

Report of a...

Relative Accuracy Test Audit

performed for the...

Grayling Generating Station Grayling, Michigan

on the...

Wood Fired Boiler

October 30 - November 1, 2017

Project #: 106.34

by...

Network Environmental, Inc.
Grand Rapids, MI

RECEIVED

DEC 12 2017

AIR QUALITY DIVISION

RECEIVED

DEC 12 2017

I. INTRODUCTION

AIR QUALITY DIVISION

Network Environmental, Inc. was retained by CMS Grayling Generation of Grayling, Michigan to perform a Relative Accuracy Test Audit (RATA) on the Continuous Emissions Monitoring System (CEMS) that services their wood fired boiler. The CEMS is for oxides of nitrogen (NO_x), sulfur dioxide (SO₂), carbon monoxide (CO), air flow rate and carbon dioxide (CO₂). The following is a list of the RATA's conducted at the facility:

- SO₂ Monitor (RATA at Mid (Normal) Load Only)
- NO_x Monitor (RATA at Mid (Normal) Load Only)
- CO Monitor (RATA at Mid (Normal) Load Only)
- CO₂ Monitor (RATA at Mid (Normal) Load Only)
- Flow Monitor (RATA's at Low, Mid & High Loads)

(Low Load = 10 MW, Mid Load = 18 MW & High Load = 36 MW)

The RATA's were performed over the period of October 30 - November 1, 2017. Stephan K. Byrd, Richard D. Eerdmans and David D. Engelhardt of Network Environmental, Inc. conducted the RATA's in accordance with Part 75 of Title 40 of the Code of Federal Regulations. The following reference test methods were employed to conduct the RATA sampling:

- Air Flow Rates – U.S. EPA Methods 1-2
- Oxygen & Carbon Dioxide (O₂ & CO₂) – U.S. EPA Methods 3 & 3A
- Moisture – U.S. EPA Method 4
- Sulfur Dioxide (SO₂) – U.S. EPA Method 6C
- Oxides of Nitrogen (NO_x) – U.S. EPA Method 7E
- Carbon Monoxide (CO) – U.S. EPA Method 10

Assisting with the RATA's were Mr. Tim Porter of CMS Grayling and the operating staff of the facility. Mr. Jeremy Howe and Ms. Rebecca Radulski of the Michigan Department of Environmental Quality (MDEQ) - Air Quality Division was present to observe the sampling and source operation.

I. PRESENTATION OF RESULTS

**II.1 TABLE 1
SO₂ (LBS/MMBTU) RELATIVE ACCURACY DETERMINATION
WOOD FIRED BOILER EXHAUST
CMS GRAYLING GENERATION
GRAYLING, MICHIGAN
OCTOBER 31, 2017**

Run #	Time	REFERENCE METHOD			CEM	DIFF
		SO ₂ ⁽¹⁾	CO ₂ ⁽²⁾	#/MMBtu	#/MMBtu	
1 ⁽³⁾	12:41-13:06	1.0	11.6	0.003	0.001	0.002
2 ⁽³⁾	13:19-13:44	1.0	11.7	0.003	0.002	0.001
3 ⁽³⁾	13:57-14:22	0.6	11.7	0.002	0.008	-0.006
4	14:34-14:59	7.4	12.6	0.018	0.022	-0.004
5	15:13-15:38	10.9	12.6	0.026	0.031	-0.005
6	15:50-16:15	0.1	12.7	0.000	0.005	-0.005
7	16:27-16:52	0.3	12.6	0.001	0.002	-0.001
8	17:08-17:33	0.4	12.7	0.001	0.001	0.000
9	17:46-18:11	0.4	12.6	0.001	0.001	0.000
10	18:23-18:48	0.6	12.6	0.001	0.001	0.000
11	19:00-19:25	0.3	12.7	0.001	0.001	0.000
12	19:37-20:02	0.3	12.6	0.001	0.001	0.000

Mean Reference Value = 0.00556

Mean of the Differences = -0.00167

Standard Deviation = 0.00229

Confidence Co-efficient = 0.00176

Relative Accuracy = 4.90% of the emission limit (0.07 Lbs/MMBTU)

