EMISSIONS TEST REPORT

for

FINE PARTICULATE MATTER ($PM_{10/2.5}$) EMISSIONS

EUTURBINE1 & EUTURBINE2
PTI 185-15A

DTE Gas Company – Milford Compressor Station
Milford, Michigan

April 10-16, 2019

Prepared By
Environmental Management & Resources
Environmental Field Services Group
DTE Corporate Services, LLC
7940 Livernois H-136
Detroit, MI 48210

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EXECUTIVE SUMMARY

DTE Energy's Environmental Management and Resources (EM&R) Field Services Group performed emissions testing at the DTE Gas Company – Milford Compressor Station, located in Milford, Michigan. The fieldwork, performed between April 10-16, 2019, was conducted to satisfy requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Permit to Install (PTI) 185-15A. Emissions tests were performed on the Solar Turbines 2100 (EUTURBINE1) and 2200 (EUTURBINE2) for fine particulate matter ($PM_{10/2.5}$).

The results of the emissions testing are highlighted below:

Emissions Test Results
Milford Compressor Station
EUTURBINE1-2
April 10-16, 2019

Emission Unit	$PM_{10/2.5}$ (lb/MMBtu)
EUTURBINE1	0.003
EUTURBINE2	0.003
Permit Limit	***0.015***

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1.0 INTRODUCTION

DTE Energy's Environmental Management and Resources (EM&R) Field Services Group performed emissions testing at the DTE Gas Company– Milford Compressor Station, located in Milford, Michigan. The fieldwork, performed between April 10-16, 2019, was conducted to satisfy requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Permit to Install (PTI) 185-15A. Emissions tests were performed on the Solar Turbines 2100 (EUTURBINE1) and 2200 (EUTURBINE2) for fine particulate matter ($PM_{10/2.5}$).

The following DTE personnel participated in the testing program: Mark Grigereit, Principal Engineer, Thomas Snyder and Jason Logan, Environmental Specialists, Mark Westerberg, Senior Environmental Specialist, and Fred Meinecke, Senior Environmental Technician. Mr. Shamim Ahammod, Mr. Mark Dziadosz, Mr. Tom Gasloli, and Ms. Regina Hines, with EGLE, were on site to observe individual portions of the test program.

2.0 SOURCE DESCRIPTION

The DTE Gas Company – Milford Compressor Station installed three (3) identical Model Taurus 70 turbines, manufactured by Solar Turbines, at the facility. The purpose of the turbines is to generate the compression needed to distribute natural gas through the pipeline delivery system. The turbines are all simple cycle design, natural gas fired turbines nominally rated at 10,504 horsepower (ISO).

While PTI 185-15A allows for the installation of a total of five (5) gas compression turbines, only the three addressed in this report have been installed to date.

Figure 1 presents a schematic of the sampling location for each turbine. The exhaust on each turbine is identical.

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 Methods 1 & 2	Sampling Location & Exhaust Volumetric Flowrates	S-type Pitot Tube and Manometer
USEPA Method 3A	Oxygen/Carbon Dioxide	Instrumental Analyzer Method
USEPA Method 4	Exhaust Moisture Content	Gravimetric
USEPA Method 5	$PM_{10/2.5}$	Isokinetic Sampling Train
USEPA Method 202	Condensable Particulate Matter	Isokinetic Sampling Train

As proposed in the Test Plan, USEPA Method 5, a method for measuring ***all*** particulate, was used as a surrogate for actual Fine Particulate measurements. This is common practice the for testing of natural gas fired, combustion turbines, because particulate greater than 10 microns should not occur in the exhaust gas stream.

3.1 OXYGEN AND CARBON DIOXIDE (USEPA METHOD 3A)

3.1.1 Sampling Method

Exhaust oxygen (O_2) and carbon dioxide (CO_2) content was measured using USEPA Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)".

All gas samples were measured on a dry basis (i.e. sample was conditioned prior to introduction into the pollutant analyzers).

3.1.2 Sampling Train

The EPA Methods 3A sampling system consisted of the following components:

(1) Stainless steel sampling probe with sintered filter.
(2) Heated Teflon™ sampling line.

(3) Universal® gas conditioner with particulate filter.
(4) Flexible unheated Teflon™ sampling line.
(5) Instrumental gas analyzers.
(6) Data Acquisition System.

Refer to Figure 2 for a schematic of the gaseous sampling train.

3.1.3 Sampling Train Calibration

The O_2 and CO_2 instruments were calibrated according to procedures outlined in USEPA Method 3A. Zero, span, and mid-range calibration gases were introduced directly into each analyzer to determine the instruments linearity. Then a zero and mid-range span gas was then introduced through the entire sampling system to determine sampling system bias for each analyzer. System calibrations were performed prior to, and at the end of, each test period.

3.1.4 Sampling Duration & Frequency

O_2 and CO_2 testing consisted of continually sampling throughout the duration of each test run. Sampling was performed at a single sampling location, determined during previous emissions testing. Concentration averages were logged at 10-second intervals.

3.1.5 Quality Control and Assurance

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

Field calibration data sheets and gas certification sheets are in Appendix C.

