1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

Gerdau Monroe Mill (Facility ID: B7061) contracted Montrose Air Quality Services, LLC (Montrose) to perform a compliance test program on the Billet Reheat Furnace (EUBILLETREHEAT-WB) at the Gerdau Monroe Mill facility located in Monroe, Michigan. Testing was performed on December 22, 2021, for the purpose of satisfying the emission testing requirements pursuant to Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operation Permit No. MI-ROP-B7061-2016 and Permit to Install Permit No. MI-PTI-B7061-2016.

The specific objectives were to:

- Verify the emissions of nitrogen oxides (NO_x) (as NO_2) and carbon monoxide (CO) at the exhaust stack serving EUBILLETREHEAT-WB
- Conduct the test program with a focus on safety

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

TABLE 1-1
SUMMARY OF TEST PROGRAM

Test Date	Unit ID/ Source Name	Activity/ Parameters	Test Methods	No. of Runs	Duration (Minutes)
12/22/2021	EUBILLETREHEAT-WB	Velocity/Volumetric Flow Rate	EPA 1 & 2	4	4-8
12/22/2021	EUBILLETREHEAT-WB	O_2, CO_2	EPA 3A	3	60
12/22/2021	EUBILLETREHEAT-WB	Moisture	EPA 4	3	60
12/22/2021	EUBILLETREHEAT-WB	NO_x	EPA 7E	3	60
12/22/2021	EUBILLETREHEAT-WB	CO	EPA 10	3	60

To simplify this report, a list of Units and Abbreviations is included in Appendix C.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 Table 1-2. 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 1-3. The tests were conducted according to the Test Plan dated November 19, 2021 that was submitted to EGLE.

TABLE 1-2
SUMMARY OF AVERAGE COMPLIANCE RESULTS -
EUBILLETREHEAT-WB
DECEMBER 22, 2021

Parameter/Units	Average Results	Emission Limits
Nitrogen Oxides (NO_x)		
lb/hr, as NO_2	5.11	18.3
lb/MMBtu, as NO_2	0.04	0.07
Carbon Monoxide (CO)		
lb/MMSCF*	0.0	84

* CO concentrations were negative and assigned a value of zero. See Section 4.2 for details.

1.2 KEY PERSONNEL

A list of project participants is included below:

Facility Information

Source Location:	Gerdau Montroe Mill 3000 East Front Street Monroe, MI 48161
Project Contact:	Christopher Hessler
Role:	Regional Environmental Manager
Company:	Gerdau Montroe Mill
Telephone:	734-384-6544
Email:	Christopher.hessler@gerdau.com

Agency Information

Regulatory Agency:	EGLE
Agency Contact:	Karen Kajiya-Mills
Telephone:	517-335-3122
Email:	kajiya-millsk@michigan.gov

Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC	
Contact:	Robert J. Lisy, Jr.	Robert H. Sava, Jr.
Title:	Reporting Hub Manager	Client Project Manager
Telephone:	440-262-3760	440-262-3760
Email:	rlisy@montrose-env.com	rsava@montrose-env.com

Test personnel and observers are summarized in Table 1-3.

TABLE 1-3
TEST PERSONNEL AND OBSERVERS

Name	Affiliation	Role/Responsibility
Robert H. Sava, Jr.	Montrose	Client Project Manager, QI
Shane Downey	Montrose	Field Technician
Christopher Hessler	Gerdau Monroe Mill	Observer/Client Liaison/Test Coordinator

2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 PROCESS DESCRIPTION, OPERATION, AND CONTROL EQUIPMENT

Gerdau Monroe Mill is a producer of steel. During the steel making process the refined molten steel is sent through a continuous caster and formed into billets which are then reheated in a Billet Reheat Furnace (EUBILLETREHEAT-WB), fed into a mill on a conveyor, then rolled into a desired shape. The EUBILLETREHEAT-WB was in operation during this test event.

