

# COMPLIANCE STACK EMISSION TEST REPORT

## BASIC OXYGEN FURNACE (EUBOF) AND BASIC OXYGEN FURNACE SHOP OPERATIONS (FGBOFSHOP)

### Determination of Manganese, and Lead Emissions

#### Utilizing US EPA Methods 1, 2, 3, 4, and 29

Test Date(s): December 17, 2019  
Facility ID: A8640  
Source Location: Dearborn, Michigan  
Permit: EGLE Renewable Operating Permit  
No. MI-ROP-A8640-2016a

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**TEST RESULTS SUMMARY**


<b>Source Name:</b>	<b>Basic Oxygen Furnace (BOF)</b>	<b>BOF Shop Operations</b>
<b>Source ID :</b>	<b>EUBOF</b>	<b>FGBOFSHOP</b>
<b>Control Device:</b>	<b>Electrostatic Precipitator (ESP)</b>	<b>SEC Baghouse</b>
<b>Sampling Location:</b>	<b>Exhaust Stack</b>	<b>Exhaust Stack</b>
<b>Sampling Location ID:</b>	<b>SVBOFESP</b>	<b>SVBOFBH</b>
<b>Test Date:</b>	<b>12/17/2019</b>	
<b>Production Rate (ton/hr)*</b>	<b>316.9</b>	
<b>Manganese Emissions (lb/hr)</b>	<b>0.17</b>	<b>0.01</b>
<i>Permit Limit - Manganese (lb/hr)</i>	<i>NA</i>	<i>0.07</i>
<i>Compliance Permit Requirement Met (YES/NO)</i>	<i>NA</i>	<i>YES</i>
<b>Combined Manganese Emissions (lb/hr)</b>	<b>0.18</b>	
<i>Combined Permit Limit - Manganese (lb/hr)</i>	<i>0.10</i>	
<i>Compliance Permit Requirement Met (YES/NO)</i>	<i>NO</i>	
<b>Combined Lead Emissions (lb/hr)</b>	<b>0.118</b>	
<i>Combined Permit Limit - Lead (lb/hr)</i>	<i>0.067</i>	
<i>Compliance Permit Requirement Met (YES/NO)</i>	<i>NO</i>	
<b>Lead Emissions (lb/hr)</b>	<b>0.116</b>	<b>0.0025</b>
<b>EGLE Renewable Operating Permit No.:</b>	<b>MI-ROP-A8640-2016a</b>	

\* Production data was provided by AK Steel Corporation - Dearborn Works personnel.

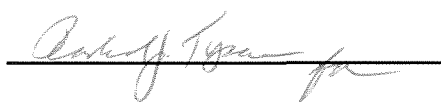
### REVIEW AND CERTIFICATION

The results of the Compliance Test conducted on December 17, 2019 are a product of the application of the United States Environmental Protection Agency (US EPA) Stationary Source Sampling Methods listed in 40 CFR Part 60, and Appendix A, 40 CFR Part 51, Appendix M, that were in effect at the time of this test.

All work, calculations, and other activities and tasks performed and presented in this document were carried out by me or under my direction and supervision. I hereby certify that, to the best of my knowledge, Montrose operated in conformance with the requirements of the Montrose Quality Management System and ASTM D7036-04 during this test project.

Signature:  Date: 2/11/20  
Name: Steven Smith Title: Client Project Manager

I have reviewed, technically and editorially, details, calculations, results, conclusions, and other appropriate written materials contained herein. I hereby certify that, to the best of my knowledge, the presented material is authentic, accurate, and conforms to the requirements of the Montrose Quality Management System and ASTM D7036-04.

Signature:  Date: 2-10-20  
Name: Matthew Young Title: District Manager

## **1.0 INTRODUCTION**

### **1.1 SUMMARY OF TEST PROGRAM**

The AK Steel Corporation - Dearborn Works (Facility ID: A8640), located in Dearborn, Michigan, contracted Montrose Air Quality Services, LLC (Montrose) of Detroit, Michigan, to conduct compliance stack emission testing for their Basic Oxygen Furnace (EUBOF) and Basic Oxygen Furnace Shop Operations (FGBOFSHOP). Testing was performed to satisfy the emissions testing requirements pursuant to Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operating Permit MI-ROP-A8640-2016a. The testing was performed on December 17, 2019.

Simultaneous sampling was performed at the EUBOF electrostatic precipitator (ESP) Exhaust Stack (SVBOFESP) and FGBOFSHOP secondary emissions capture (SEC) Baghouse Exhaust Stack (SVBOFBH) to determine the combined emissions of manganese (Mn), and lead (Pb). Testing was conducted during normal shop operations. During this test emissions from EUBOF and FGBOFSHOP were controlled by an ESP and a baghouse.

The test methods that were conducted during this test were US EPA Methods 1, 2, 3, 4, and 29.

### **1.2 KEY PERSONNEL**

The key personnel who coordinated this test program (and their phone numbers) were:

- David Pate, Senior Environmental Engineer, AK Steel Dearborn Works, 313-323-1261
- Mark Dziadosz, Environmental Quality Analyst (EQA), Michigan Department of Environment, Great Lakes and Energy (EGLE), 586-753-3745
- Jonathan Lamb, EQA, EGLE, 313-456-4685
- Steven Smith QI, Client Project Manager, Montrose, 734-751-9701
- Mason Sakshaug QI, Field Project Manager, Montrose, 248-548-7980
- David Trahan QI, Field Project Manager, Montrose, 248-548-7980
- Jeff Peitsch QI, Field Technician, Montrose, 248-548-7980
- Jacob Young QI, Field Technician, Montrose, 248-548-7980

## **2.0 SUMMARY AND DISCUSSION OF TEST RESULTS**

### **2.1 OBJECTIVES AND TEST MATRIX**

The purpose of this test was to determine the emissions of Mn and Pb at the ESP Exhaust Stack and SEC Baghouse Exhaust Stack during normal shop operations. Testing was performed to satisfy the emissions testing requirements pursuant to EGLE Renewable Operating Permit MI-ROP-A8640-2016a.

