I. INTRODUCTION

Network Environmental, Inc. was retained by the Holland Board of Public Works (BPW), Holland, Michigan to conduct a carbon monoxide (CO) emission study on their Unit 9 exhaust. Unit 9 is located at the Holland BPW 48th Street Peaking Station. The purpose of the CO sampling was to meet the emission testing requirements of Renewable Operating Permit (ROP) No. MI-ROP-N2586-2015a.

The following reference test methods were employed to conduct the sampling:

- CO – U.S. EPA Reference Method 10
- Exhaust Gas Parameters (flow rate, temperature, moisture & density) – U.S. EPA Methods 1-4

The CO sampling was conducted in conjunction with the annual relative accuracy test audit (RATA) on Unit 9. Three (3) samples were collected from the unit. Each sample consisted of three (3), twenty-five (25) minute runs.

The sampling was conducted on June 11, 2020 by Stephan K. Byrd and David D. Engelhardt of Network Environmental, Inc.. Assisting with the study was Ms. Trista Gregorski of the Holland Board of Public Works. Mr. Cody Yazzie and Mr. Matthew Karl of the Michigan Department of Environment, Great Lakes and Energy (EGLE) - Air Quality Division were present to observe the sampling and source operation.

II. PRESENTATION OF RESULTS

II.1 TABLE 1
CARBON MONOXIDE (CO) EMISSION RESULTS
UNIT 9 EXHAUST
48th STREET PEAKING STATION
HOLLAND BOARD OF PUBLIC WORKS
HOLLAND, MICHIGAN
JUNE 11, 2020

Sample	Time	Air Flow Rate DSCFM (1)	CO Concentrations PPM (2)	CO Mass Emission Rates Lbs/Hr (3)
1	07:27-09:14	442,369	1.5	2.89
2	09:26-11:08	440,010	1.7	3.25
3	11:20-13:01	432,893	1.5	2.82
Average		**438,424**	**1.6**	**2.99**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) PPM = Parts Per Million (v/v) On A Dry Basis
(3) Lbs/Hr = Pounds of CO Per Hour

III. DISCUSSION OF RESULTS

The results of the emission sampling are summarized in Table 1 (Section II.1). The results are presented as follows:

III.1 Carbon Monoxide (CO) Emission Results (Table 1)

Table 1 summarizes the CO emission results as follows:

- Sample
- Time
- Air Flow Rate (DSCFM) – Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- CO Concentration (PPM) – Parts Per Million (v/v) On A Dry Basis
- CO Mass Emission Rate (Lbs/Hr) – Pounds of CO Per Hour

III.2 Emission Limits (R.O.P. # MI-ROP-N2586-2015a)

Compound	Emission Limit(s)
Carbon Monoxide (CO)	**(1)** 125 Lbs/Hr **(2)** 222.5 Tons/Year

IV. SAMPLING AND ANALYTICAL PROTOCOL

The sampling for Unit 9 was conducted on the 108 in. x 228 in. exhaust duct. The duct has seven (7) sample ports (on the 228 in. side) at a location that exceeds two (2) duct diameters downstream and 2 duct diameters upstream from the nearest disturbances. Three (3) sampling points were used for the CO sampling (18.36, 54.0 & 89.64 inches). Twenty-eight (28) traverse points were used for the velocity traverses (dimensions are shown in Appendix G).

IV.1 Carbon Monoxide (CO) - The Carbon Monoxide (CO) emission sampling was conducted in accordance with U.S. EPA Reference Method 10. The sample gas was extracted from the exhaust through a heated teflon sample line which led to a VIA MAK 2 sample gas conditioner and then to a Thermo Environmental Model 48 portable stack gas monitor. This analyzer is capable of giving instantaneous

readouts of the CO concentrations (PPM). Three (3) samples were collected from the unit. Each sample consisted of three (3), twenty-five (25) minute runs.

The analyzer was calibrated with EPA protocol CO calibration gases. A span gas of 89.7 PPM was used to establish the initial instrument calibration. A calibration gas of 49.5 PPM was used to determine the calibration error of the analyzer. The sampling system (from the back of the stack probe to the analyzer) was injected using the 49.5 PPM gas to determine the system bias. After each sample, a system zero and system injection of 49.5 PPM were performed to establish system drift and system bias during the test period. All calibration gases were EPA Protocol 1 Certified.

The analyzer was calibrated to the output of the data acquisition system (DAS) used to collect the data from the exhaust. The analyzer averages were corrected for calibration error and drift using formula EQ.7E-5 from 40 CFR Part 60, Appendix A, Method 7E. A diagram of the sampling train is shown in Figure 1.

