RELATIVE ACCURACY TEST AUDIT FOR THE GENERAL ELECTRIC, FRAME 7FA.05, UNIT #EU-CTG1 CEMS PREPARED FOR WOLVERINE POWER SUPPLY COOPERATIVE, INC. AT THE ALPINE POWER PLANT ELMIRA, OTSEGO COUNTY, MICHIGAN AUGUST 8, 2024

Permit No: MI-ROP-P0582-2019a

Report Date: August 21, 2024

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ELMIRA, OTSEGO COUNTY, MICHIGAN
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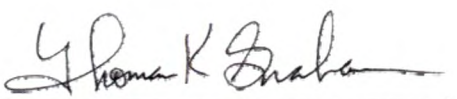
Prepared and Reviewed by:



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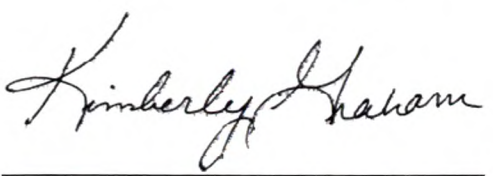

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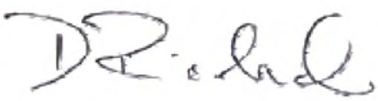

I, _____
Dean Richardson
Test Manager
certify that this testing was conducted and this report was created in conformance with the requirements of ASTM D7036

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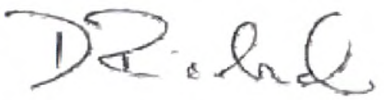
CERTIFICATION OF INFORMATION

I certify under penalty of law that I believe the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties, including the possibility of fine or imprisonment or both, for submitting false, inaccurate, or incomplete information.



Dean Richardson
Test Manager
Air Hygiene International, Inc.

August 20, 2024
Date

FACILITY CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attached documents and, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil and criminal penalties, including the possibility of fine or imprisonment or both, for submitting false, inaccurate, or incomplete information.

I am the responsible official with direct knowledge and overall responsibility for the information contained in this report.

_____
Name

_____
Title

_____
Signature

_____
Date

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Relative Accuracy Test Audit
General Electric, Frame 7FA.05, Unit #EU-CTG1 CEMS
Wolverine Power Supply Cooperative, Inc.
Alpine Power Plant
Elmira, Otsego County, Michigan
August 8, 2024

1.0 INTRODUCTION

Air Hygiene International, Inc. (Air Hygiene) has completed the Relative Accuracy Test Audit (RATA) for nitrogen oxides (NOx) and oxygen (O_2) from the exhaust of the General Electric, Frame 7FA.05, Unit #EU-CTG1 for Wolverine Power Supply Cooperative, Inc. at the Alpine Power Plant in Elmira, Otsego County, Michigan. This report details the background, results, process description, and the sampling/analysis methodology of the stack sampling survey conducted on August 8, 2024.

The accumulated data from the RATA provides the figures for evaluating the acceptability of the operation of the on-site continuous emission monitoring system (CEMS) for the monitoring of NOx and O_2 from the General Electric, Frame 7FA.05, Unit #EU-CTG1 for Wolverine Power Supply Cooperative, Inc. at the Alpine Power Plant in Elmira, Otsego County, Michigan.

1.1 TEST PURPOSE AND OBJECTIVES

The purpose of the test was to perform the periodic quality assurance (QA) RATA on the CEMS that serves the General Electric, Frame 7FA.05, Unit #EU-CTG1 for Wolverine Power Supply Cooperative, Inc. at the Alpine Power Plant in Elmira, Otsego County, Michigan. Reference method (RM) testing followed the Code of Federal Regulations (CFR), Title 40 (40 CFR), Part 60 (40 CFR 60), Appendix A, Methods 1, 3A, 7E, and 19. RM values are compared with the on-site CEMS to document performance as required in the 40 CFR 60, Appendix B, Performance Specifications (PS) and 40 CFR 75 Appendix A and B. All relative accuracies were established on-site and were governed by the following sets of rules:

In accordance with 40 CFR 75, Appendix A, Section 3.3.2(a) and (b), the NOx RATA results are acceptable if the relative accuracy (RA) does not exceed 10.0 percent or if during the RATA the average NOx emission rate is less than or equal to 0.200 lb/MMBtu and the average difference between the CEMS and reference method (RM) values does not exceed 0.020 lb/MMBtu absolute value. Passing this set of criteria requires the CEMS to be retested after no more than two operating quarters. Alternatively, in accordance with 40 CFR 75, Appendix B, Section 2.3.1.2(a) and (f), and Appendix B, Figure 2, the NOx RATA results are acceptable if the RA does not exceed 7.5 percent or if during the RATA the average NOx emission rate is less than or equal to 0.200 lb/MMBtu and the average difference between the CEMS and RM values does not exceed 0.015 lb/MMBtu absolute value. Passing this set of criteria allows the CEMS to be retested after four operating quarters or at least within eight calendar quarters.