The specific test objectives for this test were as follows:

- Simultaneously measure the concentrations of Mn and Pb at the ESP Exhaust Stack and SEC Baghouse Exhaust Stack.
- Simultaneously measure the actual and dry standard volumetric flow rate of the stack gas at the ESP Exhaust Stack and SEC Baghouse Exhaust Stack.
- Utilize the above variables to determine the emissions of Mn and Pb at the ESP Exhaust Stack and SEC Baghouse Exhaust Stack during normal shop operations.

Table 2.1 presents the sampling matrix log for this test.

### **2.2 FIELD TEST CHANGES AND PROBLEMS**

No field test changes or problems occurred during the performance of this test that would bias the accuracy of the results of this test.

### **2.3 PRESENTATION OF RESULTS**

One sampling train was utilized during each run at the ESP Exhaust Stack and SEC Baghouse Exhaust Stack to determine the emissions of Mn and Pb. At each location, the sampling train measured the stack gas volumetric flow rate, moisture content, and concentrations of Mn and Pb. Grab samples of the stack gas were analyzed for dry molecular weight determination.

Table 2.2 displays the emissions of Mn and Pb measured at the ESP Exhaust Stack during normal shop operations.

Table 2.3 displays the emissions of Mn and Pb measured at the SEC Exhaust Stack during normal shop operations.

## **2.4 TEST METHOD DEVIATIONS**

### **2.4.1 ESP Exhaust Stack Sampling**

In order to provide a more representative sample, port changes did not take place during the oxygen blowing portion of the heat.

Testing was performed for an integral number of production cycles. All sample points were sampled while the heat was still in progress. Sampling was repeated for the final test port (and if necessary, moved to the previous test port) until the production cycle was completed.

The BOF facility at Dearborn Works consists of 2 BOF Vessels. The end of a heat on one vessel could overlap with portions of a heat on the other vessel. In this case, testing was concluded 3 minutes after the slag was emptied from the vessel being tested into a slag pot. For production calculations, production from the overlapping heat was pro-rated and included in the production rate calculations.

### **2.4.2 SEC Baghouse Exhaust Stack Sampling**

Testing was performed for an integral number of production cycles. All sample points were sampled while the heat was still in progress. Sampling was repeated for the final test port (and if necessary, moved to the previous test port) until the production cycle was completed.

The BOF facility at Dearborn Works consists of 2 BOF Vessels. The end of a heat on one vessel could overlap with portions of a heat on the other vessel. In this case, testing was concluded 3 minutes after the slag was emptied from the vessel being tested into a slag pot. For production calculations, production from the overlapping heat was pro-rated and included in the production rate calculations.

All method deviations were specified in the test protocols and were approved in the EGLE test plan and approval letters. See Appendix E of this report.

The ESP Test Plan specified that US EPA Method 3A would be utilized to measure O<sub>2</sub> and CO<sub>2</sub> content in the ESP exhaust gas. During the August 13-14, 2019 testing, O<sub>2</sub> and CO<sub>2</sub> were measured along with NO<sub>x</sub> and CO concentrations from a test trailer. A test trailer was not used during this mobilization, therefore, US EPA Method 3 was utilized to measure O<sub>2</sub> and CO<sub>2</sub> at the ESP. This was requested prior to testing and this was further discussed with the EGLE Inspector onsite at the time of the test.



AK Steel Corporation - Dearborn Works  
 December 2019 EUBOF and FGBOFSHOP Compliance Test

**TABLE 2.1  
 SAMPLING MATRIX OF TEST METHODS UTILIZED**

Date	Run No.	Sampling Location	US EPA METHODS 1/2 (Flow)	US EPA METHOD 3 (Dry Molecular Wt.)	US EPA METHOD 4 (%H <sub>2</sub> O)	US EPA METHOD 29 (Mn, Pb)
			Sampling Time / Duration (min)	Sampling Time / Duration (min)	Sampling Time / Duration (min)	Sampling Time / Duration (min)
12/17/2019	1	ESP Exhaust Stack	8:29 - 11:29 / 147	8:35 - 9:48 / 3	8:29 - 11:29 / 147	8:29 - 11:29 / 147
12/17/2019	2	ESP Exhaust Stack	12:20 - 14:56 / 140	12:27 - 13:29 / 3	12:20 - 14:56 / 140	12:20 - 14:56 / 140
12/17/2019	3	ESP Exhaust Stack	15:28 - 18:14 / 146	15:33 - 16:43 / 3	15:28 - 18:14 / 146	15:28 - 18:14 / 146
12/17/2019	1	SEC Baghouse Exhaust Stack	8:29 - 11:29 / 134	8:45 - 10:15 / 3	8:29 - 11:29 / 134	8:29 - 11:29 / 134
12/17/2019	2	SEC Baghouse Exhaust Stack	12:20 - 14:56 / 132	12:30 - 13:30 / 3	12:20 - 14:56 / 132	12:20 - 14:56 / 132
12/17/2019	3	SEC Baghouse Exhaust Stack	15:28 - 18:14 / 132	15:30 - 16:00 / 3	15:28 - 18:14 / 132	15:28 - 18:14 / 132

All times are Eastern Daylight Time.