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 Diameter (in.)	Distance from Nearest Disturbance		Number of Traverse Points
		Downstream EPA "B" (in./dia.)	Upstream EPA "A" (in./dia.)	
EUBILLETREHEAT -WB Exhaust Stack	62.7 X 62.6 Elliptical	492 / 7.8	300 / 4.8	Flow: 12 (6/port); Gaseous: 12 (6/port)

The sampling location was verified in the field to conform to EPA Method 1. Acceptable cyclonic flow conditions were confirmed prior to testing using EPA Method 1, Section 11.4. See Appendix A.1 for more information.

2.3 OPERATING CONDITIONS AND PROCESS DATA

Emission tests were performed while EUBILLETREHEAT-WB and air pollution control devices were operating at the conditions required by the permit. EUBILLETREHEAT-WB was tested when operating within ±10% of furnace capacity.

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:

- Duration, min
- Billet throughput, ton
- Natural gas consumption, SCF

3.0 SAMPLING AND ANALYTICAL PROCEDURES

3.1 TEST METHODS

The test methods for this test program were presented previously 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

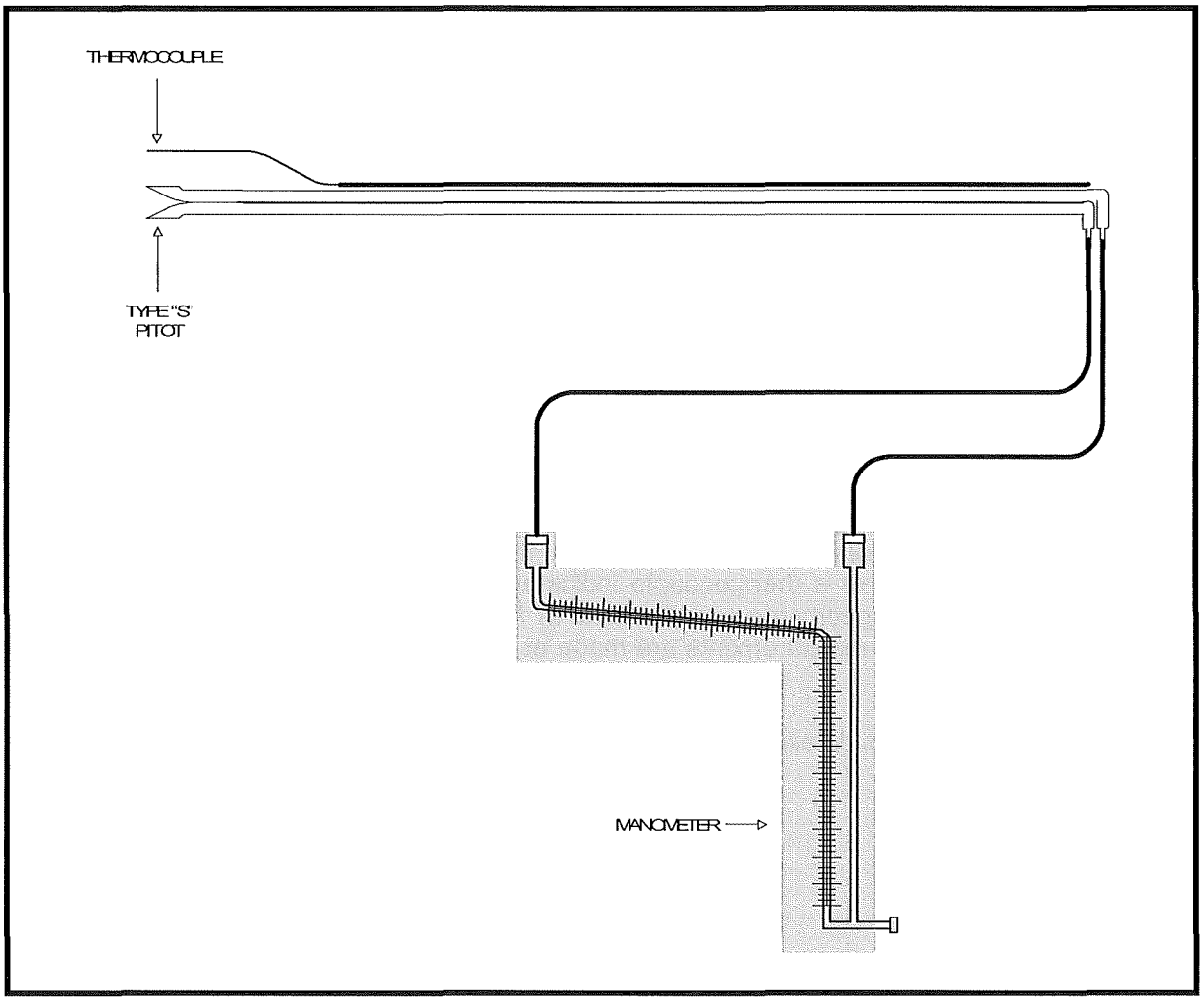
EPA Method 1 is used to assure that representative measurements of volumetric flow rate are obtained by dividing the cross-section of the stack or duct into equal areas, and then locating a traverse point within each of the equal areas. Acceptable sample locations must be located at least two stack or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

