

1.0 Introduction

1.1 Summary of Test Program

Cleveland-Cliffs Dearborn Works (State Registration No.: A8640) contracted Montrose Air Quality Services (Montrose) to perform a compliance test program on the Desulfurization Operation (EUBOFDESULF) at the Cleveland-Cliffs Dearborn Works (CCDW) facility located in Dearborn, Michigan. The test was conducted on August 30, 2022 through September 2, 2022, for the purpose of satisfying the emission testing requirements pursuant to Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operating Permit No. MI-ROP-A8640-2016a as well as 40 CFR Part 63, Subpart FFFFF, the Integrated Iron and Steel Manufacturing National Emission Standards for Hazardous Air Pollutants (NESHAP).

The specific objectives were to:

- Verify the emissions of filterable particulate matter (FPM), particulate matter less than 10 microns (PM₁₀), and particulate matter less than 2.5 microns (PM_{2.5}) from the baghouse serving EUBOFDESULF
- Verify the emissions of lead (Pb) and manganese (Mn) from the baghouse serving EUBOFDESULF
- Verify the percent opacity of visible emissions (VE) from the EUBOF Shop Building
- Conduct the test program with a focus on safety

Montrose performed the tests to measure the emission parameters listed in Table 1-1.

TPM will be reported as both PM₁₀ and PM_{2.5}. For purposes of compliance with 40 CFR 63, Subpart FFFFF, PM will be assumed to be only FPM.

Table 1-1
Summary of Test Program

Test Date(s)	Unit ID/ Source Name	Activity/ Parameters	Test Methods	No. of Runs	Duration (Minutes)
August 30- September 1, 2022	EUBOFDESULF Baghouse	Velocity/Volumetric Flow Rate	EPA 1 & 2	4	62.5-80
August 30- September 1, 2022	EUBOFDESULF Baghouse	O ₂ , CO ₂	EPA 3	4	62.5-80
August 30- September 1, 2022	EUBOFDESULF Baghouse	Moisture	EPA 4	4	62.5-80
August 30- September 1, 2022	EUBOFDESULF Baghouse	Pb and Mn	EPA 29	4	62.5-80

Table 1-1 continued
Summary of Test Program

Test Date(s)	Unit ID/ Source Name	Activity/ Parameters	Test Methods	No. of Runs	Duration (Minutes)
September 1-2, 2022	EUBOFDESULF Baghouse	Velocity/Volumetric Flow Rate	EPA 1 & 2	3	80-82.5
September 1-2, 2022	EUBOFDESULF Baghouse	O ₂ , CO ₂	EPA 3	3	80-82.5
September 1-2, 2022	EUBOFDESULF Baghouse	Moisture	EPA 4	3	80-82.5
September 1-2, 2022	EUBOFDESULF Baghouse	PM and TPM (PM, PM ₁₀ and PM _{2.5})	EPA 5/202	3	80-82.5
September 1-2, 2022	EUBOF Shop Building	Opacity	EPA 9	3	86-90 (3 steel production cycles, 6 Desulf Heats)

To simplify this report, a list of Units and Abbreviations is included in Appendix D.1. Throughout this report, chemical nomenclature, acronyms, and reporting units are not defined. Please refer to the list for specific details.

This report presents the test results and supporting data, descriptions of the testing procedures, descriptions of the facility and sampling locations, and a summary of the quality assurance procedures used by Montrose. The average emission test results are summarized and compared to their respective permit limits in Tables 1-2 to 1-4. Detailed results for individual test runs can be found in Section 4.0. All supporting data can be found in the appendices.

The testing was conducted by the Montrose personnel listed in Table 1-5. The tests were conducted according to the test plan (protocol) dated June 30, 2022 that was submitted to EGLE.

Table 1-2
Summary of Average Compliance Results – EUBOFDESULF
September 1-2, 2022

Parameter/Units	Average Results	Emission Limits
Filterable Particulate Matter (FPM)		
gr/dscf	0.00074	0.01
lb/hr	0.50	7.7
Total Particulate Matter (TPM)*		
lb/hr†	<0.75	3.6

* Total PM emissions are to be considered as PM₁₀ and PM_{2.5} for compliance determination.

† The "<" symbol indicates that compound was below the Minimum Detection Limit (MDL) of the analytical method. See Section 4.2 for details.