**TABLE 2.2  
 EMISSION RESULTS**

Parameter	ESP Exhaust Stack			
	Run 1	Run 2	Run 3	Average
Lead Emissions (lb/hr)	0.13	0.10	0.12	0.12
Lead Concentration (mg/dscm)	0.064	0.049	0.064	0.059
Manganese Emissions (lb/hr)	0.17	0.17	0.18	0.17
Manganese Concentration (mg/dscm)	0.086	0.086	0.092	0.088
Stack Gas Average Flow Rate (acfm)	740,205	735,259	733,636	736,367
Stack Gas Average Flow Rate (scfm)	596,321	589,401	574,194	586,638
Stack Gas Average Flow Rate (dscfm)	533,587	523,071	510,247	522,302
Stack Gas Average Velocity (fpm)	3,261	3,239	3,232	3,244
Stack Gas Average Static Pressure (in-H <sub>2</sub> O)	-0.60	-0.60	-0.60	-0.60
Stack Gas Average Temperature (°F)	180	183	199	187
Stack Gas Percent by Volume Moisture (%H <sub>2</sub> O)	10.5	11.3	11.1	11.0
Measured Stack Inner Diameter (in)		204		
Percent by Volume Carbon Dioxide in Stack Gas (%-dry)	2.33	2.00	2.17	2.17
Percent by Volume Oxygen in Stack Gas (%-dry)	17.50	17.17	17.00	17.22
Percent by Volume Nitrogen in Stack Gas (%-dry)	80.17	80.83	80.83	80.61

**TABLE 2.3  
 EMISSION RESULTS**

Parameter	SEC Baghouse Exhaust Stack			
	Run 1	Run 2	Run 3	Average
Lead Emissions (lb/hr)	0.0034	0.0023	0.0017	0.0025
Lead Concentration (mg/dscm)	0.0017	0.0017	0.00104	0.0015
Manganese Emissions (lb/hr)	0.0088	0.0044	0.0038	0.0057
Manganese Concentration (mg/dscm)	0.0045	0.0033	0.0023	0.0034
Stack Gas Average Flow Rate (acfm)	531,449	369,922	461,329	454,234
Stack Gas Average Flow Rate (scfm)	525,124	361,117	444,284	443,508
Stack Gas Average Flow Rate (dscfm)	522,446	359,289	442,154	441,296
Stack Gas Average Velocity (fpm)	1,977	1,376	1,716	1,690
Stack Gas Average Static Pressure (in-H <sub>2</sub> O)	-0.30	-0.30	-0.30	-0.30
Stack Gas Average Temperature (°F)	62	68	76	69
Stack Gas Percent by Volume Moisture (%H <sub>2</sub> O)	0.51	0.51	0.48	0.50
Measured Stack Inner Diameter (in)		222		
Percent by Volume Carbon Dioxide in Stack Gas (%-dry)	0.00	0.00	0.00	0.00
Percent by Volume Oxygen in Stack Gas (%-dry)	20.90	20.90	20.90	20.90
Percent by Volume Nitrogen in Stack Gas (%-dry)	79.10	79.10	79.10	79.10

## **3.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS**

### **3.1 PROCESS DESCRIPTION AND OPERATION**

AK Steel Corporation - Dearborn Works is a steel-producing facility. The facility operates a Basic Oxygen Furnace (BOF) (EUBOF) which was in operation during this test event. The process and its operations are described in detail in Sections 1.b - 1.f of Test Plans M049AS-555875-PP-7 and M049AS-555875-PP-16 in Appendix E of this report.

Figure 3.1 schematically depicts the sampling location.

### **3.2 CONTROL EQUIPMENT DESCRIPTION**

During this test, emissions from BOF and FGBOFSHOP were controlled by an ESP and a baghouse.

### **3.3 SAMPLING LOCATION(S)**

#### **3.3.1 ESP Exhaust Stack**

The ESP Exhaust Stack had an inner diameter of 204-inches, was oriented in the vertical plane, and was accessed from a permanent platform. Four sampling ports were located 90° apart from one another at a location that met US EPA Method 1, Section 11.1.1 criteria. Prior to emissions sampling, the stack was traversed to verify the absence of cyclonic flow. An average yaw angle of 0.0° was measured. Therefore, the sampling location also met US EPA Method 1, Section 11.4.2 criteria. During emissions sampling, the stack was traversed for stack gas volumetric flow rate, moisture content, and Mn and Pb concentration determinations. Grab samples were obtained for stack gas dry molecular weight determination.

