Report of a...

Relative Accuracy Test Audit

Performed for the...

Holland Board of Public Works

48th Street Peaking Station
Holland, Michigan

On...

Units 8 & 9

June 6 & 12, 2024

Project#: 215.23

By...

Network Environmental, Inc.
Grand Rapids, MI

performed for

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I. INTRODUCTION

Network Environmental, Inc. was retained by the Holland Board of Public Works to perform Relative Accuracy Test Audits (RATAs) on the Continuous Emission Monitoring Systems (CEMS's) that service Units 8 and 9 at the 48th Street Peaking Station.

The CEMS on Units 8 and 9 are for oxides of nitrogen (NO_x) and oxygen (O_2).

The RATAs were performed on June 6 & 12, 2024. Stephan K. Byrd and David D. Engelhardt of Network Environmental, Inc. conducted the RATAs in accordance with Parts 60 and 75 of Title 40 of the Code of Federal Regulations. The following reference test methods were employed to conduct the RATA sampling:

- Oxides of Nitrogen (NO_x) - U.S. EPA Method 7E
- Oxygen (O_2) - U.S. EPA Method 3A

Assisting with the RATA was Ms. Trista Gregorski of the Holland Board of Public Works. Mr. Cody Yazzie 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
NO_x RELATIVE ACCURACY DETERMINATION (LBS/MMBTU)
UNIT 8
HOLLAND BOARD OF PUBLIC WORKS
HOLLAND, MICHIGAN
JUNE 6, 2024

Run #	Time	REFERENCE METHOD			CEM	DIFF
		NO_x(1)	O_2(2)	Lbs/MMBTU	Lbs/MMBTU	
1	08:25-08:50	32.6	15.5	0.132	0.118	0.014
2	09:08-09:33	33.6	15.5	0.136	0.122	0.014
3	09:43-10:08	32.9	15.4	0.131	0.120	0.011
4	10:16-10:41	33.2	15.4	0.132	0.121	0.011
5	10:50-11:15	33.6	15.4	0.133	0.121	0.012
6	11:24-11:49	33.8	15.4	0.134	0.122	0.012
7	11:58-12:23	34.8	15.4	0.138	0.124	0.014
8	12:32-12:57	34.5	15.4	0.137	0.125	0.012
9	13:05-13:30	35.0	15.4	0.139	0.127	0.012

Mean Reference Value = 0.13467

Mean of the Differences = 0.01244

Standard Deviation = 0.00124

Confidence Co-efficient = 0.00095

Relative Accuracy = 9.95% of the mean of the reference method

Bias Adjustment = 1.102

Relative Accuracy Needs To Be ≤ 10% **Or** Mean Of The Differences ≤ 0.020

(1) = Concentration in terms of PPM by volume on a dry basis
(2) = Concentration in terms of % by volume on a dry basis

II.2 TABLE 2
NO_x RELATIVE ACCURACY DETERMINATION (PPM @ 15%O_2)
UNIT 8
HOLLAND BOARD OF PUBLIC WORKS
HOLLAND, MICHIGAN
JUNE 6, 2024

Run #	Time	REFERENCE METHOD	CEM	DIFF
		PPM @ 15%O_2	PPM @ 15% O_2	
1	08:25-08:50	35.9	32.0	3.9
2	09:08-09:33	36.9	33.0	3.9
3	09:43-10:08	35.5	32.5	3.0
4	10:16-10:41	35.8	32.7	3.1
5	10:50-11:15	36.2	33.0	3.2
6	11:24-11:49	36.5	33.3	3.2
7	11:58-12:23	37.6	33.7	3.9
8	12:32-12:57	37.2	34.0	3.2
9	13:05-13:30	37.7	34.5	3.2

Mean Reference Value = 36.58889

Mean of the Differences = 3.40000

Standard Deviation = 0.38079

Confidence Co-efficient = 0.29270

Relative Accuracy = 10.09% of the mean of the reference method

Bias Adjustment = Not Applicable

Relative Accuracy Needs To Be ≤ 20% of the mean of the reference method **Or** ≤ 10% of the emission limit

II.3 TABLE 3
NO_x RELATIVE ACCURACY DETERMINATION (LBS/MMBTU)
UNIT 9
HOLLAND BOARD OF PUBLIC WORKS
HOLLAND, MICHIGAN
JUNE 12, 2024