Table 1-3
Summary of Average Compliance Results – EUBOFDESULF
August 30 - September 1, 2022

Parameter/Units	Average Results	Emission Limits
Lead (Pb)		
lb/hr	0.00023	0.0016
Manganese (Mn)		
lb/hr	0.0010	0.013

Table 1-4
Summary of Average Compliance Results – EUBOF Shop Building
September 1-2, 2022

Parameter/Units	Average Results	Emission Limits
Visible Emissions (VE)		
%, 3-minute average	2.5 (rolling and block 3-minute average)	20

1.2 Key Personnel

A list of project participants is included below:

Facility Information

Source Location: Cleveland-Cliffs Dearborn Works
4001 Miller Road
Dearborn, MI 48120

Project Contact: David Pate
Role: Senior Environmental Engineer
Company: Cleveland-Cliffs Dearborn Works
Telephone: 313-323-1261
Email: david.pate@clevelandcliffs.com

Agency Information

Regulatory Agency: EGLE
Agency Contact: Regina Angellotti
Telephone: 313-418-0895
Email: AngellottiR1@michigan.gov

Testing Company Information

Testing Firm: Montrose Air Quality Services, LLC

Contact: John Nestor	Robert J. Lisy, Jr.
Title: District Manager	Reporting Hub Manager
Telephone: 248-548-8070	440-262-3760
Email: jnestor@montrose-env.com	rlisy@montrose-env.com

Laboratory Information

Laboratory: Montrose Royal Oak
City, State: Royal Oak, MI
Method: EPA Method 5

Laboratory Information

Laboratory: Montrose Wauconda
City, State: Wauconda, IL
Method: EPA Method 202

Laboratory Information

Laboratory: Enthalpy Analytical, LLC
City, State: Durham, NC
Method: EPA Method 29

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Test personnel and observers are summarized in Table 1-5.

Table 1-5
Test Personnel and Observers

Name	Affiliation	Role/Responsibility
John Nestor	Montrose	District Manager
Jeffrey Peitzsch	Montrose	Shop Coordinator/VE Observer
David Koponen	Montrose	Field Technician
Roy Zimmer	Montrose	Field Technician
David Pate	Cleveland-Cliffs Dearborn Works	Test Coordinator
Regina Angellotti	EGLE	Observer
Katherine Koster	EGLE	Observer

2.0 Plant and Sampling Location Descriptions

2.1 Process Description, Operation, and Control Equipment

Cleveland-Cliffs Dearborn Works owns and operates a Desulfurization Station. During the desulfurization operation, a movable hood and lances are moved into position over the iron pouring ladle. Once in position, the lances are lowered into the hot metal (molten iron) and inject desulfurizing reagents (magnesium and lime) with a nitrogen or argon carrier into the hot metal. This process converts the sulfur in the hot metal to sulfides. The sulfides rise to the surface of the hot metal and become bound in the slag.

The fume and dust emissions produced during the desulfurization operation are captured in the hood and sent to the desulfurization and slag skimming baghouse. Once the desulfurization is complete, the lances are raised. The ladle is then tilted and the slag is skimmed from the surface of the molten iron using a hydraulic powered skimming arm, with a refractory paddle. The slag skimmed from the surface of the hot metal drops into a slag pot located below the Desulfurization Station.

Emissions from slag skimming are also captured by the movable hood and sent to the same baghouse. The baghouse is equipped with a bag leak detection system that continuously monitors the particulate matter loading in the exhaust to ensure proper operation.

Approximately 200-220 tons of molten iron are processed at the Desulfurization station each heat. The amount of magnesium and lime injected depends on the sulfur content of the heat prior to desulfurization and the desired sulfur content of the heat after desulfurization is completed. Typical amounts injected are 150-300 pounds of magnesium per heat and 400-800 pounds of lime per heat.

Emissions occur during two processes at the Desulfurization Station: 1) desulfurization by reagent injection, and 2) slag skimming. Each batch typically takes approximately 20-40 minutes

Initial and target molten iron chemistry and temperature are monitored to ensure that the molten iron leaves the Desulfurization Station in a manner conducive to processing it into high quality steel in the BOF Vessels. To ensure the baghouse is operating correctly, a bag leak detection system has been installed. The bag leak detection system monitors the particulate matter loading in the exhaust on a continuous basis. The baghouse should be operated with a differential pressure between 2.5" and 8.5" WC.

Normal production for the desulfurization operation is 250-350 tons per clock hour.

Emissions from EUBOFDESULF are controlled by a dust collector (baghouse) which is a suction type, shaker baghouse with six separate compartments arranged in two parallel rows of three compartments. The main fan provides the suction for moving the fume and dust laden gases through the fume control system. The fan is of the radial tip design with a single inlet box, louver type damper, single outlet and is direct driven by a 400 H.P. Motor. The fan is designed to handle 94,500 ACFM at 1180 RPM.