#### **3.3.2 SEC Baghouse Exhaust Stack**

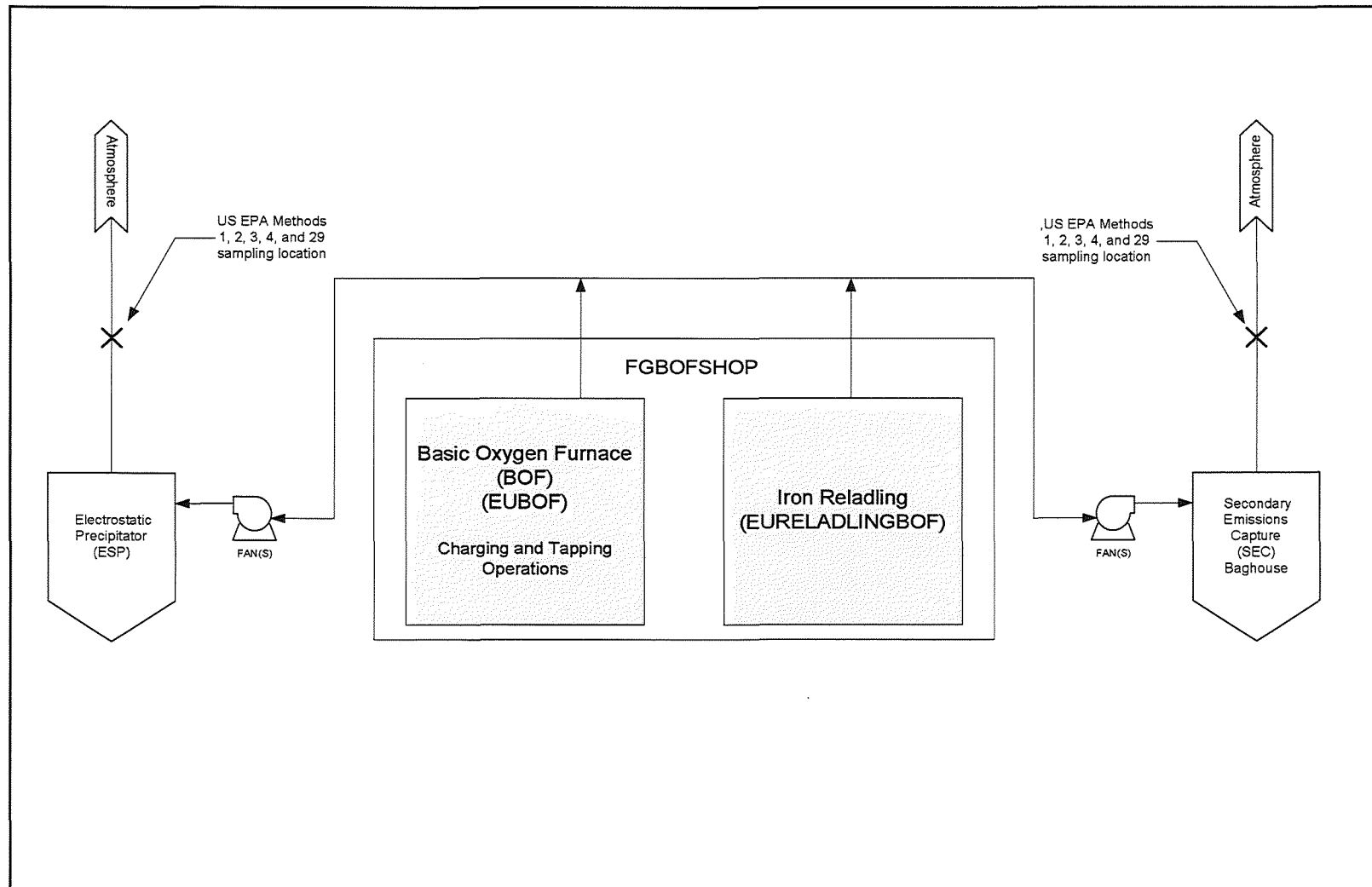
The SEC Baghouse Exhaust Stack had an inner diameter of 222-inches, was oriented in the vertical plane, and was accessed from a permanent platform. Four sampling ports were located 90° apart from one another at a location that met US EPA Method 1, Section 11.1.1 criteria. Prior to emissions sampling, the stack was traversed to verify the absence of cyclonic flow. An average yaw angle of 0.0° was measured. Therefore, the sampling location also met US EPA Method 1, Section 11.4.2 criteria. During emissions sampling, the stack was traversed for stack gas volumetric flow rate, moisture content, and Mn and Pb concentration determinations. Grab samples were obtained for stack gas dry molecular weight determination.

Figures 3.2 and 3.3 schematically illustrate the traverse point and sample port locations utilized.

