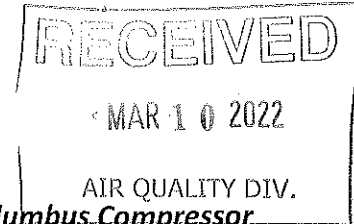


March 8, 2022

DTE

Ms. Joyce Zhu
Air Quality Division
Michigan Department of Environment, Great Lakes, and Energy
27700 Donald Court
Warren, MI 48092



Re: Carbon Monoxide Emissions Compliance Test Report for Columbus Compressor Station – Unit 1 (EU007)

Dear Ms. Zhu:

Please find the attached Emissions Test report for Carbon Monoxide (CO) testing conducted on Unit 1 (EU007) at the DTE Gas, Columbus Compressor Station. Testing was performed to demonstrate compliance with the Michigan Renewable Operating Permit No. B6480-2018 and 40 CFR, Part 63, Subpart ZZZZ regulations. The testing was conducted on January 26, 2022.

If you have any questions on the information contained in the test report, please contact me at Thomas.Snyder@dteenergy.com or 313-897-0899.

Sincerely,
DTE ENERGY CORPORATE SERVICES, LLC

A handwritten signature in black ink, appearing to read "TS", written over a horizontal line.

Thomas Snyder, QSTI
Sr. Environmental Specialist
Ecology, Monitoring, and Remediation
Environmental Management & Safety

Enc: Emissions Test Report – Units 1

Cc: Karen Kajiya-Mills, EGLE (with enclosure)
Joyce Zhu, EGLE (with enclosure)
Joe Neruda, EM&S
Susan King, DTE Gas
Mike Waters, DTE Gas

RECEIVED

MAR 10 2022

RENEWABLE OPERATING PERMIT
REPORT CERTIFICATION

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.
AIR QUALITY DIV.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environment, Great Lakes, and Energy, Air Quality Division upon request.

Source Name DTE Gas Co. - Columbus Compressor Station County St. Clair
Source Address 1647 Caughill Road City Columbus Township
AQD Source ID (SRN) B6480 ROP No. MI-ROP-B6480 ROP Section No. _____

Please check the appropriate box(es):

Annual Compliance Certification (Pursuant to Rule 213(4)(c))

Reporting period (provide inclusive dates): From _____ To _____

- 1. During the entire reporting period, this source was in compliance with ALL terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.
- 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, EXCEPT for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))

Reporting period (provide inclusive dates): From _____ To _____

- 1. During the entire reporting period, ALL monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.
- 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred, EXCEPT for the deviations identified on the enclosed deviation report(s).

Other Report Certification

Reporting period (provide inclusive dates): From 08/11/2021 To 01/26/2022

Additional monitoring reports or other applicable documents required by the ROP are attached as described:

Emissions Compliance Testing Report, EU007 CO DE 40CFR, Part 63, Subpart ZZZZ

Initial Certification of newly installed catalyst.

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

Thomas L. Anderson Manager - T&SO 313-256-6476
Name of Responsible Official (print or type) Title Phone Number

Thomas L Anderson 2/11/22
Signature of Responsible Official Date

EMISSIONS TEST REPORT

for

CARBON MONOXIDE (CO) EMISSIONS

EU007

**DTE - Gas Columbus Compressor Station
Columbus Township, Michigan**

January 26, 2022

**Prepared By
Environmental Management & Safety
Ecology, Monitoring, and Remediation
DTE Corporate Services, LLC
7940 Livernois G4-S
Detroit, MI 48210**

The logo for DTE Energy Services, consisting of the letters 'DTE' in a bold, blocky, sans-serif font. The letters are dark grey with a slightly textured or stippled appearance.