To ensure the baghouse is operating correctly, a bag leak detection system has been installed. The bag leak detection system monitors the particulate matter loading in the exhaust on a continuous basis. The baghouse operating temperature is between 100-200°F with a moisture content of 1-3%. The flow rate through the baghouse is typically approximately 90,000 ACFM. The capture system efficiency is 93%. Daily checks are made of the baghouse compartment and overall differential pressures. Weekly checks are performed on the dust hoppers to verify that dust is being collected. A monthly inspection of the baghouse cleaning system is performed to ensure that the baghouse is cleaning properly. A quarterly internal check is performed on the baghouse interior to check for bag leaks or damage to the baghouse interior. Vibration analysis is also performed on the baghouse ID Fan at a minimum of once per quarter. Re-bagging of the compartments is performed on an as-needed bases.

2.2 Flue Gas Sampling Location

Information regarding the sampling location is presented in Table 2-1.

Table 2-1
Sampling Location

Sampling Location	Stack Inside Dimensions (in.)	Distance from Nearest Disturbance		Number of Traverse Points
		Downstream EPA "B" (in./dia.)	Upstream EPA "A" (in./dia.)	
EUBOFDESULF SVDESULFBH	73.0 X 47.0	240.0 / 4.2	120.0 / 2.1	Isokinetic: 24 (8/port)

The sample location was previously verified in the field to conform to EPA Method 1. See Appendix A.1 for more information.

2.3 Operating Conditions and Process Data

Emission tests were performed while the EUBOFDESULF operation and air pollution control devices were operating at the conditions specified in the test plan. The EUBOFDESULF was tested when operating normally for three process heats and a minimum of 60 minutes for each sampling run. Each sampling run consisted of an integral number of heats.

Plant personnel were responsible for establishing the test conditions and collecting all applicable unit-operating data. The process data that was provided is presented in Appendix B. Data collected includes the following parameters:

- Start and Stop time of each desulfurization batch, including desulfurization and slag skimming times
- Start and stop time of each steel production cycle during which opacity observations are taking place on the EUBOF Shop Building
- Tons of hot metal processed during each desulfurization batch
- Pressure drop of each baghouse compartment and overall baghouse pressure drop, in-H₂O, recorded once per desulfurization batch
- Bag leak detector “percent of scale readout” recorded once per desulfurization batch

3.0 Sampling and Analytical Procedures

3.1 Test Methods

The test methods for this test program have been presented in Table 1-1. Additional information regarding specific applications or modifications to standard procedures is presented below.

3.1.1 EPA Method 1, Sample and Velocity Traverses for Stationary Sources

EPA Method 1 is used to assure that representative measurements of volumetric flow rate are obtained by dividing the cross-section of the stack or duct into equal areas, and then locating a traverse point within each of the equal areas. Acceptable sample locations must be located at least two stack or duct equivalent diameters downstream from a flow disturbance and one-half equivalent diameter upstream from a flow disturbance.

The sample port and traverse point locations are detailed in Appendix A.

3.1.2 EPA Method 2, Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

EPA Method 2 is used to measure the gas velocity using an S-type pitot tube connected to a pressure measurement device, and to measure the gas temperature using a calibrated thermocouple connected to a thermocouple indicator. Typically, Type S (Staußcheibe) pitot tubes conforming to the geometric specifications in the test method are used, along with an inclined manometer. The measurements are made at traverse points specified by EPA Method 1.3

The typical sampling systems are detailed in Figures 3-1 and 3-2.

3.1.3 EPA Method 3, Gas Analysis for the Determination of Dry Molecular Weight

EPA Method 3 is used to calculate the dry molecular weight of the stack gas using one of three methods. The first choice is to measure the percent O₂ and CO₂ in the gas stream. 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 CO₂ and percent O₂ using either an Orsat or a Fyrite analyzer. The second choice is to use stoichiometric calculations to calculate dry molecular weight. The third choice is to use an assigned value of 30.0, in lieu of actual measurements, for processes burning natural gas, coal, or oil.

For this testing event, the single-point grab sample method was used.