Bias Adjustment = Not Applicable

Relative Accuracy Needs To Be Less Than 20% Of Reference Method Or Less Than 10% Of Limit

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

(2) Concentration in terms of % on a dry

(3) Not used in Relative Accuracy calculation

II.2 TABLE 2
SO₂ (PPM) RELATIVE ACCURACY DETERMINATION
WOOD FIRED BOILER EXHAUST
CMS GRAYLING GENERATION
GRAYLING, MICHIGAN
OCTOBER 31, 2017

Run #	Time	REFERENCE METHOD			CEM	DIFF
		SO ₂ ⁽¹⁾	% Moisture	SO ₂ ⁽²⁾	SO ₂ ⁽²⁾	
1	12:41-13:06	1.0	21.65	0.8	0.7	0.1
2	13:19-13:44	1.0	21.65	0.8	1.0	-0.2
3 ⁽³⁾	13:57-14:22	0.6	21.65	0.5	2.6	-2.1
4	14:34-14:59	7.4	21.46	5.8	7.3	-1.5
5 ⁽³⁾	15:13-15:38	10.9	21.46	8.6	10.4	-1.8
6 ⁽³⁾	15:50-16:15	0.1	21.46	0.1	1.8	-1.7
7	16:27-16:52	0.3	21.40	0.3	0.8	-0.5
8	17:08-17:33	0.4	21.40	0.3	0.3	0.0
9	17:46-18:11	0.4	21.40	0.3	0.5	-0.2
10	18:23-18:48	0.6	21.14	0.4	0.3	0.1
11	19:00-19:25	0.3	21.14	0.3	0.4	-0.1
12	19:37-20:02	0.3	21.14	0.3	0.4	-0.1

Mean Reference Value = 1.03333

Mean of the Differences = **-0.26667**

Standard Deviation = 0.49749

Confidence Co-efficient = 0.38241

Relative Accuracy = Not Applicable

Bias Adjustment = No Bias Adjustment Required

Relative Accuracy Needs To Be Less Than 10% Of Reference Method Or Average Difference Less Than 15PPM

- (1) Concentration in terms of PPM by volume on a dry basis
- (2) Concentration in terms of PPM by volume on a wet basis
- (3) Not used in Relative Accuracy calculation.

II.3 TABLE 3
NO_x (LBS/MMBTU) RELATIVE ACCURACY DETERMINATION
WOOD FIRED BOILER EXHAUST
CMS GRAYLING GENERATION
GRAYLING, MICHIGAN
OCTOBER 31, 2017

Run #	Time	REFERENCE METHOD			CEM	DIFF
		NO _x ⁽¹⁾	CO ₂ ⁽²⁾	#/MMBtu	#/MMBtu	
1 ⁽³⁾	12:41-13:06	83.3	11.6	0.157	0.073	0.084
2 ⁽³⁾	13:19-13:44	85.8	11.7	0.160	0.124	0.036
3	13:57-14:22	88.7	11.7	0.166	0.168	-0.002
4 ⁽³⁾	14:34-14:59	78.9	12.6	0.137	0.141	-0.004
5	15:13-15:38	76.2	12.6	0.132	0.132	0.000
6	15:50-16:15	81.9	12.7	0.141	0.141	0.000
7	16:27-16:52	79.6	12.6	0.138	0.138	0.000
8	17:08-17:33	73.9	12.7	0.127	0.126	0.001
9	17:46-18:11	80.8	12.6	0.140	0.142	-0.002
10	18:23-18:48	81.7	12.6	0.142	0.143	-0.001
11	19:00-19:25	77.6	12.7	0.133	0.135	-0.002
12	19:37-20:02	79.3	12.6	0.137	0.139	-0.002

Mean Reference Value = 0.13956

Mean of the Differences = -0.00089

Standard Deviation = 0.00117

Confidence Co-efficient = 0.00090

Relative Accuracy = 1.28% of the mean of the reference method

Bias Adjustment = No Bias Adjustment Required

Relative Accuracy Needs To Be Less Than 10% Of Reference Method or Mean of Differences ≤ 0.020

