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EMISSIONS TEST REPORT

for

OXIDES OF NITROGEN (NO_X) EMISSIONS

EUTURBINEC50 (Unit 7) and EUTURBINET70 (Unit 8)

DTE Gas, Belle River Mills Compressor Station
China Twp, Michigan

March 6-7, 2023

Prepared By:
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CONTENTS

RESULTS TABLES

FIGURES

APPENDICES

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EXECUTIVE SUMMARY

DTE Energy's Environmental Management & Safety (EM&S) Ecology, Monitoring & Remediation Group performed emissions testing at the DTE Gas, Belle River Mills Compressor Station, located in China Twp, Michigan. The fieldwork, performed on March 6-7, 2023 was conducted to satisfy requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operating Permit (ROP) MI-ROP-B6478-2021 and 40 CFR Part 60 Subpart KKKK. Testing was performed for oxides of nitrogen (NO_x) to determine emissions from EUTURBINEC50 and EUTURBINEC70 while operating within 25% of peak load (hp).

The results of the emissions testing are highlighted below:

NO_x Emissions Test Results
Belle River Mills Compressor Station
March 6-7, 2023

Emission Unit	Turbine Load (% of rated hp)	NO_x Concentration (ppm @ 15% O_2) (1)	NOx Emission Rate (lb/hr) (2) (3)
EUTURBINEC50	78.2%	13.1	2.47
EUTURBINET70	81.1%	9.4	2.93

(1) Permit Limit – 25ppm - Average Oxides of Nitrogen Emissions Concentration (ppm) corrected to 15%
(2) Permit Limit – EUTURBINEC50 – 3.67 lb/hr
EUTURBINET70 – 5.34 lb/hr

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1.0 INTRODUCTION

DTE Energy's Environmental Management & Safety (EM&S) Ecology, Monitoring & Remediation Group performed emissions testing at the DTE Gas, Belle River Mills Compressor Station, located in China Twp, Michigan. The fieldwork, performed on March 6-7, 2023, was conducted to satisfy requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operating Permit (ROP) MI-ROP-B6478-2021 and 40 CFR Part 60 Subpart KKKK. Testing was performed for oxides of nitrogen (NO_x) to determine emissions from EUTURBINEC50 and EUTURBINEC70 while operating within 25% of peak load (hp).

Testing was performed pursuant to Title 40, *Code of Federal Regulations*, Part 60, Appendix A (40 CFR §60 App. A), Methods 3A and ASTM Method D6348.

The fieldwork was performed in accordance with EPA Reference Methods and EM&S's intent to test[1], which was approved by the Michigan Department of Environment, Great Lakes, and Energy (EGLE). The following DTE personnel participated in the testing program: Mr. Mark Grigereit, Principal Engineer and Mr. Thomas Snyder, Sr. Environmental Specialist. Mr. Snyder was the project leader.

Ms. Susan King, DTE Gas, provided coordination support for the testing. Mr. Andrew Riley, (EGLE), reviewed the test plan.

2.0 SOURCE DESCRIPTION

The Belle River Mills Compressor Station located at 5440 Puttygut Road, China Twp, Michigan, employs the use of three natural gas-fired compressor turbines rated at 6,130 horsepower (EUTURBINEC50), 10,915 horsepower (EUTURBINET70), and 15,900 horsepower (EUTURBINE1). Each turbine is equipped with a low NO_x combustor for NO_x control. The turbines generate line pressure assisting with the transmission of natural gas into and out of the gas storage field, as well as to and from the pipeline transmission system in SE Michigan. Testing for NO_x emissions was performed while the turbines operated in the $LoNO_x$ mode within 25% of peak load (rated horsepower).

The turbines exhaust directly to the atmosphere through vertical, rectangular exhaust ducts.

A schematic representation of the turbines exhaust and sampling locations are presented in Figures 1 & 2.

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[1] EGLE, Test Plan, Submitted January 13, 2023. (Attached-Appendix A)

[2] EGLE, Acceptance Letter, February 10, 2023. (Attached-Appendix A)

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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

Sampling Method	Parameter	Analysis
USEPA Method 3A	Oxygen	Instrumental Analyzer Method
USEPA Method 7E	Oxides of Nitrogen	Instrumental Analyzer Method

3.1 OXYGEN AND OXIDES OF NITROGEN (USEPA METHODS 3A AND 7E)

3.1.1 Sampling Method

Oxygen (O_2) emissions were evaluated using USEPA Method 3A, "Gas Analysis for Carbon Dioxide, Oxygen, Excess Air, and Dry Molecular Weight (Instrumental Analyzer Method)". The O_2 analyzer utilizes a paramagnetic sensor.

