

**Source Test Report for 2024  
Relative Accuracy Test Audits  
Boiler 8 and Boiler 11  
Billerud Escanaba, LLC  
Facility ID No. A0884  
Escanaba, Michigan**

**Prepared For:**

**Billerud Escanaba, LLC  
7100 County Road 426  
Escanaba, MI 49829**

**Prepared By:**

**Montrose Air Quality Services, LLC  
1802 Brummel Avenue  
Elk Grove Village, IL 60007**

**For Submission To:**

**Michigan Department of Environment, Great Lakes, and Energy  
525 W. Allegan Street  
Lansing, MI 48933**

**Document Number: MW023AS-039864-RT-2184**

**Test Dates: April 17 and 18, 2024**

**Submittal Date: May 21, 2024**





**MONTROSE**  
AIR QUALITY SERVICES

## Review and Certification

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:** James Christ **Date:** 05 / 15 / 2024

**Name:** James Christ **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:** Henry M. Taylor **Date:** 05 / 14 / 2024

**Name:** Henry M. Taylor **Title:** Senior Reporting QC Specialist

## Table of Contents

<b><u>Section</u></b>	<b><u>Page</u></b>
1.0 Introduction .....	5
1.1 Summary of Test Program .....	5
1.2 Key Personnel .....	7
2.0 Plant and Sampling Location Descriptions .....	8
2.1 Process Description, Operation, and Control Equipment .....	8
2.2 CEMS Description .....	8
2.3 Flue Gas Sampling Locations .....	8
2.4 Operating Conditions and Process Data .....	9
3.0 Sampling and Analytical Procedures .....	10
3.1 Test Methods .....	10
3.1.1 EPA Methods 3A and 7E .....	10
3.1.2 EPA Method 19 .....	11
3.1.3 EPA Performance Specification 2 .....	12
3.1.4 EPA Performance Specification 3 .....	12
3.2 Process Test Methods .....	13
4.0 Test Discussion and Results .....	14
4.1 Field Test Deviations and Exceptions .....	14
4.2 Presentation of Results .....	14
5.0 Internal QA/QC Activities .....	21
5.1 QA/QC Audits .....	21
5.2 QA/QC Discussion .....	21
5.3 Quality Statement .....	21

## List of Appendices

A	Field Data and Calculations .....	22
A.1	Sampling Locations .....	23
A.2	Instrumental Test Method Data .....	26
A.3	Calculations/Results .....	47
A.4	Example Calculations .....	58
B	Facility CEMS Data .....	62
C	Quality Assurance/Quality Control .....	96
C.1	Units and Abbreviations .....	97
C.2	Instrumental Test Method QA/QC Data .....	105
C.3	Accreditation Information/Certifications .....	134



## List of Tables

1-1	Summary of Test Program .....	5
1-2	Summary of Part 60 RA Test Results – Boiler 8 .....	6
1-3	Summary of Part 60 RA Test Results – Boiler 11.....	6
1-4	Test Personnel and Observers.....	7
2-1	CEMS Information .....	8
2-2	Sampling Locations .....	9
4-1	O <sub>2</sub> (%) RATA Results - Boiler 8 .....	15
4-2	NO <sub>x</sub> (ppmvd) RATA Results - Boiler 8.....	16
4-3	NO <sub>x</sub> (lb/MMBtu) RATA Results - Boiler 8 .....	17
4-4	O <sub>2</sub> (%) RATA Results - Boiler 11.....	18
4-5	NO <sub>x</sub> (ppmvd) RATA Results - Boiler 11 .....	19
4-6	NO <sub>x</sub> (lb/MMBtu) RATA Results - Boiler 11.....	20
5-1	Gas Cylinder Information .....	21

## List of Figures

3-1	EPA Method 3A and 7E Sampling Train.....	11
-----	--	----

## 1.0 Introduction

### 1.1 Summary of Test Program

Billerud Escanaba LLC (Billerud) contracted Montrose Air Quality Services, LLC (Montrose) to perform CEMS RATAs on Boiler 8 (EU8B13) and Boiler 11 (EU11B68) at their facility located in Escanaba, Michigan.