- (1) Concentration in terms of PPM by volume on a dry basis
- (2) Concentration in terms of % on a dry basis
- (3) Not used in Relative Accuracy calculation

**II.4 TABLE 4
CO (LBS/MMBTU) RELATIVE ACCURACY DETERMINATION
WOOD FIRED BOILER EXHAUST
CMS GRAYLING GENERATION
GRAYLING, MICHIGAN
OCTOBER 31, 2017**

Run #	Time	REFERENCE METHOD			CEM	DIFF
		CO ⁽¹⁾	CO ₂ ⁽²⁾	#/MMBtu	#/MMBtu	
1 ⁽³⁾	12:41-13:06	107.9	11.6	0.124	0.065	0.059
2 ⁽³⁾	13:19-13:44	94.2	11.7	0.107	0.095	0.012
3	13:57-14:22	87.7	11.7	0.100	0.116	-0.016
4 ⁽³⁾	14:34-14:59	64.6	12.6	0.068	0.087	-0.019
5	15:13-15:38	61.5	12.6	0.065	0.079	-0.014
6	15:50-16:15	74.6	12.7	0.078	0.091	-0.013
7	16:27-16:52	100.2	12.6	0.106	0.115	-0.009
8	17:08-17:33	134.0	12.7	0.140	0.154	-0.014
9	17:46-18:11	87.9	12.6	0.093	0.105	-0.012
10	18:23-18:48	102.1	12.6	0.108	0.119	-0.011
11	19:00-19:25	99.0	12.7	0.104	0.119	-0.015
12	19:37-20:02	94.7	12.6	0.100	0.116	-0.016

Mean Reference Value = 0.09933

Mean of the Differences = -0.01333

Standard Deviation = 0.00235

Confidence Co-efficient = 0.00180

Relative Accuracy = 3.78% of the emission limit (0.4 Lbs/MMBTU)

Bias Adjustment = Not Applicable

Relative Accuracy Needs To Be Less Than 10% Of Reference Method or 5% of Emission Limit

- (1) Concentration in terms of PPM by volume on a dry basis
- (2) Concentration in terms of % on a dry basis
- (3) Not used in Relative Accuracy calculation

II.5 TABLE 5
CO₂ (%) RELATIVE ACCURACY DETERMINATION
WOOD FIRED BOILER EXHAUST
CMS GRAYLING GENERATION
GRAYLING, MICHIGAN
OCTOBER 31, 2017

Run #	Time	REFERENCE METHOD			CEM	DIFF
		CO ₂ ⁽¹⁾	% Moisture	CO ₂ ⁽²⁾	CO ₂ ⁽²⁾	
1 ⁽³⁾	12:41-13:06	11.6	21.65	9.1	9.5	-0.4
2 ⁽³⁾	13:19-13:44	11.7	21.65	9.2	9.6	-0.4
3 ⁽³⁾	13:57-14:22	11.7	21.65	9.2	9.6	-0.4
4	14:34-14:59	12.6	21.46	9.9	10.2	-0.3
5	15:13-15:38	12.6	21.46	9.9	10.3	-0.4
6	15:50-16:15	12.7	21.46	10.0	10.3	-0.3
7	16:27-16:52	12.6	21.40	9.9	10.2	-0.3
8	17:08-17:33	12.7	21.40	10.0	10.3	-0.3
9	17:46-18:11	12.6	21.40	9.9	10.2	-0.3
10	18:23-18:48	12.6	21.14	9.9	10.1	-0.2
11	19:00-19:25	12.7	21.14	10.0	10.1	-0.1
12	19:37-20:02	12.6	21.14	9.9	10.1	-0.2

Mean Reference Value = 9.93333

Mean of the Differences = -0.26667

Standard Deviation = 0.08660

Confidence Co-efficient = 0.06657

Relative Accuracy = 3.35% of the mean of the reference method

Bias Adjustment = Not Applicable

Relative Accuracy Needs To Be Less Than 10% Of Reference Method

- (1) Concentration in terms of % by volume on a dry basis
- (2) Concentration in terms of % by volume on a wet basis
- (3) Not used in Relative Accuracy calculation