In accordance with 40 CFR 75, Appendix A, Section 3.3.3, the O_2 RATA results are acceptable if the relative accuracy (RA) does not exceed 10.0 percent or if during the RATA the average difference between the CEMS and reference method (RM) values does not exceed 1.0 percent absolute value. Passing this set of criteria requires the CEMS to be retested after no more than two operating quarters. Alternatively, in accordance with 40 CFR 75, Appendix B, Section 2.3.1.2(a) and (h), and Appendix B, Figure 2, the O_2 / CO_2 RATA results are acceptable if the RA does not exceed 7.5 percent or if during the RATA the average difference between the CEMS and RM values does not exceed 0.7 percent absolute value. Passing this set of criteria allows the CEMS to be retested after four operating quarters or at least within eight calendar quarters.

1.2 SUMMARY OF TEST PROGRAM

The following list details pertinent information related to this specific project:

1.2.1 Participating Organizations
- Michigan Department of Environment, Great Lakes & Energy (EGLE)
- Wolverine Power Supply Cooperative, Inc.
- Air Hygiene

1.2.2 Industry
- Electric Utility / Electric Services

1.2.3 Air Permit and Federal Requirements
- Permit Number: MI-ROP-P0582-2019a
- 40 CFR 60, Appendix B, Performance Specifications (PS)
- 40 CFR 75, Appendix A and B

1.2.4 Plant Location
- Alpine Power Plant in Elmira, Otsego County, Michigan
  - GPS Coordinates [Latitude 45.06175, Longitude -84.84466]
  - Physical Address: 7432 M-32, Elmira, Michigan 49730
  - Federal Registry System / Facility Registry Service (FRS) No. – 110067539293
  - Source Classification Code (SCC) – 20100209

1.2.5 Equipment Tested
- General Electric, Frame 7FA.05, Unit #EU-CTG1
  - NOx / O_2 Analyzer (Thermo, 42IQLS-ABBNA, Serial No. 12116012378)

1.2.6 Emission Points
- Exhaust from the General Electric, Frame 7FA.05, Unit #EU-CTG1
- For all gases, one sample point in the exhaust duct from the General Electric, Frame 7FA.05, Unit #EU-CTG1, determined after conducting a stratification test

1.2.7 Emission Parameters Measured
- NOx
- O_2

1.2.8 Date of Emission Test
- August 8, 2024

1.2.9 Federal Certifications
- Stack Testing Accreditation Council AETB Certificate No. 3796.02
- International Standard ISO/IEC 17025:2005 Certificate No. 3796.01

1.3 KEY PERSONNEL

Wolverine Power Supply Cooperative, Inc.:	Joe Hazewinkel (jhazewinkel@wpsci.com)	231-577-8721
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Air Hygiene:	Michael Stockwell	918-307-8865
Air Hygiene:	Jared Frederick	918-307-8865

2.0 SUMMARY OF TEST RESULTS

Results from the sampling conducted on Wolverine Power Supply Cooperative, Inc.'s General Electric, Frame 7FA.05, Unit #EU-CTG1 located at the Alpine Power Plant on August 8, 2024 are summarized in the following table and relate only to the items tested.

TABLE 2.1
SUMMARY OF GENEREAL ELECTRIC, 7FA.05, UNIT #EU-CTG1 RATA RESULTS

Pollutant	Units	Criteria			Results	Passed / Test Frequency
		CFR	Specification / Section	Standard		
NOx	lb/MMBtu	Part 75	Appendix A, Section 3.3.2(a),(b) Appendix B, Section 2.3.1.2(a),(f), Figure 2	RA ≤ 10.0%, or if lb/MMBtu ≤ 0.200, d ≤ ±0.020 lb/MMBtu Annual Incentive RA ≤ 7.5%, or if lb/MMBtu ≤ 0.2, d ≤ ±0.015 lb/MMBtu	RA = 0.0% BAF=1.000	YES / ANNUAL
O_2	%vd	Part 75	Appendix A, Section 3.3.3 Appendix B, Section 2.3.1.2(a),(h), Figure 2	RA ≤ 10.0%, or d ≤ ±1.0% Annual Incentive RA ≤ 7.5%, or d ≤ ±0.7%	RA = 0.0%	YES / ANNUAL
Load	MW	Part 75	Appendix A and B	normal or secondary normal load range	159.8	WITHIN TOLERANCE

Notes: RA = relative accuracy, ARA = alternative relative accuracy, RM = reference method value, d = difference between RM and CEMS value, BAF = bias adjustment factor

The RATA passed for all pollutants (NOx and O_2) in all units (lb/MMBtu and %vd) under all 40 CFR 75 criteria.

