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**Source Test Report for  
2022 Annual QA PEMS RATA Testing**

**Boiler No. 4 (EUBLR004)**

**UP Paper LLC  
Manistique, Michigan**

**Prepared For:**

**UP Paper LLC  
402 West Ell Street  
Manistique, MI 49854**

**Prepared By:**

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**For Submission To:**

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

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**Submittal Date: January 25, 2023**



## 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:**  **Date:** 01 / 04 / 2023

**Name:** Brian Romani **Title:** Field 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:** 01 / 24 / 2023

**Name:** Robert J. Lisy, Jr. **Title:** Reporting Hub Manager

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## 1.0 Introduction

### 1.1 Summary of Test Program

UP Paper, LLC contracted Montrose Air Quality Services, LLC (Montrose) to perform the Annual Quality Assurance (QA) Relative Accuracy Test Audit (RATA) for the Predictive Emission Monitoring Systems (PEMS) associated with the Boiler No. 4 (EUBLR004) at the UP Paper, LLC facility (State Registration No.: A6475) located in Manistique, Michigan. Testing was performed on December 20, 2022, 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-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 B and F.

The specific objectives were to:

- Verify the relative accuracy (RA) of the EUBLR004 PEMS for nitrogen oxides (NO<sub>x</sub>) emissions (lb/MMBtu) (as NO<sub>2</sub>), NO<sub>x</sub> concentration (ppmvd), and oxygen (O<sub>2</sub>) concentration (%-Dry) in accordance with Performance Specification 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)
12/20/2022	EUBLR004 PEMS	O <sub>2</sub>	EPA 3A	10	21
12/20/2022	EUBLR004 PEMS	NO <sub>x</sub>	EPA 7E	10	21

For the Part 60 RATA, of the ten (10) RATA runs performed, nine were used to determine the RA of the EUBLR004 PEMS.

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 November 6, 2022, that was submitted to and approved by the EGLE.

**Table 1-2**  
**Summary of Part 60 PEMS RATA Results – EUBLR004 PEMS**  
**December 20, 2022**

Parameter/Units	Regulatory Reference	RA	Allowable
<b>Part 60</b>			
<b>Oxygen (O<sub>2</sub>)</b>			
% volume dry	PS-16	0.042	≤ 1.0% O <sub>2</sub>
<b>Nitrogen Oxides (NO<sub>x</sub>)</b>			
ppmvd	PS-16	2.77	≤ 20% of RM
lb/MMBtu (as NO <sub>2</sub> )	PS-16	2.33	≤ 20% of RM

## 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: EH&S Specialist  
 Company: UP Paper  
 Telephone: 260-729-8213  
 Email: markozoga@uppaperllc.com

### Agency Information

Regulatory Agency: EGLE  
 Agency Contact: Acting TPU Supervisor  
 Telephone: 517-256-0880

### Testing Company Information

Testing Firm: Montrose Air Quality Services, LLC	
Contact: John Nestor	Brian Romani
Title: District Manager	Field Project Manager
Telephone: 248-548-8070	630-860-4740
Email: jonestor@montrose-env.com	bromani@montrose-env.com

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

**Table 1-3**  
**Test Personnel and Observers**

<b>Name</b>	<b>Affiliation</b>	<b>Role/Responsibility</b>
Brian Romani	Montrose	Field Project Manager, QI
Matthew Libman	Montrose	Logistics Manager, QI
Mark Ozoga	UP Paper	Test Coordinator

## 2.0 Plant and Sampling Location Descriptions

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

Boiler No. 4 (EUBLR004) has an input capacity of 186.8 MMBtu/hr while firing natural gas. The steam from the boiler is dispatched to various process equipment at the facility. Low-NO<sub>x</sub> combustors minimize the emissions of NO<sub>x</sub> from the boilers.