3.1.6 Data Reduction

The O_2 and CO_2 (%) readings were logged at 10-second intervals and recorded in 1-minute increments.

CEM data is presented in Appendix B.

3.2 FINE PARTICULATE MATTER (USEPA METHODS 5/202)

3.2.1 Sampling Method

A combined USEPA Method 5/Method 202 isokinetic sampling train was used to measure the filterable (front-half) and condensable (back-half) particulate emissions. The permit limit specifies $PM_{10/2.5}$ determination however because of the nature of the source being tested, Method 5 along with Method 202 was performed instead of the Method 201A/202 combination. The results from Method 5 and Method 202 were

combined and assumed to be $PM_{10/2.5}$. This practice is not uncommon for combustion sources that are fired with natural gas.

Field data sheets for the Method 5/Method 202 sampling can be found in Appendix F.

3.2.2 Particulate Matter Sampling Train

The combined Method 5/202 isokinetic sampling train consisted of the following components:

(1) Stainless-steel button-hook nozzle
(2) Unheated stainless steel-lined probe
(3) Heated 3" glass filter holder with a quartz filter (maintained at a temperature of 250 ± 25 °F)
(4) Method 23-type condenser
(5) Condensate dropout impinger (dry) without the bubbler tube
(6) Modified Greenburg-Smith impinger (dry) with no taper as a backup impinger
(7) 3" glass filter holder with a PTFE filter (maintained at a temperature between 65 and 85 °F)
(8) Modified Greenburg-Smith impinger containing 100 millimeters (ml) of distilled de-ionized (DDI) water
(9) Modified Greenburg-Smith impinger containing approximately 300 grams of silica gel desiccant.
(10) Length of sample line
(11) Environmental Supply® control case equipped with a pump, dry gas meter, and calibrated orifice.

Refer to Figure 3 for a schematic of the isokinetic sampling train.

3.2.3 Sampling Train Calibration

All sampling and analytical equipment was calibrated according to the guidelines referenced in Method 5 and Method 202, as appropriate.

Equipment calibration data can be found in Appendix C.

3.2.4 Sampling Duration & Frequency

Triplicate, 120-minute test runs were conducted on the exhaust of each turbine.

3.2.5 *Sample Recovery*

After completion of the final leak test for each test run, the Method 5 filter was recovered, and the probe, nozzle and the front half of the filter holder assembly were brushed and rinsed with acetone. The acetone rinses were collected in a pre-cleaned sample container. The container was labeled with the test number, test location, test date, and the level of liquid marked on the outside of the container. Immediately after recovery, the sample containers were placed in a cooler for storage.

The Method 202 impinger train was carefully disassembled. The liquid volume of each impinger was measured (by weight) and recorded on the field data sheet. The silica gel was re-weighed, and any increase was recorded on the field data sheets. Moisture from the condensate dropout impinger was added to the second impinger. The Method 202 impinger train was purged with ultra-high purity compressed nitrogen at 14 liters per minute for 60 minutes. During the purge the condenser recirculation pump was operated and the first two impingers were heated/cooled to maintain the gas temperature exiting the CPM filter between 65 and 85 °F.

After completion of the purge, contents from the dropout impinger and the impinger prior to the CPM filter were collected into a pre-cleaned sample container. The condenser, impingers and front-half of the CPM filter holder were rinsed with DDI water and the rinses added to the sample container. The sample components were then rinsed with acetone followed by two rinses with hexane. The acetone and hexane rinses were collected into a pre-cleaned sample container. The CPM filter was recovered and placed into a labeled container. All containers were labeled with the test number, test location, test date, and the level of liquid marked on the outside of the container. Immediately after recovery, the sample containers were placed in a cooler for storage.

3.2.6 *Quality Control and Assurance*

The condensate dropout impinger and backup impinger were placed in an insulated box with water and maintained so that the gas stream temperature at the exit of the condensable filter holder was between 65 and 85 °F. The water and silica gel impingers were placed in an ice water bath to maintain the exit gas temperature from the silica gel impinger below 68°F.

All Method 5 glassware was rinsed with acetone prior to use in the field. All Method 202 glassware was pre-cleaned prior to testing with soap and water, and rinsed using tap water, distilled de-ionized (DDI) water, acetone, and finally, hexane. After cleaning, the glassware was baked at 300 °C for 6 hours.

Collected blanks consisted of a field recovery blank, acetone rinse blank, a DDI water rinse blank, and a hexane rinse blank taken directly from the bottles used during recovery of the samples. A proof blank was not required as the glassware was baked prior to use in the field.

At the laboratory, the Method 5 PM acetone rinses were transferred to clean pre-weighed beakers and evaporated to dryness at ambient temperature and pressure. The beakers and filters were then desiccated for 24 hours and weighed to a constant weight. The data sheets containing the initial and final weights on the filters and beakers can be found in Appendix G.

Analysis of the Method 202 samples and blanks were conducted by Maxxam Analytics of Mississauga, Ontario. All analysis followed the procedures listed in Method 202. A complete laboratory report can be found in Appendix G.

