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Relative Accuracy Test Audit Report

Consumers Energy
Covert Generating Station
Unit 002
Covert, Michigan
September 14, 2023

Report Submittal Date
November 3, 2023

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Mostardi Platt

Project No. M233711B

Crown Point, IN | Mendota Heights, MN | Denver, CO | Henderson, NV

Corporate Headquarters
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TABLE OF CONTENTS

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1.0 EXECUTIVE SUMMARY

Mostardi Platt conducted a Continuous Emissions Monitoring System (CEMS) Relative Accuracy Test Audit (RATA) test program for Consumers Energy at the Covert Generating Station in Covert, Michigan, on Unit 002 on September 14, 2023. This report summarizes the results of the test program and test methods used in accordance with the Mostardi Platt Protocol P233711 submitted to MDEQ on July 21, 2023. Mostardi Platt is a self-certified air emissions testing body (AETB). A copy of Mostardi Platt's self-certification can be found in Appendix A.

The test location, test date, and test parameters are summarized below.

TEST INFORMATION		
Test Location	**Test Date**	**Test Parameters**
Unit 002 Stack	September 14, 2023	Carbon Monoxide (CO), Oxygen (O_2), and Nitrogen Oxides (NO_x)

The purpose of the test program was to demonstrate the relative accuracies of the Unit 001 CO, O_2, and NO_X analyzers during the specified operating condition. The test results from this test program indicate that each CEMS component meets the United States Environmental Protection Agency (USEPA) annual performance specification for relative accuracy as published in 40 Code of Federal Regulations Part 75 (40CFR75) and 40 Code of Federal Regulations Part 60 (40CFR 60).

RATA RESULTS						
Test Location	**Date**	**Parameter**	**Units**	**Relative Accuracy Acceptance Criteria**	**Relative Accuracy (RA)**	**Bias Adjustment Factor (BAF)**
Unit 002 Stack	9/14/23	CO	ppmvd	+/- 5 ppmvd + cc mean difference	0.27 ppm mean difference + confidence coefficient	N/A
		NO_x	lb/mmBtu	≤ 7.5 % of the mean reference value	0.00%	1.00
		NO_x	ppmvd @ 15 % O_2	≤ 20 % of the mean reference value	10.00%	N/A
		O_2	% dry	≤ 7.5 % of the mean reference value	0.27%	N/A

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The gas cylinders used to perform the RATA are summarized below.

GAS CYLINDER INFORMATION				
Parameter	**Gas Vendor**	**Cylinder Serial Number**	**Cylinder Value**	**Expiration Date**
NO_X	Airgas	CC101641	0.00 ppm	12/20/2030
NO_X	Airgas	EB0058865	12.66 ppm	4/22/2025
NO_X	Airgas	CC403273	25.21 ppm	8/15/2026
O_2	Airgas	EB0058865	0.00 %	4/22/2025
O_2	Airgas	SG9125104BAL	9.976%	8/9/2031
O_2	Airgas	CC432067	19.01%	12/20/2030
CO	Airgas	EB0058865	0.00 ppm	4/22/2025
CO	Airgas	CC101641	10.31 ppm	12/20/2030
CO	Airgas	XC017604B	19.82 ppm	1/24/2030

No deviations, additions, or exclusions from the test protocol, test methods, the Mostardi Platt Quality Manual, or the ASTM D7036-12 occurred. The specific test conditions encountered did not interfere with the collection of the data.

The identification of the individuals associated with the test program are summarized below.

TEST PERSONNEL INFORMATION		
Location	**Address**	**Contact**
Test Facility	Consumers Energy Covert Generating Station 26000 77th Street Covert, Michigan 49043	Chris Head Operations Manager (269) 764-3805 (phone) chris.head@cmsenergy.com
Testing Company Supervisor	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Damian Panek 630-993-2100 (phone) dpanek@mp-mail.com QI Group V (certified on 1/19/2021)
Testing Company Personnel		Ryan Gartner Test Engineer

A copy of the QI certification for test personnel is included in Appendix B.