### 2.2 Facility PEMS and Reference Method (RM) CEMS Descriptions

The Facility PEMS analyzer information is presented in Table 2-1, and the RM CEMS analyzer information is presented in Table 2-2.

**Table 2-1  
Facility PEMS Information**

Analyzer Type	Manufacturer	Model No.	Serial No.
O <sub>2</sub>	CMC Solutions	SmartCEMS@-60	EUBLR004.9995
NO <sub>x</sub>	CMC Solutions	SmartCEMS@-60	EUBLR004.9995

**Table 2-2  
RM CEMS Information**

Analyzer Type	Manufacturer	Model No.	Serial No.	Range
O <sub>2</sub>	Teledyne	T803	71	0-10.06%
NO <sub>x</sub>	Teledyne	T200H	163	0-44.90 ppm

### 2.3 Flue Gas Sampling Location

Information regarding the sampling location is 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.)	
EUBLR004 Exhaust Stack	52.0	240.0 / 4.6	360.0 / 6.9	Gaseous: 3

See Appendix A.1 for more information.



## 2.4 Operating Conditions and Process Data

The PEMS RATA was performed while EUBLR004 was operating at greater than 50% of permitted capacity conditions.

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

- Facility PEMS data for each 21-minute RATA run
- Heat Input Rate, MMBtu/hr
- Gas Flow Rate, kscfh

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## 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 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<sub>2</sub> and CO<sub>2</sub> in stack gas. The effluent gas is continuously or intermittently sampled and conveyed to analyzers that measure the concentration of O<sub>2</sub> and CO<sub>2</sub>. The performance requirements of the method must be met to validate data.

The typical 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<sub>x</sub> as NO<sub>2</sub>. Conditioned gas is sent to an analyzer to measure the concentration of NO<sub>x</sub>. NO and NO<sub>2</sub> can be measured separately or simultaneously together but, for the purposes of this method, NO<sub>x</sub> is the sum of NO and NO<sub>2</sub>. The performance requirements of the method must be met to validate the data.

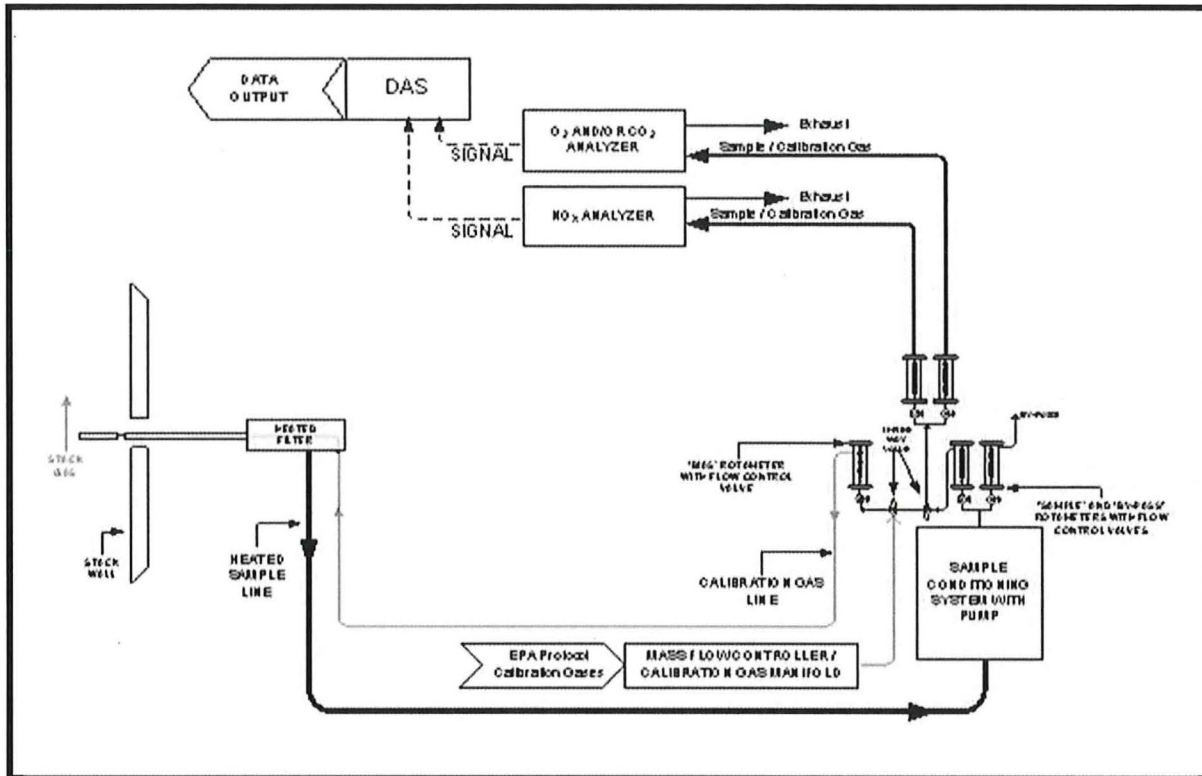
The typical sampling system is detailed in Figure 3-1.

