

1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

UP Paper, LLC - Manistique, LLC (State Registration No. :A6475), located in Manistique, Michigan, contracted Montrose Air Quality Services (Montrose) of Royal Oak, Michigan, to conduct a Relative Accuracy Audit (RAA) of the Predictive Emission Monitoring System (PEMS) for their Boiler 4 (EUBLR004). Testing was performed on May 4, 2021, for the purpose of satisfying the emission testing requirements of Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operating Permit No. MI ROP-A6475-2019 by evaluating the quality of the emissions data produced by UP Paper, LLC's PEMS in accordance with 40 CFR Part 60, Appendices A and B.

The specific objectives were to:

- Verify the relative accuracy of oxygen (%-dry as O₂), nitrogen oxides (NO_x) (ppmvd) and (lb/MMBtu) (as NO₂) at the exhaust stack serving EUBLR004 in accordance with Performance Specifications 16 (PS-16)
- 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(s)	Unit ID/ Source Name	Activity/ Parameters	Test Methods	No. of Runs	Duration (Minutes)
05/04/2021	EUBLR004	O ₂	EPA 3A	3	30
05/04/2021	EUBLR004	NO _x	EPA 7E	3	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 RAA test results are summarized 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 Montrose testing proposal dated April 22, 2021.

**TABLE 1-2
 SUMMARY OF PART 60 RAA TEST RESULTS -
 EUBLR004
 MAY 4, 2021**

Parameter/Units	Regulatory Reference	RAA	Allowable
Part 60			
Oxygen (O₂) %	PS-16	0.04	± 1 % as O ₂
Nitrogen Oxides (NO_x) ppmvd	PS-16	-1.18	± 20%
NO_x, as NO₂ lb/MMBtu	PS-16	-0.87	± 20%

1.2 KEY PERSONNEL

A list of project participants is included below:

Facility Information

Source Location: UP Paper, LLC
 402 West Ell Street
 Manistique, MI 49854

Project Contact: Mark Ozoga
 Role: Environmental Manager
 Company: UP Paper, LLC
 Telephone: 260-729-8213
 Email: markozoga@uppaperllc.com

Testing Company Information

Testing Firm: Montrose Air Quality Services, LLC	
Contact: Matthew Young	Todd Wessel
Title: District Manager	Client Project Manager
Telephone: 248-548-8070	248-548-8070
Email: myoung@montrose-env.com	twessel@montrose-env.com

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

**TABLE 1-3
TEST PERSONNEL AND OBSERVERS**

Name	Affiliation	Role/Responsibility
Todd Wessel	Montrose	Client Project Manager
Shane Rabideau	Montrose	Field Technician
Mark Ozoga	UP Paper, LLC	Observer/Client Liaison/Test Coordinator

2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 PROCESS DESCRIPTION, OPERATION, AND CONTROL EQUIPMENT

Boiler 4 (EUBLR004) generates steam for use in mill operations. The boiler is rated for a maximum heat input capacity of 186.8 MMBtu/hr and is equipped with low-NOx burners and flue gas recirculation for NOx emissions control.

2.2 PEMS AND RM CEMS DESCRIPTION

The Facility PEMS is presented in Table 2-1. The RM CEMS analyzers utilized during this RAA are presented in Table 2-2.

**TABLE 2-1
FACILITY PEMS INFORMATION**

Analyzer Type	Manufacturer	Model No.	Serial No.
Boiler 4 PEMS	CMC Solutions	SmartCEMS®-60	EUBLR004.9995

**TABLE 2-2
RM CEMS INFORMATION**

Analyzer Type	Manufacturer	Model No.	Serial No.	Span
O ₂	M&C	PMA100-L	0502189	0-19.69%
NO _x	Thermo Electron	42i HL	631018883	0-89.12 ppm

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2.3 FLUE GAS SAMPLING LOCATION

Information regarding the sampling location are presented in Table 2-3.

**TABLE 2-3
 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.)	
Boiler 4 Exhaust	72	~168 / 2.3	~432 / 6	Gaseous: 3/port

Sample locations conformed to EPA Method 1. 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 boilers were tested when operating at normal capacity.

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

- Facility PEMS data for each 30-minute RAA run
- Gas flow rates, kscfh
- Heat Input, MMBtu/hr

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 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 O₂ and CO₂ in stack gas. The effluent gas is sampled and conveyed to analyzers that measure the concentration of O₂ and CO₂. The performance requirements of the method must be met to validate data.

The sampling system is detailed in Figure 3-1.

3.1.2 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 NO₂. Conditioned gas is sent to an analyzer to measure the concentration of NO_x. NO and NO₂ can be measured separately or simultaneously together but, for the purposes of this method, NO_x is the sum of NO and NO₂. The performance requirements of the method must be met to validate the data.