3.1.4 EPA Method 4, Determination of Moisture Content in Stack Gas

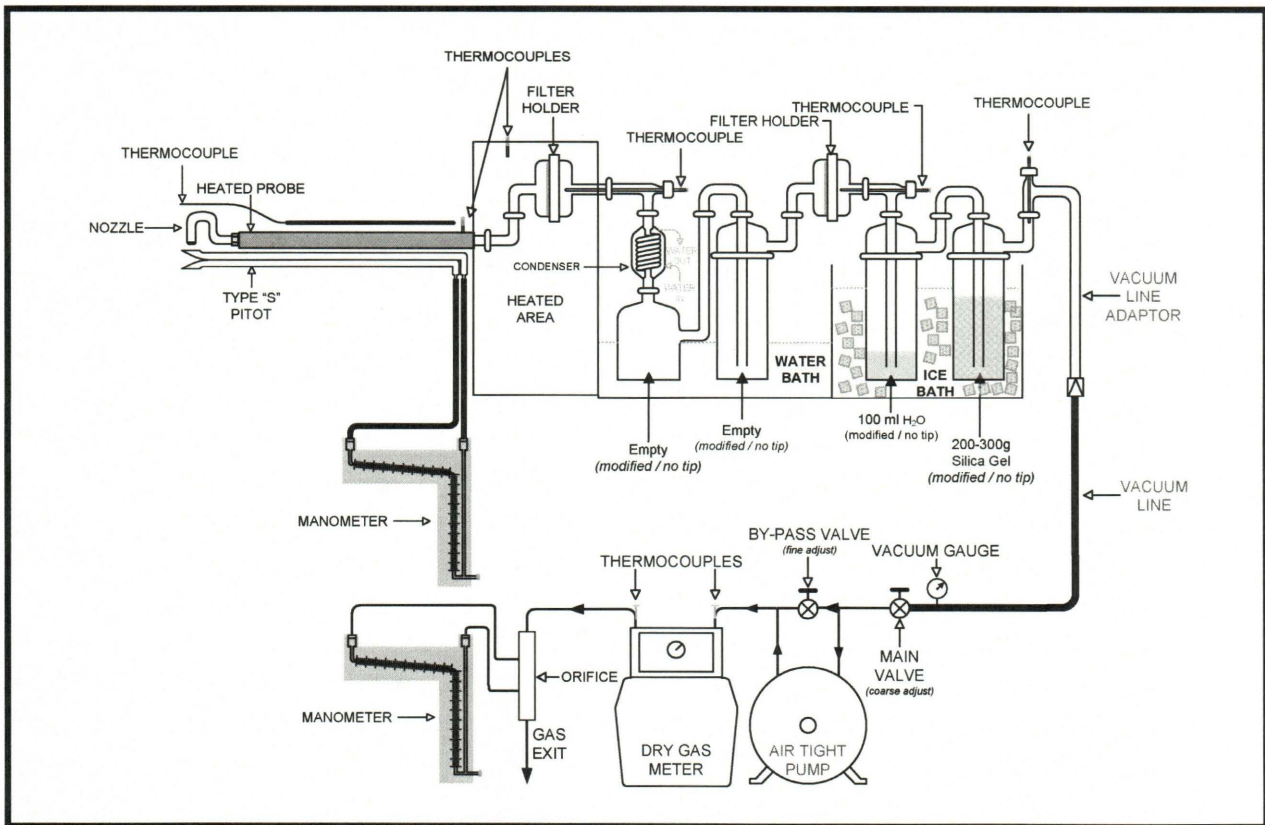
EPA Method 4 is a manual, non-isokinetic method used to measure the moisture content of gas streams. Gas is sampled at a constant sampling rate through a probe and impinger train. Moisture is removed using a series of pre-weighed impingers containing methodology-specific liquids and silica gel immersed in an ice water bath. The impingers are weighed after each run to determine the percent moisture.

3.1.5 EPA Method 5, Determination of Particulate Matter from Stationary Sources

EPA Method 5 is a manual, isokinetic method used to measure FPM emissions. The samples are analyzed gravimetrically. This method is performed in conjunction with EPA Methods 1 through 4. The stack gas is sampled through a nozzle, probe, filter, and impinger train. FPM results are reported in emission concentration and emission rate units.

The typical sampling system is detailed in Figure 3-1.

**Figure 3-1
EPA Method 5/202 Sampling Train**



3.1.6 EPA Method 9, Visual Determination of the Opacity of Emissions

EPA Method 9 is used to observe the visual opacity of emissions (opacity). The observer stands at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140° sector to their back. The line of vision is perpendicular to the plume direction and does not include more than one plume diameter. Observations are recorded at 15-second intervals and are made to the nearest 5% opacity. The qualified observer is certified according to the requirements of EPA Method 9, section 3.1.