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.

The sampling apparatus is detailed in Figure 3-1.

FIGURE 3-1
US EPA METHOD 2 SAMPLING TRAIN



3.1.3 EPA Method 3A, Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)

EPA Method 3A is an instrumental test method used to measure the concentration of O_2 and CO_2 in stack gas. The effluent gas is continuously or intermittently sampled and conveyed to analyzers that measure the concentration of O_2 and CO_2. The performance requirements of the method must be met to validate data.

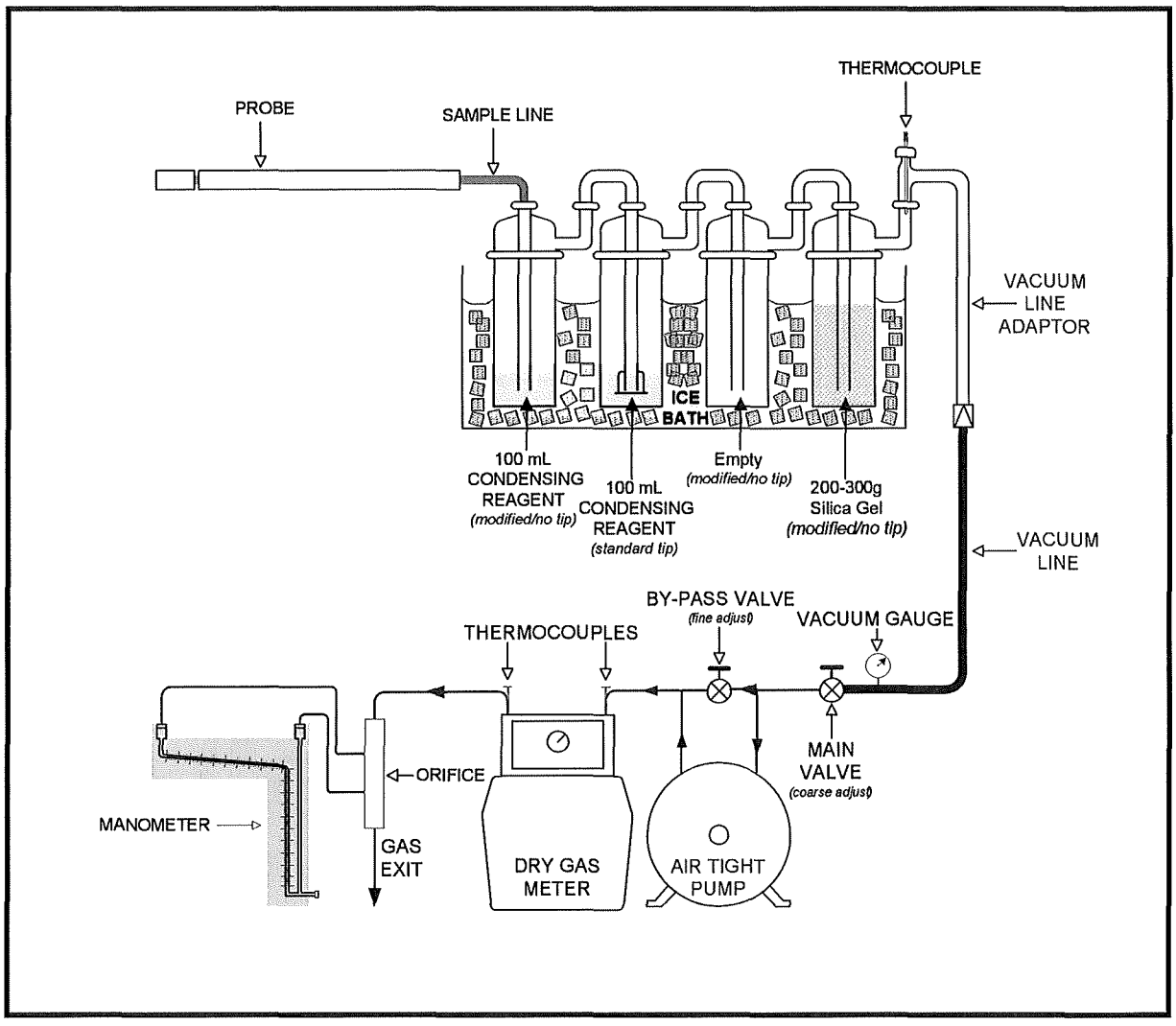
The sampling system is detailed in Figure 3-3.