Oxides of Nitrogen (NO_x) emissions were evaluated using USEPA Method 7E, "Determination of Oxides of Nitrogen Emissions from Stationary Sources". The NO_X analyzer utilizes a chemiluminescent detector.

3.1.2 O_2 and NO_X Sampling Train

The EPA Methods 3A and 7E sampling system (Figure 2) consisted of the following components:

(1) Stainless steel sampling probe.
(2) Heated Teflon™ sampling line.
(3) MAK® gas conditioner with particulate filter.
(4) Flexible unheated Teflon™ sampling line.
(5) Servomex 1400 O_2/CO_2 gas analyzer and TECO 42i NO_X gas analyzer.
(6) Appropriate USEPA Protocol 1 Calibration Gases
(7) Data Acquisition System.

Refer to Figure 2 for a schematic of the O_2 and NO_X sampling train.

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3.1.3 Sampling Train Calibration

The O_2 / NO_X sampling trains were calibrated according to procedures outlined in USEPA Methods 3A & 7E. Zero, span, and mid-range calibration gases were introduced directly into the NO_X and O_2 analyzers to determine the instruments linearity. A zero and mid-range span gas was then introduced through the entire sampling system to determine sampling system bias for each analyzer. Additional system calibrations were performed at the completion of each test.

3.1.4 Sampling Duration & Frequency

The emissions testing of the turbines consisted of triplicate 20-minute samples performed at one load. Sampling was performed simultaneously for O_2 & NO_x. Previous testing performed on the sources demonstrated that they are not stratified; therefore, a single sampling point was utilized. Data was recorded at 10-second intervals.

3.1.5 Quality Control and Assurance (O_2 and NOX)

All sampling and analytical equipment was calibrated according to the guidelines referenced in Methods 3A and 7E. Calibration gases were EPA Protocol 1 gases. Calibration gas concentrations were within the acceptable ranges (analyzer span >30% of the pollutant gas measured with mid-range calibration gas values 40-60% of the analyzer span) specified in Method 7E. Methods 3A references Method 7E for calibration standards. Calibration gas certification sheets are in Appendix B.

Prior to testing, DTE performed converter efficiency testing by directly challenging the NO_x analyzer with a nitrogen dioxide (NO_2) calibration gas of 15.4 ppm. Results from the converter efficiency test demonstrated that the analyzer met the requirements of Method 7E[Eq. 1] (Greater than 90%).

Eq. 1 $$Eff_{NO2} = \frac{13.9}{15.4} = 90\%$$

3.1.6 Data Reduction

The O_2 and NO_x emission readings in parts per million (ppm) were recorded at 10-second intervals and averaged to 1-minute increments. The NOx emissions were reported in parts per million corrected to 15% O_2 (ppm @ 15% O_2) as required by the EGLE ROP.

The emissions data collected can be found in Appendix B.

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4.0 OPERATING PARAMETERS

The test program included the collection of turbine operating data during each test run. Parameters recorded included compressor exhaust temperature and pressure, % Load (reported as Hp), gross dry BTU, fuel feed rate, and stack exhaust temperature.

Operational data and results of the fuel analysis can be found in Appendix E.

5.0 RESULTS

The results of the NOx emission testing conducted on EUTURBINEC50 and EUTURBINET70 are presented in Table No 1. The NOx emissions are presented in parts per million (ppm), parts per million at 15% oxygen (ppm @ 15% O_2), and pounds per hour (lb/hr). Process data presented in unit load (%).

Testing of EUTURBINEC50 and EUTURBINET70 demonstrated compliance with permitted emission rates at 78.2% and 81.1% load, respectively.

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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: _____

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DTE Energy Corporate Services, LLC

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RESULTS TABLE

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TABLE NO. 1
NITROGEN OXIDE (NOx) EMISSION TESTING RESULTS
Belle River Mills Compressor Station
EUTURBINEC50
March 6, 2023

Test	Time	Load (% of rated hp)	Oxygen [1] (%)	NO_x Emissions (ppm)	NO_x Emissions (ppm @ 15% O_2)	NO_x Emissions (lb/hr)
Test-1	7:23-7:43	78.1%	15.6	11.8	13.1	2.45
Test-2	7:54-8:14	78.3%	15.5	11.7	12.9	2.43
Test-3	8:23-8:43	78.3%	15.5	12.1	13.3	2.54
	Avg:	*78.2%*	*15.5*	*11.9*	*13.1*	*2.47*