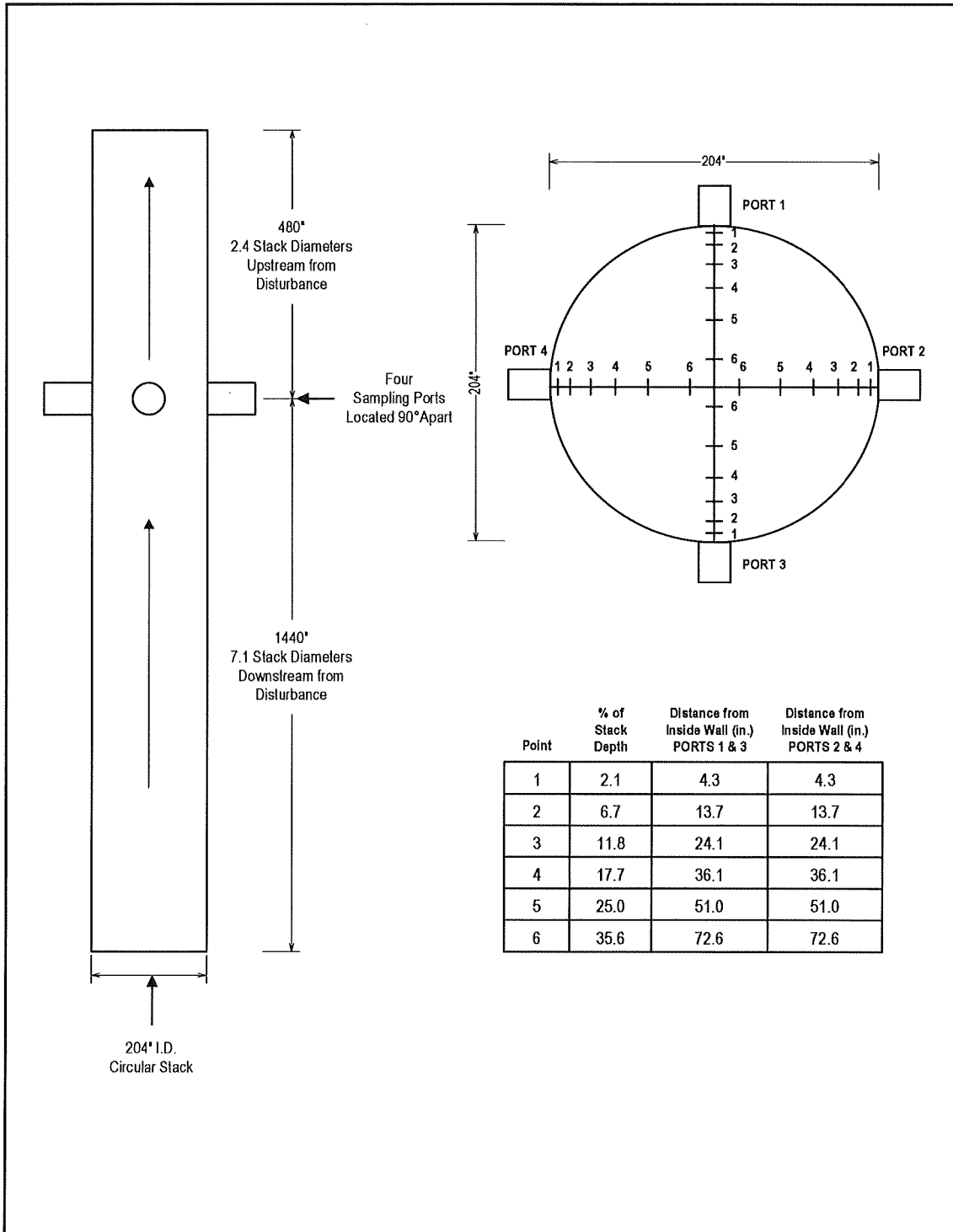
### **3.4 PROCESS SAMPLING LOCATION(S)**

The US EPA Reference Test Methods performed did not specifically require that process samples were to be taken during the performance of this testing event. It is in the best knowledge of Montrose that no process samples were obtained and therefore no process sampling location was identified in this report.

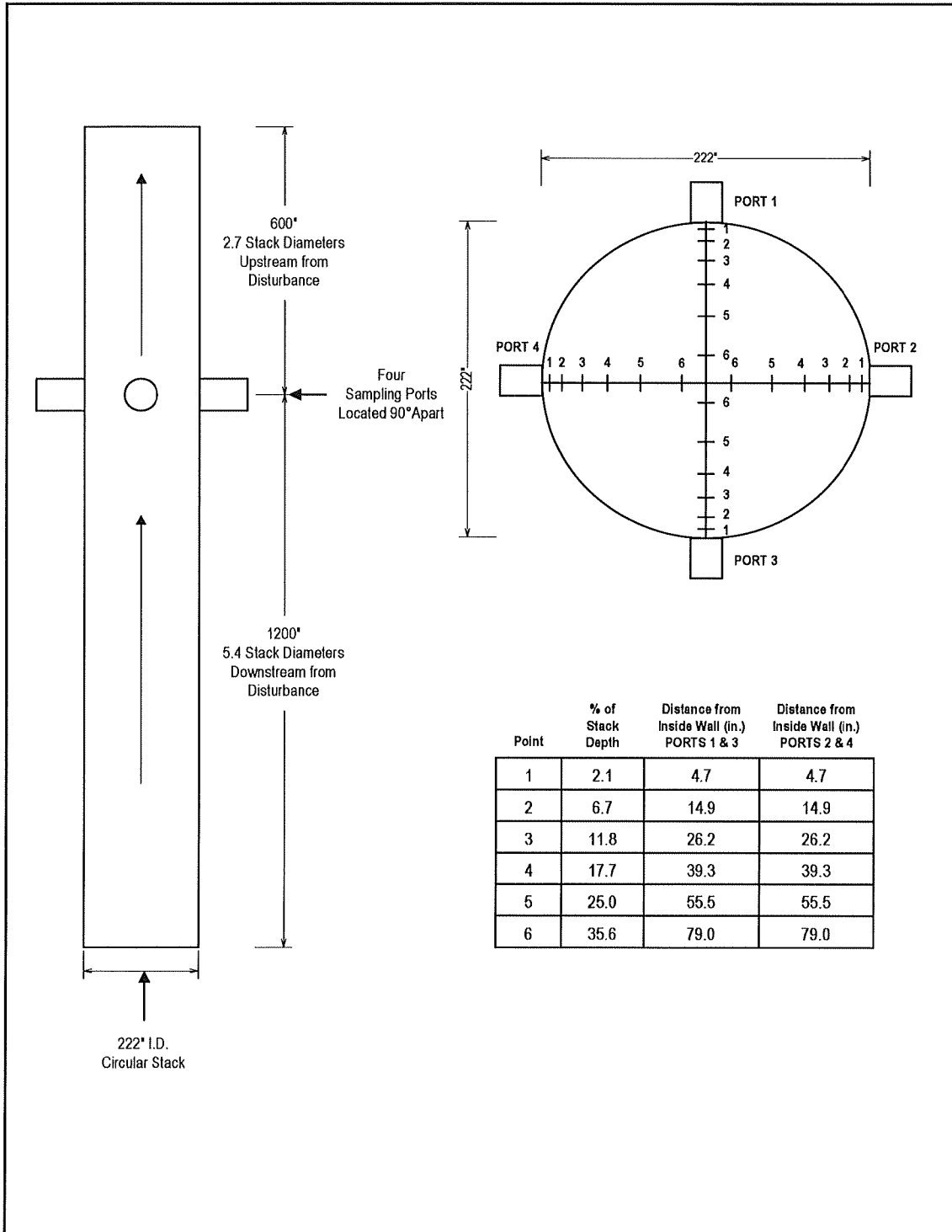
**FIGURE 3.1**  
**BOF/FGBOFSHOP SAMPLING LOCATION SCHEMATIC**



**FIGURE 3.2**  
**ESP EXHAUST TRAVERSE POINT LOCATION DRAWING**



**FIGURE 3.3  
 SEC BAGHOUSE EXHAUST TRAVERSE POINT LOCATION DRAWING**



## **4.0 SAMPLING AND ANALYTICAL PROCEDURES**

### **4.1 TEST METHODS**

#### **4.1.1 US EPA Method 1: "Sample and Velocity Traverses for Stationary Sources"**

Principle: To aid in the representative measurement of pollutant emissions and/or total volumetric flow rate from a stationary source, a measurement site where the effluent stream is flowing in a known direction is selected, and the cross-section of the stack is divided into a number of equal areas. A traverse point is then located within each of these equal areas. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