Specifically, NOx in units of lb/MMBtu passed the 40 CFR 75 annual incentive criteria with a RA less than 7.5 percent. Also, the Bias Adjustment Factor test passed with an adjustment factor equal to 1.0 (no adjustment required). O_2 in units of %vd passed the 40 CFR 75 annual incentive criteria with a RA less than 7.5 percent.

Unit load was within the 40 CFR 60 required criteria of greater than 50 percent of the maximum load and fell within the normal or secondary normal load criteria as defined in the plant's Quality Control and Monitoring Plan which defined the upper and lower boundary on the unit and the normal and secondary normal load ranges.

The results of all measured pollutant emissions were below the required limits. All testing was performed without any real or apparent errors. All testing was conducted according to the approved testing protocol.

3.0 SOURCE OPERATION

3.1 PROCESS DESCRIPTION

Wolverine Power Supply Cooperative, Inc. (WP) owns and operates the Alpine Power Plant located in Elmira, Otsego County, Michigan. The station consists of two General Electric (GE) Frame 7FA.05 simple cycle combustion turbines, designated as EU-CTG1 and EU-CTG2. Each CTG has a nominal rating of 203 MW, with a nominal design heat input of 2,045 MMBtu/hr, an exhaust flow rate of ~800,000 scfm (at 100% load), and an exhaust gas temperature of ~1,100 °F. The interest of this report is unit EU-CTG1.

3.2 SAMPLING LOCATION

The EU-CTG1 stack is vertical, circular and measures 25 feet (ft) (300 inches) in diameter, including insulation, at the test ports which are approximately 74 ft above grade level with an exit elevation of approximately 85 ft above grade level. The test ports are located approximately 39.2 ft (470.5 inches) downstream and approximately 11 ft (132 inches) upstream from the nearest disturbances. Air Hygiene has field verified the measurable dimensions. Non-field verified dimensions are provided by Wolverine Power Supply Cooperative, Inc. All exhaust samples for gaseous emissions were continuously drawn from the exhaust system at the sample ports from a single point determined after conducting a stratification test. During the stratification test three points were traversed from each of the four ports. The probe was allowed to remain at a point for at least two times the system response time.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 TEST METHODS

The emission test on the General Electric, Frame 7FA.05, Unit #EU-CTG1 at the Alpine Power Plant was performed following United States Environmental Protection Agency (EPA) methods described by the Code of Federal Regulations (CFR). Table 4.1 outlines the specific methods performed on August 8, 2024.

TABLE 4.1
SUMMARY OF SAMPLING METHODS

Pollutant or Parameter	Sampling Method	Analysis Method
Sample Point Location	EPA Method 1	Equal Area Method
Oxygen	EPA Method 3A	Paramagnetic Cell
Nitrogen Oxides	EPA Method 7E	Chemiluminescent Analyzer
Stack Flow Rate	EPA Method 19	Dry Oxygen F Factor

4.2 INSTRUMENT CONFIGURATION AND OPERATIONS FOR GAS ANALYSIS

The sampling and analysis procedures used during these tests conform with the methods outlined in the Code of Federal Regulations (CFR), Title 40, Part 60, Appendix A, Methods 1, 3A, 7E, and 19.

Figure 4.1 depicts the sample system used for the real-time gas analyzer tests. The gas sample was continuously pulled through the probe and transported, via heat-traced Teflon® tubing, to a stainless-steel minimum-contact condenser designed to dry the sample. Transportation of the sample, through Teflon® tubing, continued into the sample manifold within the mobile laboratory via a stainless steel/Teflon® diaphragm pump. From the manifold, the sample was partitioned to the real-time analyzers through rotameters that controlled the flow rate of the sample.

Figure 4.1 shows that the sample system was also equipped with a separate path through which a calibration gas could be delivered to the probe and back through the entire sampling system. This allowed for convenient performance of system bias checks as required by the testing methods.

All instruments were housed in a climate controlled, trailer-mounted mobile laboratory. Gaseous calibration standards were provided in aluminum cylinders with concentrations certified by the vendor. EPA Protocol No. 1 was used to determine the cylinder concentrations where applicable (i.e., NOx calibration gases).

Table 4.2 provides a description of the analyzers used for the instrument portion of the tests. All data from the continuous monitoring instruments were recorded on a Logic Beach Portable Data Logging System which retrieves calibrated electronic data from each instrument every one second and reports an average of the collected data every 30 seconds.

The stack gas analysis for O_2 concentrations was performed in accordance with procedures set forth in EPA Method 3A. The O_2 analyzer uses a paramagnetic cell detector.