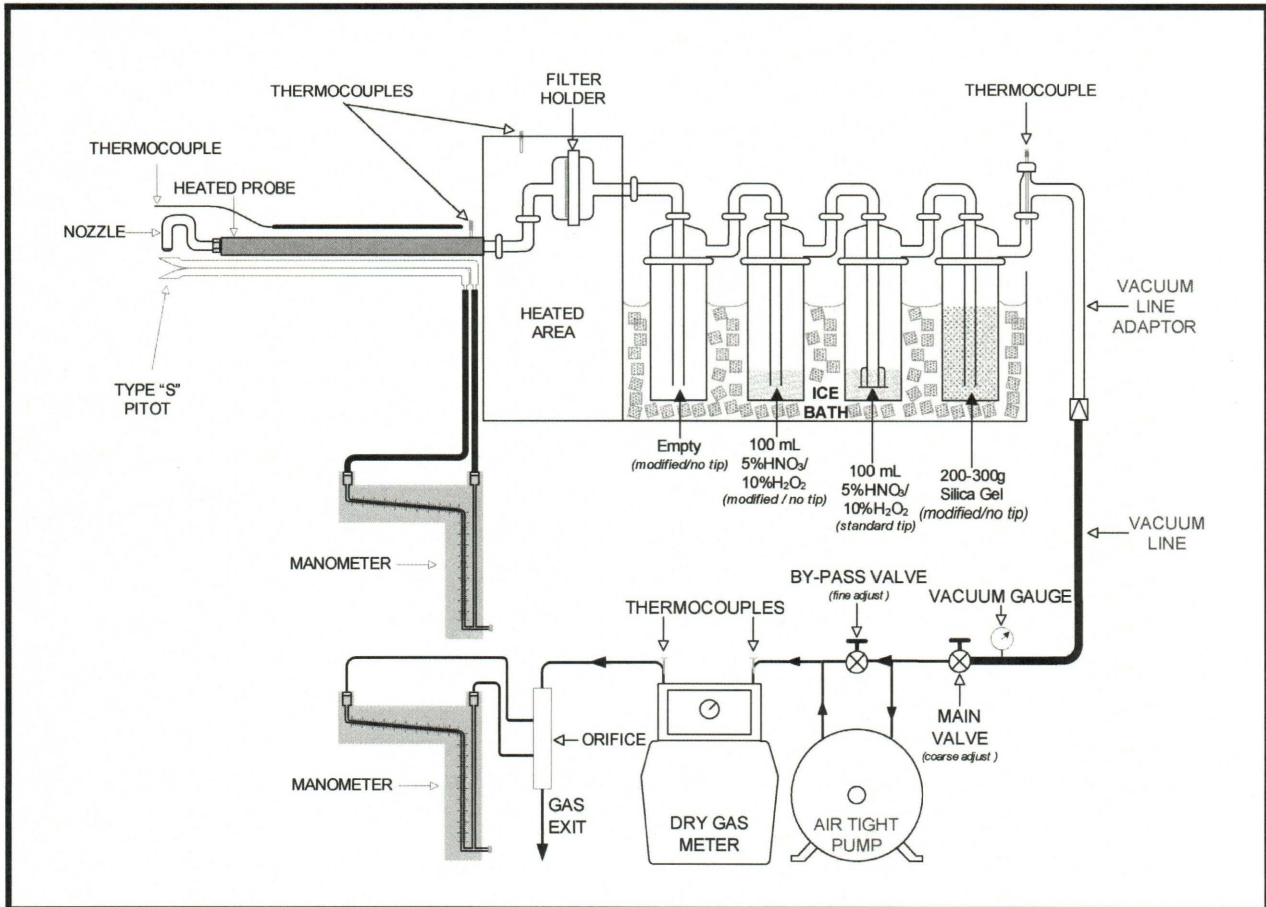
3.1.7 EPA Method 29, Determination of Metals Emissions from Stationary Sources

EPA Method 29 is a manual, isokinetic test method to measure a variety of metals using inductively coupled argon plasma emission spectroscopy (ICAP) and cold vapor atomic absorption (CVAA) spectroscopy. This method is performed in conjunction with EPA Methods 1-4. A stack sample is withdrawn isokinetically from the source, filterable emissions are collected in the probe and on a heated filter, and condensable emissions are collected in an aqueous acidic solution of hydrogen peroxide (analyzed for all target analytes) and an optional aqueous acidic solution of potassium permanganate (required only when Hg is a target analyte). The recovered samples are digested, and appropriate fractions are analyzed for the target analytes which may include Hg by CVAAS and for Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Ni, P, Se, Ag, Tl, and Zn by ICAP or atomic 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 using ICAP. AAS may be used for analysis of all target analytes if the resulting in-stack method detection limits meet the goal of the testing program. Similarly, inductively coupled plasma-mass spectroscopy (ICP-MS) may be used for analysis of Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Ni, Ag, Tl and Zn. The results from analysis of individual fractions of the sample train are summed to obtain the total concentration of each metal per sample train.

The target metals for this compliance emissions testing program are Pb and Mn.

The typical sampling system is detailed in Figure 3-2.

Figure 3-2
EPA Method 29 Sampling Train



3.1.8 EPA Method 202, Dry Impinger Method for Determining Condensable Particulate Emissions from Stationary Sources

The CPM is collected in dry impingers after filterable PM has been collected on a filter maintained as specified in either Method 5 of Appendix A-3 to 40 CFR 60, Method 17 of Appendix A-6 to 40 CFR 60, or Method 201A of Appendix M to 40 CFR 51. The organic and aqueous fractions of the impingers and an out-of-stack CPM filter are then taken to dryness and weighed. The total of the impinger fractions and the CPM filter represents the CPM. Compared to the version of Method 202 that was promulgated on December 17, 1991, this method eliminates the use of water as the collection media in impingers and includes the addition of a condenser followed by a water dropout impinger immediately after the final in-stack or heated filter. This method also includes the addition of one modified Greenburg Smith impinger (backup impinger) and a CPM filter following the water dropout impinger.