3.2.7 Data Reduction

Particulate matter concentrations (PM_{10} and $PM_{2.5}$) were reduced to lb/MMbtu for comparison to the permitted emission limit. This was calculated using the default F-Factor (F_d) for natural gas of 8,710. Filterable and condensable PM results were combined and assumed to be PM_{10} and $PM_{2.5}$ (i.e. PM_{10} and $PM_{2.5}$ results are equal).

4.0 OPERATING PARAMETERS

The test program included the collection of turbine operating data during each test run. Parameters recorded included % Load (reported as Horsepower), gas producer speed, gross dry BTU, fuel feed rate, and turbine discharge temperature and pressure.

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

5.0 RESULTS

The results of the particulate matter emission testing conducted on EUTURBINE1-2 are presented in Table Nos. 1-2. $PM_{10/2.5}$ emissions are presented in lb/MMBtu (combined filterable and condensable particulate).

EUTURBINE1 and 2 demonstrated compliance with permitted $PM_{10/2.5}$ emission rates.

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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."

Mark Grigereit, QSTI

This report prepared by:

Mr. Mark Grigereit, QSTI
Principal Engineer, Field Services Group
Environmental Management and Resources
DTE Energy Corporate Services, LLC

This report reviewed by:

Mr. Thomas Snyder
Environmental Specialist, Field Services Group
Environmental Management and Resources
DTE Energy Corporate Services, LLC

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RESULTS TABLES

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TABLE NO. 1
FINE PARTICULATE EMISSIONS TEST RESULTS
DTE Gas - Milford Compressor Station
EUTURBINE1 (2100)
April 10, 2019

Test	Test Time	Unit Load (%)[2]	Stack Temperature (°F)	Stack Moisture (%)	Stack Velocity (ft/min)	Exhaust Gas Flowrates (ACFM)	(SCFM)	(DSCFM)	Filterable PM 10/2.5 (lb/MMBtu)[1]	Condensable PM (lb/MMBtu)[1]	Total PM10/2.5 Emissions (lb/MMBtu)[1]
CPM-1	6:52-9:02	94%	938	6.0	8,062	130,612	49,302	46,356	0.002	0.003	0.004
CPM-2	9:46-11:59	93%	940	5.7	8,006	129,694	48,886	46,085	0.002	0.001	0.003
CPM-3	12:25-14:35	93%	943	5.7	7,958	128,923	48,494	45,718	0.001	0.001	0.003
										Ave:	***0.003***
										Permit Limit:	***0.015***

[1] calculated from the standard F-Factor (Fd) for natural gas, 8710, found in Method 19 Table 19-2

2 calculated as average actual horsepower divided by 10,504 (nominal rated horsepower)

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TABLE NO. 2
FINE PARTICULATE EMISSIONS TEST RESULTS
DTE Gas - Milford Compressor Station
EUTURBINE2 (2200)
April 15-16, 2019

Test	Test Time	Unit Load (%)[2]	Stack Temperature (°F)	Stack Moisture (%)	Stack Velocity (ft/min)	Exhaust Gas Flowrates (ACFM)	(SCFM)	(DSCFM)	Filterable PM 10/2.5 (lb/MMBtu)[1]	Condensable PM (lb/MMBtu)[1]	Total PM10/2.5 Emissions (lb/MMBtu)[1]
CPM-1	8:53-11:02	94%	924	5.8	7,165	116,070	43,940	41,411	0.002	0.001	0.003
CPM-2	5:35-7:42	93%	937	5.9	8,097	131,169	49,772	46,827	0.001	0.001	0.002
CPM-3	8:23-10:32	92%	939	5.8	8,017	129,879	49,210	46,360	<0.0003	0.003	0.003
										Ave:	***0.003***
										Permit Limit:	***0.015***

[1] calculated from the standard F-Factor (Fd) for natural gas, 8710, found in Method 19 Table 19-2

2 calculated as average actual horsepower divided by 10,504 (nominal rated horsepower)

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FIGURES

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Figure 1 – Sampling Location
Milford Compressor Station – EUTurbines1-2
April 10-16, 2019