EPA Method 7E was used to determine concentrations of NOx. A chemiluminescent analyzer was used to determine the nitrogen oxides concentration in the gas stream. A NO_2 in air manufacturer-certified gas cylinder was used to verify at least a 90 percent NO_2 conversion on the day of the test.

TABLE 4.2
ANALYTICAL INSTRUMENTATION

Parameter	Manufacturer and Model	Range	Sensitivity	Detection Principle
NOx	THERMO 42 series	User may select up to 5,000 ppm	0.1 ppm	Thermal reduction of NO_2 to NO. Chemiluminescence of reaction of NO with O_3. Detection by PMT. Inherently linear for listed ranges.
O_2	SERVOMEX 1440	0-25%	0.1%	Paramagnetic cell, inherently linear.

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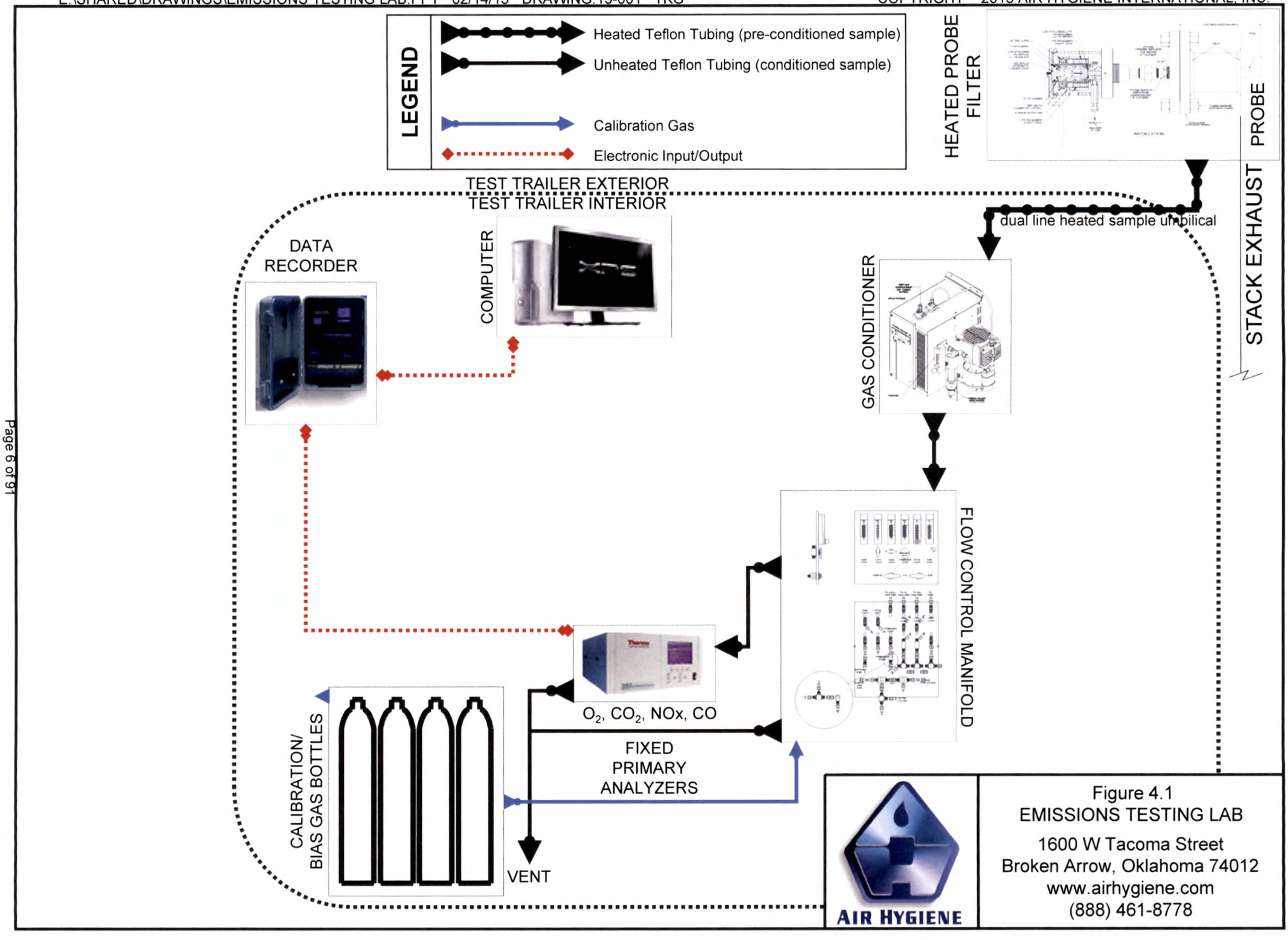

Figure 4.1
EMISSIONS TESTING LAB

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