The tests were conducted to meet the requirements listed in 40 CFR, Part 60, Appendix B and permit number MI-ROP-A0884-2021b issued by the State of Michigan Department of Environment, Great Lakes, and Energy (EGLE).

The specific objectives were to:

- Determine the relative accuracy of the CEMS installed to monitor the concentrations of O<sub>2</sub> and NO<sub>x</sub> from the exhausts of Boiler 8 and Boiler 11
- 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 Dates	Unit ID/ Source Name	Activity/Parameters	Test Methods	No. of Runs	Duration (Minutes)
4/17/2024	Boiler 8	O <sub>2</sub>	EPA 3A	10	30
		NO <sub>x</sub>	EPA 7E and 19	10	30
4/18/2024	Boiler 11	O <sub>2</sub>	EPA 3A	10	30
		NO <sub>x</sub>	EPA 7E and 19	10	30

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 RA test results are summarized and compared to their respective regulatory requirements 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 (protocol) dated March 4, 2024 that was submitted to and approved by EGLE.



**MONTROSE**  
AIR QUALITY SERVICES

**Table 1-2**  
**Summary of Part 60 RA Test Results – Boiler 8**  
**April 17, 2024**

Parameter/Units	Regulatory Reference	RA	Allowable
<b>Part 60</b>			
<b>Oxygen (O<sub>2</sub>)</b>			
% volume dry	PS-3	0.18%  d	≤ 1.0%  d
<b>Nitrogen Oxides (NO<sub>x</sub> as NO<sub>2</sub>)</b>			
ppmvd	PS-2	3.86%	≤ 20.0% of RM
lb/MMBtu	PS-2	5.10%	≤ 20.0% of RM

**Table 1-3**  
**Summary of Part 60 RA Test Results – Boiler 11**  
**April 18, 2024**

Parameter/Units	Regulatory Reference	RA	Allowable
<b>Part 60</b>			
<b>Oxygen (O<sub>2</sub>)</b>			
% volume dry	PS-3	0.09%  d	≤ 1.0%  d
<b>Nitrogen Oxides (NO<sub>x</sub> as NO<sub>2</sub>)</b>			
ppmvd	PS-2	6.49%	≤ 20.0% of RM
lb/MMBtu	PS-2	1.74%	≤ 10.0% of AS



## 1.2 Key Personnel

A list of project participants is included below:

### Facility Information

Source Location: Billerud Escanaba, LLC  
 7100 County Road 426 M. 5 Rd.  
 Escanaba, MI 49829

Project Contact: Amanda Freele  
 Role: Environmental Engineer  
 Telephone: 906-233-2603  
 Email: Amanda.Freele@billerud.com

### Agency Information

Regulatory Agency: EGLE  
 Agency Contact: Jeremy Howe  
 Telephone: 231-878-6687  
 Email: HoweJ1@Michigan.gov

### Testing Company Information

Testing Firm: Montrose Air Quality Services, LLC  
 Contact: James Christ  
 Title: Client Project Manager  
 Telephone: 630-625-2112  
 Email: jchrist@montrose-env.com

Test personnel and observers are summarized in Table 1-4.

**Table 1-4**

**Test Personnel and Observers**

Name	Affiliation	Role/Responsibility
James Christ	Montrose	Client Project Manager
Nicholas Klein	Montrose	Field Project Manager/Field Team Leader/Qualified Individual (QI)/Trailer operator
Ethan Wernikoff	Montrose	Field Support
Sean Dyra	Montrose	Calculations and report preparation
Amanda Freele	Billerud Escanaba LLC	Client Liaison/Test Coordinator

## 2.0 Plant and Sampling Location Descriptions

### 2.1 Process Description, Operation, and Control Equipment

Billerud Escanaba, LLC operates an ABB Combustion Engineering combination fuel boiler (Boiler No. 11) rated for 750,000 pounds of steam per hour (approximately 1,040 million BTU per hour heat input) that provides steam for mill processes and steam turbine generators for producing electricity. Boiler No. 11 burns natural gas and solid fuels, which include pulverized coal, wood residue, wastewater treatment plant residuals, tire-derived fuel and NHSM pellets.

The Boiler 8 (EU8B13) is a Combustion Engineering boiler rated for 450,000 pounds of steam per hour (approximately 594 million BTU per hour heat input) that provides steam for mill processes and steam turbine-generator sets for producing electricity. A Flue Gas Recirculation system was installed on Boiler 8. Boiler 8 burns natural gas and fuel oil.