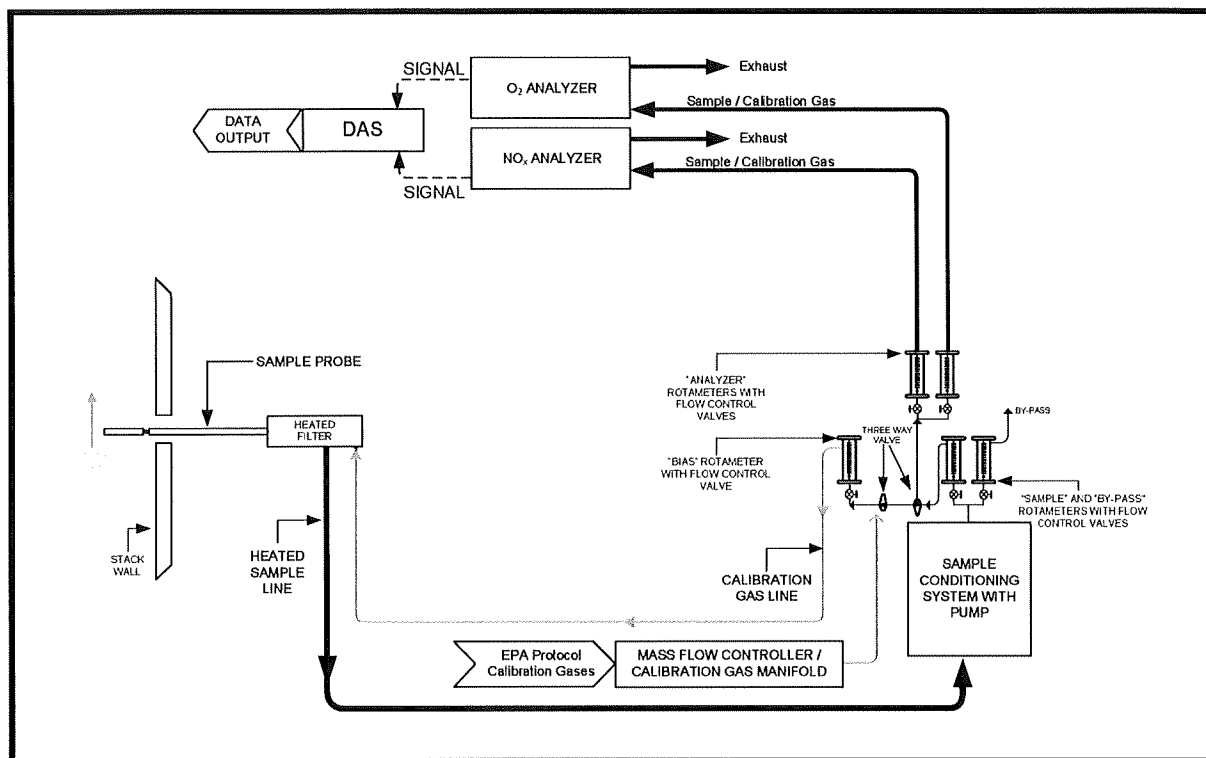
The sampling system is detailed in Figure 3-1.

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

EPA Method 19 is a manual method used to determine (a) PM, SO₂, and NO_x emission rates; (b) sulfur removal efficiencies of fuel pretreatment and SO₂ control devices; and (c) overall reduction of potential SO₂ emissions. This method provides data reduction procedures, but does not include any sample collection or analysis procedures.

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.

**FIGURE 3-1
 EPA METHODS 3A (O₂), 7E SAMPLING TRAIN**



3.1.4 EPA Performance Specification 16, Performance Specification for Predictive Emission Monitoring Systems in Stationary Sources

EPA Performance Specification 16 is utilized to evaluate the acceptability of Predictive Emission Monitoring Systems (PEMS) at the time of installation or soon after and whenever specified in the regulations.

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.

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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 RAA results are compared to the regulatory requirements in Table 1-2. The results of individual 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.

As outlined in PS-16 section 13.1 for the diluent (O₂) PEMS the alternative criterion of ±1 percent difference (% as O₂) between the PEMS and RM was utilized.

**TABLE 4-1
 O₂ (%) PEMS RAA RESULTS -
 EUBLR004**

Run #	Date	Time	RM	PEMS*	Difference (d)
1	05/04/2021	08:47-09:17	4.803	4.822	-0.019
2	05/04/2021	09:30-10:00	4.753	4.796	-0.043
3	05/04/2021	10:11-10:41	4.821	4.881	-0.060
Averages			4.793	4.833	-0.040
RAA based on mean d			-0.040	%-dry as O ₂	

* PEMS Data provided by CMC Solutions, Inc.

**TABLE 4-2
 NOx (ppmvd) PEMS RAA RESULTS -
 EUBLR004**

Run #	Date	Time	RM	PEMS*	Difference (d)
1	05/04/2021	08:47-09:17	27.252	26.988	0.264
2	05/04/2021	09:30-10:00	27.227	27.305	-0.078
3	05/04/2021	10:11-10:41	27.002	26.231	0.771
Averages			27.161	26.841	0.319

RAA based on RM mean -1.18 %

* PEMS Data provided by CMC Solutions, Inc.