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.

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

FIGURE 3-2
US EPA METHOD 4 SAMPLING TRAIN



3.1.5 EPA Method 7E, Determination of Nitrogen Oxides Emissions from Stationary Source (Instrumental Analyzer Procedure)

EPA Method 7E is an instrumental test method used to continuously measure emissions of NO_x as NO_2. Conditioned gas is sent to an analyzer to measure the concentration of NO_x. NO and NO_2 can be measured separately or simultaneously together but, for the purposes of this method, NO_x is the sum of NO and NO_2. The performance requirements of the method must be met to validate the data.

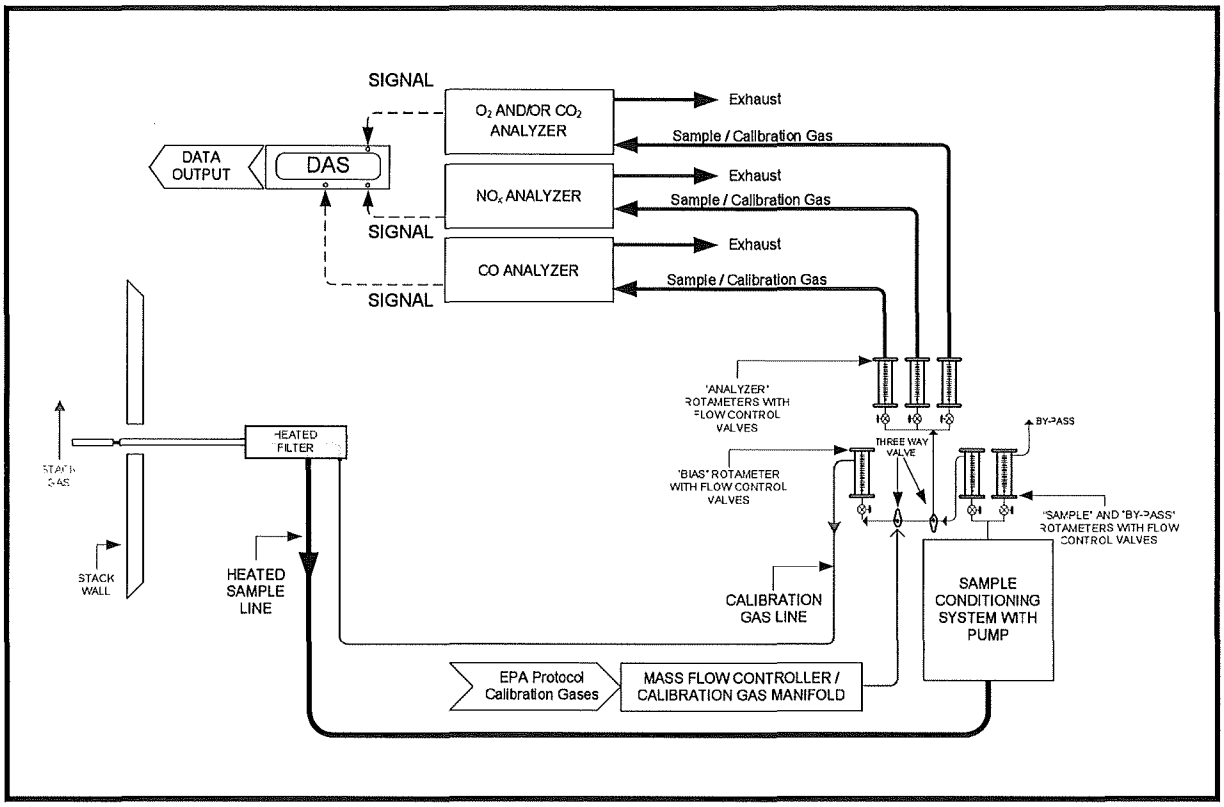
The sampling system is detailed in Figures 3-3.