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CPM is collected in the water dropout impinger, the modified Greenburg Smith impinger, and the CPM filter of the sampling train as described in this method. The impinger contents are purged with nitrogen immediately after sample collection to remove dissolved SO₂ gases from the impinger. The CPM filter is extracted with water and hexane. The impinger solution is then extracted with hexane. The organic and aqueous fractions are dried and the residues are weighed. The total of the aqueous and organic fractions represents the CPM.

The potential artifacts from SO₂ are reduced using a condenser and water dropout impinger to separate CPM from reactive gases. No water is added to the impingers prior to the start of sampling. To improve the collection efficiency of CPM, an additional filter (the "CPM filter") is placed between the second and third impingers.

The typical sampling system is detailed in Figure 3-2.

3.2 Process Test Methods

The test plan did not require that process samples be collected during this test program; therefore, no process sample data are presented in this test report.

4.0 Test Discussion and Results

4.1 Field Test Deviations and Exceptions

After the completion of the second batch on Run 2 of the EPA Method 29 testing, the BOF experienced issues with the PLC control system that resulted in a lengthy period of downtime. The run was paused and the final batch for the run was completed on the following day (August 31). Run 3 of EPA Method 29 testing was initiated shortly thereafter but was voided due to numerous starts and stops and abnormal heat times associated with issues with the Desulfurization injection system. In consultation with EGLE personnel, the decision was made to terminate the run and restart when the process was operating normally. The final EPA Method 29 run (Run 4) was completed on September 1. The EPA Method 29 samples collected from Run 3 of this test event were not analyzed and therefore are not displayed in this test report.

Part of normal testing procedure involves moving the testing apparatus to different ports to obtain sample from various traverse points. Due to the batch nature of the desulfurization cycle and the layout of the sampling location, sampling was continued within a single port for an entire batch until the batch was complete. The testing apparatus was then moved to a different port between batches. This is necessary to avoid missing large portions of a batch while changing ports. This method deviation was requested in the test plan and was approved by EGLE prior to testing.

4.2 Presentation of Results

The average results are compared to the permit limits in Tables 1-2 through 1-4. The results of individual compliance test runs performed are presented in Tables 4-1 through 4-3. Emissions are reported in units consistent with those in the applicable regulations or requirements. Additional information is included in the appendices as presented in the Table of Contents.

Concentration values in Tables 1-2 and 4-1 denoted with a '<' were measured to be below the minimum detection limit (MDL) of the applicable analytical method. Mass emission rates denoted with a '<' in Tables 1-2 and 4-1 were calculated utilizing the applicable MDL concentration value instead of the "as measured" concentration value.

Table 4-1
TPM Emissions Results -
EUBOFDESULF

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	9/1/2022	9/1/2022	9/2/2022	--
Time	10:57-13:16	14:25-16:39	9:01-11:19	--
Process Data				
Heats	3	3	3	3
Production rate, TPH	450.7	495.0	448.9	464.9
Sampling & Flue Gas Parameters				
O ₂ , % volume dry	20.8	20.8	20.8	20.8
CO ₂ , % volume dry	0.0	0.0	0.0	0.0
flue gas temperature, °F	145.1	150.4	132.2	142.6
moisture content, % volume	1.76	2.15	1.69	1.87
volumetric flow rate, dscfm	78,048	79,859	80,274	79,394
Filterable Particulate Matter (FPM)				
gr/dscf	0.00064	0.00086	0.00071	0.00074
lb/hr	0.43	0.59	0.49	0.50
Condensable Particulate Matter (CPM)				
gr/dscf†	<0.00034	<0.00033	0.00043	<0.00037
lb/hr†	<0.23	<0.22	0.30	<0.25
Total Particulate Matter (TPM)*				
lb/hr†	<0.65	<0.81	0.79	<0.75

* Total PM emissions are to be considered as PM₁₀ and PM_{2.5} for compliance determination.

† The "<" symbol indicates that compound was below the Minimum Detection Limit (MDL) of the analytical method. See Section 4.2 for details.