#### 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, SO<sub>2</sub>, and NO<sub>x</sub> emission rates; (b) sulfur removal efficiencies of fuel pretreatment and SO<sub>2</sub> control devices; and (c) overall reduction of potential SO<sub>2</sub> 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 and 7E Sampling Train**



### 3.1.4 EPA Performance Specification 16, Specifications and Test Procedures for Predictive Emission Monitoring Systems in Stationary Sources

EPA Performance Specification 16 is a specification used to evaluate the acceptability of Predictive Emission Monitoring Systems (PEMS) to show compliance with an emission limitation under 40 CFR 60, 61, or 63. These procedures are used to certify a PEMS after initial installation and periodically thereafter to ensure the system is operating properly and meets the requirements of all applicable regulations. Ongoing QA/QC tests include sensor evaluation, bias correction, quarterly Relative Accuracy Audits (RAA), and annual Relative Accuracy Test Audits (RATA).

### 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 RA 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.

**Table 4-1  
NO<sub>x</sub> (lb/MMBtu) RATA Results -  
EUBLR004 PEMS**

Run No.	Date	Time	RM	PEMS*	Difference	Run used (Y/N)	Heat Input Rate (MMBtu/hr)
1	12/20/2022	8:23-8:44	0.0373	0.0330	0.0043	N	121.4
2	12/20/2022	8:55-9:16	0.0378	0.0380	-0.0002	Y	121.8
3	12/20/2022	9:24-9:45	0.0377	0.0400	-0.0023	Y	118.4
4	12/20/2022	9:54-10:15	0.0388	0.0380	0.0008	Y	124.0
5	12/20/2022	10:23-10:44	0.0383	0.0380	0.0003	Y	122.9
6	12/20/2022	10:52-11:13	0.0376	0.0380	-0.0004	Y	121.5
7	12/20/2022	11:23-11:44	0.0379	0.0380	-0.0001	Y	122.3
8	12/20/2022	11:53-12:14	0.0383	0.0380	0.0003	Y	121.3
9	12/20/2022	12:23-12:44	0.0384	0.0390	-0.0006	Y	124.5
10	12/20/2022	12:53-13:14	0.0385	0.0380	0.0005	Y	122.3
Averages			0.0381	0.0383	-0.0002		122.1
Standard Deviation			0.00092				
Confidence Coefficient (CC)			0.00071				
Unit Load			Normal	>50% of maximum rated capacity			
RA based on mean RM value			2.33	%			

\* PEMS data provided by CMC Solutions, LLC.