IV.2 Oxygen & Carbon Dioxide – The O_2 & CO_2 sampling was conducted in accordance with U.S. EPA Reference Method 3A. Servomex Model 1400M portable stack gas analyzers were used to monitor the exhaust. A heated teflon sample line was used to transport the exhaust gases to a gas conditioner to remove moisture and reduce the temperature. From the gas conditioner stack gases were passed to the analyzers. The analyzers produce instantaneous readouts of the O_2 & CO_2 concentrations (%). Three (3) samples were collected from the unit. Each sample consisted of three (3), twenty-five (25) minute runs.

The analyzers were calibrated by direct injection prior to the testing. Span gases of 21.0% O_2 and 21.04% CO_2 were used to establish the initial instrument calibrations. Calibration gases of 12.0% O_2/5.95% CO_2 and 5.97% O_2/11.7% CO_2 were used to determine the calibration error of the analyzers. The sampling system (from the back of the stack probe to the analyzers) was injected using the 12.0% O_2/5.95% CO_2 gas to determine the system bias. After each sample, a system zero and system injection of 12.0% O_2/5.95% CO_2 were performed to establish system drift and system bias during the test period. All calibration gases were EPA Protocol 1 Certified.

The analyzers were calibrated to the output of the data acquisition system (DAS) used to collect the data from the exhaust. The analyzer averages were corrected for calibration error and drift using formula EQ.7E-5 from 40 CFR Part 60, Appendix A, Method 7E. A diagram of the sampling train is shown in Figure 1.

IV.3 Exhaust Gas Parameters – The exhaust gas parameters (air flow rate, temperature, moisture and density) were determined in conjunction with the other sampling by employing U.S. EPA Methods 1 through 4. Three (3) velocity traverses were conducted to determine air flow rates and temperatures. One (1) moisture sample was collected to determine moisture content. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

This report was prepared by:

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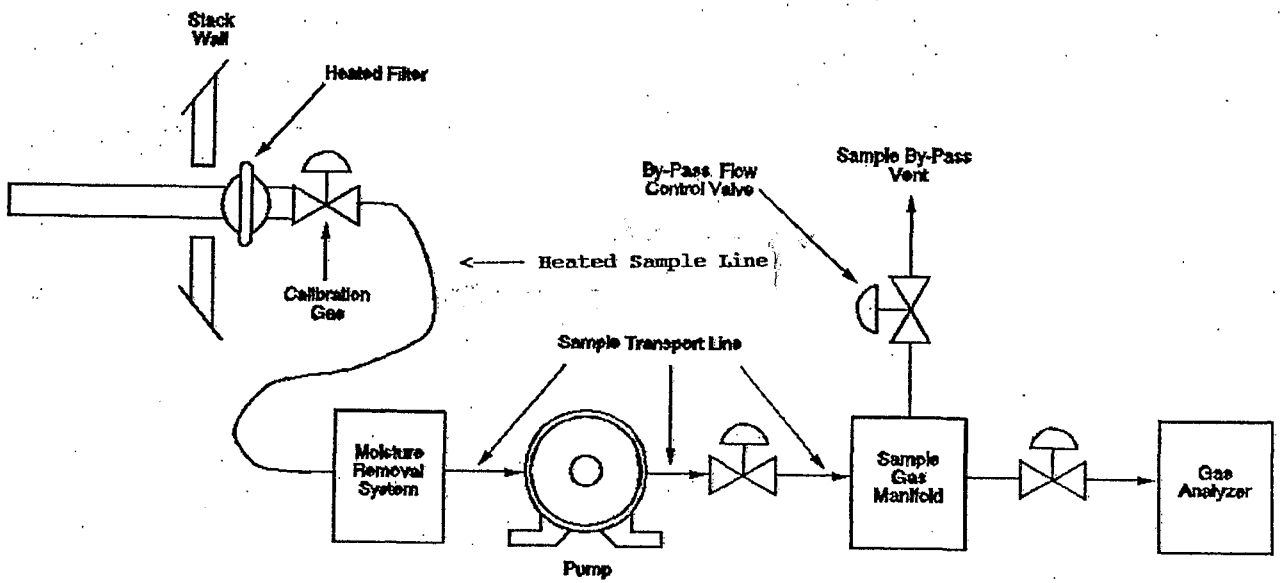

Figure 1

CO, O_2 & CO_2 Sampling Train