**II.6 TABLE 6
AIR FLOW (HIGH LOAD) RELATIVE ACCURACY DETERMINATION
WOOD FIRED BOILER EXHAUST
CMS GRAYLING GENERATION
GRAYLING, MICHIGAN
OCTOBER 31, 2017**

Run #	Time	REFERENCE METHOD	CEM	DIFF
		SCFH ⁽¹⁾	SCFH ⁽¹⁾	
1	08:01-08:11	6,998,926	6,751,818	247,108
2	08:34-08:43	6,918,426	6,838,700	79,726
3	09:04-09:14	6,922,392	6,865,182	57,210
4	09:31-09:41	6,904,067	6,630,091	273,976
5	10:06-10:16	6,905,101	6,646,545	258,556
6	10:22-10:31	6,913,283	6,871,800	41,483
7	10:52-11:01	6,861,103	6,838,300	22,803
8	11:07-11:16	6,886,998	6,837,000	49,998
9	11:27-11:36	6,883,369	6,824,500	58,869

Mean Reference Value = 6,910,407.22

Mean of the Differences = 121,081.00

Standard Deviation = 105,395.88

Confidence Co-efficient = 81,014.30

Relative Accuracy = 2.92% of the mean of the reference method

Bias Adjustment = 1.01783

Relative Accuracy Needs To Be Less Than 10% Of Reference Method

(1) Standard Cubic Feet Per Hour

**II.7 TABLE 7
AIR FLOW (MID LOAD) RELATIVE ACCURACY DETERMINATION
WOOD FIRED BOILER EXHAUST
CMS GRAYLING GENERATION
GRAYLING, MICHIGAN
OCTOBER 30, 2017**

Run #	Time	REFERENCE METHOD	CEM	DIFF
		SCFH ⁽¹⁾	SCFH ⁽¹⁾	
1	14:40-14:51	6,403,395	6,170,727	232,668
2	15:14-15:24	6,064,760	5,744,727	320,033
3	15:30-15:38	6,011,376	5,740,889	270,487
4	15:47-15:57	6,036,061	5,726,909	309,152
5	16:20-16:29	4,963,144	5,158,800	-195,656
6	16:35-16:46	4,817,178	4,595,917	221,261
7	16:57-17:05	4,925,792	4,566,333	359,459
8	17:14-17:22	4,864,886	4,716,778	148,108
9	17:30-17:38	4,896,156	4,661,778	234,378

Mean Reference Value = 5,442,527.56

Mean of the Differences = 211,098.89

Standard Deviation = 164,903.96

Confidence Co-efficient = 126,756.18

Relative Accuracy = 6.21% of the mean of the reference method

Bias Adjustment = 1.04035

Relative Accuracy Needs To Be Less Than 10% Of Reference Method

(1) Standard Cubic Feet Per Hour

**II.8 TABLE 8
AIR FLOW (LOW LOAD) RELATIVE ACCURACY DETERMINATION
WOOD FIRED BOILER EXHAUST
CMS GRAYLING GENERATION
GRAYLING, MICHIGAN
NOVEMBER 1, 2017**

Run #	Time	REFERENCE METHOD	CEM	DIFF
		SCFH ⁽¹⁾	SCFH ⁽¹⁾	
1	07:43-07:52	2,912,244	2,811,200	101,044
2	08:09-08:19	2,800,606	2,830,364	-29,758
3	08:28-08:36	2,872,954	3,065,400	-192,446
4	08:41-08:50	2,881,153	2,993,444	-112,291
5	08:56-09:04	2,882,945	3,123,889	-240,944
6	09:14-09:23	2,897,524	3,034,000	-136,476
7	09:36-09:45	3,000,428	3,138,900	-138,472
8	09:51-10:00	3,054,571	3,099,800	-45,229
9	10:06-10:14	3,041,061	3,088,556	-47,495