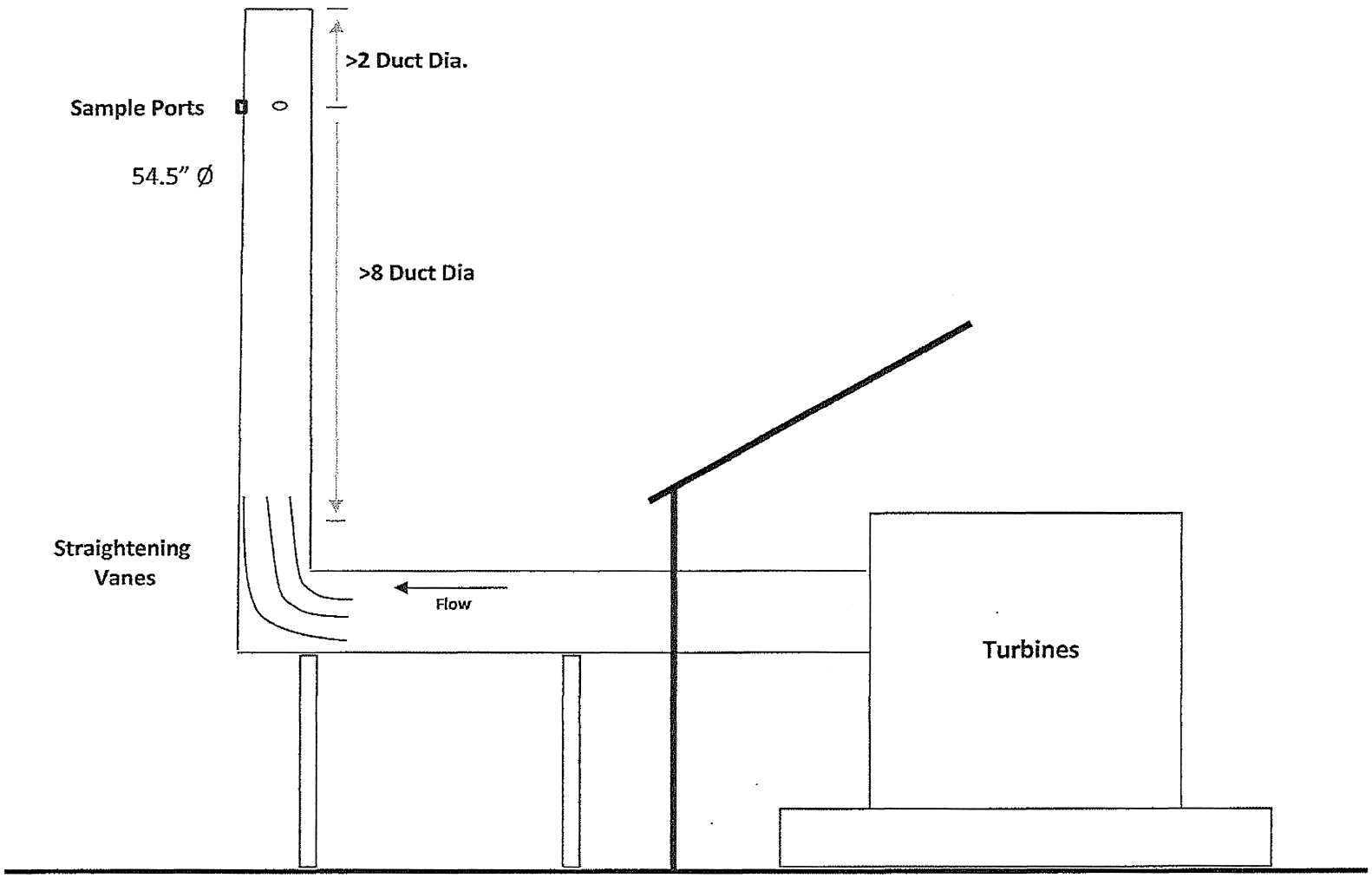

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Figure 2 – EPA Methods 3A
Milford Compressor Station – EUTurbine1-2
April 10-16, 2019

