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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_x) and oxygen (O₂). 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 December 14, 2023 by Richard D. Eerdmans 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_x RELATIVE ACCURACY AUDIT RESULTS
BOILER #4 (EU-BOILER4)
TILDEN MINING COMPANY, L.C.
NATIONAL MINE, MICHIGAN
DECEMBER 14, 2023**

Run #	Time	PORTABLE ANALYZER	PEMS	DIFF
		Lbs/MMBTU	Lbs/MMBTU	
1	09:42-10:12	0.030	0.028	0.002
2	10:15-10:45	0.028	0.027	0.001
3	10:50-11:20	0.026	0.027	-0.001
Average		0.028	0.027	0.001
RAA = 3.57%				

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 O₂ 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_x PEMS was **3.57%** 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_x 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_x & O₂ 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_x gas and a 11.8 % O₂ gas.

Calibration gases of 25.1 PPM NO_x, 50.9 PPM NO₂ and 6.05 % O₂ were direct injected to demonstrate the calibration error of the analyzer.

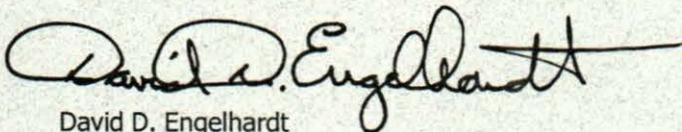
The analyzer was calibrated through the entire sampling system before and after the entire sampling period using a 25.1 PPM NO_x gas and a 6.05 % O₂ gas. All calibration gases were EPA Protocol 1 Certified.

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

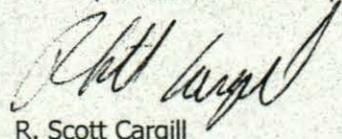
Results of the stratification test can be found in Appendix A. The stratification test showed no stratification (< 5%), so a single sampling point (Port 3 - Point 3) was used for the RAA sampling.

This report was prepared by:



David D. Engelhardt
Vice President

This report was reviewed by:



R. Scott Cargill
Project Manager