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2.0 TEST METHODOLOGY

Emission testing was conducted following the United States Environmental Protection Agency (USEPA) methods specified in 40CFR75 and 40CFR60, Appendix A, in addition to the Mostardi Platt Quality Manual and the Mostardi Platt test protocol. Schematics of the test section diagram and sampling train used are included in Appendix C and D respectively. Calculation and nomenclature are included in Appendix E. Copies of analyzer print-outs for each test run are included in Appendix F. CEM data and process data as provided by Consumer's Energy are included in Appendix G.

The following methodologies were used during the test program:

Method 3A Oxygen (O_2) Determination

Stack gas O_2 concentrations were determined in accordance with USEPA Method 3A, 40CFR60, Appendix A. A Servomex analyzer was used to determine the O_2 concentrations in the manner specified in the Method. The instrument has a paramagnetic detector and the O_2 operates in the nominal range of 0% to 25% with the specific range determined by the high-level calibration gas. High-range calibrations were performed using USEPA Protocol gas. Zero nitrogen (a low ppm pollutant in balance nitrogen calibration gases) was introduced during other instrument calibrations to check instrument zero. High- and a mid-range % O_2 levels in balance nitrogen were also introduced. Zero and mid-range calibrations were performed using USEPA Protocol gas after each test run. Copies of the gas cylinder certifications are found in Appendix J. This testing met the performance specifications as outlined in the Method.

Method 7E Nitrogen Oxides (NO_X) Determination

Stack gas NO_X concentrations were determined in accordance with USEPA Method 7E, 40CFR60, Appendix A. A Thermo Scientific Model 42i-HL Chemiluminescence Nitrogen Oxides Analyzer was used to determine NOx concentrations, in the manner specified in the Method. The instrument operated in the nominal range of 0 ppm to 100 ppm with the specific range determined by the high-level span calibration gas of 25.21 ppm.

The Model 42i-HL is based on the principle that nitric oxide (NO) and ozone (O_3) react to produce a characteristic luminescence with an intensity linearly proportional to the NO concentration. Infrared light emission results when electronically excited nitrogen dioxide (NO_2) molecules decay to lower energy states. Specifically,

$$NO+O_3 \rightarrow NO_2+O_2+h\upsilon$$

NO_2 must first be transformed into NO before it can be measured using the chemiluminescent reaction. NO_2 is converted to NO by a molybdenum NO_2-to-NO converter heated to about 620°C. The flue gas air sample is drawn into the Model 42i-HL through the sample bulkhead. The sample flows through a particulate filter, a capillary, and then to the mode solenoid valve. The solenoid valve routes the sample either straight to the reaction chamber (NO mode) or through the NO_2-to-NO converter and then to the reaction chamber (NO_x mode).

Dry air enters the Model 42i-HL through the dry air bulkhead, through a flow sensor, and then through a silent discharge ozonator. The ozonator generates the necessary ozone concentration needed for the chemiluminescent reaction. The ozone reacts with the NO in the ambient air sample to produce electronically excited NO_2 molecules. A photomultiplier tube (PMT) housed in a thermoelectric cooler detects the NO_2 luminescence.

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The NO and NO_X concentrations calculated in the NO and NO_X modes are stored in memory. The difference between the concentrations is used to calculate the NO_2 concentration. The Model 42i outputs NO, NO_2, and NO_x concentrations to both the front panel display and the analog outputs.

Stack gas was delivered to the analyzer via a Teflon® sampling line, heated to a minimum temperature of 250°F. Excess moisture in the stack gas was removed using a refrigerated condenser. The entire system was calibrated in accordance with the Method, using USEPA Protocol gases introduced at the probe, before and after each test run. This testing met the performance specifications as outlined in the Method.

A list of calibration gases used and the results of all calibration and other required quality assurance checks are found in Appendix H. Copies of the gas cylinder certifications are found in Appendix I. The NO_2 to NO converter test can be found in Appendix J. This testing met the performance specifications as outlined in the Method.

Method 10 Carbon Monoxide (CO) Determination

Stack gas CO concentrations and emission rates were determined in accordance with USEPA Method 10, 40CFR60, Appendix A. A Thermo Scientific Model 48i Gas Filter Correlation Carbon Monoxide was used to determine carbon monoxide concentrations, in the manner specified in the Method. The instrument operated in the nominal range of 0 ppm to 100 ppm with the specific range determined by the high-level span calibration gas of 19.82 ppm.