Mean Reference Value = 2,927,054.00

Mean of the Differences = -93,563.00

Standard Deviation = 101,309.85

Confidence Co-efficient = 77,873.51

Relative Accuracy = 5.86% of the mean of the reference method

Bias Adjustment = No Bias Adjustment Required

Relative Accuracy Needs To Be Less Than 10% Of Reference Method

(1) Standard Cubic Feet Per Hour

RECEIVED

DEC 12 2017

AIR QUALITY DIVISION

III. DISCUSSION OF RESULTS

The results of the RATA's are presented in Tables 1 through 7 (Section II.1 through II.7) as follows:

- Table 1 – SO₂ Lbs/MMBTU
- Table 2 – SO₂ PPM
- Table 3 – NO_x Lbs/MMBTU
- Table 4 – CO Lbs/MMBTU
- Table 5 – CO₂ %
- Table 6 – Air Flow (High Load)
- Table 7 – Air Flow (Mid Load)
- Table 8 – Air Flow (Low Load)

The results of the RATA's are summarized as follows:

Parameter	EPA Performance Specification	Actual Performance	Bias Adjustment	RATA Frequency
SO ₂ – Lbs/MMBTU	≤20% of RM or ≤10% of limit	4.90% of Limit	Not Applicable	Annual
SO ₂ – PPM	≤10% of RM or ±15 PPM Diff	Diff = -0.2667	No Bias Required	Annual
NO _x – Lbs/MMBTU	≤10% of RM or ±0.020 Lbs/MMBTU Diff	1.28% of RM	No Bias Required	Annual
CO – Lbs/MMBTU	≤10% of RM or ≤5% of limit	3.78% of Limit	Not Applicable	Annual
CO ₂ – %	≤10% of RM or ±1.0% Diff	3.35% of RM	Not Applicable	Annual
Air Flow – High	≤10% of RM	2.92% of RM	1.0178	Annual
Air Flow – Mid	≤10% of RM	6.21% of RM	1.0404	Annual
Air Flow – Low	≤10% of RM	5.86% of RM	No Bias Required	Annual

The RATA frequencies were determined from Section 2.3.1.2 of Part 75 Appendix B (reduced RATA frequencies). For every Part 75 parameter, except the SO₂ PPM, the relative accuracy was ≤7.5% of the mean of the reference method (RM) to qualify for annual RATA status. Because of the low SO₂ concentrations (average reference method during RATA was ≤ 250 PPM) the SO₂ qualifies for annual RATA.

status based on the average difference being ± 12 PPM (actual difference was -0.27). The SO_2 Lbs/MMBTU limits and the CO limits are not subject to Part 75. The RATA frequencies for these parameters are always annual as long as the Performance Specifications are met.

All analyzer reference method results were corrected in accordance with EPA Method 7E, Equation 7E-5. The results (where applicable) were converted to #/MMBTU per EPA Method 19 for CO_2 on a dry basis (Equation 19-6). The F_c factor used was 1,830 DSCF/MMBTU. When the RATA's were conducted on a concentration basis (PPM & %), the reference method concentrations were converted to a "wet basis" using the moisture data collected during the sampling.

IV. CEMS SPECIFICATIONS

Parameter	Manufacturer / Model #	Serial #
SO_2	Thermo Electron Model 43I	0723223532
NO_x	Thermo Electron Model 42I-D	0728324764
CO	Thermo Electron Model 48I	0718622788
CO_2	Thermo Electron Model 410I	0723423603
Air Flow	Sick Mahak Model Flowsik 100-PR	16438615

V. SAMPLING AND ANALYTICAL PROTOCOL

The RATA's were performed in accordance with 40 CFR Part 75. A three (3) point traverse was used for the gas sampling. A twelve (12) point traverse was used for the velocity traverses. The actual sampling point dimensions can be found in Appendix F.

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 exhaust stack. 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. A span gas of 191.0 PPM was used to establish the initial instrument calibration. Calibration gases of 102.0 PPM and 54.0 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 102.0 PPM gas to determine the system bias. After each sample, a system zero and system injection of 102.0 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 schematic diagram of the sampling train is shown in Figure 1.

V.2 Sulfur Dioxide – The SO₂ sampling was conducted in accordance with U.S. EPA Reference Method 6C. A Bovar Model 721M gas analyzer was used to monitor the exhaust stack. 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 SO₂ concentrations (PPM).