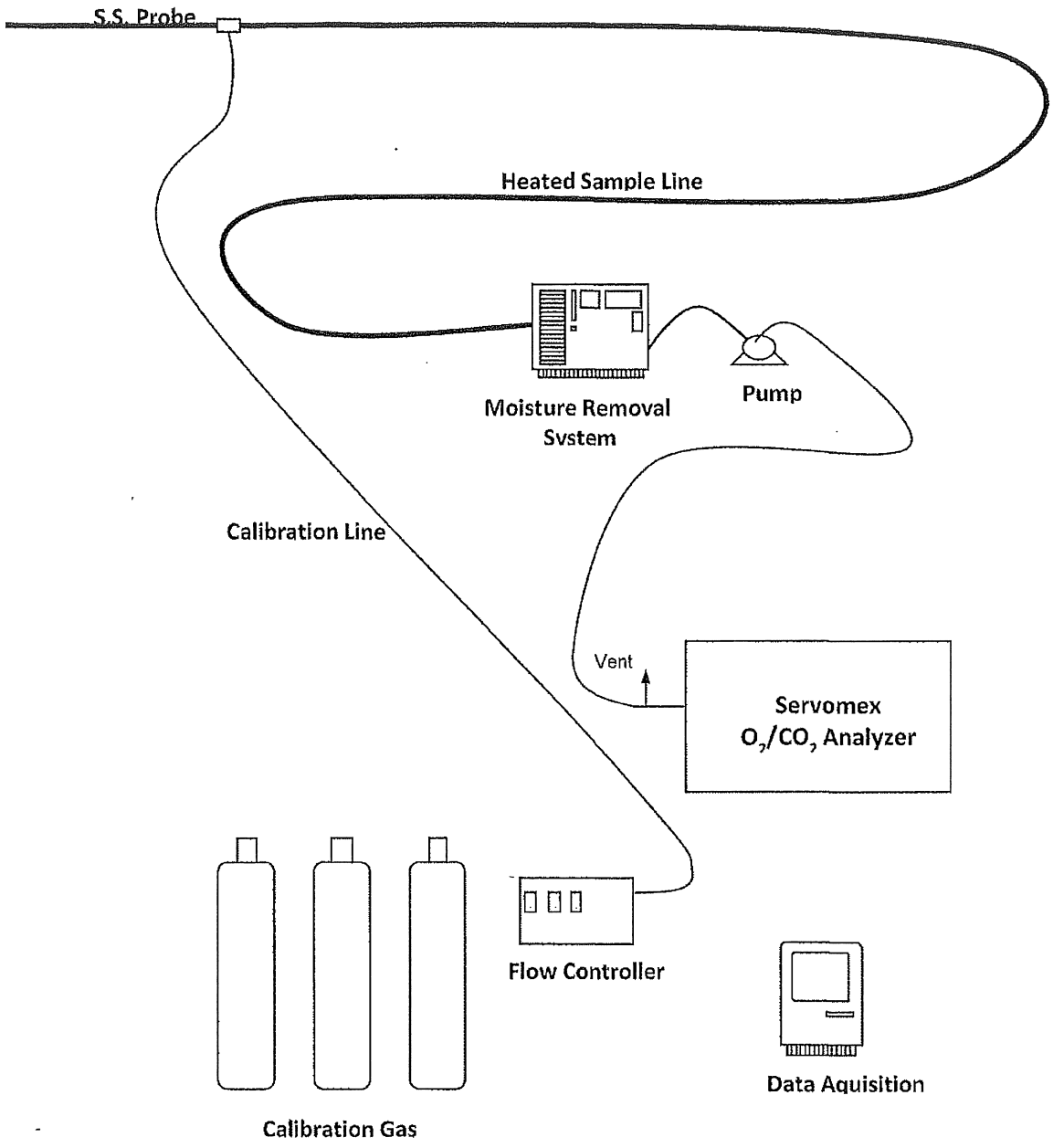

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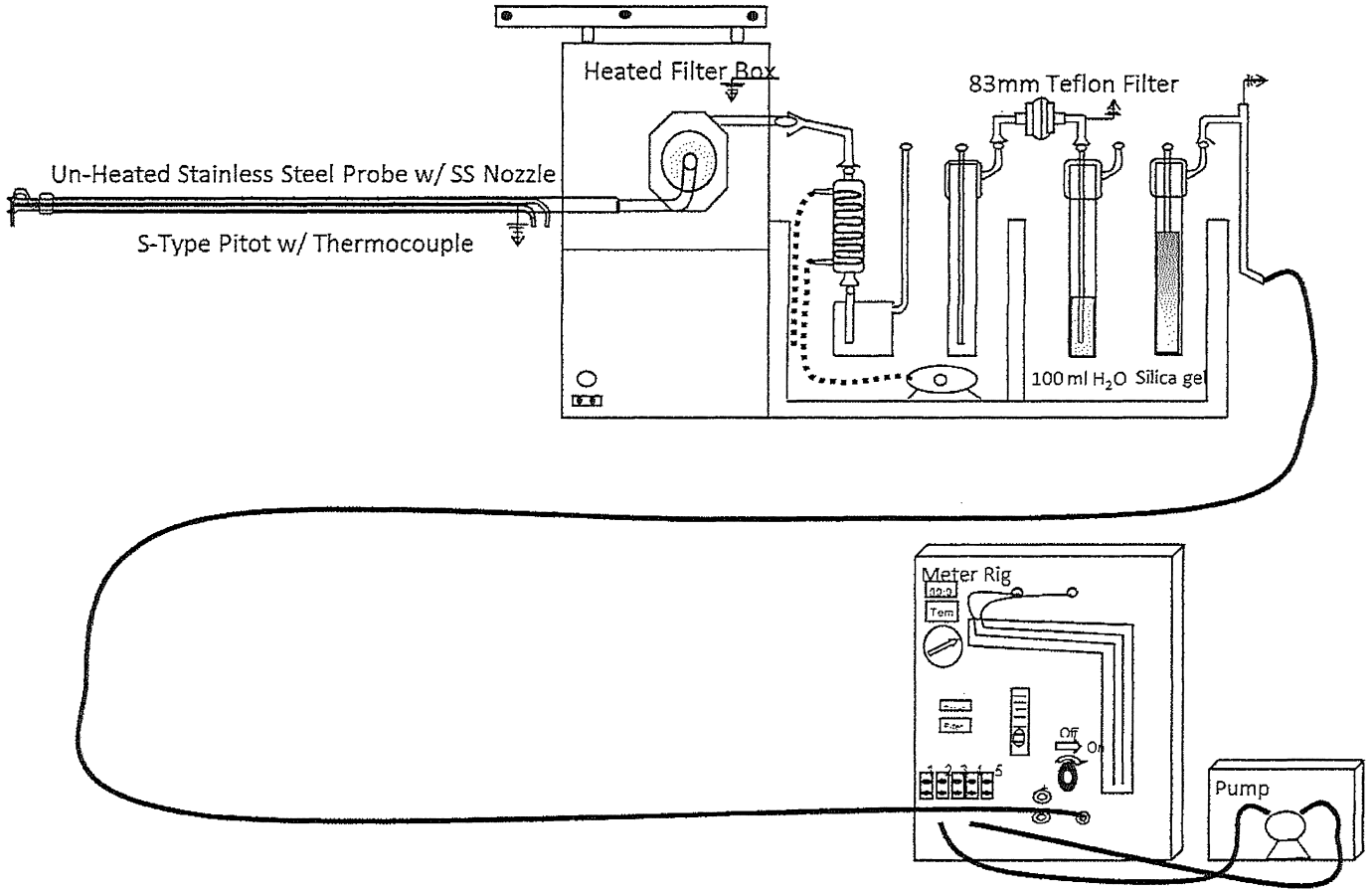
Figure 3 – EPA Methods 5/202
Milford Compressor Station – EUTurbines1-2
April 10-16, 2019