The Model 48i operates on the principle that CO absorbs infrared radiation at a wavelength of 4.6 microns. Because infrared absorption is a non-linear measurement technique, it is necessary to transform the basic analyzer signal into a linear output. The Model 48i uses an internally stored calibration curve to accurately linearize the instrument output over any range up to a concentration of 10,000 ppm. The sample is drawn into the Model 48i through the sample bulkhead. The sample flows through the optical bench. Radiation from an infrared source is chopped and then passed through a gas filter alternating between CO and N_2. The radiation then passes through a narrow bandpass interference filter and enters the optical bench where absorption by the sample gas occurs. The infrared radiation then exits the optical bench and falls on an infrared detector. The CO gas filter acts to produce a reference beam which cannot be further attenuated by CO in the sample cell. The N_2 side of the filter wheel is transparent to the infrared radiation and therefore produces a measurement beam which can be absorbed by CO in the cell. The chopped detector signal is modulated by the alternation between the two gas filters with an amplitude related to the concentration of CO in the sample cell. Other gases do not cause modulation of the detector signal since they absorb the reference and measure beams equally. Thus, the GFC system responds specifically to CO. The Model 48i outputs the CO concentration to the front panel display, the analog outputs, and also makes the data available over the serial or Ethernet connection.

Stack gas was delivered to the analyzer via a Teflon® sampling line, heated to a minimum temperature of 250°F. Excess moisture in the stack gas was removed using a refrigerated condenser. The entire system was calibrated in accordance with the Method, using USEPA protocol gases introduced at the probe, before and after each test run. A list of calibration gases used and the results of all calibration and other required quality assurance checks are found in Appendix H. Copies of the gas cylinder certifications are found in Appendix I. This testing met the performance specifications as outlined in the Method.

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3.0 TEST RESULT SUMMARIES

Client: Consumers Energy
Facility: Covert Generating Station
Project #: M233711

Location: Unit 002
Date: 9/14/23
Test Method: 10

CO ppmvd RATA

CEM Analyzer Information

CO Monitor/Model:	Teledyne T300M	CO Serial # :	416

1=accept 0=reject	Test Run	Mw	Test Date	Start Time	End Time	RM CO ppmvd	CEM CO ppmvd	(RM-CEM) Difference (di)	(RM-CEM) Difference^2 (di^2)
1	1	186	09/14/23	08:35	08:55	0.0	0.1	-0.1	0.01
1	2	186	09/14/23	09:13	09:33	0.0	0.1	-0.1	0.01
1	3	186	09/14/23	09:49	10:09	0.0	0.1	-0.1	0.01
1	4	186	09/14/23	10:29	10:49	0.0	0.2	-0.2	0.04
0	5	186	09/14/23	11:05	11:25	0.0	0.3	-0.3	0.09
1	6	186	09/14/23	11:42	12:02	0.0	0.3	-0.3	0.09
1	7	185	09/14/23	12:26	12:46	0.0	0.3	-0.3	0.09
1	8	186	09/14/23	13:02	13:22	0.0	0.3	-0.3	0.09
1	9	186	09/14/23	13:37	13:57	0.0	0.2	-0.2	0.04
1	10	186	09/14/23	14:20	14:40	0.0	0.2	-0.2	0.04

n	**9**	
t(0.975)	**2.306**	
Mean Reference Method Value	**0.000**	**RM avg**
Mean CEM Value	**0.200**	**CEM avg**
Sum of Differences	**-1.800**	**di**
Mean Difference	**-0.200**	**d**
Sum of Differences Squared	**0.420**	**di^2**
Standard Deviation	**0.087**	**sd**
Confidence Coefficient 2.5% Error (1-tail)	**0.067**	**cc**
Relative Accuracy - APS	**0.27**	**ppm + cc difference[A]**

[A] Relative accuracy based upon alternate performance standard of +/- 5 ppm CO plus the confidence coefficient.