**TABLE 4-3
 NOx (as NO₂) (lb/MMBtu) PEMS RAA RESULTS -
 EUBLR004**

Run #	Date	Time	RM	PEMS*	Difference (d)
1	05/04/2021	08:47-09:17	0.037	0.036	0.000799
2	05/04/2021	09:30-10:00	0.037	0.037	-0.000349
3	05/04/2021	10:11-10:41	0.037	0.036	0.000502
Averages			0.037	0.036	0.000318

RAA based on RM mean -0.87 %

* PEMS Data provided by CMC Solutions, Inc.

5.0 INTERNAL QA/QC ACTIVITIES

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

**TABLE 5-1
PEMS RAA GAS CYLINDER INFORMATION**

Gas Type	Gas Concentration	Cylinder ID	Expiration Date
O ₂ , Balance N ₂	10.00%	CC72971	11/13/2028
O ₂ , Balance N ₂	19.69%	SG9183487BAL	3/19/2028
NO _x , Balance N ₂	50.81 ppmv	XC033964B	11/19/2024
NO _x , Balance N ₂	89.12 ppmv	CC53453	4/7/2028
NO ₂ , Balance N ₂	51.92 ppmv	CC513944	1/4/2024

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 NO₂ 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.

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).

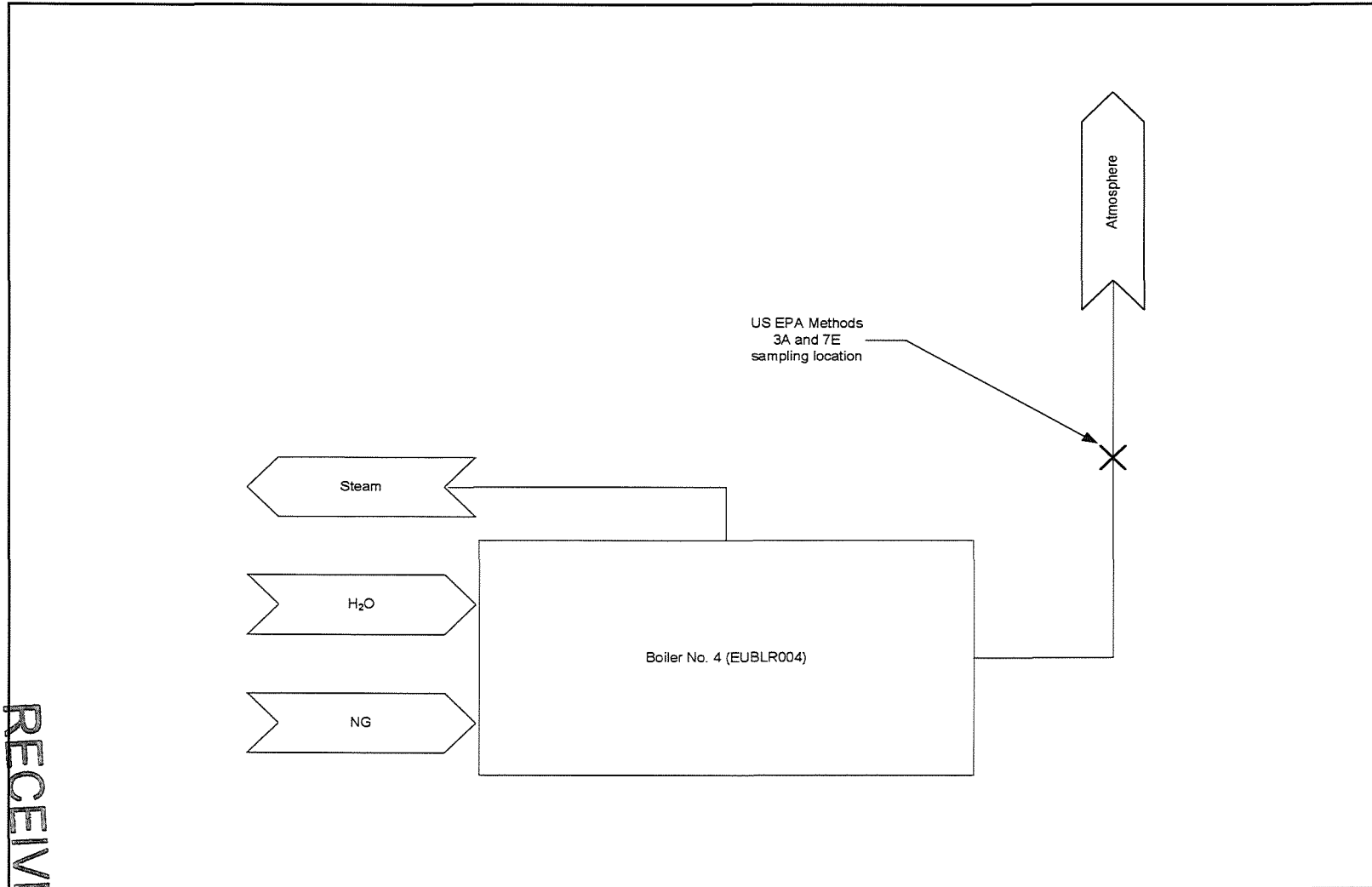
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Appendix A.1 Sampling Locations

BOILER 4 SAMPLING LOCATION SCHEMATIC



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BOILER 4 EXHAUST CEMS TRAVERSE POINT LOCATION DRAWING