### 2.2 CEMS Description

The CEMS analyzers are presented in Table 2-1.

**Table 2-1**  
**CEMS Information**

Analyzer Type	Manufacturer	Model No.	Serial No.
<b>Boiler 8</b>			
NO <sub>x</sub>	TEI	42IQ-ACANN	12218618489
O <sub>2</sub>	TEI	25595003	CC0227157
<b>Boiler 11</b>			
NO <sub>x</sub>	TEI	42IQ-ACANB	1181030037
O <sub>2</sub>	TEI	25595003	CC111105-5

### 2.3 Flue Gas Sampling Locations

Information regarding the sampling locations is presented in Table 2-2.



**Table 2-2**  
**Sampling Locations**

Sampling Location	Stack Inside Diameter (in.)	Distance from Nearest Disturbance		Number of Traverse Points
		Downstream EPA "B" (in./dia.)	Upstream EPA "A" (in./dia.)	
Boiler 8	84	>168/>2.0	672/8.0	Gaseous: 3
Boiler 11	168	NA	NA	Gaseous: 1

The sample location for Boiler 8 was verified in the field to conform to EPA Method 1. Due to clearance issues, Boiler 11 sampling was performed at a single point at an approved location nearest to the facility CEMS. See Appendix A.1 for more information.

## 2.4 Operating Conditions and Process Data

Emission tests were performed while the source/units and air pollution control devices were operating at the conditions required by the permit. The units were tested when operating at greater than 50% of the maximum rated/normal capacity.

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

- Fuel Type
- Fuel throughput
- Fuel blend ratio
- Operating load
- Heat Input
- Oxygen level

## 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 Methods 3A and 7E, Determination of Oxygen and Nitrogen Oxides Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)

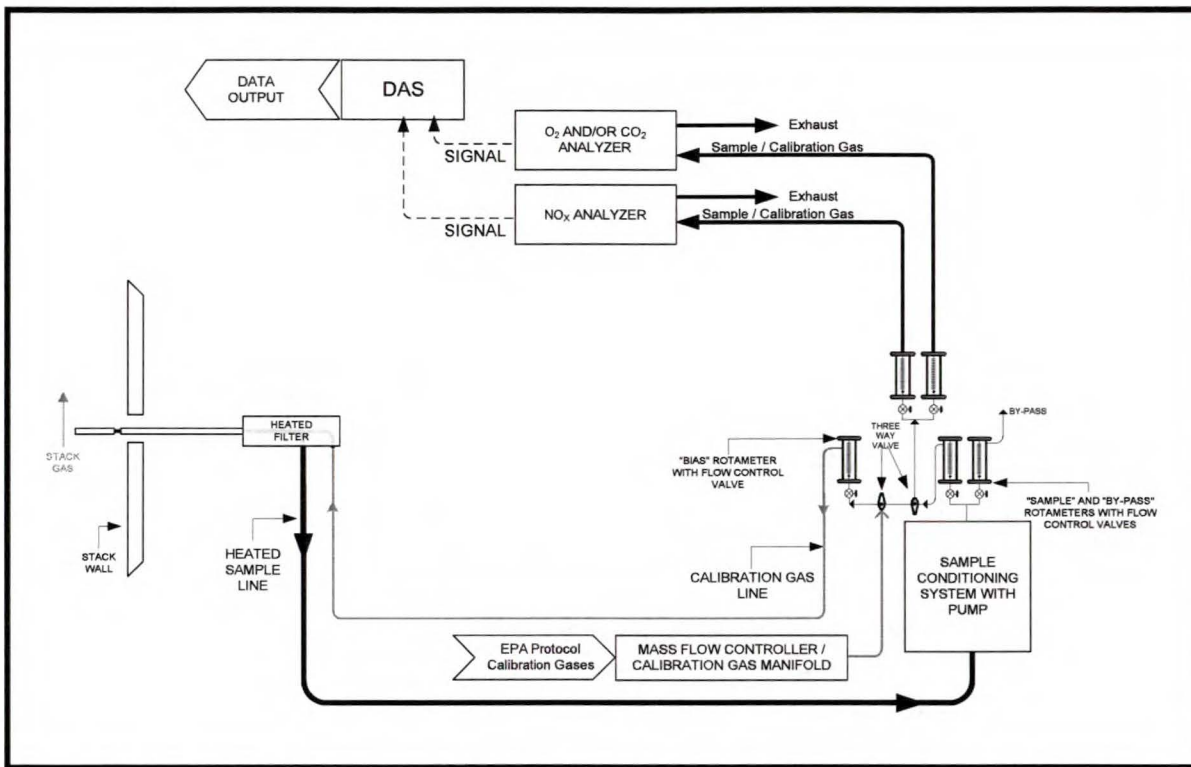
Concentrations of O<sub>2</sub> and NO<sub>x</sub> are measured simultaneously using EPA Methods 3A and 7E, which are instrumental test methods. Conditioned gas is sent to a series of analyzers to measure the gaseous emission concentrations. The performance requirements of the method must be met to validate the data.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - A dry extractive sampling system is used to report emissions on a dry basis
  - A paramagnetic analyzer is used to measure O<sub>2</sub>
  - A chemiluminescent analyzer is used to measure NO<sub>x</sub>
- Method Exceptions:
  - For gaseous emissions sampling, MDL are calculated for each analyzer. The ISDL is equal to the sensitivity of the instrumentation, which is 2% of the span value.
- Target and/or Minimum Required Sample Duration: 30 minutes
- Target Analytes: O<sub>2</sub> and NO<sub>x</sub>