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Client: Consumers Energy
Facility: Covert Generating Station
Project #: M233711
Fuel Type: Natural Gas

Location: Unit 002
Date: 9/14/23
Test Method: 7E, 3A
Fuel Factor: 8710

O2 based NOx lb/mmBtu RATA

CEM Analyzer Information

NO_x Monitor/Model:	Teledyne T200M	**NO_x Serial # :**	782
O2 Monitor/Model:	Teledyne T300M	**O2 Serial # :**	416

1=accept 0=reject	Test Run	Mw	Test Date	Start Time	End Time	RM NO_x lb/MMBtu	CEM NO_x lb/MMBtu	(RM-CEM) Difference (di)	(RM-CEM) Difference^2 (di^2)
1	1	186	09/14/23	08:35	08:55	0.007	0.007	0.000	0.000000
1	2	186	09/14/23	09:13	09:33	0.007	0.007	0.000	0.000000
1	3	186	09/14/23	09:49	10:09	0.007	0.007	0.000	0.000000
0	4	186	09/14/23	10:29	10:49	0.008	0.007	0.001	0.000001
1	5	186	09/14/23	11:05	11:25	0.007	0.007	0.000	0.000000
1	6	186	09/14/23	11:42	12:02	0.007	0.007	0.000	0.000000
1	7	185	09/14/23	12:26	12:46	0.007	0.007	0.000	0.000000
1	8	186	09/14/23	13:02	13:22	0.007	0.007	0.000	0.000000
1	9	186	09/14/23	13:37	13:57	0.007	0.007	0.000	0.000000
1	10	186	09/14/23	14:20	14:40	0.007	0.007	0.000	0.000000

n	**9**	
t(0.025)	**2.306**	
Mean Reference Method Value	**0.007**	RM avg
Mean CEM Value	**0.007**	CEM avg
Sum of Differences	**0.000**	di
Mean Difference	**0.000**	d
Sum of Differences Squared	**0.000**	di^2
Standard Deviation	**0.000**	sd
Confidence Coefficient 2.5% Error (1-tail)	**0.000**	cc
Relative Accuracy	**0.00**	RA
Bias Adjustment Factor	**1.000**	BAF

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Client: Consumers Energy
Facility: Covert Generating Station
Project #: M233711

Location: Unit 002
Date: 9/14/23
Test Method: 7E, 3A

NOx ppmvd @ 15% O2 RATA

CEM Analyzer Information

NO_x Monitor/Model:	Teledyne T200M	NO_x Serial # :	782
O_2 Monitor/Model:	Teledyne T300M	O_2 Serial # :	416

1=accept 0=reject	Test Run	Mw	Test Date	Start Time	End Time	RM NOx ppmvd @ 15 %O2	CEM NOx ppmvd @ 15 %O2	(RM-CEM) Difference (di)	(RM-CEM) Difference^2 (di^2)
1	1	186	09/14/23	08:35	08:55	2.0	1.8	0.2	0.04
1	2	186	09/14/23	09:13	09:33	2.0	1.8	0.2	0.04
1	3	186	09/14/23	09:49	10:09	2.0	1.8	0.2	0.04
1	4	186	09/14/23	10:29	10:49	2.0	1.8	0.2	0.04
1	5	186	09/14/23	11:05	11:25	2.0	1.8	0.2	0.04
1	6	186	09/14/23	11:42	12:02	2.0	1.8	0.2	0.04
1	7	185	09/14/23	12:26	12:46	2.0	1.8	0.2	0.04
1	8	186	09/14/23	13:02	13:22	2.0	1.8	0.2	0.04
1	9	186	09/14/23	13:37	13:57	2.0	1.8	0.2	0.04
0	10	186	09/14/23	14:20	14:40	2.0	1.8	0.2	0.04

n	9	
t(0.975)	2.306	
Mean Reference Method Value	2.000	RM avg
Mean CEM Value	1.800	CEM avg
Sum of Differences	1.800	di
Mean Difference	0.200	d
Sum of Differences Squared	0.360	di^2
Standard Deviation	0.000	sd
Confidence Coefficient 2.5% Error (1-tail)	0.000	cc
Relative Accuracy	10.00	RA

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Client: Consumers Energy | **Location:** Unit 002
Facility: Covert Generating Station | **Date:** 9/14/23
Project #: M233711 | **Test Method:** 3A