Table 4-2
Pb and Mn Emissions Results -
EUBOFDESULF

Parameter/Units	Run 1	Run 2	Run 4	Average
Date	8/30/2022	8/30-31/2022	9/1/2022	--
Time	9:34-11:34	16:03-9:55	7:59-9:53	--
Process Data				
Heats	3	3	3	3
Production rate, TPH	565.2	515.2	578.3	552.9
Sampling & Flue Gas Parameters				
O ₂ , % volume dry	20.8	20.8	20.8	20.8
CO ₂ , % volume dry	0.0	0.0	0.0	0.0
flue gas temperature, °F	132.4	139.9	138.5	136.9
moisture content, % volume	2.34	1.55	1.48	1.79
volumetric flow rate, dscfm	72,529	80,043	82,106	78,226
Lead (Pb)				
mg/dscm	0.00107	0.00062	0.00067	0.00079
lb/hr	0.00029	0.00019	0.00020	0.00023
Manganese (Mn)				
mg/dscm	0.0044	0.0034	0.0027	0.0035
lb/hr	0.0012	0.0010	0.0008	0.0010

Table 4-3
VE Emissions Results -
EUBOF Shop Building

Parameter/Units	Run 1	Run 2	Run 3	Maximum
Date	9/1/2022	9/1/2022	9/2/2022	--
Time	11:57-13:27	14:21-15:51	9:00-10:26	
Visible Emissions (VE)				
%, 3-minute average	1.67	2.50	0.00	2.50

4.3 NESHAP Considerations

Table 4-4 summarizes the NESHAP (40 CFR 63, Subpart FFFFF) and ROP conditions as they relate to the testing and notification requirements.

**Table 4-4
NESHAP and ROP Testing Requirements**

NESHAP Reference	ROP Reference	NESHAP / ROP Language	Comments
40 CFR 63.7821	EUBOFDESULF V.1	Conduct performance tests for particulate matter and opacity at least once every 5 years	Previous performance test was conducted on April 10-11, 2018. This performance test was completed within the 5 year period.
40 CFR 63.7822(b)(1)	N/A	Determine the concentration of particulate matter according to the listed test methods in 40 CFR 63.7822(b)(1)(i-v)	The particulate matter concentration was determined in accordance with the required test methods.
40 CFR 63.7822(b)(2)	N/A	Collect a minimum of 60 dry standard cubic feet of gas during each particulate matter test run. Three valid test runs are needed to comprise a performance test.	A minimum of 60 dry standard cubic feet was collected during each particulate matter test run.
40 CFR 63.7822(h)	EUBOFDESULF V.2	Sampling during the performance test will occur only when the operations being controlled are in operation.	Sampling only took place when desulfurization or slag skimming was taking place. Testing will be paused between heats.

Table 4-4 (Continued)
NESHAP and ROP Testing Requirements

NESHAP Reference	ROP Reference	NESHAP / ROP Language	Comments
40 CFR 63.7823(b)	EUBOFDESULF V.3	Performance tests for visible emissions shall be conducted such that opacity observations overlap with the performance tests for particulate.	All opacity observations overlapped with the performance tests for particulate.
40 CFR 63.7823(d)(1)(ii)	EUBOFDESULF V.4(a)	Record observations to the nearest 5 percent at 15-second intervals for at least three steel production cycles rather than using the procedure specified in Section 2.4 of Method 9.	Observations were conducted in accordance with the NESHAP methodology.
40 CFR 63.7823(d)(1)(iii)	EUBOFDESULF V.4(b)	Determine the 3-minute block average opacity from the average of 12 consecutive observations recorded at 15-second intervals.	Average opacity was determined in accordance with the NESHAP methodology. Both 3-minute rolling and block averages are reported.
40 CFR 63.7840(d)	EUBOFDESULF VII.4	Submit a notification to perform any performance testing under 40 CFR Part 63, Subpart FFFFF at least 60 calendar days before testing is to begin.	The notification was submitted on June 30, 2022, 61 days prior to the start of testing.

5.0 Internal QA/QC Activities

5.1 QA/QC Audits

The meter boxes and sampling trains used during sampling performed within the requirements of their respective methods. All post-test leak checks, minimum metered volumes, minimum sample durations, and percent isokinetics met the applicable QA/QC criteria.

Fyrite analyzer audits were performed during this test in accordance with EPA Method 3, Section 10.1 requirements. The results were within $\pm 0.5\%$ of the respective audit gas concentrations.

EPA Method 9 was performed by a certified Visible Emissions Evaluator. For quality assurance, the observer obtained a view of the emissions with the best available contrasting background and with the sun oriented in the 140° sector to their back. Readings were taken every 15 seconds and made to the nearest 5% opacity.

EPA Method 5 analytical QA/QC results are included in the laboratory report. The method QA/QC criteria were met, except if noted in Section 5.2. An EPA Method 5 reagent blank was analyzed. The maximum allowable amount that can be subtracted is 0.001% of the weight of the acetone used. The blank did not exceed the maximum residue allowed.