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

**Figure 3-1**  
**EPA Method 3A and 7E Sampling Train**



### 3.1.2 EPA Method 19, Measurement of 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.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - F factor is the oxygen-based F factor, dry basis ( $F_d$ )
  - $F_d$  factor of 8,710 for natural gas was used for Boiler 8 lb/MMBtu calculations
  - $F_d$  factor of 9,820 for natural gas and wood waste was used for Boiler 11 lb/MMBtu calculations. See Section 4.0 Test Discussion and Results.
- Method Exceptions:
  - None



### **3.1.3 EPA Performance Specification 2, Specifications and Test Procedures for NO<sub>x</sub> Continuous Emission Monitoring Systems in Stationary Sources**

EPA Performance Specification 2 is a specification used to evaluate the acceptability of NO<sub>x</sub> CEMS. The evaluation is conducted at the time of installation or soon after, and whenever specified in the regulations. The CEMS may include, for certain stationary sources, a diluent (O<sub>2</sub> or CO<sub>2</sub>) monitor. The RA and CD tests are conducted to determine conformance of the CEMS to the specification.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - More than nine sets of RM tests are performed. A maximum of three sets of the test results may be rejected so long as the total number of test results used to determine the RA is greater than or equal to nine. All data is reported, including the rejected data.
  - EPA Method 3A is utilized as the reference method
  - EPA Method 7E is utilized as the reference method
  - Integrated sampling is performed
- Method Exceptions:
  - None
- Applicable Performance Specifications:
  - When average RM results are  $\geq 50\%$  of the AS, RA calculated with RM in the denominator must be  $\leq 20.0\%$
  - When average RM results are  $< 50\%$  of the AS, RA calculated with AS in the denominator must be  $\leq 10.0\%$

### **3.1.4 EPA Performance Specification 3, Specifications and Test Procedures for O<sub>2</sub> and CO<sub>2</sub> Continuous Monitoring Systems in Stationary Sources**

EPA Performance Specification 3 is a specification used to evaluate the acceptability of O<sub>2</sub> and CO<sub>2</sub> CEMS. The evaluation is conducted at the time of installation or soon after, and whenever specified in the regulations. This specification applies to O<sub>2</sub> or CO<sub>2</sub> monitors that are not included under PS-2. The RA and CD tests are conducted to determine conformance of the CEMS to the specification.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - EPA Method 3A is utilized as the reference method procedure
  - Integrated sampling is performed

- More than nine sets of RM tests are performed. A maximum of three sets of the test results may be rejected so long as the total number of test results used to determine the RA is greater than or equal to nine. All data is reported, including the rejected data.
- Method Exceptions:
  - None
- Applicable Performance Specifications:
  - When RA is calculated as the absolute average difference between the RM and CEMS, the RA must be within 1.0% O<sub>2</sub> or CO<sub>2</sub>

### 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**

Initial notification for compliance testing via test plan was made for Boiler 11 RATA on 4/17/2024 and Boiler 8 RATA on 4/18/2024. Two notifications of change were made due to market availability and malfunction of stack testers equipment that affected test dates. Dates tested were: 4/18/2024 for Boiler 11 RATA and 4/17/2024 for Boiler 8 RATA.