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Results Table No. 1 EU007 CO Emission Testing Results

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FIGURES

- 1 Stack Drawing & Exhaust Sampling Point Location
- 2 USEPA Method 3A and 10 Sampling Train

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- A EGLE Test Plan
- B Raw Analyzer Data
- C Equipment and Analyzer Calibration Data
- D Operational Data
- E Example Calculations



EXECUTIVE SUMMARY

DTE Energy's Environmental Management and Safety (EM&S), Ecology, Monitoring, and Remediation Group, performed emissions testing at the DTE - Gas Columbus Compressor Station, located in Columbus, Michigan. The fieldwork, performed on January 26, 2022, was conducted to satisfy requirements of Michigan Air Renewable Operating Permit No. B6480-2018 and 40 CFR Part 63 Subpart ZZZZ. Emission testing was performed on EU007 at the inlet and outlet of the engine's catalyst to determine carbon monoxide destruction efficiency.

The results of the emissions testing are highlighted below:

**Emissions Testing Summary
Columbus Compressor Station
EU007
January 26, 2022**

Parameter	EU007
Average Inlet Carbon Monoxide Emissions (gram/BHP-Hr, dry)	0.91
Average Outlet Carbon Monoxide Emissions (gram/BHP-Hr, dry)	0.0001
Average Carbon Monoxide Reduction Efficiency (93%) ⁽¹⁾	99.99%

⁽¹⁾ (Permit Limit)



1.0 INTRODUCTION

DTE Energy's Environmental Management and Safety (EM&S), Ecology, Monitoring, and Remediation Group, performed emissions testing at the DTE - Gas Columbus Compressor Station, located in Columbus, Michigan. The fieldwork, performed on January 26, 2022, was conducted to satisfy requirements of Michigan Air Renewable Operating Permit No. B6480-2018 and 40 CFR Part 63 Subpart ZZZZ. Emission testing was performed on EU007 at the inlet and outlet of the engine's catalyst to determine carbon monoxide destruction efficiency.

Testing was performed pursuant to Title 40, *Code of Federal Regulations*, Part 60, Appendix A (40 CFR §60 App. A), Methods 3A and 10.

The fieldwork was performed in accordance with EPA Reference Methods and DTE's Intent to Test¹, test plan submittal, which was approved in a letter by Mr. Trevor Drost from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) dated January 11, 2022. The following DTE personnel participated in the testing program: Mr. Thomas Snyder, Sr. Environmental Specialist and Mr. Fred Meinecke, Environmental Specialist. Mr. Snyder was the project leader. Mr. Shamim Ahammod, EGLE, witnessed the testing.

2.0 SOURCE DESCRIPTION

The Columbus Compressor Station located at 1647 Caughill Road, Columbus, Michigan, employs the use of two (2) DeLaval, 4-cycle, lean burn, natural gas-fired 2,000 Horse Power reciprocating engines. The engines generate line pressure assisting in the transmission of natural gas throughout the pipeline transmission system in SE Michigan.

Emissions from EU007-008 are exhausted through a catalyst bed and to the atmosphere through individual exhaust stacks. The composition of the emissions from the engines depend both upon the speed of the engine and the torque delivered to the compressor. Ambient atmospheric conditions, as it affects the density of air, may limit the speed and torque at which the engines can effectively operate.

Schematic representations of each engine's exhaust and sampling locations are presented in Figure 1.

3.0 SAMPLING AND ANALYTICAL PROCEDURES

DTE Energy obtained emissions measurements in accordance with procedures specified in the USEPA *Standards of Performance for New Stationary Sources*. The sampling and analytical methods used in the testing program are indicated in the table below

¹ EGLE, Test Plan, Submitted November 8, 2021. (Attached-Appendix A)

² EGLE, Approval Letter, January 11, 2022 (Attached-Appendix A)

DTE

Sampling Method	Parameter	Analysis
USEPA Method 3A	Oxygen	Paramagnetic
USEPA Method 10	Carbon Monoxide	NDIR

3.1 OXYGEN AND CARBON MONOXIDE (USEPA METHODS 3A AND 10)

3.1.1 Sampling Method

Oxygen (O₂) emissions were evaluated using USEPA Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)". The O₂ analyzer utilizes a paramagnetic sensor.