3.1.6 EPA Method 10, Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)

EPA Method 10 is an instrumental test method used to continuously measure emissions of CO. Conditioned gas is sent to an analyzer to measure the concentration of CO. The performance requirements of the method must be met to validate the data.

The sampling system is detailed in Figure 3-3.

FIGURE 3-3
EPA METHOD 3A, 7E, AND 10 SAMPLING TRAIN



3.1.7 EPA Method 19, Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide, and Nitrogen Oxide Emission Rates

EPA Method 19 is used to calculate mass emission rates in units of lb/MMBtu. EPA Method 19, Table 19-2 contains a list of assigned fuel factors for different types of fuels, which can be used for these calculations.

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

No field deviations or exceptions from the test plan or test methods occurred during this test program.

4.2 PRESENTATION OF RESULTS

The average results are compared to the permit limits in Table 1-2. The results of individual compliance test runs performed are presented in Table 4-1. 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.

The CO concentrations displayed in Table 4-1 for Runs 1 through 3 were negative and are assigned a value of zero. Emissions displayed Table 4-1 were calculated utilizing the assigned zero concentration value for CO.

TABLE 4-1
NO_X AND CO EMISSIONS RESULTS - EUBILLETREHEAT-WB

Run Number	1	2	3	Average
Date	12/22/2021	12/22/2021	12/22/2021	--
Time	10:07-11:35	12:32-13:37	14:06-15:18	--
Process Data				
billets produced, ton/hr	99.6	74.0	90.3	88.0
natural gas usage, MMscfh	0.107	0.099	0.078	0.095
Flue Gas Parameters				
O_2, % volume dry	13.1	13.5	13.9	13.5
CO_2, % volume dry	4.39	4.08	3.81	4.09
flue gas temperature, °F	368	301	337	335
moisture content, % volume	4.20	5.38	5.27	4.95
volumetric flow rate, dscfm	50,940	45,595	47,165	47,900
Nitrogen Oxides (NO_x as NO_2)				
ppmvd	15.77	14.07	14.72	14.85
lb/hr	5.76	4.59	4.97	5.11
lb/MMBtu	0.044	0.041	0.046	0.044
Carbon Monoxide (CO)				
ppmvd †	0.00	0.00	0.00	0.00
lb/hr †	0.00	0.00	0.00	0.00
lb/MMscf	0.00	0.00	0.00	0.00

* Process Data was provided by Gerdau Monroe Mill personnel.
† CO concentrations were negative and are assigned a value of zero. See Section 4.2 for details.

5.0 INTERNAL QA/QC ACTIVITIES

5.1 QA/QC AUDITS

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

EPA Method 3A, 7E, and 10 calibration audits were all within the measurement system performance specifications for the calibration drift checks, system calibration bias checks, and calibration error checks.