EPA Method 202 analytical QA/QC results are included in the laboratory report. The method QA/QC criteria were met. An EPA Method 202 Field Train Recovery Blank (FTRB) was performed for each source category. The maximum allowable amount that can be subtracted is 0.002 g (2.0 mg). For this project, the FTRB had a mass of 1.25 mg, and 1.25 mg was subtracted.

5.2 QA/QC Discussion

Montrose did not have a Qualified Individual (QI) for EPA Method 5, 29, and 202 onsite during the test event as per ASTM D7036-04 requirements. However, upon data review, all EPA Method 5, 29, and 202 data quality objectives were met.

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 included in the report appendices. The content of this report is modeled after the EPA Emission Measurement Center Guideline Document (GD-043).



Appendix A

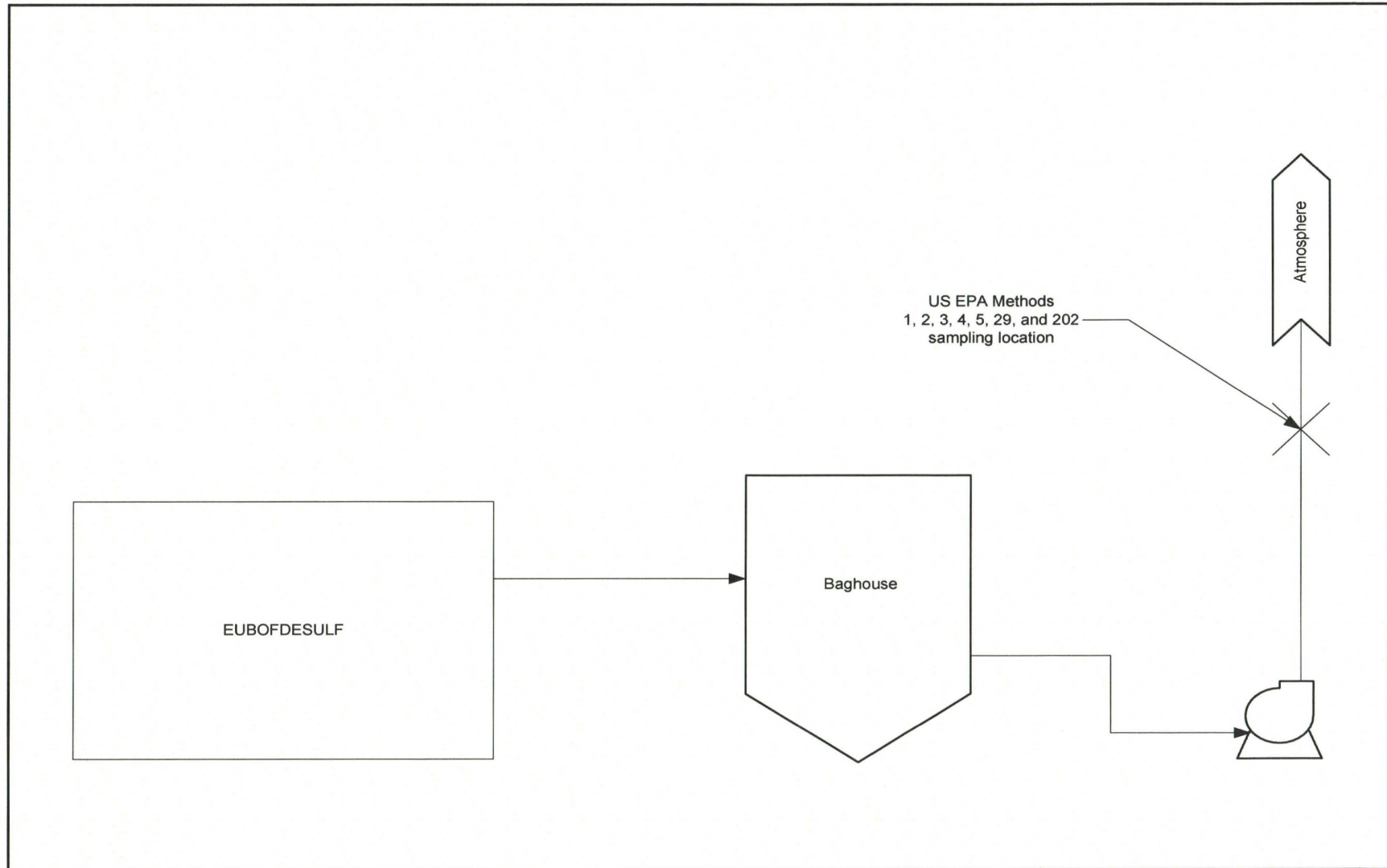
Field Data and Calculations



Appendix A.1

Sampling Locations

EUBOFDESULF PROCESS AND SAMPLING LOCATION SCHEMATIC



EUBOFDESULF BAGHOUSE EXHAUST TRAVERSE POINT LOCATION DRAWING