Run #	Time	REFERENCE METHOD			CEM	DIFF
		NO_x(1)	O_2(2)	Lbs/MMBTU	Lbs/MMBTU	
1	07:19-07:44	10.5	14.8	0.037	0.033	0.004
2	08:02-08:27	9.6	14.8	0.034	0.031	0.003
3	08:40-09:05	9.5	14.7	0.033	0.031	0.002
4	09:16-09:41	9.7	14.8	0.034	0.032	0.002
5	09:52-10:17	9.7	14.9	0.035	0.032	0.003
6	10:28-10:53	9.8	14.9	0.035	0.032	0.003
7	11:04-11:29	9.9	14.9	0.036	0.032	0.004
8	11:39-12:04	9.9	14.9	0.036	0.032	0.004
9	12:15-12:40	9.8	14.9	0.036	0.032	0.004

Mean Reference Value = 0.03511

Mean of the Differences = 0.00322

Standard Deviation = 0.00083

Confidence Co-efficient = 0.00064

Relative Accuracy = 11.00% of the mean of the reference method

Bias Adjustment = 1.101

Relative Accuracy Needs To Be ≤ 10% **Or** Mean Of The Differences ≤ 0.020

(1) = Concentration in terms of PPM by volume on a dry basis
(2) = Concentration in terms of % by volume on a dry basis

II.4 TABLE 4
NO_x RELATIVE ACCURACY DETERMINATION (PPM @ 15%O_2)
UNIT 9
HOLLAND BOARD OF PUBLIC WORKS
HOLLAND, MICHIGAN
JUNE 12, 2024

Run #	Time	REFERENCE METHOD	CEM	DIFF
		PPM @ 15%O_2	PPM @ 15% O_2	
1	07:19-07:44	10.1	8.9	1.2
2	08:02-08:27	9.3	8.5	0.8
3	08:40-09:05	9.1	8.3	0.8
4	09:16-09:41	9.4	8.6	0.8
5	09:52-10:17	9.5	8.7	0.8
6	10:28-10:53	9.5	8.7	0.8
7	11:04-11:29	9.7	8.7	1.0
8	11:39-12:04	9.7	8.7	1.0
9	12:15-12:40	9.6	8.7	0.9

Mean Reference Value = 9.54444

Mean of the Differences = 0.90000

Standard Deviation = 0.14142

Confidence Co-efficient = 0.10871

Relative Accuracy = 10.57% of the mean of the reference method

Bias Adjustment = Not Applicable

Relative Accuracy Needs To Be ≤ 20% of the mean of the reference method **Or** ≤ 10% of the emission limit

III. DISCUSSION OF RESULTS

III.1 Unit 8

III.1.1 NO_x Lbs/MMBTU - The results of the Unit 8 NO_x RATA in terms of Lbs/MMBTU can be found in Table 1 (Section II.1). The relative accuracy calculations were performed in terms of Lbs/MMBTU in accordance with U.S. EPA Reference Method 19. The reference method results were corrected using Eq. 7E-5. The Lbs/MMBTU results were calculated using the formula found in Section 2.1 of Method 19 for O_2 on a dry basis. The F factor used was 8,710. Nine (9) - twenty five (25) minute samples were collected from the Unit 8 exhaust.

The NO_x relative accuracy was 9.95% of the mean of the reference method. The average difference was 0.0124. The bias adjustment factor is 1.102 for Unit 8.

III.1.2 NO_x PPM @15% O_2 - The results of the Unit 8 NO_x RATA in terms of PPM @ 15% O_2 can be found in Table 2 (Section II.2). The relative accuracy calculations were performed in terms of PPM @ 15% O_2 (parts per million corrected to 15% oxygen). The reference method results were corrected using Eq. 7E-5. Nine (9) - twenty five (25) minute samples were collected from the Unit 8 exhaust.

The NO_x relative accuracy was 10.09% of the mean of the reference method.

III.2 Unit 9

III.2.1 NO_x Lbs/MMBTU - The results of the Unit 9 NO_x RATA in terms of Lbs/MMBTU can be found in Table 3 (Section II.3). The relative accuracy calculations were performed in terms of Lbs/MMBTU in accordance with U.S. EPA Reference Method 19. The reference method results were corrected using Eq. 7E-5. The Lbs/MMBTU results were calculated using the formula found in Section 2.1 of Method 19 for O_2 on a dry basis. The F factor used was 8,710. Nine (9) - twenty five (25) minute samples were collected from the Unit 9 exhaust.

The NO_x relative accuracy was 11.00% of the mean of the reference method. The average difference was 0.0032. The bias adjustment factor is 1.101 for Unit 9.

III.2.2 NO_x PPM @15% O_2 - The results of the Unit 9 NO_x RATA in terms of PPM @ 15% O_2 can be found in Table 4 (Section II.4). The relative accuracy calculations were performed in terms of PPM @

15% O_2 (parts per million corrected to 15% oxygen). The reference method results were corrected using Eq. 7E-5. Nine (9) - twenty five (25) minute samples were collected from the Unit 9 exhaust.

