I. INTRODUCTION

Network Environmental, Inc. was retained by the Cabot Corporation of Midland, Michigan (SRN: N6251 - Midland County) to perform a Relative Accuracy Test Audit (RATA) on the Continuous Emissions Monitoring System (CEMS) that services their fumed silica plant scrubber exhaust (CD-SCRUB VENT SV-7). The CEMS on the scrubber exhaust monitors carbon monoxide (CO) as required in ROP No. MI-ROP-N6251-2020. The CEMS consists of two (2) CO monitors. Both monitors are Thermo Scientific Model 48i analyzers. The older analyzer Serial No. is 1033445163. The newer analyzer Serial No. is 1127149736.

The RATA was performed on December 20, 2022. Richard D. Eerdmans and David D. Engelhardt of Network Environmental, Inc. conducted the RATA in accordance with 40 CFR Part 60 Appendix B Performance Specification 4 for CO. Assisting with the RATA were Mr. Kevin Musser of the Cabot Corporation and the operating staff of the facility. Mr. Daniel Droste of the Michigan Department of Environment, Great Lakes and Energy (EGLE) - Air Quality Division was present to observe the sampling and source operation.

II. PRESENTATION OF RESULTS

II.1 TABLE 1
CO RELATIVE ACCURACY TEST AUDIT RESULTS
THERMO SCIENTIFIC MODEL 48i, SERIAL # 1033445163
SCRUBBER EXHAUST
CABOT CORPORATION
MIDLAND, MICHIGAN
DECEMBER 20, 2022

Run #	Time	REFERENCE METHOD	CEM	DIFF
		CO PPM(1)	CO PPM(1)	
1	09:00-09:25	2724.0	2672.8	51.2
2	09:39-10:04	2642.4	2587.9	54.5
3	10:18-10:43	2575.2	2525.9	49.3
4	10:54-11:19	2524.0	2476.2	47.8
5	11:32-11:57	2491.3	2431.9	59.4
6	12:08-12:33	2353.6	2332.2	21.4
7	12:46-13:11	2376.0	2312.4	63.6
8	13:22-13:47	2376.8	2331.2	45.6
9	13:57-14:22	2357.9	2317.2	40.7

Mean of the Reference Method 2,491.24

Absolute Value of the Mean of the Difference 48.1667

Standard Deviation 12.2163

Confidence Co-efficient 9.3903

Relative Accuracy = **2.31%** of the mean of the reference method

(1) = PPM (v/v) on a dry basis

II.2 TABLE 2
CO RELATIVE ACCURACY TEST RESULTS
THERMO SCIENTIFIC MODEL 48i, SERIAL # 1127149736
SCRUBBER EXHAUST
CABOT CORPORATION
MIDLAND, MICHIGAN
DECEMBER 20, 2022

Run #	Time	REFERENCE METHOD	CEM	DIFF
		CO PPM(1)	CO PPM(1)	
1	09:00-09:25	2724.0	2777.5	-53.5
2	09:39-10:04	2642.4	2683.3	-40.9
3	10:18-10:43	2575.2	2616.0	-40.8
4	10:54-11:19	2524.0	2562.1	-38.1
5	11:32-11:57	2491.3	2511.9	-20.6
6	12:08-12:33	2353.6	2400.4	-46.8
7	12:46-13:11	2376.0	2374.7	1.3
8	13:22-13:47	2376.8	2396.7	-19.9
9	13:57-14:22	2357.9	2382.8	-24.9

Mean of the Reference Method 2,491.24

Absolute Value of the Mean of the Difference 31.5778

Standard Deviation 16.9898

Confidence Co-efficient 13.0595

Relative Accuracy = **1.79%** of the mean of the reference method

(1) = PPM (v/v) on a dry basis

III. DISCUSSION OF RESULTS

III.1 CO RATA (Older Thermo Scientific Model 48i Serial # 1033445163) – The results of the CO RATA for the scrubber exhaust can be found in Table 1 (Section II.1). The relative accuracy calculations were performed in terms of PPM. The reference method results were corrected in accordance with EPA Method 7E Equation 7E-5. Nine (9), twenty five (25) minute samples were collected from the scrubber exhaust.

The relative accuracy for the older Thermo Scientific CO CEMS was **2.31%** of the mean of the reference method samples.

According to Performance Specification 4 in 40 CFR Part 60 Appendix B, "The relative accuracy (RA) of the CEMS shall be no greater than 10 percent of the mean value of the reference method test data in terms of the units of the emission standard or 5 percent of the applicable standard, whichever is greater." The CO monitor meets this requirement.

III.2 CO RATA (Newer Thermo Scientific Model 48i Serial # 1127149736) – The results of the CO RATA for the scrubber exhaust can be found in Table 2 (Section II.2). The relative accuracy calculations were performed in terms of PPM. The reference method results were corrected in accordance with EPA Method 7E Equation 7E-5. Nine (9), twenty five (25) minute samples were collected from the scrubber exhaust.