O_2 % (dry) RATA

CEM Analyzer Information

O_2 Monitor/Model:	Teledyne T300M	O_2 Serial # :	416

1=accept 0=reject	Test Run	Mw	Test Date	Start Time	End Time	RM O_2 % (dry)	CEM O_2 % (dry)	(RM-CEM) Difference (di)	(RM-CEM) Difference^2 (di^2)
1	1	186	09/14/23	08:35	08:55	13.5	13.4	0.1	0.01
0	2	186	09/14/23	09:13	09:33	13.6	13.4	0.2	0.04
1	3	186	09/14/23	09:49	10:09	13.5	13.5	0.0	0.00
1	4	186	09/14/23	10:29	10:49	13.5	13.5	0.0	0.00
1	5	186	09/14/23	11:05	11:25	13.5	13.5	0.0	0.00
1	6	186	09/14/23	11:42	12:02	13.5	13.5	0.0	0.00
1	7	185	09/14/23	12:26	12:46	13.5	13.5	0.0	0.00
1	8	186	09/14/23	13:02	13:22	13.5	13.5	0.0	0.00
1	9	186	09/14/23	13:37	13:57	13.5	13.5	0.0	0.00
1	10	186	09/14/23	14:20	14:40	13.5	13.5	0.0	0.00

n	9	
t(0.025)	2.306	
Mean Reference Method Value	13.500	RM avg
Mean CEM Value	13.489	CEM avg
Sum of Differences	0.100	di
Mean Difference	0.011	d
Sum of Differences Squared	0.010	di^2
Standard Deviation	0.033	sd
Confidence Coefficient 2.5% Error (1-tail)	0.026	cc
Relative Accuracy	0.27	RA

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4.0 CERTIFICATION

Mostardi Platt is pleased to have been of service to Consumers Energy. If you have any questions regarding this test report, please do not hesitate to contact us at 630-993-2100.

As the program manager, I hereby certify that this test report represents a true and accurate summary of emissions test results and the methodologies employed to obtain those results. The test program was performed in accordance with the test protocol, test methods, the Mostardi Platt Quality Manual, and the ASTM D7036-12, as applicable.

MOSTARDI PLATT

Damian Panek — Program Manager

Damian P. Panek

Benjamin W Hendricks — Quality Assurance

Benjamin W. Hendricks

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AIR QUALITY DIVISION

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APPENDICES

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Appendix A - Company AETB Certification

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March 23, 2012

Effective immediately, Mostardi Platt self-certifies that all Part 75 test projects conform to the ASTM D 7036-04 Standard Practice. The following contact information is provided as required by the Standard:

Mostardi Platt
888 Industrial Drive
Elmhurst, Illinois 60126

630-993-2100

tplatt@mp-mail.com

Also, attached is a list of each Qualified Individual (QI) with the type of exam (e.g., Group I, II, III IV and/or V), the date the exam was taken and the name and email address of the exam provider.

Should you have any questions or need additional information, please contact Thomas Platt, P.E. at 630-993-2683.

Approved:

By: _____
Robert J. Platt
Chief Executive Officer

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QSTI AETB Import Data

QI Last Name [REQUIRED]	QI First Name [REQUIRED]	QI Middle Initial	AETB Name [REQUIRED]	AETB Phone Number [REQUIRED]	AETB Email [REQUIRED]	Exam Date mm/dd/yyyy [REQUIRED]	Exam Provider Name [REQUIRED]	Exam Provider Email [REQUIRED]	Comment
Beckham	Kenneth	J	Mostard Platt	630-993-2100	tplatt@mp-mail.com	5/18/2023	Source Evaluation Society	qstiprogram@gmail.com	Group V (Part 75)
Benninghoff	Aaron	W	Mostard Platt	630-993-2100	tplatt@mp-mail.com	9/8/2023	Source Evaluation Society	qstiprogram@gmail.com	Group V (Part 75)
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Kaschinske	Jordan	R	Mostard Platt	630-993-2100	tplatt@mp-mail.com	1/8/2021	Source Evaluation Society	qstiprogram@gmail.com	Group V (Part 75)
Kossack	Daniel	J	Mostard Platt	630-993-2100	tplatt@mp-mail.com	11/11/2021	Source Evaluation Society	qstiprogram@gmail.com	Group V (Part 75)
Kukla	Joshua	R	Mostard Platt	630-993-2100	tplatt@mp-mail.com	1/4/2019	Source Evaluation Society	qstiprogram@gmail.com	Group V (Part 75)
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Petrovich	William	A	Mostard Platt	630-993-2100	tplatt@mp-mail.com	2/4/2022	Source Evaluation Society	qstiprogram@gmail.com	Group V (Part 75)
Russ	Timothy	E	Mostard Platt	630-993-2100	tplatt@mp-mail.com	4/8/2020	Source Evaluation Society	qstiprogram@gmail.com	Group V (Part 75)
Sands	Stuart	T	Mostard Platt	630-993-2100	tplatt@mp-mail.com	1/5/2023	Source Evaluation Society	qstiprogram@gmail.com	Group V (Part 75)
Sather	Michael	P	Mostard Platt	630-993-2100	tplatt@mp-mail.com	2/7/2020	Source Evaluation Society	qstiprogram@gmail.com	Group V (Part 75)
Simon	Ryan	K	Mostard Platt	630-993-2100	tplatt@mp-mail.com	1/19/2023	Source Evaluation Society	qstiprogram@gmail.com	Group V (Part 75)
Sollars	Richard	J	Mostard Platt	630-993-2100	tplatt@mp-mail.com	7/28/2023	Source Evaluation Society	qstiprogram@gmail.com	Group V (Part 75)
Sorce	Angelo	M	Mostard Platt	630-993-2100	tplatt@mp-mail.com	2/18/2022	Source Evaluation Society	qstiprogram@gmail.com	Group V (Part 75)
Trezak	Christopher	S	Mostard Platt	630-993-2100	tplatt@mp-mail.com	4/14/2020	Source Evaluation Society	qstiprogram@gmail.com	Group V (Part 75)

9/8/2023

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Appendix B - QI Certification(s) for Field Personnel

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Qualified Individual

Damian P. Panek

Has satisfactorily completed the requirements of

ASTM D 7036 – 04, Section 8.3

Standard Practice for Competence of Air Emission Testing Bodies

Examinations provided by Source Evaluation Society: www.sesnews.org, (919) 544-6338

All Part 75 test methods, under my supervision, shall conform to the company's Quality Manual and to this practice, in all respects.

Passed Group V on 1/19/2021

Expiration Date: 1/19/2026

Signature: Damian Panek **Date:** January 19, 2021

Quality Manager: Thomas S. Platt **Technical Director:** Scott W. Bauer

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Appendix C - Test Section Diagram

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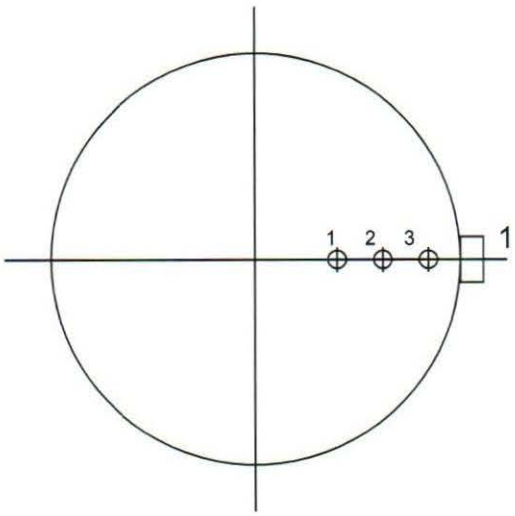
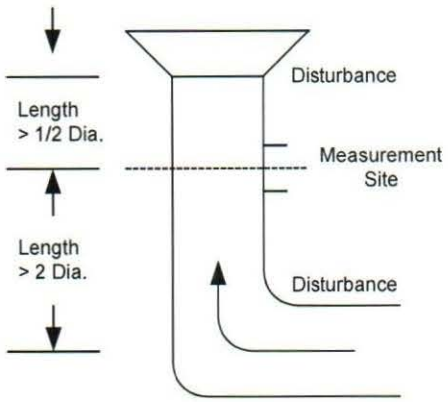
GASEOUS TRAVERSE FOR ROUND DUCTS





Job:	Consumers Energy Covert Generating Station Covert, Michigan
Date:	September 14, 2023
Test Location:	Unit 002 Stack
Stack Diameter:	22.083 Feet
Stack Area:	383.02 Square Feet
Upstream Disturbance:	240 Inches (0.91 diameters)
Downstream Disturbance:	1,020 Inches (3.85 diameters)
No. Sample Points:	3
Port Length:	12 Inches