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APPENDIX A

EGLE TEST PLAN & ACCEPTANCE LETTER

GRETCHEN WHITMER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
DETROIT FIELD OFFICE

LIESL EICHLER CLARK
DIRECTOR

April 3, 2019

Mr. Chris Conley
Manager, Transmission & Storage Operations
DTE Gas
3515 Childs Lake Road
Milford, Michigan 48381

SRN: B7221

Dear Mr. Conley:

SUBJECT: DTE Gas Company Milford Compressor Station Turbine Emissions Test; PTI No. 185-15A

The Department of Environmental Quality, Air Quality Division (DEQ-AQD) has completed the quality assurance review of the test plan for particulate matter less than 10 and 2.5 microns ($PM_{10/2.5}$) on three natural gas-fired, 10,504 horsepower (HP) combustion turbines (EUTURBINE1-3) operated at the DTE Gas Company Milford Compressor Station facility in Milford, Michigan received on March 12, 2019. Permit to Install (PTI) No. 185-15A requires this testing. This testing is being conducted due to a failed compliance test performed in December 2018. All sampling will be performed according to the United States Environmental Protection Agency (USEPA) methods found at epa.gov/emc. Any modification to a method must be approved by the AQD.

Process

PM emissions from the turbines will be performed while each turbine is operated at >90% of rated HP (>9,454 HP). During each run of the emissions test, the following information will be recorded:

- Load
- BTU content of the fuel
- Compressor discharge pressure and temperature
- Stack exhaust temperature
- Natural gas usage rate

Mr. Shamim Ahammod will coordinate the collection of process data. If you have questions about process, please contact him at 586-212-0508 or ahammods@michigan.gov.

Sampling

Testing for $PM_{10/2.5}$ will be conducted in accordance with USEPA methods 1, 2, 3A, 4, 5, and 202 for three 120-minute test runs per turbine. PM_{10} and $PM_{2.5}$ will be equal and will be calculated as the sum of the methods 5 and 202 results. Sampling will be performed using a stainless-steel probe liner and nozzle. Sample recovery will include at least six acetone probe rinses and brushes. For Method 202, DTE has the option of baking the glassware at 300° C for six hours prior to beginning the test or recovering a field train proof blank before beginning the test. The recovery and analysis of at least one Method 202 field train blank is required. All QA/QC procedures of the methods must be followed.

The analyzers will be calibrated with Protocol 1 gases. The concentration of the high-level calibration gas will define the calibrated range of the analyzer. The span of the analyzer will be selected so that the concentration of pollutants is at least 20% of the concentration of the high-

level calibration gas. If a dilution system is used to generate calibration gases, then the report will contain the record of the annual calibration and the field evaluation of the equipment.

After the test has begun, it shall continue and be completed within a 36-hour period. DTE shall not interrupt testing without the prior consent of the AQD, unless there is a forced shutdown or circumstances occur that are beyond the operator's control, such as extreme meteorological conditions.

If you have any questions about the test procedures, please contact me at 313-418-0895 or angellottir1@michigan.gov.

Report

The AQD requests that the results are presented in tables in units of the permit limits. The report will include the test results, the operational data, the calibration record and quality assurance checks of the equipment used for this test, and all field notes for this project. The AQD requests that the report include the minute average of the emission measurements. The emission measurement data may be submitted in electronic format. Please submit a complete copy of the test report to both:

Ms. Joyce Zhu
Department of Environmental Quality
District Supervisor, Air Quality Division
Southeast Michigan District Office
27700 Donald Court
Warren, Michigan 48092-2793

Ms. Karen Kajiya-Mills
Department of Environmental Quality
Air Quality Division
Constitution Hall, 2nd Floor South
525 West Allegan Street
Lansing, Michigan 48933-1502

Testing is scheduled to begin April 23, 2019. Please notify both Mr. Ahammod and me if there is a change in schedule.

Sincerely,

Regina Angellotti

Regina Angellotti
Air Quality Division

cc: Mr. Mark Grigereit, DECS-EM&R
Ms. Karen Kajiya-Mills, DEQ
Ms. Joyce Zhu, DEQ
Mr. Shamim Ahammod, DEQ

DTE Energy®

March 12, 2019

Ms. Karen Kajiya-Mills
Toxics & Compliance Support Section
Michigan Department of Environmental Quality
Air Quality Division
Constitution Hall, 525 W. Allegan St.
Lansing, MI 48933

Subject: **Test Plan for $PM_{10/2.5}$ Emissions Testing on the DTE Gas, Milford Compressor Turbines (EUTURBINE1-3) (MI PTI 185-15A)**

Dear Ms. Kajiya-Mills:

The Environmental Management & Resources (EMR) Field Services Group of DTE Energy Corporate Services, LLC (DECS), is pleased to provide the following Test Plan for Michigan Permit to Install (PTI) No. 185-15A compliance emissions testing of three compressor turbines (EUTURBINE1-3) for particulates less than 10 micron ($PM_{10/2.5}$). The turbines are located at the DTE Gas Milford Compressor Station in Milford, Michigan. The purpose of this document is to provide the required testing information and to notify the Michigan Department of Environmental Quality (MDEQ) of the upcoming retest event.