(1) Corrected for analyzer drift per USEPA method 7E

NOx Permit Limits:

25.0 ppm corrected to 15% O2

3.67 pounds per hour

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TABLE NO. 2
NITROGEN OXIDE (NOx) EMISSION TESTING RESULTS
Belle River Mills Compressor Station
EUTURBINET70
March 7, 2023

Test	Time	Load (% of rated hP)	Oxygen [1] (%)	NO_x Emissions (ppm)	(NO_x Emissions (ppm @ 15% O_2))	(NO_x Emissions (lb/hr))
Test-1	7:06-7:26	81.1%	15.1	9.3	9.5	2.91
Test-2	7:33-7:53	81.0%	15.1	9.4	9.6	2.94
Test-3	8:01-8:21	81.3%	15.2	9.4	9.7	2.95
	Avg:	*81.1%*	*15.1*	*9.4*	*9.6*	*2.93*

(1) Corrected for analyzer drift per USEPA method 7E

NOx Permit Limits:

25.0 ppm corrected to 15% O2

5.34 pounds per hour

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FIGURES

Figure 1 – Sampling Location
Belle River Mills Compressor Station
EUTURBINEC50
February 6, 2023

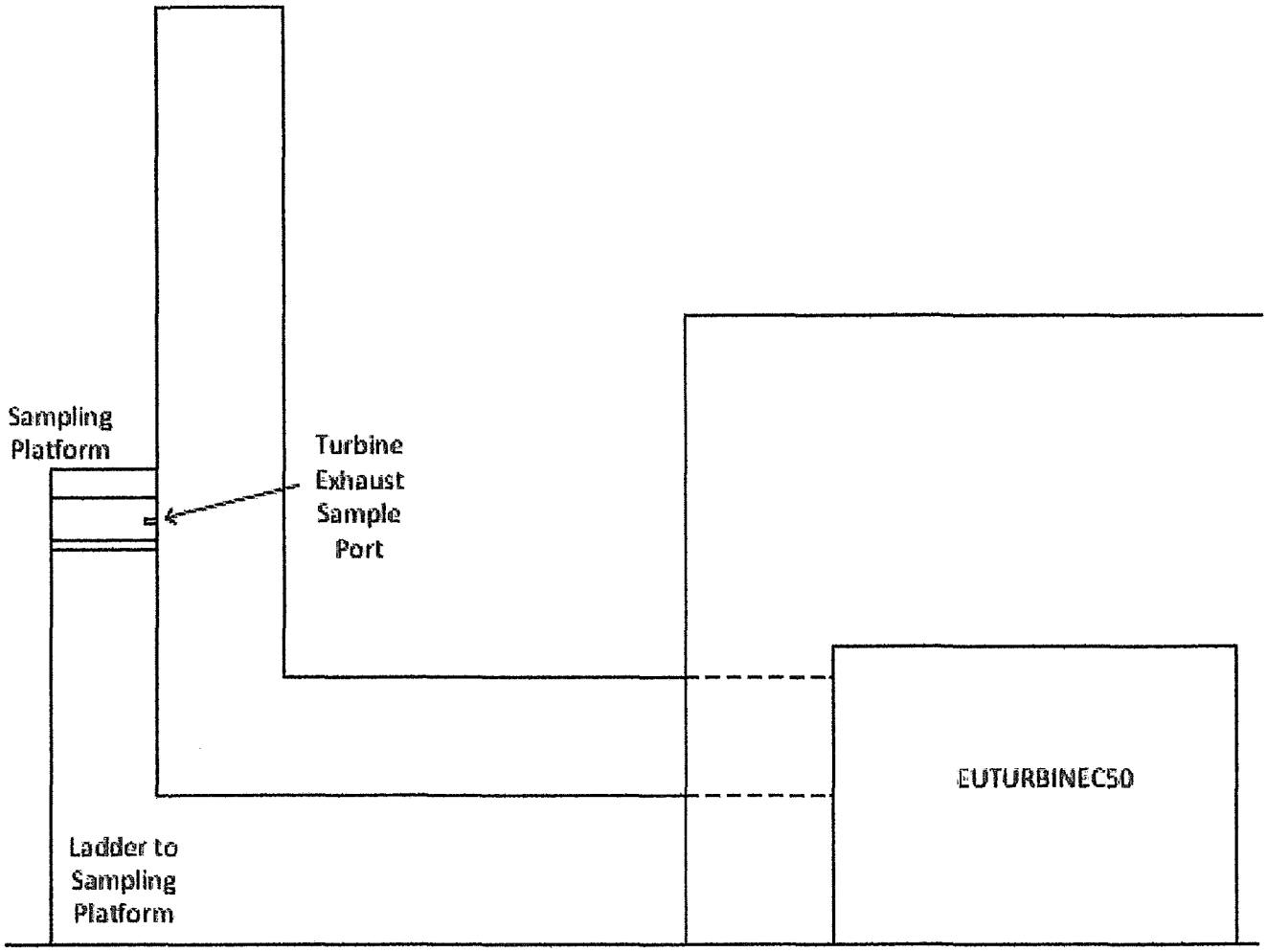

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Figure 2 – Sampling Location
Belle River Mills Compressor Station
EUTURBINET70
February 7, 2023