The NO_2 to NO converter efficiency check of the analyzer was conducted per the procedures in EPA Method 7E, Section 8.2.4. The conversion efficiency met the criteria.

An EPA Method 205 field evaluation of the calibration gas dilution system was conducted. The dilution accuracy and precision QA specifications were met.

5.2 QA/QC DISCUSSION

All QA/QC criteria were met during this test program.

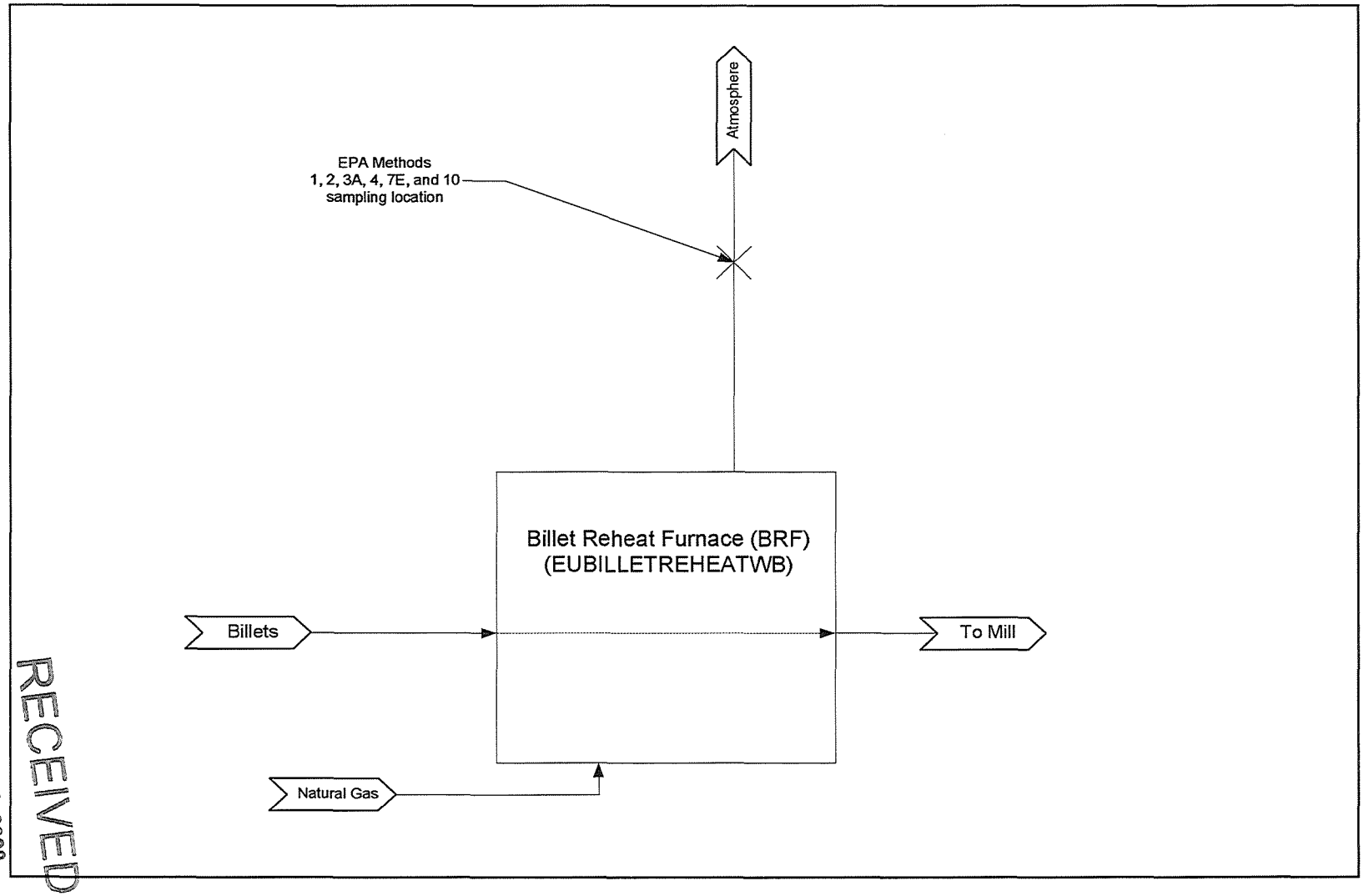
5.3 QUALITY STATEMENT

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).