DTE Energy Corporate Services, LLC's Environmental Management & Resources (EMR) stack testing group will conduct the testing described in the attached test plan. Testing is tentatively scheduled for April 23 - May 2, 2019, pending MDEQ approval of the Test Plan. What follows is an item-by-item description of the information required by the MDEQ for testing approval. I can be contacted at (313) 412-0305 or mark.grigereit@dteenergy.com if you have any questions or need additional information.

Sincerely,

Mark Grigereit, QSTI
Principal Engineer – Field Services
DTE Energy, Environmental

Cc: Joe Kotwicki, DTE EM&R
Phillis Rynne, DTE EM&R
Chris Conley, DTE Transmission Operations
District Supervisor, Southeast Michigan District, MDEQ-AQD

Test Plan – DTE-Gas Milford Compressor EUTurbine1-3 Exhaust

1a. ***Names, titles, and telephone numbers for the personnel directly involved with this study are listed in the following table:***

Name and Title	Company	Telephone
Ms. Phillis Rynne Sr. Environmental Engineer (DTE Environmental)	DTE Energy – EM&R 655 General Offices 2000 2nd Avenue Detroit, MI 48226	(313) 235-9419
Mr. Mark Grigereit Principal Engineer (DTE Environmental)	DTE Energy Corporate Services, LLC 7940 Livernois Ave Room H-136 Detroit, MI 48210	(313) 412-0305
Mr. Chris Conley, Manager, Transmission & Storage Operations	DTE Gas 3515 Childs Lake Rd Milford MI	(248) 685-9606

1b. ***Type of industrial process or combustion facility:***
The DTE Gas Milford Compressor Station located at 3515 Childs Lake Road, employs the use of three natural gas-fired 10,504 Horse Power combustion turbines (EUTURBINE1-3) with low NO_x combustor for NO_x control. The turbines generate line pressure assisting the transmission of natural gas to and from the pipeline transmission system in SE Michigan.

1c. ***Type and quantity of raw and finished materials used in the process:***
The compressor turbines are natural gas-fired. Fuel consumption varies with operating parameters and will be measured throughout the emissions test.

1d. ***Description of any cyclical or batch operations which would tend to produce variable emissions with time:***
The compressor turbines operate on an as needed basis providing pipeline pressure. Operating parameters (e.g. fuel flow, gas producer speed, horsepower) are relatively constant during operation and emissions are not expected to vary.

Particulate emissions testing will be performed while each turbine operates at maximum routine operating conditions.

1e. ***Basic operating parameters used to regulate the process:***
Operating parameters used to regulate the compressor turbines include gas producer speed, fuel flow, compressor discharge pressure, compressor discharge temperature, and horsepower. Operating parameters will be documented during each test.

1f. ***Rated capacity of the process and process rate during the testing:***
Particulate testing will be performed while the turbines are operated at maximum routine operating conditions in accordance with PTI 185-15A and will consist of triplicate 120-minute tests on each unit.

2a. ***Type of control device associated with the process:***
The compressor turbines have no post-combustion air pollution control devices.

2b. ***Operating parameters of the control device:***
Not applicable

2c. ***Rated capacity and efficiency of the control device:***
Not applicable

3. ***Applicable permit number and emission limits for the process to be tested:***
The DTE Energy Gas compressor turbine (EUTURBINE1-3) emissions are regulated by State of Michigan PTI No. 185-15A. The $PM_{10/2.5}$ emission limits as stated in the permit are as follows: 0.015 lb/MMBtu (each unit).

4. ***Identify all pollutants to be measured:***
Exhausts of EUTURBINE1-3 will be sampled for filterable and condensable particulate matter. USEPA Methods 5 and 202 will be used to measured total particulate matter as $PM_{10/2.5}$ due to the limitations of USEPA Method 201A on high temperature exhaust stacks. In addition, exhaust oxygen (O_2) and carbon dioxide (CO_2) concentrations will be measured.

5. ***Description of the sampling train(s) to be used, including schematic diagrams if appropriate:***
USEPA Methods 5 and 202 will be utilized to measure particulate less than 10 microns ($PM_{10/2.5}$). Filterable and condensable PM will be combined and reported as $PM_{10/2.5}$. USEPA Method 3A will be utilized to measure exhaust O_2 and CO_2 concentrations.

PM sampling will be performed using a stainless-steel probe. The probe will be unheated as the stack exhaust is expected to be in the range of 900-950 °F and minimal gas cooling is expected between the nozzle and filter box. This modification to Method 5 is to eliminate possible bias when using a heated sheath. Filterable PM sample recovery will include six (6) acetone probe rinse and brushes as required when using a stainless-steel probe in Method 5. The filter box will be heated to 250 °F.