#### **4.1.2 US EPA Method 2: "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)"**

Principle: The average gas velocity in a stack is determined from the gas density and from measurement of the average velocity head with a Type S (Stausscheibe or reverse type) pitot tube. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

#### **4.1.3 US EPA Method 3: "Gas Analysis for the Determination of Dry Molecular Weight"**

Principle: A gas sample is extracted from a stack by one of the following methods: (1) single-point, grab sampling; (2) single-point, integrated sampling; or (3) multi-point, integrated sampling. The gas sample is analyzed for percent CO<sub>2</sub>, percent O<sub>2</sub>, and if necessary, for percent CO. For dry molecular weight determination, either an Orsat or a Fyrite analyzer may be used for the analysis. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

#### **4.1.4 US EPA Method 4: "Determination of Moisture Content in Stack Gases"**

Principle: A gas sample is extracted at a constant rate from the source; moisture is removed from the sample stream and determined either volumetrically or gravimetrically. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.



#### **4.1.5 US EPA Method 29: "Determination of Metals Emissions from Stationary Sources"**

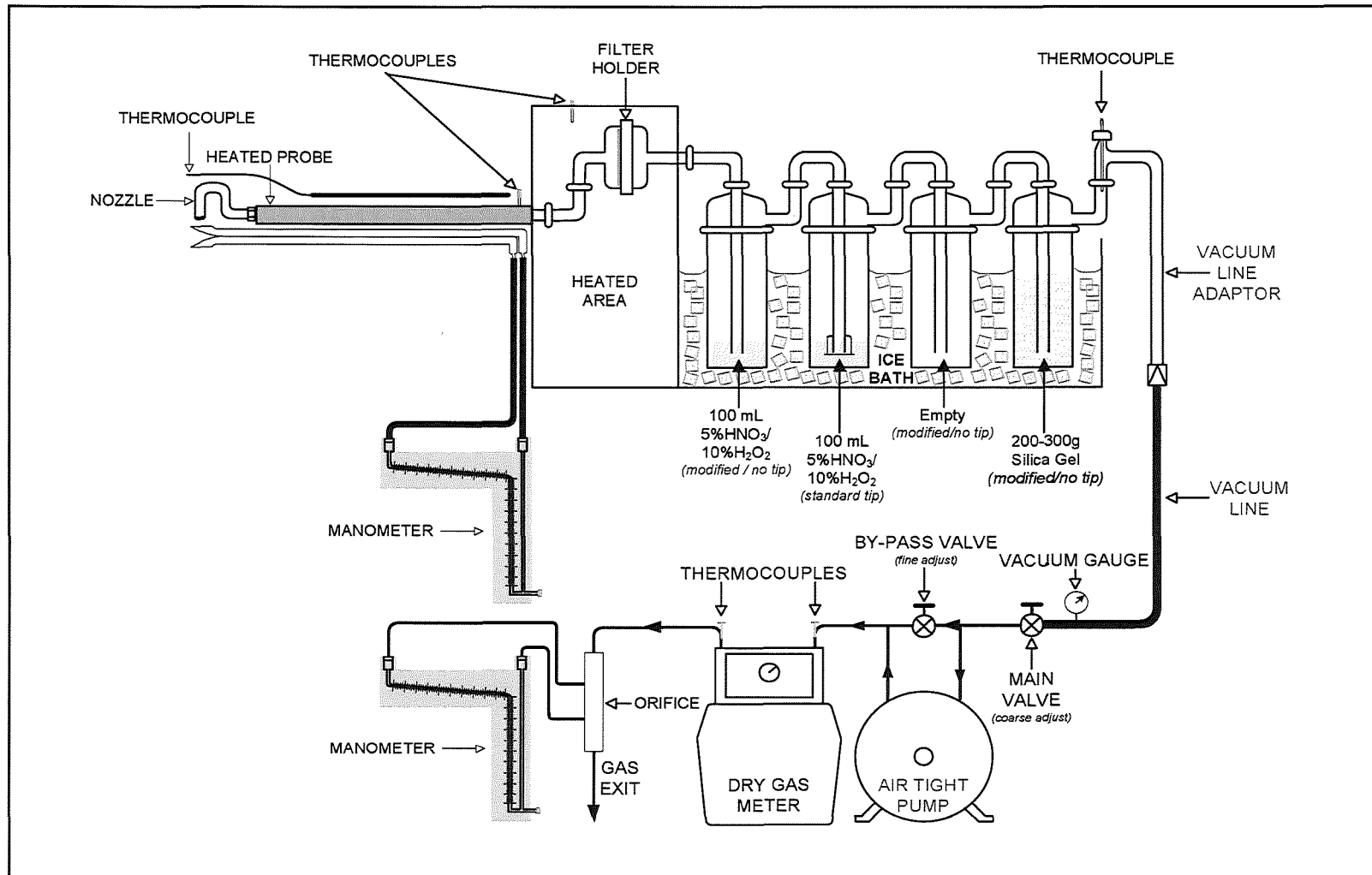
Principle: A stack sample is withdrawn isokinetically from the source, particulate emissions are collected in the probe and on a heated filter, and gaseous emissions are then collected in an aqueous acidic solution of hydrogen peroxide (analyzed for all metals including Hg) and an aqueous acidic solution of potassium permanganate (analyzed only for Hg). The recovered samples are digested, and appropriate fractions are analyzed for Hg by cold vapor atomic absorption spectroscopy (CVAAS) and for Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Ni, P, Se, Ag, Tl, and Zn by inductively coupled argon plasma emission absorption spectroscopy (AAS). Graphite furnace atomic absorption spectroscopy (GFAAS) is used for analysis of Sb, As, Cd, Co, Pb, Se, and Tl if these elements require greater analytical sensitivity than can be obtained by ICAP. Additionally, if desired, the tester may use AAS for analysis of all listed metals if the resulting in-stack method detection limits meet the goal of the testing program. Only Mn and Pb were sampled during this test event. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