**Table 4-2**  
**NO<sub>x</sub> (ppmvd) RATA Results -**  
**EUBLR004 PEMS**

Run No.	Date	Time	RM	PEMS*	Difference	Run used (Y/N)	Heat Input Rate (MMBtu/hr)
1	12/20/2022	8:23-8:44	28.880	25.785	3.095	N	121.4
2	12/20/2022	8:55-9:16	29.216	29.317	-0.101	Y	121.8
3	12/20/2022	9:24-9:45	28.898	31.088	-2.190	Y	118.4
4	12/20/2022	9:54-10:15	30.175	29.924	0.251	Y	124.0
5	12/20/2022	10:23-10:44	29.755	29.437	0.318	Y	122.9
6	12/20/2022	10:52-11:13	29.058	29.208	-0.150	Y	121.5
7	12/20/2022	11:23-11:44	29.265	29.461	-0.196	Y	122.3
8	12/20/2022	11:53-12:14	29.540	29.522	0.018	Y	121.3
9	12/20/2022	12:23-12:44	29.964	30.230	-0.266	Y	124.5
10	12/20/2022	12:53-13:14	29.860	29.631	0.229	Y	122.3
Averages			29.526	29.758	-0.232		122.1
Standard Deviation			0.76418				
Confidence Coefficient (CC)			0.58740				
Unit Load			Normal	>50% of maximum rated capacity			
RA based on mean RM value			2.77	%			

\* PEMS data provided by CMC Solutions, LLC.

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**Table 4-3**  
**O<sub>2</sub> (%-Dry) RATA Results -**  
**EUBLR004 PEMS**

Run No.	Date	Time	RM	PEMS*	Difference	Run used (Y/N)	Heat Input Rate (MMBtu/hr)
1	12/20/2022	8:23-8:44	4.056	4.039	0.017	Y	121.4
2	12/20/2022	8:55-9:16	4.093	4.035	0.058	Y	121.8
3	12/20/2022	9:24-9:45	4.229	4.089	0.140	N	118.4
4	12/20/2022	9:54-10:15	3.993	3.981	0.012	Y	124.0
5	12/20/2022	10:23-10:44	4.016	4.012	0.004	Y	122.9
6	12/20/2022	10:52-11:13	4.100	4.042	0.058	Y	121.5
7	12/20/2022	11:23-11:44	4.127	4.023	0.104	Y	122.3
8	12/20/2022	11:53-12:14	4.140	4.043	0.097	Y	121.3
9	12/20/2022	12:23-12:44	3.951	3.964	-0.013	Y	124.5
10	12/20/2022	12:53-13:14	4.057	4.017	0.040	Y	122.3
Averages			4.059	4.017	0.042		122.4
Standard Deviation			0.04091				
Confidence Coefficient (CC)			0.03145				
Unit Load			Normal	>50% of maximum rated capacity			
RA based on   mean difference			0.042	% as O <sub>2</sub>			

\* PEMS data provided by CMC Solutions, LLC.

## 5.0 Internal QA/QC Activities

### 5.1 QA/QC Audits

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

**Table 5-1**  
**Part 60 Gas Cylinder Information**

Gas Type	Gas Concentrations	Cylinder ID	Expiration Date
O <sub>2</sub> , Balance N <sub>2</sub>	5.051%	CC361028	7/18/2030
O <sub>2</sub> , Balance N <sub>2</sub>	10.06%	CC136287	9/25/2029
NO <sub>x</sub> , Balance N <sub>2</sub>	44.90 ppmv	CC456758	11/1/2025
NO <sub>x</sub> , Balance N <sub>2</sub>	25.13 ppmv	CC473213	9/16/2024
NO <sub>2</sub> , Balance Air	51.54 ppmv	CC521692	8/1/2025

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 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).