Carbon monoxide (CO) emissions were evaluated using USEPA Method 10, "Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)". The CO analyzer utilizes a NDIR detector.

3.1.2 O₂ and CO Sampling Train

The EPA Methods 3A and 10 sampling system (Figure 2) consisted of the following components:

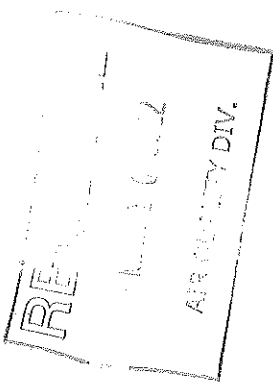
- (1) Stainless steel sampling probe.
- (2) Heated PTFE sampling line.
- (3) Sampling gas conditioner with particulate filter.
- (4) Flexible unheated PTFE sampling line.
- (5) Servomax 1400 O₂/CO₂ gas analyzer and TECO 48i NDIR CO gas analyzer.
- (6) USEPA Protocol 1 calibration gases.
- (7) Data Acquisition System.

3.1.3 Sampling Duration & Frequency

The emissions testing of EU007 consisted of three 15-minute test runs. Sampling was conducted in the centroid position at each sampling location and was performed simultaneously for O₂ and CO at the inlet and outlet of the catalyst. Data was recorded at 10-second intervals.

3.1.4 Quality Control and Assurance (O₂ and CO)

All sampling and analytical equipment was calibrated per the guidelines referenced in Methods 3A and 7E. Calibration gases were EPA Protocol 1 gases and the



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concentrations were within the acceptable ranges (40-60% mid-range and span) specified in Method 7E.

Calibration gas certification sheets are in Appendix C.

3.1.5 Data Reduction

Data collected during the emissions testing was recorded at 10-second intervals and averaged in 1-minute increments. The CO emissions were recorded in parts per million, by volume, dry basis (ppmvd). The 1-minute readings collected can be found in Appendix B.

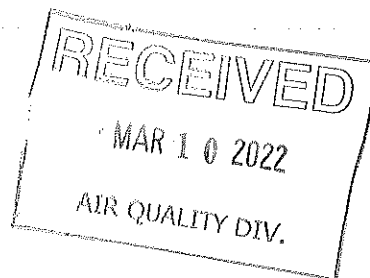
USEPA Method 19 was used to calculate CO emission rates using a proxy GC to determine fuel heating value. CO emissions data collected during testing was calculated as pounds per hour (lb/hr), ppmvd adjusted to 15% oxygen, and grams per brake horsepower-hour (g/BHp-Hr).

4.0 OPERATING PARAMETERS

The test program included the collection of engine torque (%), engine speed (RPM), Horsepower (BHp), inlet and exhaust manifold air temperature (°F) suction and discharge pressure (psig), fuel upper heating value (BTU), and fuel flow (SCFH). Operational data is in Appendix D.

5.0 DISCUSSION OF RESULTS

The results of the CO emission testing on EU007 are presented in the Results Table. The CO emissions are presented in grams per brake horsepower hour (g/Bhp-Hr), prior to and after the catalyst, and the Destruction Efficiency in percent (%). Process data presented includes the Unit load in percent (%), Engine Speed in revolutions per minute (RPM), Engine Torque in brake horsepower (Brake-hp), and Heat Input in million British Thermal Unit per hour (MMBtu/hr) for each test. The results of the testing indicate that EU007 is in compliance with permit requirements for CO of 93% Destruction Efficiency.





6.0 CERTIFICATION STATEMENT

"I certify that I believe the information provided in this document is true, accurate, and complete. Results of testing are based on the good faith application of sound professional judgment, using techniques, factors, or standards approved by the Local, State, or Federal Governing body, or generally accepted in the trade."