The sampling train utilized during this testing project is depicted in Figure 4.1.

#### **4.2 PROCEDURES FOR OBTAINING PROCESS DATA**

Process data was recorded by AK Steel Corporation - Dearborn Works personnel utilizing their typical record keeping procedures. Recorded process data was provided to Montrose personnel at the conclusion of this test event. The process data is located in the Appendix A of this report.

**FIGURE 4.1  
 US EPA METHOD 29 SAMPLING TRAIN SCHEMATIC**



## **5.0 INTERNAL QA/QC ACTIVITIES**

### **5.1 QA AUDITS**

Tables 5.1 to 5.4 illustrate the QA audits that were performed during this test.

All meter boxes and sampling trains used during sampling performed within the requirements of their respective methods as is shown in Tables 5.1 to 5.2. All post-test leak checks were well below the applicable limit. Minimum metered volumes and percent isokinetics were also met where applicable.

Tables 5.3.1 and 5.3.2 display the US EPA Method 3 Fyrite Audits performed for this test event in accordance with US EPA Method 3, Section 10.1 requirements. As shown in Tables 5.3.1 and 5.3.2 the Fyrite analyzer results were within  $\pm 0.5\%$  of the respective Audit Gas concentrations.

Table 5.4 displays the laboratory QA results for US EPA Method 29. All the spike recoveries were within the US EPA Method 29 limits.

### **5.2 QA/QC PROBLEMS**

No QA/QC problems occurred during this test event.

### **5.3 QUALITY STATEMENT**

Montrose is qualified to conduct this test program and has established a quality management system that led to accreditation with ASTM Standard D7036-04 (Standard Practice for Competence of Air Emission Testing Bodies). Montrose participates in annual functional assessments for conformance with D7036-04 which are conducted by the American Association for Laboratory Accreditation (A2LA). All testing performed by Montrose is supervised on site by at least one Qualified Individual (QI) as defined in D7036-04 Section 8.3.2. Data quality objectives for estimating measurement uncertainty within the documented limits in the test methods are met by using approved test protocols for each project as defined in D7036-04 Sections 7.2.1 and 12.10. Additional quality assurance information is presented in the report appendices.

**TABLE 5.1  
 US EPA METHOD 29 SAMPLING TRAIN AUDIT RESULTS**

<b>Parameter</b>	<b>Run 1</b>	<b>Run 2</b>	<b>Run 3</b>
<b>Sampling Location</b>		<b>ESP Exhaust Stack</b>	
Post-Test Leak Rate Observed (cfm)	0.000	0.000	0.000
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.020
Acceptable	Yes	Yes	Yes
Volume of Dry Gas Collected (dscf)	103.950	97.789	99.888
Recommended Volume of Dry Gas Collected (dscf)	44.143	44.143	44.143
Acceptable	Yes	Yes	Yes
Percent of Isokinetic Sampling Rate (%)	98.2	98.9	99.3
Applicable Method Allowable Isokinetic Sampling Rate (%)	100 ± 10	100 ± 10	100 ± 10
Acceptable	Yes	Yes	Yes
<b>Sampling Location</b>		<b>SEC Baghouse Exhaust Stack</b>	
Post-Test Leak Rate Observed (cfm)	0.000	0.000	0.000
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.020
Acceptable	Yes	Yes	Yes
Volume of Dry Gas Collected (dscf)	122.322	84.318	103.748
Recommended Volume of Dry Gas Collected (dscf)	44.143	44.143	44.143
Acceptable	Yes	Yes	Yes
Percent of Isokinetic Sampling Rate (%)	99.0	100.7	100.7
Applicable Method Allowable Isokinetic Sampling Rate (%)	100 ± 10	100 ± 10	100 ± 10
Acceptable	Yes	Yes	Yes

**TABLE 5.2  
 USEPA METHOD 29 DRY GAS METER AUDIT RESULTS**

<b>Sampling Location</b>	<b>Pre-Test Dry Gas Meter Calibration Factor (Y)</b>	<b>Average Post- Test Dry Gas Meter Calibration Check Value (Yqa)</b>	<b>Post Test Dry Gas Meter Calibration Check Value Difference From Pre-Test Calibration Factor (%)</b>	<b>Applicable Method Allowable Difference (%)</b>	<b>Acceptable</b>
ESP Exhaust Stack	0.986	1.009	-2.37%	5.00%	Yes
SEC Baghouse Exhaust Stack	1.011	1.042	-3.04%	5.00%	Yes