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

### **4.2 Presentation of Results**

The RA results are compared to the regulatory requirements in Tables 1-2 and 1-3. The results of individual test runs performed are presented in Tables 4-1 through 4-6. 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.

An  $F_d$  factor of 9,820 was used in the calculation of the  $\text{NO}_x$  lb/MMBtu emission rate for Boiler 11. This  $F_d$  factor is based on coal as fuel. Although Boiler 11 was fired on a combination of natural gas and wood waste for this RATA, the  $F_d$  factor of 9,820 was used as a worst-case condition yielding the highest emission rate. The facility CEMS utilizes the 9,820  $F_d$  for any type of fuel or combination of fuels burned in Boiler 11.



**Table 4-1**  
**O<sub>2</sub> (%) RATA Results -**  
**Boiler 8**

Run No.	Date	Time	RM	CEMS	Difference	Run used (Y or N)
1	4/17/2024	0800-0829	5.71	5.59	0.12	Y
2	4/17/2024	0855-0924	5.80	5.62	0.18	Y
3	4/17/2024	0925-0954	5.77	5.61	0.16	Y
4	4/17/2024	0955-1024	5.76	5.62	0.14	Y
5	4/17/2024	1042-1111	5.81	5.60	0.21	Y
6	4/17/2024	1112-1141	5.80	5.61	0.19	Y
7	4/17/2024	1142-1211	5.81	5.61	0.20	N
8	4/17/2024	1228-1257	5.80	5.59	0.21	Y
9	4/17/2024	1258-1327	5.79	5.61	0.18	Y
10	4/17/2024	1328-1357	5.83	5.63	0.20	Y
Averages			5.787	5.609	0.178	--
Standard Deviation			0.031			
Confidence Coefficient (CC)			0.024			
RA based on absolute difference			0.18	% d		

**Table 4-2**  
**NO<sub>x</sub> (ppmvd) RATA Results -**  
**Boiler 8**

Run No.	Date	Time	RM	CEMS	Difference	Run used (Y or N)
1	4/17/2024	0800-0829	139.6	138.1	1.5	Y
2	4/17/2024	0855-0924	143.4	136.7	6.7	Y
3	4/17/2024	0925-0954	141.6	136.5	5.1	Y
4	4/17/2024	0955-1024	141.1	136.4	4.7	Y
5	4/17/2024	1042-1111	140.6	138.1	2.5	Y
6	4/17/2024	1112-1141	141.3	136.2	5.1	Y
7	4/17/2024	1142-1211	142.8	137.0	5.8	N
8	4/17/2024	1228-1257	138.0	133.4	4.6	Y
9	4/17/2024	1258-1327	136.2	132.2	4.0	Y
10	4/17/2024	1328-1357	138.2	134.0	4.2	Y
Averages			139.99	135.73	4.25	--
Standard Deviation			1.498			
Confidence Coefficient (CC)			1.151			
RA based on mean RM value			3.86	%		

**Table 4-3**  
**NO<sub>x</sub> (lb/MMBtu) RATA Results -**  
**Boiler 8**

Run No.	Date	Time	RM	CEMS	Difference	Run used (Y or N)
1	4/17/2024	0800-0829	0.200	0.196	0.0038	Y
2	4/17/2024	0855-0924	0.206	0.194	0.0124	Y
3	4/17/2024	0925-0954	0.203	0.194	0.0094	Y
4	4/17/2024	0955-1024	0.203	0.194	0.0086	Y
5	4/17/2024	1042-1111	0.203	0.196	0.0066	Y
6	4/17/2024	1112-1141	0.203	0.194	0.0094	Y
7	4/17/2024	1142-1211	0.206	0.195	0.0108	N
8	4/17/2024	1228-1257	0.199	0.189	0.0097	Y
9	4/17/2024	1258-1327	0.196	0.188	0.0080	Y
10	4/17/2024	1328-1357	0.199	0.191	0.0083	Y
Averages			0.2013	0.1929	0.00846	--
Applicable Standard (AS)			0.350	lb/MMBtu		
Standard Deviation			0.0024			
Confidence Coefficient (CC)			0.0018			
RA based on mean RM value			5.10	%		