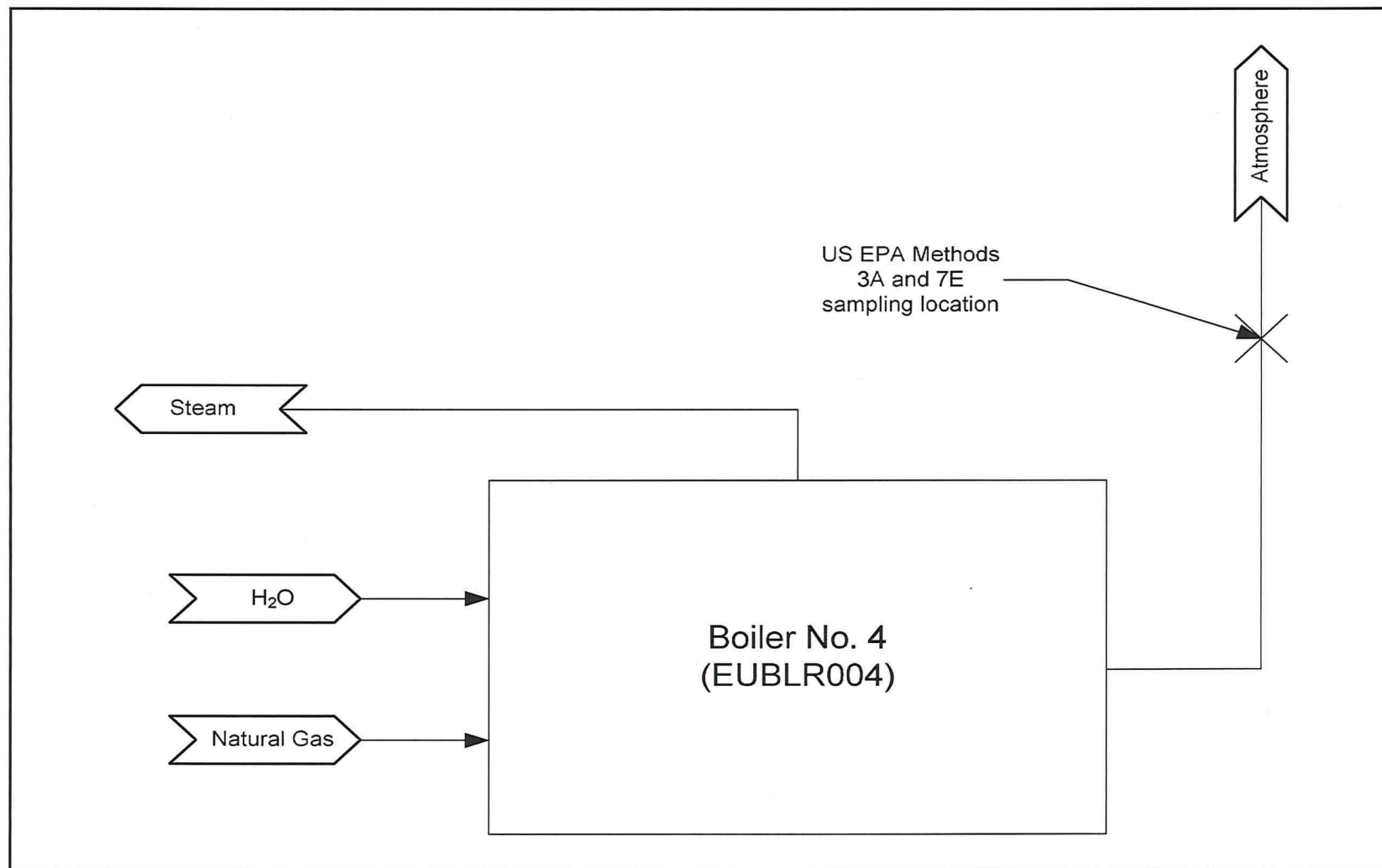
## **Appendix A**

### **Field Data and Calculations**

## **Appendix A.1**

### **Sampling Locations**

**EUBLR004 SAMPLING LOCATION SCHEMATIC**



**EUBLR004 EXHAUST STACK TRAVERSE POINT LOCATION DRAWING**

