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## **I. INTRODUCTION**

Network Environmental, Inc. was retained by the Tilden Mining Company, L.C. of Ishpeming, Michigan to perform a Relative Accuracy Audit (RAA) at the Tilden Mine located in National Mine, Michigan.

The purpose of the testing was to conduct a Relative Accuracy Audit (RAA) on the Predictive Emission Monitoring System (PEMS) that services Gas Fired Boiler #4 (EU-BOILER4). The PEMS on the boiler is for oxides of nitrogen (NO<sub>x</sub>) and oxygen (O<sub>2</sub>). The PEMS was installed and the RAA was performed in order to meet the requirements of Michigan Department of Environment, Great Lakes & Energy (EGLE), Air Quality Division ROP No. MI-ROP-B4885-2017a.

The RAA was conducted in accordance with 40 CFR Part 60 Appendix B Performance Specification 16 (PS-16). As per PS-16, three (3) - thirty (30) minute portable analyzer determinations were performed on the Boiler #4 exhaust and compared to the PEMS data.

The RAA was performed on February 28, 2024 by Stephan K. Byrd and David D. Engelhardt of Network Environmental, Inc.. Assisting with the testing was Mr. Thomas O'Brien of the Tilden Mining Company, L.C.

**II. PRESENTATION OF RESULTS**

**II.1 TABLE 1  
NO<sub>x</sub> RELATIVE ACCURACY AUDIT RESULTS  
BOILER #4 (EU-BOILER4)  
TILDEN MINING COMPANY, L.C.  
NATIONAL MINE, MICHIGAN  
FEBRUARY 28, 2024**

| Run #          | Time        | PORTABLE ANALYZER | PEMS         | DIFF         |
|----------------|-------------|-------------------|--------------|--------------|
|                |             | Lbs/MMBTU         | Lbs/MMBTU    |              |
| 1              | 10:07-10:37 | 0.029             | 0.026        | 0.003        |
| 2              | 10:40-11:10 | 0.029             | 0.026        | 0.003        |
| 3              | 11:14-11:44 | 0.029             | 0.026        | 0.003        |
| <b>Average</b> |             | <b>0.029</b>      | <b>0.026</b> | <b>0.003</b> |

**RAA = 10.34%**

### **III. DISCUSSION OF RESULTS**

**III.1 RAA** – The results of the RAA can be found in Table 1 (Section II.1). The relative accuracy calculations were performed in terms of Lbs/MMBTU. The Lbs/MMBTU results were calculated using the formula found in Section 2.1 of Method 19 for O<sub>2</sub> on a dry basis. The F factor used was 8,710. Three (3) thirty (30) minute samples were collected from the boiler exhaust using a portable analyzer. Raw analyzer output results were calibration corrected using Equation 7E-5 (U.S. EPA Method 7E).

The RAA for the NO<sub>x</sub> PEMS was **10.34%** of the mean of the portable analyzer samples.

According to Performance Specification 16 in 40 CFR Part 60 Appendix B, "The RAA of the CEMS shall be no greater than 20 percent of the mean value of the portable analyzer test data."

### **IV. SOURCE DESCRIPTION**

Boiler 4 is a natural gas-fired boiler with a rated capacity of 300 MMBTU/Hr of heat input. The boiler is equipped with low NO<sub>x</sub> burners. Boiler 4 is used to provide process steam to the facility. During the testing periods, the boiler was operated at a normal load. Steam Load and Gas Flow data during the sampling can be found in Appendix B.

The boiler is exhausted to a stack through a four (4) foot by eight (8) foot breaching. A schematic diagram of the source and sampling location can be found in Appendix E.

### **V. SAMPLING AND ANALYTICAL PROTOCOL**

The sampling methods used for the testing determinations were as follows:

**V.1 Oxides of Nitrogen & Oxygen**– The NO<sub>x</sub> & O<sub>2</sub> sampling was conducted using a Testo 350 flue gas analyzer. Three (3) samples, each thirty (30) minutes in duration, were collected from the boiler exhaust.

The analyzer was calibrated before use by direct injection using a 55.6 PPM NO<sub>x</sub> gas and a 11.8 % O<sub>2</sub> gas.

Calibration gases of 25.1 PPM NO<sub>x</sub>, 51.3 PPM NO<sub>2</sub> and 6.05 % O<sub>2</sub> were direct injected to demonstrate the calibration error of the analyzer.

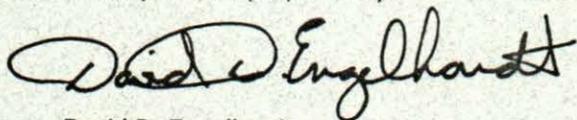
The analyzer was calibrated through the entire sampling system before and after the entire sampling period using a 25.1 PPM NO<sub>x</sub> gas and a 6.05 % O<sub>2</sub> gas. All calibration gases were EPA Protocol 1 Certified.

**V.2 Sampling Location** – Prior to the initial RATA sampling (May 2019), a twenty-four (24) point stratification test (as described in U.S. EPA Method 7E) was performed for the exhaust breaching. The breaching is 48 inches deep by 96 inches high with 4 sampling ports. The dimensions used for the stratification test were as follows:

| <u>Traverse Point</u> | <u>Dimension (Inches)</u> |
|-----------------------|---------------------------|
| 1                     | 4.00                      |
| 2                     | 12.00                     |
| 3                     | 20.00                     |
| 4                     | 28.00                     |
| 5                     | 36.00                     |
| 6                     | 44.00                     |

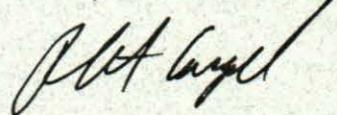
Results of the stratification test can be found in Appendix A. The stratification test showed no stratification (< 5%), so a single sampling point (Port 3 - Point 3) was used for the RAA sampling.

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