**Table 4-4**  
**O<sub>2</sub> (%) RATA Results -**  
**Boiler 11**

Run No.	Date	Time	RM	CEMS	Difference	Run used (Y or N)
1	4/18/2024	0836-0905	5.38	5.48	5.48	Y
2	4/18/2024	0916-0945	5.37	5.30	5.30	Y
3	4/18/2024	1000-1029	5.13	5.12	5.12	Y
4	4/18/2024	1038-1107	5.07	4.95	4.95	Y
5	4/18/2024	1122-1151	5.27	5.27	5.27	N
6	4/18/2024	1210-1239	5.40	5.41	5.41	Y
7	4/18/2024	1250-1319	5.53	5.50	5.50	Y
8	4/18/2024	1332-1401	5.14	5.07	5.07	Y
9	4/18/2024	1416-1445	5.45	5.23	5.23	Y
10	4/18/2024	1507-1536	5.64	5.24	5.24	Y
Averages			5.345	5.256	0.089	--
Standard Deviation			0.145			
Confidence Coefficient (CC)			0.112			
RA based on absolute difference			0.09	% d		

**Table 4-5**  
**NO<sub>x</sub> (ppmvd) RATA Results -**  
**Boiler 11**

Run No.	Date	Time	RM	CEMS	Difference	Run used (Y or N)
1	4/18/2024	0836-0905	127.1	134.9	-7.8	Y
2	4/18/2024	0916-0945	134.3	141.5	-7.2	Y
3	4/18/2024	1000-1029	131.3	136.8	-5.5	Y
4	4/18/2024	1038-1107	128.5	134.4	-5.9	Y
5	4/18/2024	1122-1151	136.7	146.0	-9.3	N
6	4/18/2024	1210-1239	135.5	136.6	-1.1	Y
7	4/18/2024	1250-1319	131.6	130.8	0.8	Y
8	4/18/2024	1332-1401	139.4	147.0	-7.6	Y
9	4/18/2024	1416-1445	151.9	162.1	-10.2	Y
10	4/18/2024	1507-1536	149.1	158.7	-9.6	Y
Averages			136.52	142.53	-6.01	--
Standard Deviation			3.70			
Confidence Coefficient (CC)			2.84			
RA based on mean RM value			6.49	%		

**Table 4-6**  
**NO<sub>x</sub> (lb/MMBtu) RATA Results -**  
**Boiler 11**

Run No.	Date	Time	RM	CEMS	Difference	Run used (Y or N)
1	4/18/2024	0836-0905	0.201	0.214	-0.013	Y
2	4/18/2024	0916-0945	0.212	0.223	-0.011	Y
3	4/18/2024	1000-1029	0.204	0.213	-0.009	Y
4	4/18/2024	1038-1107	0.199	0.206	-0.007	Y
5	4/18/2024	1122-1151	0.214	0.229	-0.015	N
6	4/18/2024	1210-1239	0.214	0.216	-0.002	Y
7	4/18/2024	1250-1319	0.210	0.209	0.001	Y
8	4/18/2024	1332-1401	0.217	0.228	-0.011	Y
9	4/18/2024	1416-1445	0.241	0.254	-0.013	Y
10	4/18/2024	1507-1536	0.239	0.249	-0.010	Y
Averages			0.2152	0.2236	-0.0084	--
Applicable Standard (AS)			0.700	lb/MMBtu		
Standard Deviation			0.0049			
Confidence Coefficient (CC)			0.0038			
RA based on AS			1.74	%		



## 5.0 Internal QA/QC Activities

Table 5-1 presents a summary of the gas cylinder information.