Thomas Snyder, QSTI

This report prepared by:

Mr. Thomas Snyder, QSTI
Sr. Environmental Specialist
Ecology, Monitoring, & Remediation
Environmental Management & Safety
DTE Energy Corporate Services, LLC

This report reviewed by:

Mr. Mark Grigereit, QSTI
Principal Engineer
Ecology, Monitoring, & Remediation
Environmental Management and Safety
DTE Energy Corporate Services, LLC

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RESULTS TABLE



Carbon Monoxide (CO) Emissions Testing Results
 EU007
 DTE Gas, Columbus Compressor Station
 Columbus, Michigan

Parameter	Run 1	Run 2	Run 3	Average
Sampling Date	01/26/22	01/26/22	01/26/22	
Sampling Start Time	10:43-10:58	11:15-11:30	11:45-12:00	
Gross Dry BTU	1054	1054	1054	1054
Load (%)	79%	79%	81%	0.8
Speed (RPM)	521.3	519.0	521.4	520.5
Brake-HP	1,584	1,577	1,617	1,593
Brake-HP (%)	79%	79%	81%	80%
Fuel Flow (100 scf/hr)	105.1	103.4	104.6	104.4
Heat Input Rate (MMBtu/Hr)	11.08	10.90	11.02	11.00
Average Inlet O ₂ Content (% dry)	11.2	11.2	11.2	11.2
Average Inlet O ₂ Content (% dry, corrected) ¹	11.2	11.2	11.2	11.2
Average Inlet CO Concentration (ppmv, dry)	217.4	216.9	219.8	218.0
Average Inlet CO Concentration (ppmv, dry, corrected) ¹	212.2	210.6	214.2	212.3
Average Inlet CO Concentration (ppmv, dry, corrected) ²	111.8	110.6	113.0	111.8
Average Inlet CO Concentration (lb/MMBtu)	0.289	0.288	0.292	0.290
Average Inlet CO Emission Rate (lb/hr, dry)	3.21	3.14	3.21	3.19
CO Emission Rate (g/BHP-Hr, dry)	0.92	0.90	0.90	0.91
Average Outlet O ₂ Content (% dry)	11.2	11.2	11.2	11.22
Average Outlet O ₂ Content (% dry, corrected) ¹	11.1	11.1	11.1	11.11
Average Outlet CO Concentration (ppmv, dry)	0.02	0.01	0.01	0.01
Average Outlet CO Concentration (ppmv, dry, corrected) ¹	0.02	0.01	0.01	0.01
Average Outlet CO Concentration (ppmv, dry, corrected) ²	0.01	0.01	0.01	0.01
Average Outlet CO Concentration (lb/MMBtu)	0.00003	0.00001	0.00001	0.00002
Average Outlet CO Emission Rate (lb/MMScf)	0.028	0.014	0.014	0.018
Average Outlet CO Emission Rate (lb/hr, dry)	0.0003	0.0001	0.0001	0.0002
CO Emission Rate (g/BHP-Hr, dry)	0.00008	0.00004	0.00004	0.00006
CO Destruction Efficiency (g/BHP-Hr, dry)	99.99%	100.00%	100.00%	99.99%
CO Destruction Efficiency (ppmvd @ 15% O ₂)	99.99%	100.00%	100.00%	99.99%

¹corrected for analyzer drift as per USEPA Method 7E

²corrected to 15% O₂

O₂ : oxygen

CO : carbon monoxide

ppmv : parts per million on a volume-to-volume basis

lb/hr : pounds per hour

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FIGURES

Figure 1 – Sampling Location
Columbus Compressor Station - Engines 1 & 2
January 26, 2022