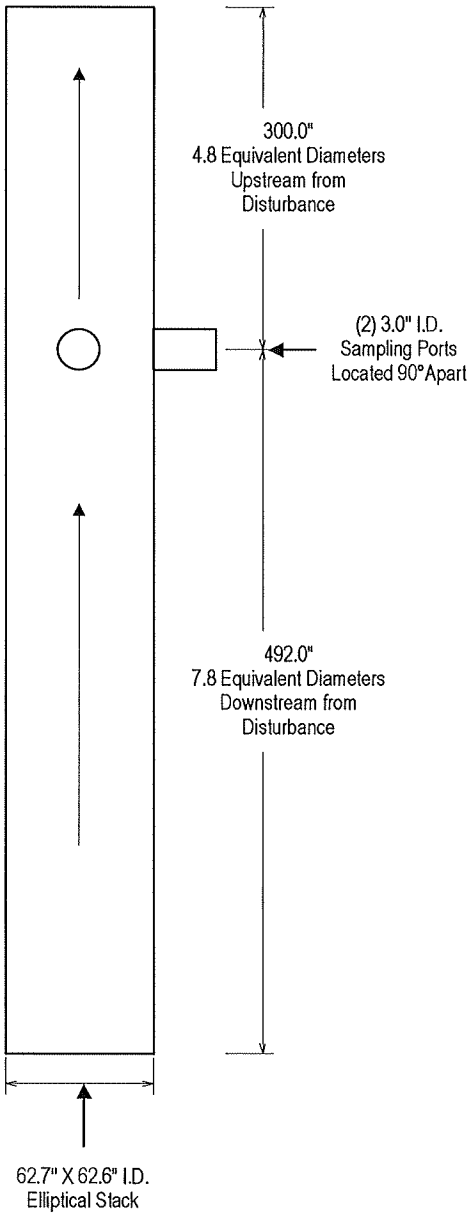
APPENDIX A
FIELD DATA AND CALCULATIONS

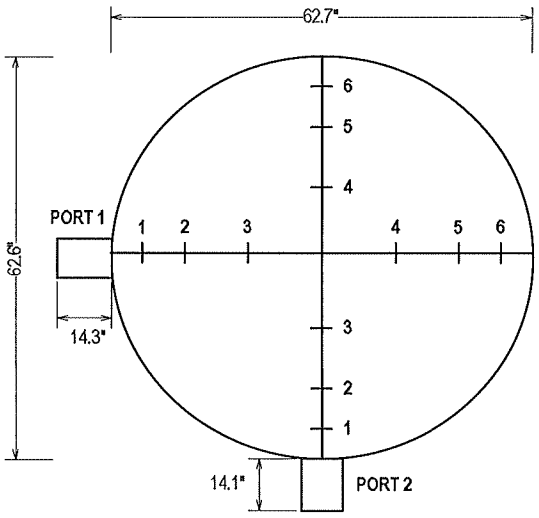
Appendix A.1
Sampling Locations

EUBILLETREHEAT-WB PROCESS AND SAMPLING LOCATION SCHEMATIC



EUBILLETREHEAT-WB EXHAUST TRAVERSE POINT LOCATION DRAWING





Point	% of Stack Depth	Distance from Inside Wall (in.) PORT 1	Distance from Inside Wall (in.) PORT 2
1	4.4	2.8	2..8
2	14.6	9.2	9.1
3	29.6	18.6	18.5
4	70.4	44.1	44.1
5	85.4	53.5	53.5
6	95.6	59.9	59.8