**Table 5-1**  
**Gas Cylinder Information**

Gas Type	Gas Level	Gas Concentration	Vendor ID (PGVP ID#)	Cylinder ID	Expiration Date
O <sub>2</sub> , Balance N <sub>2</sub>	Mid	10.10%	B12023	EB0162448	03/21/2031
O <sub>2</sub> , Balance N <sub>2</sub>	High	21.10%	B12023	CC173554	04/10/2031
NO <sub>x</sub> , Balance N <sub>2</sub>	Mid	254.3 ppmv	B12022	ALM-050772	11/01/2030
NO <sub>x</sub> , Balance N <sub>2</sub>	High	460.7 ppmv	B12022	ALM-028826	11/01/2030
NO <sub>2</sub> , Balance Air	NA	50.92 ppmv	B12023	CC503290	04/10/2026

### 5.1 QA/QC Audits

EPA Method 3A and 7E 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<sub>2</sub> to NO converter efficiency checks of the analyzer were conducted per the procedures in EPA Method 7E, Section 8.2.4. The conversion efficiencies met the criteria.

### 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**



**MONTROSE**  
AIR QUALITY SERVICES

## **Appendix A.1**

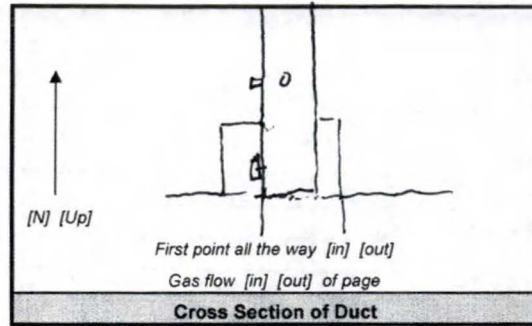
### **Sampling Locations**



MONTROSE AIR QUALITY SERVICES, LLC  
EPA Method 1 Sample and Velocity Traverses Datasheet

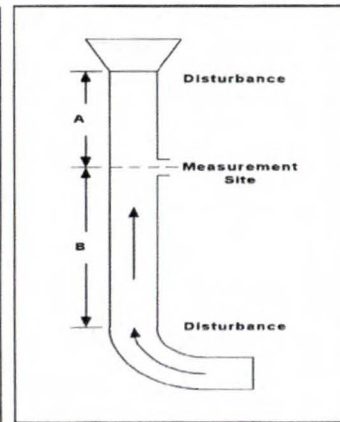
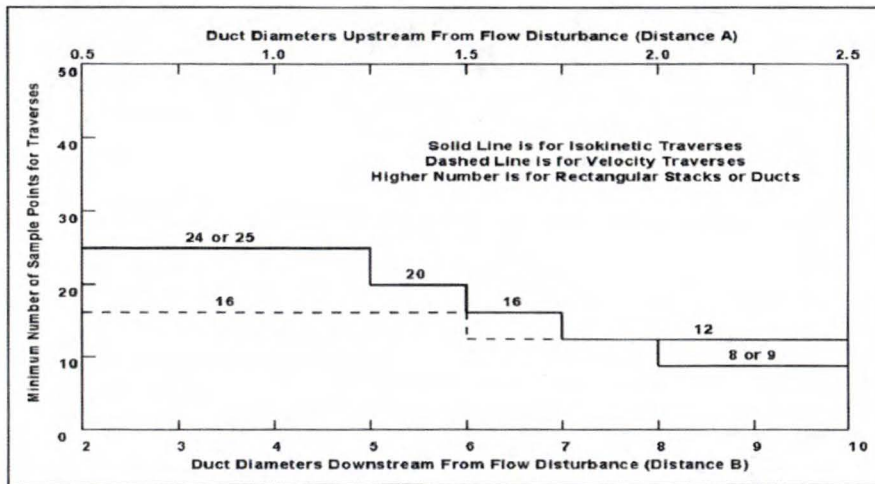
LOCATION Boiler 8

Client	Billowid	
Project No:	049333	
Plant	Esconoba MI	
Date	4-17-24	
Technician	NK	
Duct Diameter (in.)	84	
Port Diameter (in.)	5	
Port Length (in.)	7	
Port Type	flange	
Distance A (in.)	67	
Distance B (in.)	>168	
Distance A (Duct Diameters)	8.0	
Distance B (Duct Diameters)	>2.0	