The analyzer was calibrated by direct injection prior to the testing. A span gas of 25.5 PPM was used to establish the initial instrument calibration. A calibration gas of 11.9 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 11.9 PPM gas to determine the system bias. After each sample, a system zero and system injection of 11.9 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 schematic diagram of the sampling train is shown in Figure 1.

V.3 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 exhaust. Sample gas was extracted through a heated probe. 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 985.3 PPM was used to establish the initial instrument calibration. Calibration gases of 249.4 PPM and 492.5 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 249.4 PPM gas to determine the system bias. After each sample, a system zero and system injection of 249.4 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 schematic diagram of the sampling train is shown in Figure 1.

V.4 Oxygen (Mid Load) – The O₂ 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 exhaust 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 O₂ 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 20.96% was used to establish the initial instrument calibration. Calibration gases of 5.99% and 12.0% 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 5.99% gas to determine the system bias. After each sample, a system zero and system injection of 5.99% 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-5 from U.S. EPA Method 7E. A schematic diagram of the sampling train is shown in Figure 1.

V.5 Carbon Dioxide (Mid Load) – The CO₂ 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 exhaust 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 CO₂ analyzer. This analyzer produces instantaneous readouts of the carbon dioxide concentrations (%).

The analyzer was calibrated by direct injection prior to the testing. A span gas of 20.42% was used to establish the initial instrument calibration. Calibration gases of 6.03% and 12.2% 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 12.2% gas to determine the system bias. After each sample, a system zero and system injection of 12.2% 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-5 from U.S. EPA Method 7E. A schematic diagram of the sampling train is shown in Figure 1.

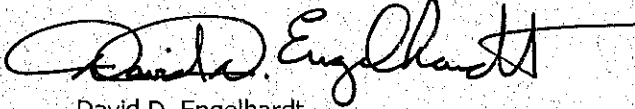
V.6 Oxygen & Carbon Dioxide (High & Low Load) – The O₂ & CO₂ during this load was determined in accordance with U.S. EPA Method 3. Samples were collected from the exhaust of the moisture trains and analyzed using an Orsat.

V.7 Moisture - Moisture samples were collected in accordance with U.S. EPA Method 4. Samples were withdrawn from the stack and passed through a condensing coil with drop out before being passed through pre-weighed silica gel. The water collected was measured to the nearest 1 ml and the silica gel was re-weighed to the nearest 0.5 g. The moisture collected along with the sample volume was used to determine the percent moisture in the exhaust. Each sample was twenty-five (25) minutes in duration and had a minimum sample volume of twenty-one (21) standard cubic feet. A diagram of the moisture sampling train is shown in Figure 2.

V.8 Air Flows - The air flow rates were determined in conjunction with the other sampling by employing U.S. EPA Reference Methods 1 and 2. The sampling for the source was conducted on the 92 inch I.D. exhaust stack. A total of 12 traverse points were used for the air flow determinations. The sample point dimensions are shown in Appendix F.

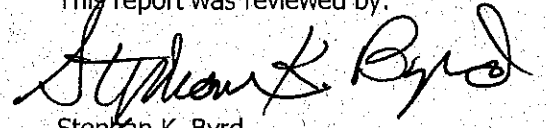
Velocity pressures were determined using an S-Type pitot tube. Temperatures were measured using a Type K thermocouple. A diagram of the air flow sampling train is shown in Figure 3.

This report was prepared by:



David D. Engelhardt
Vice President

This report was reviewed by:



Stephen K. Byrd
President

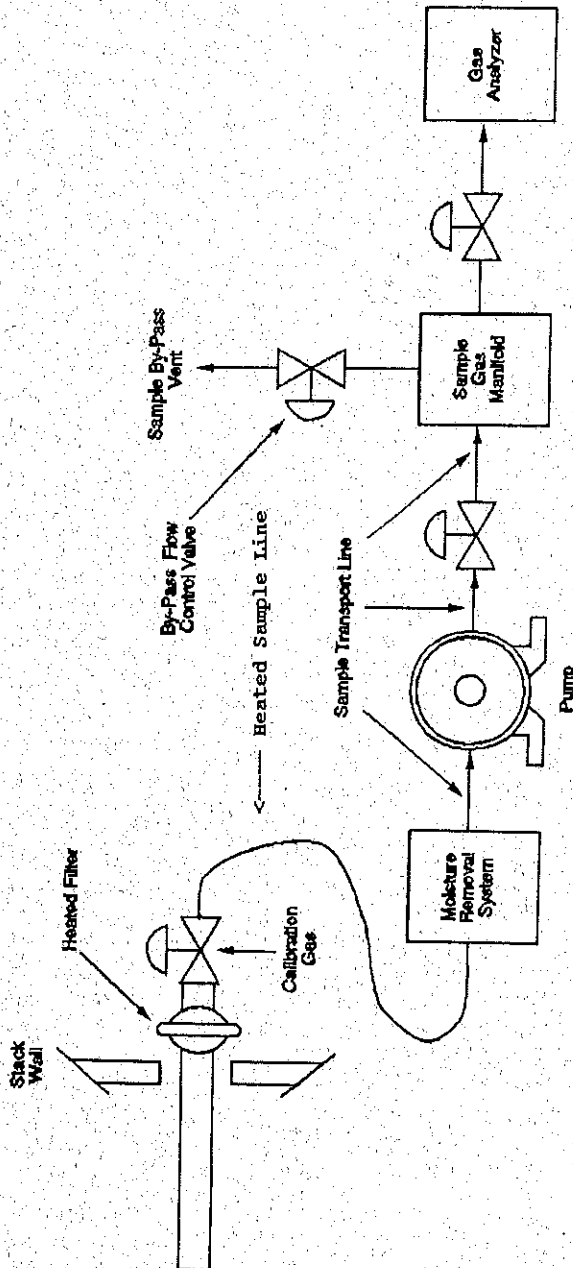


Figure 1
NO_x, SO₂, CO, O₂ & CO₂
Sampling Train