Distance from Inside Wall
To Traverse Point:

1. 2.0 Meters
2. 1.2 Meters
3. 0.4 Meters

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Appendix D - Sample Train Diagram

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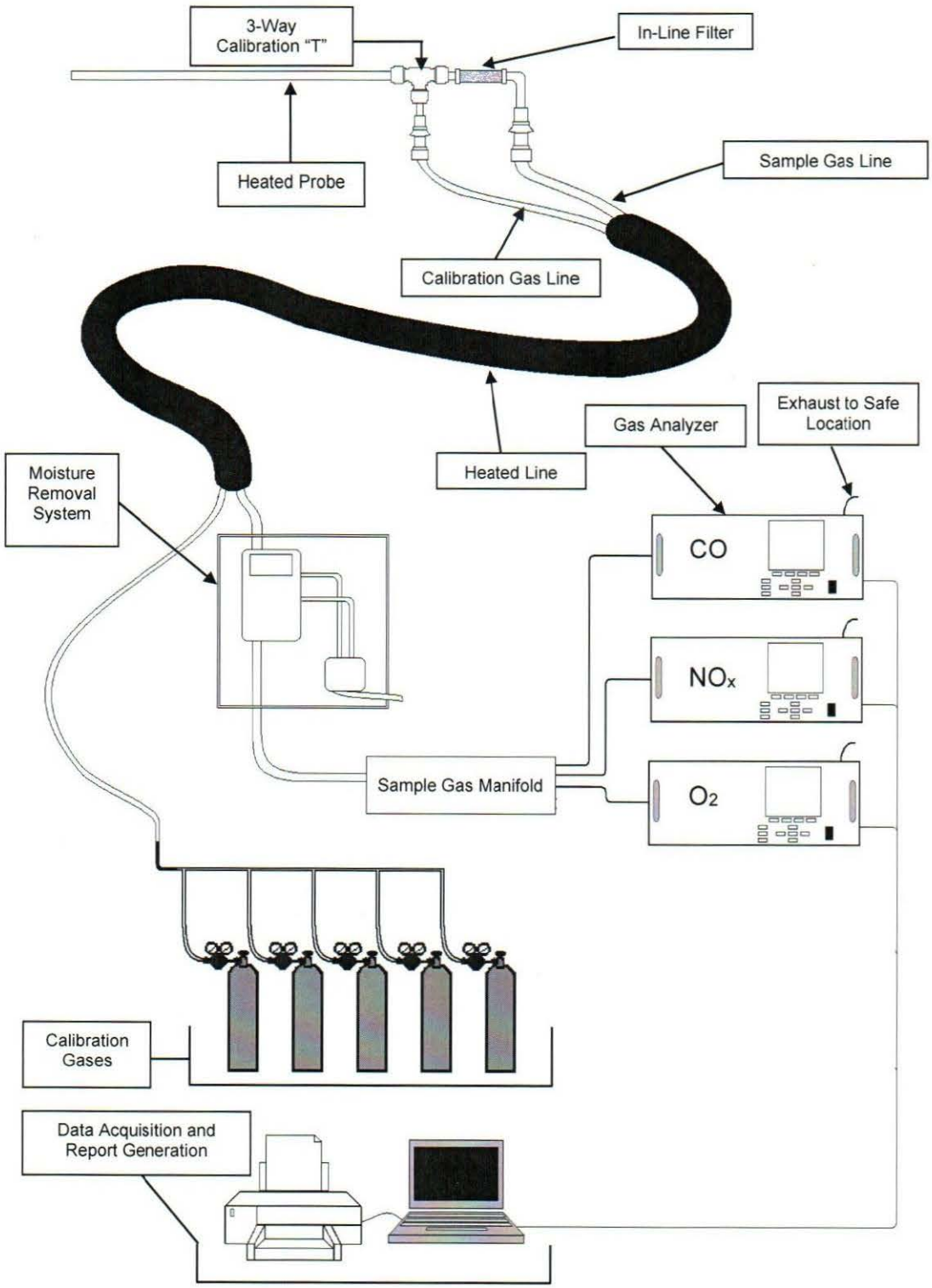
USEPA Methods 3A, 7E, and 10 Extractive Gaseous Sampling Diagram



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Appendix E - Calculation Nomenclature and Formulas

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