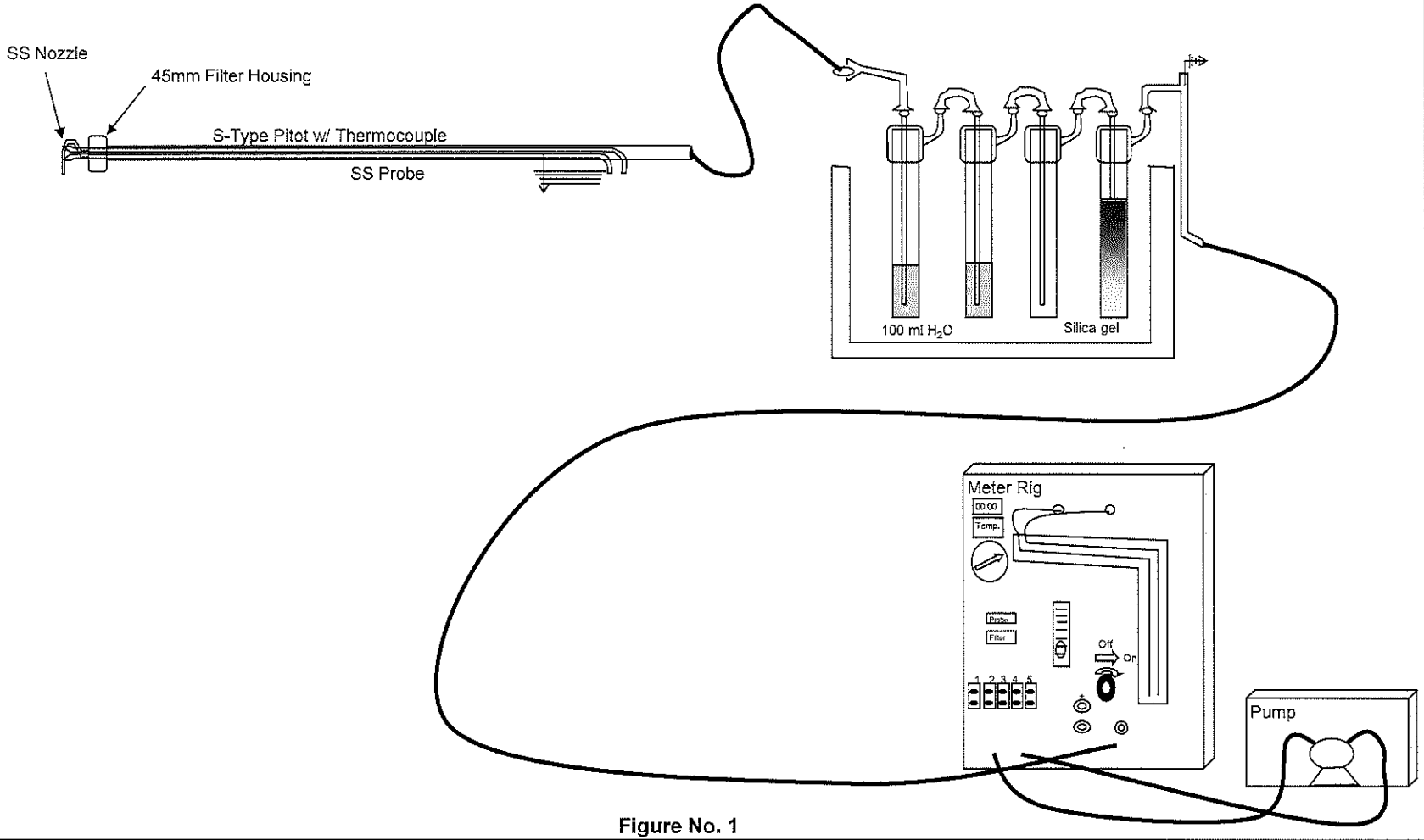


Figure No. 1

Site: USEPA Method 17 US Steel Ecorse, Michigan	Sampling Date: May 17, 2016	BT Environmental Consulting, Inc. 4949 Fernlee Avenue Royal Oak, Michigan 48073