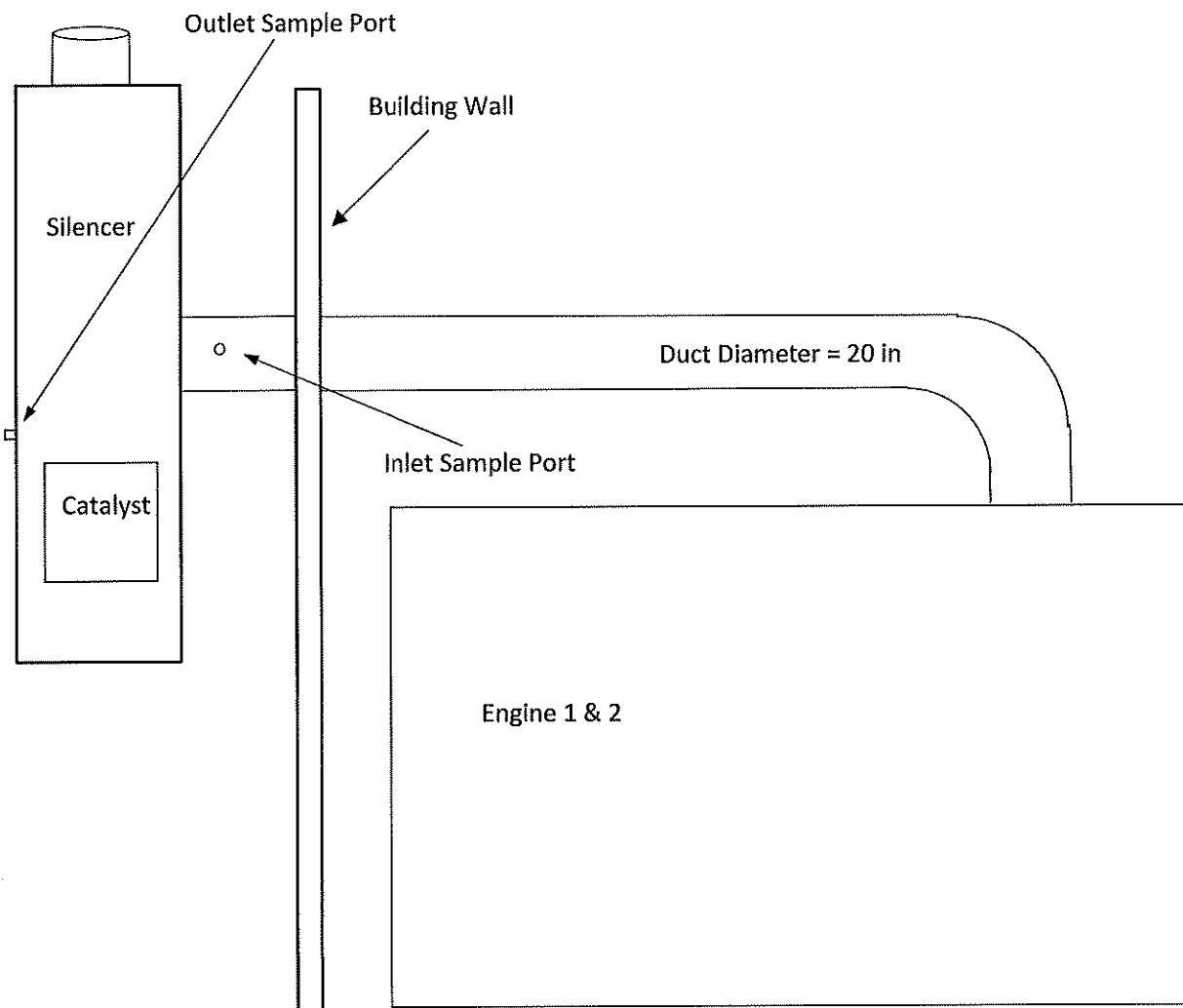
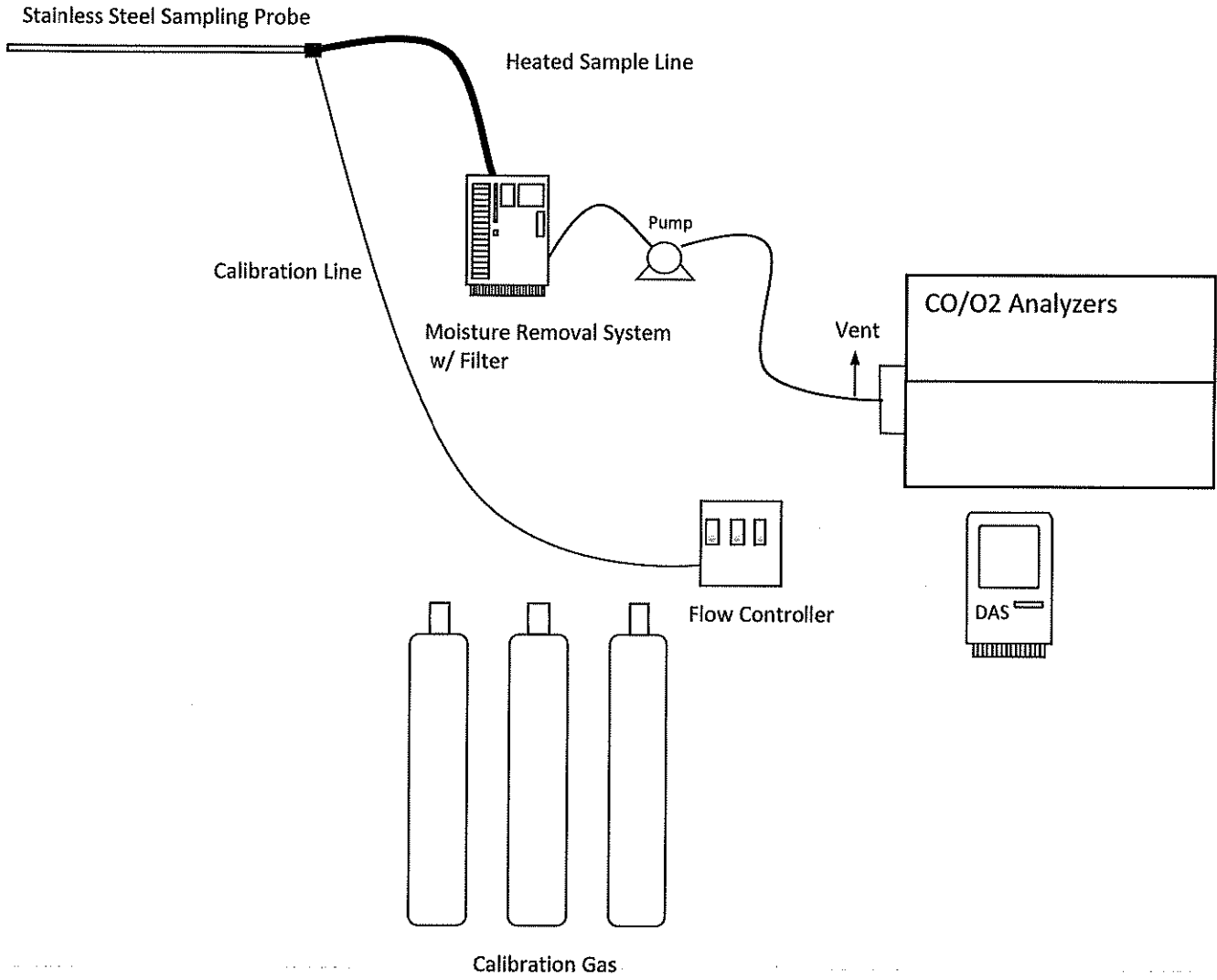


Figure 2 – EPA Methods 3A/10
Columbus Compressor Station
January 26, 2022



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APPENDIX A
EGLE TEST PLAN