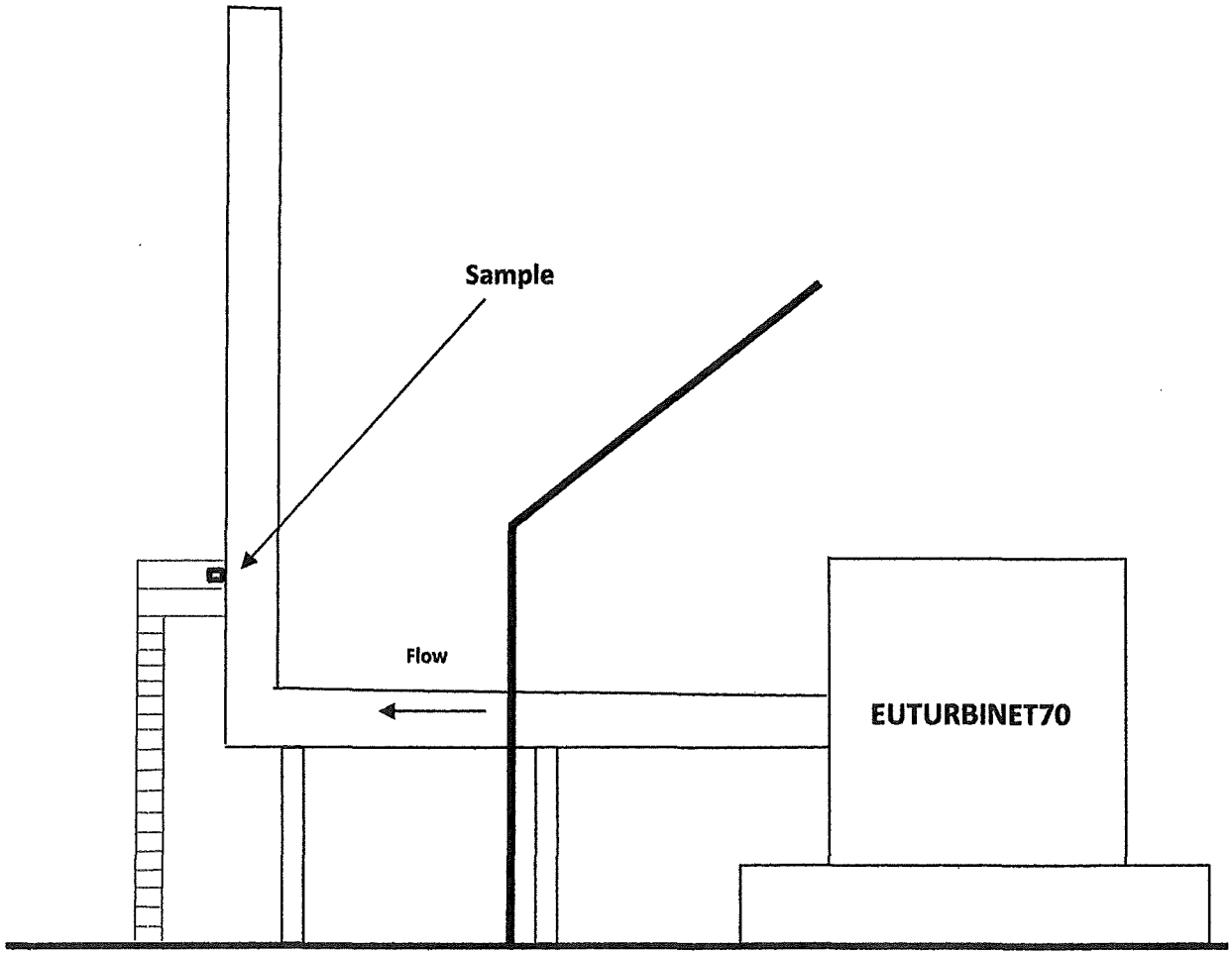

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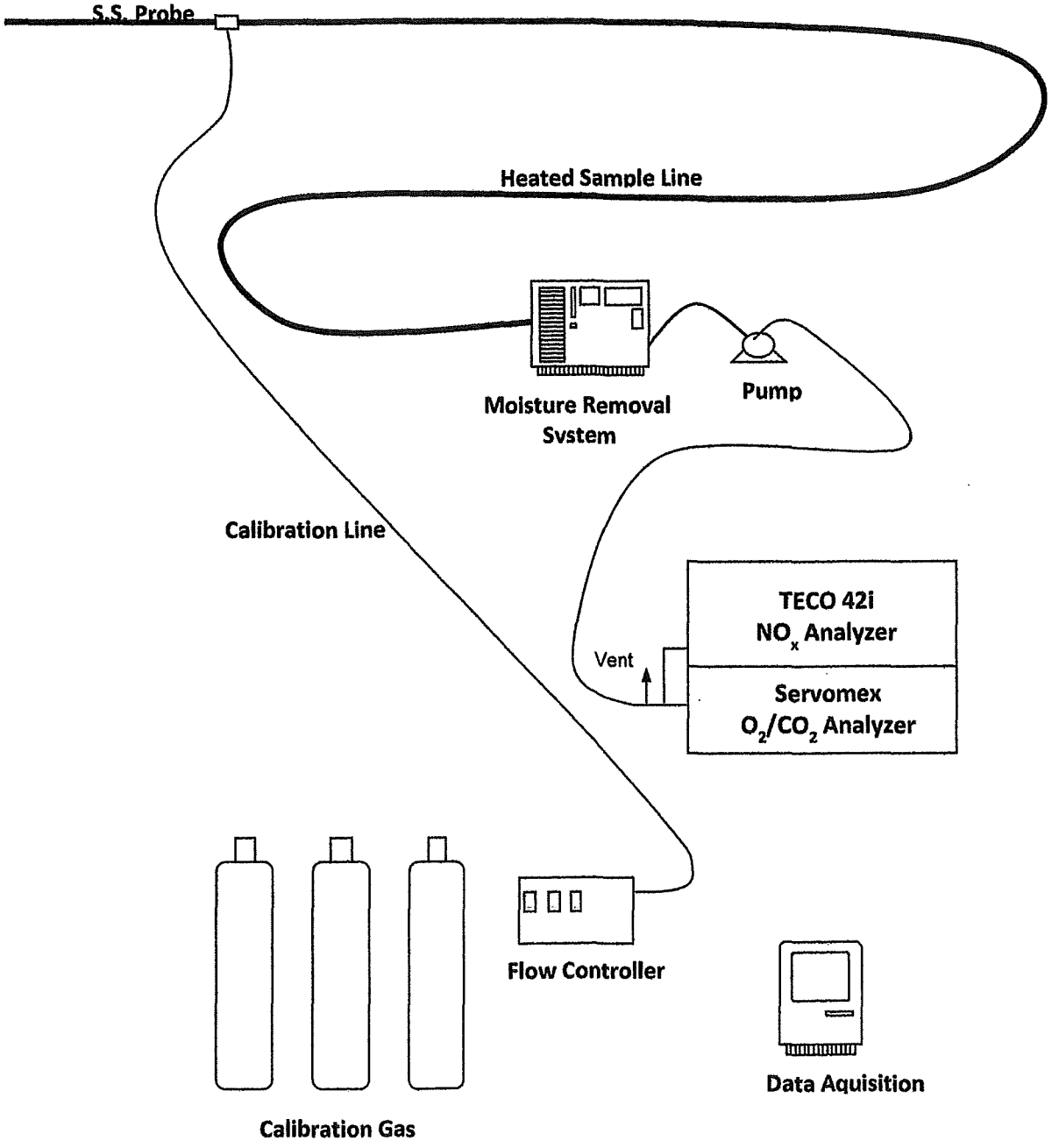
Figure 3 – EPA Methods 3A & 7E
Belle River Mills Compressor Station
EUTURBINEC50 and EUTURBINEC70
February 6-7, 2023



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APPENDIX A

EGLE TEST PLAN AND APPROVAL LETTER