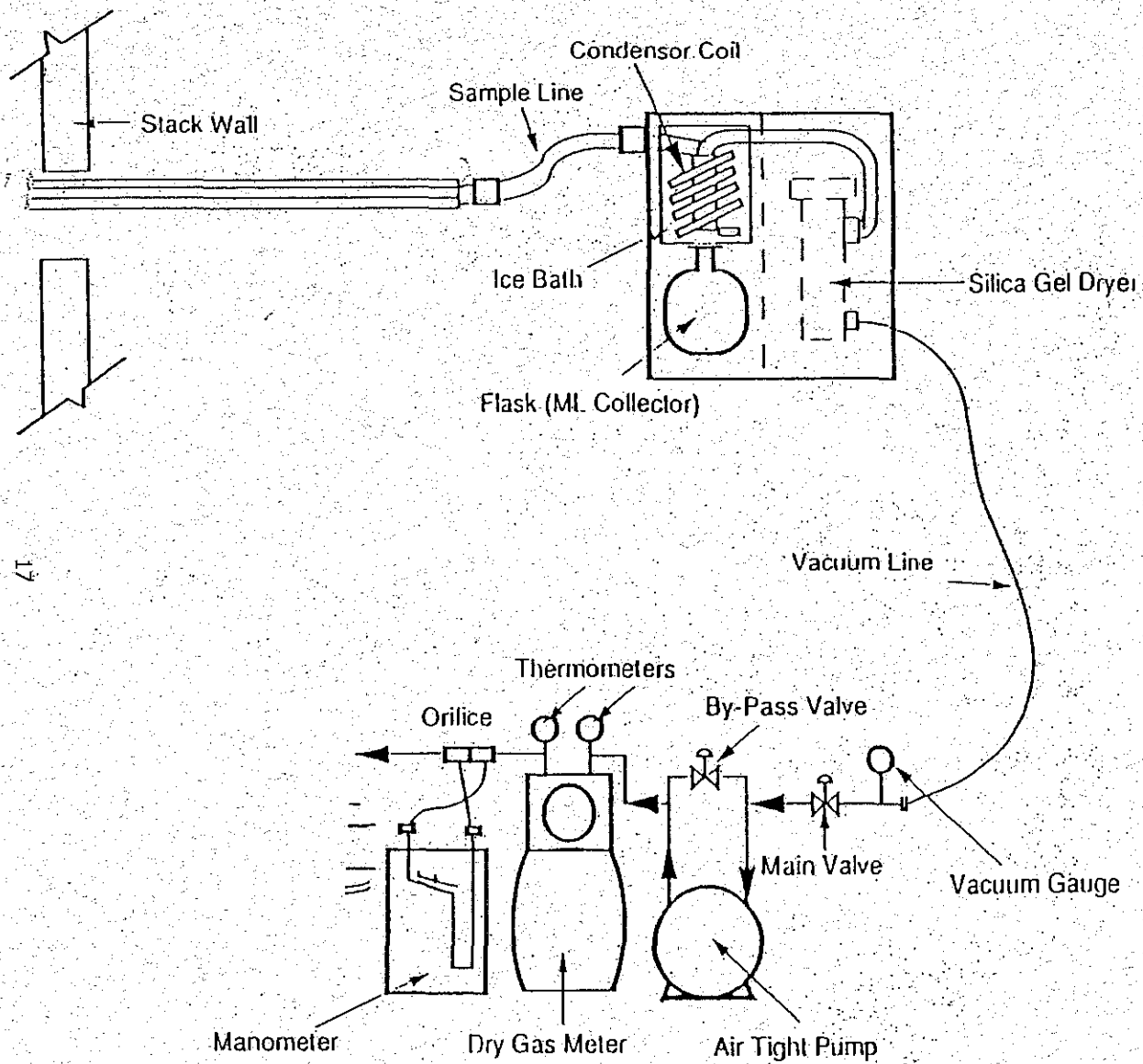


Figure 2
Moisture
Sampling Train

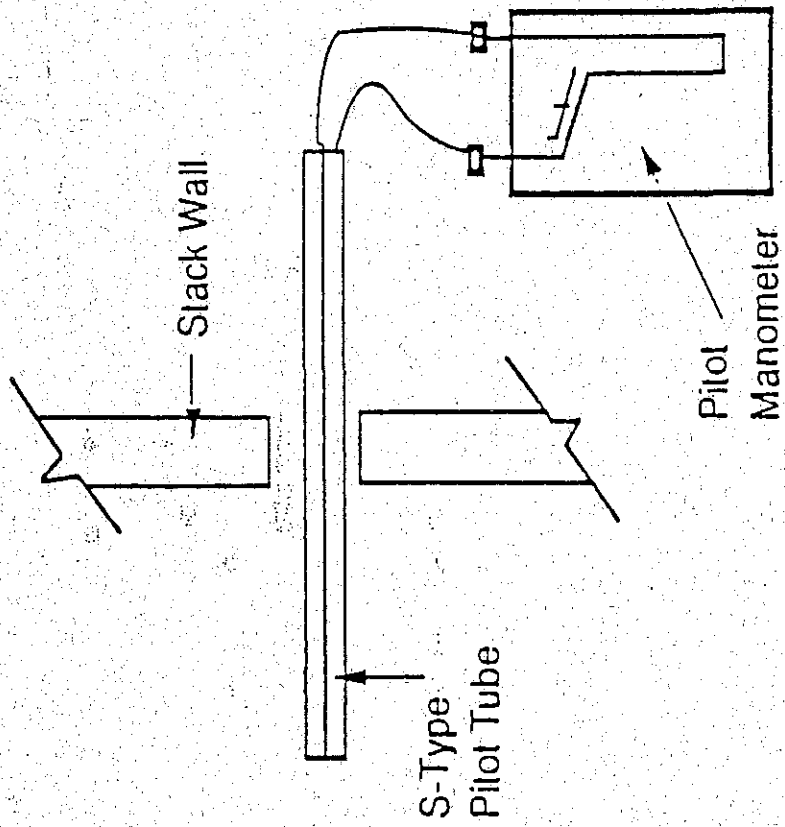


Figure 3
Air Flow
Sampling Train