The NO_x relative accuracy was 10.57% of the mean of the reference method.

IV. CEMS SPECIFICATIONS

Unit #	Parameter	Manufacturer / Model #	Serial #
8	NO_x / O_2	Thermo Electron Model 42i-LS	118073012
9	NO_x / O_2	Thermo Electron Model 42i-LS	118073013

V. SAMPLING AND ANALYTICAL PROTOCOL

The RATA's were performed in accordance with 40 CFR Parts 60 and 75.

The sampling methods used for the reference method determinations were as follows:

V.1 Oxides of Nitrogen - The NO_x sampling was conducted in accordance with U.S. EPA Reference Method 7E. A Thermo Environmental Model 42H gas analyzer was used to monitor the exhausts. 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 NO_x concentrations (PPM).

The analyzer was calibrated by direct injection prior to the testing. Span gases of 55.6 PPM or 25.1 PPM were used to establish the initial instrument calibration. Calibration gases of 25.1 PPM or 12.2 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 25.1 PPM or the 12.2 PPM gas to

determine the system bias. After each sample, a system zero and system injection of 25.1 PPM or 12.2 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 unit. All reference method data was corrected using Equation 7E-5 from U.S. EPA Method 7E. A NO_2 calibration gas of 51.3 PPM was used to determine the analyzer conversion efficiency (94.15%). A schematic diagram of the sampling train is shown in Figure 1.

V.2 Oxygen - The O_2 sampling was conducted in accordance with U.S. EPA Reference Method 3A. A heated teflon sample line was used to transport the exhaust gases from the stack to a gas conditioner to remove moisture and reduce the temperature. From the gas conditioner the stack gases were passed to a Servomex Series 1400 O_2 analyzer. This analyzer produces instantaneous readouts of the oxygen concentrations (%).

The analyzer was calibrated by direct injection prior to the testing. A span gas of 21.0% was used to establish the initial instrument calibration. Calibration gases of 6.05% and 11.8% 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 11.8% gas to determine the system bias. After each sample, a system zero and system injection of 11.8% 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. All reference method data was corrected using Equation 7E-1 from U.S. EPA Method 7E. A schematic diagram of the sampling train is shown in Figure 1.

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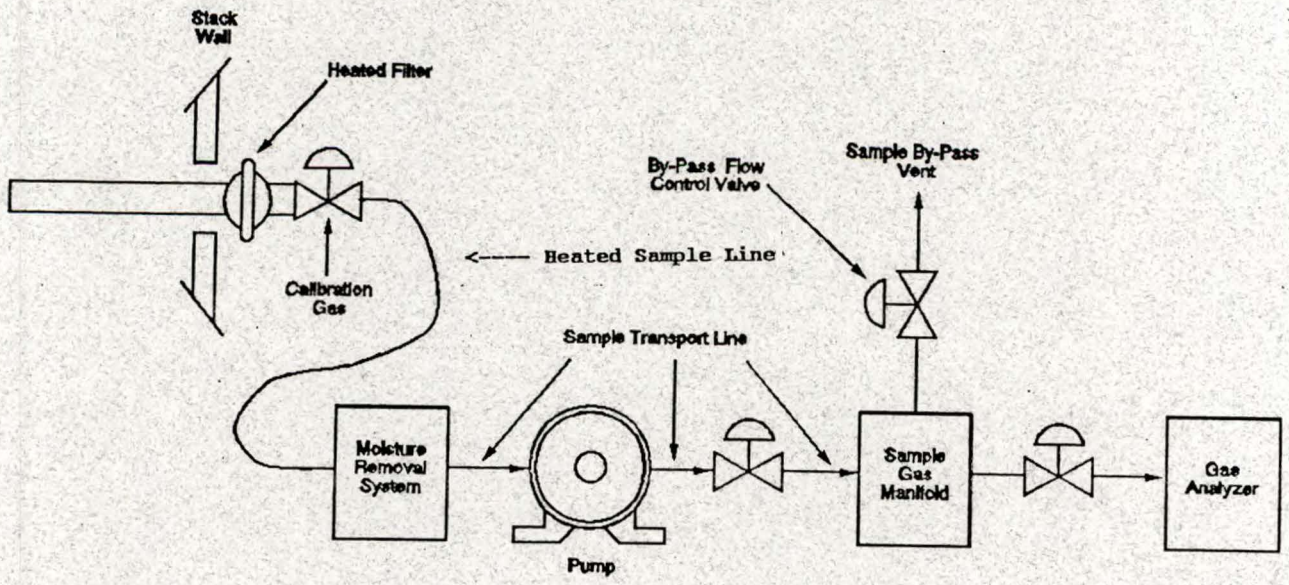

Figure 1

NO_x & O_2 Sampling Train