**TABLE 5.3.1  
 US EPA METHOD 3 FYRITE AUDIT**

<b>Sampling Location</b>	<b>ESP Exhaust Stack</b>	
<b>Fyrite Analyzer ID</b>	<b>No. 2</b>	
<b>Audit Date</b>	<b>October 28, 2019</b>	
<b>Audit Gas</b>	<b>%CO<sub>2</sub></b>	<b>%O<sub>2</sub></b>
<b>Audit Gas Concentration (%)</b>	<b>10.1</b>	<b>10.1</b>
Fyrite Response 1 (%)	10.0	10.0
Fyrite Response 2 (%)	10.0	10.0
Fyrite Response 3 (%)	10.0	10.0
Average (%)	10.0	10.0
Average Within ±0.5%	Yes	Yes

Audit Gas Cylinder Number: XC012017B

**TABLE 5.3.2  
 US EPA METHOD 3 FYRITE AUDIT**

<b>Sampling Location</b>	<b>SEC Baghouse Exhaust Stack</b>	
<b>Fyrite Analyzer ID</b>	<b>No. 1</b>	
<b>Audit Date</b>	<b>October 11, 2019</b>	
<b>Audit Gas</b>	<b>%CO<sub>2</sub></b>	<b>%O<sub>2</sub></b>
<b>Audit Gas Concentration (%)</b>	<b>10.2</b>	<b>10.0</b>
Fyrite Response 1 (%)	10.0	10.0
Fyrite Response 2 (%)	10.0	10.0
Fyrite Response 3 (%)	10.0	10.0
Average (%)	10.0	10.0
Average Within ±0.5%	Yes	Yes

Audit Gas Cylinder Number: CC262129

**TABLE 5.4  
 US EPA METHOD 29 LABORATORY QA**

	<b>Pb</b>	<b>Mn</b>
Front-Half Spike Recovery (%)	106	100
Acceptable per US EPA Method 29 (Expected Range 70%-130%)	YES	YES
Back-Half Spike Recovery (%)	105	104
Acceptable per US EPA Method 29 (Expected Range 70%-130%)	YES	YES
Front-Half Duplicate , %RPD	4	2.3
Acceptable per US EPA Method 29 (Expected Difference Within 20%)	YES	YES
Back-Half Duplicate, %RPD	2	1.6
Acceptable per US EPA Method 29 (Expected Difference Within 20%)	YES	YES

## APPENDIX



**APPENDIX CHECKLIST - M049AS-660517-RT-268R0**

**A-FACILITY DATA**

- ESP Process Operational Data
- SEC Baghouse Process Operational Data

**B-LABORATORY DATA**

- Laboratory Reports

**C-FIELD DATA**

**C.1-ESP EXHAUST**

- Calculation Spreadsheet(s) and Example Calculations
- Test Log (CEMS Methods)
- CEMS Graphs
- Main Method Field Data Sheets
- Isokinetic Field Data Sheets
- US EPA Method 9 Field Data
- Sample Recovery & Calibration Check Data
- US EPA Method 3 / Dry MW Calculation
- US EPA Method 2 Flow Data Sheets
- US EPA Method 1 Cyclonic Flow
- US EPA Method 1 Preliminary Field Data

**C.2-SEC BAGHOUSE EXHAUST**

- Calculation Spreadsheet(s) and Example Calculations
- Test Log (CEMS Methods)
- CEMS Graphs
- Main Method Field Data Sheets
- Isokinetic Field Data Sheets
- US EPA Method 9 Field Data
- Sample Recovery & Calibration Check Data
- US EPA Method 3 / Dry MW Calculation
- US EPA Method 2 Flow Data Sheets
- US EPA Method 1 Cyclonic Flow
- US EPA Method 1 Preliminary Field Data

**D-CALIBRATIONS AND CERTIFICATIONS**

**D.1-CEMS ANALYZERS**

- Analyzer Calibration Error, System Bias, and System Drift
- US EPA Method 7E Converter Efficiency Check
- US EPA Method 205 Calibration Gas Dilution System Evaluation

**D.2-FIELD EQUIPMENT**

- Probe Nozzle Inspections
- Pre-Test Pitot Tube / Probe Inspections
- Post-Test Pitot Tube / Probe Inspections
- Pre-Test Thermocouple System Audit
- Post-Test Thermocouple Check
- 10-Minute Calibrations
- Pre-Test Meter Box Calibration
- Post-Test dry Gas Meter ALT-009 Leak Check
- Post-Test Dry Gas Meter / Orifice and Console Calibration
- Post-Test Mini Meter / Orifice and Console Calibration
- Calibration Kit (C-CKT-001) Audit
- Digital Pressure Gauge / Barometer Audit
- Thermometer Audit
- Equipment Calibration Histories

**D-CALIBRATIONS AND CERTIFICATIONS (continued)**

**D.3-REFERENCE EQUIPMENT/STANDARDS**

- Calibration Gas Certifications
- Calibration Gas Diluter Certifications
- True Primary Flow Standard Certification
- Field Balance Calibration Weights Certifications
- Field / Shop Balance Calibration Certifications
- Daily Field/Shop Balance Audit
- Micromanometer Certificate
- Reference Meter Calibration
- Reference Field Hygrometer Calibration
- VE Azimuth Tables
- VE Declination
- VE Certificates
- Reference Digital Pressure Gauge Certification
- Reference Thermometer (Omega) Certification
- Reference Ruler Certification
- Reference Protractor Certification
- Reference Caliper Certification

**D.4-MONTROSE STAC & PERSONNEL**

- Montrose - Accreditation Certificate
- Montrose Personnel - QI/QSTI Certificates/Conformance Documents

**E.1-TEST PLANS AND APPROVALS**

- ESP Test Plan and Approval
- SEC Baghouse Test Plan and Approval