The relative accuracy for the newer Thermo Scientific CO CEMS was **1.79%** of the mean of the reference method samples.

According to Performance Specification 4 in 40 CFR Part 60 Appendix B, "The relative accuracy (RA) of the CEMS shall be no greater than 10 percent of the mean value of the reference method test data in terms of the units of the emission standard or 5 percent of the applicable standard, whichever is greater." The CO monitor meets this requirement.

IV. CONTINUOUS MONITORING SYSTEM DESCRIPTION

The continuous emission monitoring system (CEMS) servicing the scrubber exhaust is comprised of two (2) CO monitors. The older CO monitor is a Thermo Scientific, Model 48i, Serial # 1033445163, operating on a range from 0-8000 PPM full scale. The newer CO monitor is a Thermo Scientific, Model 48i, Serial # 1127149736, operating on a range of 0-8000 PPM full scale. The analyzers measure concentrations on a dry basis. The data produced by the CEMS is collected on a computer system that converts analog signals to the appropriate averages.

V. SAMPLING AND ANALYTICAL PROTOCOL

The RATA's were performed in accordance with 40 CFR Part 60 Appendix B Performance Specification 4 for CO. The sampling method used for the reference method determinations was as follows:

V.1 Carbon Monoxide - The CO sampling was conducted in accordance with U.S. EPA Reference Method 10. A Thermo Environmental Model 48C gas analyzer was used to monitor the scrubber 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 analyzer. The analyzer produces instantaneous readouts of the CO concentrations (PPM).

The analyzer was calibrated by direct injection prior to the testing. A span gas of 4,509 PPM was used to establish the initial instrument calibration. Calibration gases of 2,215 PPM and 998 PPM were 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 2,215 PPM gas to determine the system bias. After each sample, a system zero and system injection of 2,215 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 scrubber exhaust. All the quality assurance and quality control procedures listed in the method were incorporated in the performance of this determination.

The sampling was conducted on the 18 inch I.D. off-gas line upstream of the 24 inch I.D. exhaust stack.

The sampling location met the minimum requirement of Performance Specification 2 (2 duct diameters downstream and 0.5 duct diameter upstream from the nearest disturbances).

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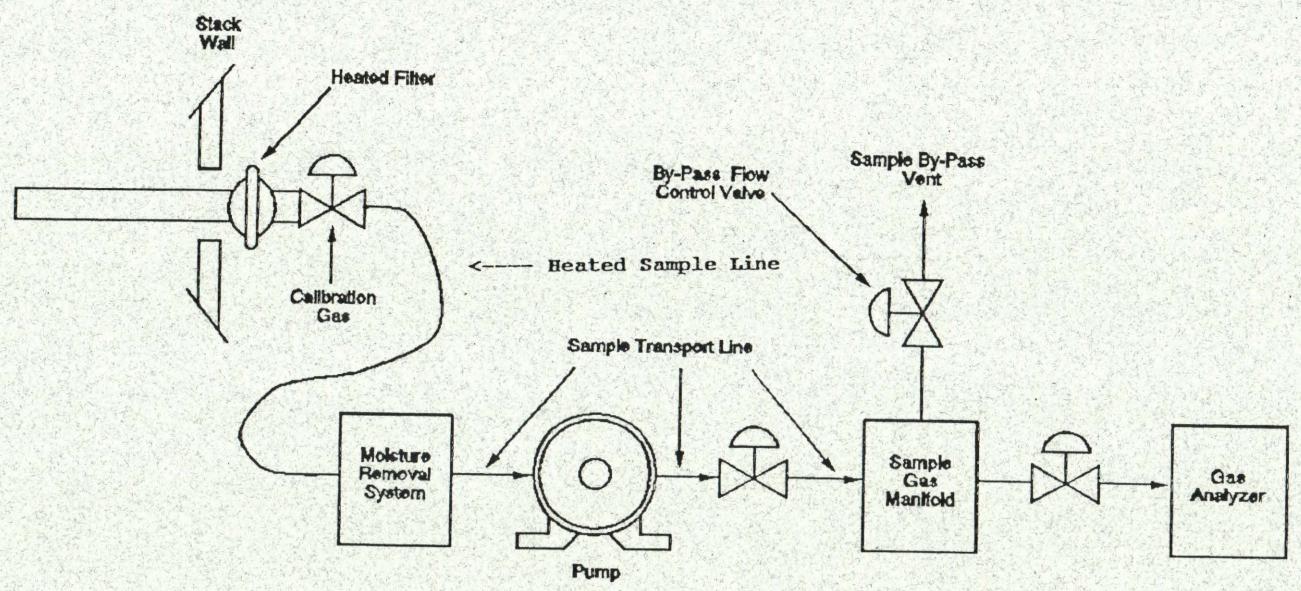

Figure 1

CO
Sampling Train