For rectangular ducts

$$ED = \frac{2LW}{(L + W)}$$



Stacks D > 24" min. ≥1.00" away from wall  
Stacks D ≤ 24" min. ≥0.50" away from wall

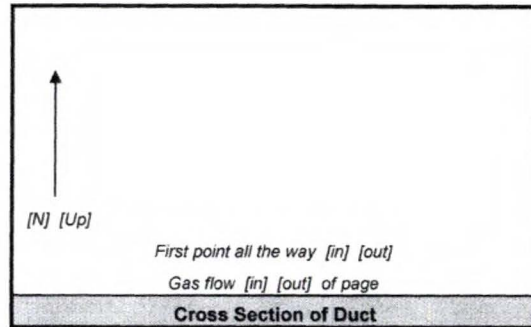
Location Schematic and Notes	Traverse Point	Distance (in.)	Dist. w/Port (in.)
	1		21
	2		49
	3		77
	4		
	5		
	6		
	7		
	8		
	9		
	10		
	11		
	12		
	13		
	14		
	15		
	16		

Indicate sample ports, height from grade, types of disturbances, access, unistrut configuration, etc.

MONTROSE AIR QUALITY SERVICES, LLC  
EPA Method 1 Sample and Velocity Traverses Datasheet

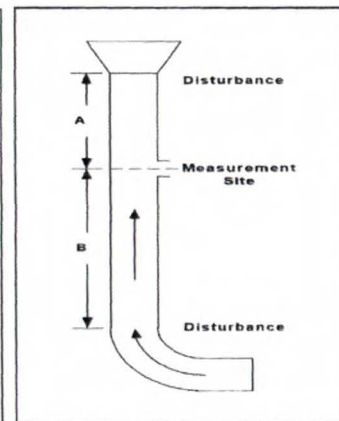
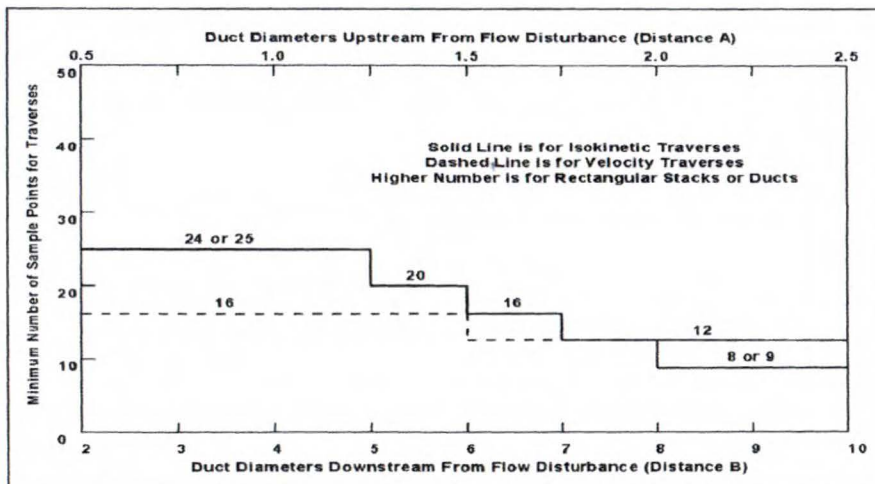
LOCATION Boiler 11

Client	<u>Billerud</u>
Project No:	<u>049333</u>
Plant	<u>Escomaba / MI</u>
Date	<u>4-18-24</u>
Technician	<u>NK</u>
Duct Diameter (in.)	<u>168</u>
Port Diameter (in.)	--
Port Length (in.)	<u>32</u>
Port Type	<u>open</u>
Distance A (in.)	--
Distance B (in.)	--
Distance A (Duct Diameters)	--
Distance B (Duct Diameters)	--



For rectangular ducts

$$ED = \frac{2LW}{(L + W)}$$



Stacks D > 24" min. ≥ 1.00" away from wall

Stacks D ≤ 24" min. ≥ 0.50" away from wall

Location Schematic and Notes	Traverse Point	Distance (in.)	Dist. w/Port (in.)
<p>Indicate sample ports, height from grade, types of disturbances, access, unistrut configuration, etc.</p>	1		<u>8-84</u>
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
	11		
	12		
	13		
	14		
	15		
	16		