A Sampling diagram is presented in Figures 2.

6. ***Detailed sampling and analysis procedures, including the applicable standard methods referenced:***
Sampling and analysis will include the following methodology:

Parameter	Method	Analytical Method
Exhaust gas flowrates	USEPA Methods 1, 2	Field Data Analysis and Reduction
Molecular weight	USEPA Method 3A	Paramagnetic Analyzer
Gas Moisture Content	USEPA Method 4	Gravimetric
Filterable Particulate Matter	USEPA Method 5	Gravimetric Analysis
Condensable Particulate Matter	USEPA Method 202	Gravimetric Analysis

USEPA Method 1, ***"SAMPLE AND VELOCITY TRAVERSES FOR STATIONARY SOURCES",*** and Method 2, ***"DETERMINATION OF STACK VELOCITY AND FLOWRATE (TYPE-S PITOT TUBE)"*** will be used to measure exhaust gas flowrates in conjunction with the particulate sample train.

USEPA Method 3A, ***"DETERMINATION OF OXYGEN AND CARBON DIOXIDE CONCENTRATIONS IN EMISSIONS FROM STATIONARY SOURCES (INSTRUMENTAL ANALYZER PROCEDURE)",*** will be used to measure exhaust gas molecular weight.

USEPA Method 4, ***"DETERMINATION OF MOISTURE CONTENT IN STACK GASES",*** will be used to measure moisture content as a component of the particulate matter sampling train.

USEPA Method 5, ***"DETERMINATION OF PARTICULATE MATTER EMISSIONS FROM STATIONARY SOURCES",*** will be used to measure filterable exhaust gas particulate matter.

USEPA Method 202, ***"DETERMINATION OF CONDENSABLE EMISSIONS FROM STATIONARY SOURCES",*** will be used to measure condensable exhaust gas particulate matter.

7. ***The number and length of sampling runs which will constitute a complete test:***
Particulate sampling will consist of triplicate 120-minute test runs at maximum routine operating conditions on each turbine exhaust.

8. ***Dimensioned sketch showing all sampling ports in relation to the breeching and to upstream and downstream disturbances or obstructions of gas flow:***
Sampling of each turbine will be conducted at a test location on the compressor turbine's exhaust stack.

Figure 1 presents a diagram of the turbine exhaust sampling location. Each exhaust is identical.

9. ***Estimated flue gas conditions such as temperature, moisture and velocity:***
From previous testing, flue gas conditions are expected to be the following.

Temperature (°F)	Moisture (%)	Velocity (fps)	Exhaust Flowrate (scfm)	Exhaust Flowrate (dscfm)
900-950	5.8	8,200	48,000	45,000

10. ***Projected process operating conditions during which the tests will be run:***
Particulate sampling will occur while the turbines operate at maximum routine operating conditions in accordance with PTI 185-15A.

11. ***Description of any process or control equipment data to be collected during the testing:***
Data to be collected during each day of testing will include the following:

Load
Fuel usage
Fuel BTU content
Compressor discharge pressure
Compressor discharge temperature

12. ***Description of any monitoring data to be collected during the test period (eg – continuous emission monitoring data):***
N/A – The compressor turbines do not have continuous emissions monitoring equipment.

13. ***Chain of Custody procedures:***
Condensable particulate samples will be sent to Maxxam Analytics in Mississauga, Ontario for analysis. Filterable particulate samples will be analyzed by DTE Energy's internal laboratory. All chain of custody forms will be included in the test report.

14. ***Field quality assurance/quality control procedures (eg – field blanks, sample storage and transport methods):***
The sampling team will prepare and calibrate field-sampling equipment and perform quality assurance/quality control (QA/QC) consistent with the employed USEPA methodology. The O_2/CO_2 analyzer will be calibrated in accordance with USEPA Methods 3A and 7E. All calibration data will be included in the test report. All calibration gases will be documented EPA Protocol Number 1, traceable to National Institute of Standards and Technology (NIST) Reference Materials.

For Method 202, one field train recovery blank will be recovered after the first or second test. A field train proof blank will not be recovered as the glassware will be baked prior to testing per the specifications in Method 202.

15. ***Laboratory quality assurance/quality control procedures utilized as part of the testing:***
EPA Method 5 gravimetric analysis will be completed by DTE Energy's internal laboratory. Weights will be collected in a climate controlled weight room, on a scale which is certified annually and calibrated daily with 3 certified weights (2.0000g, 30.0000g, 100.0000g). Method 5 samples will be weighed to 0.0005g constant weight. Method 202 samples will be shipped to a third party laboratory for analysis. All QA/QC in Method 202 will be performed by the third party.

16. ***Names and titles of personnel who will be performing the testing:***
The testing will be performed by EMR's Field Services Group. The following laboratories will perform analytical services.

Methods 1, 2, 3A, 4, and 5

Mr. Mark Grigereit, Principal Engineer – QSTI	EMR
Mr. Thom Snyder, Specialist – QSTI	EMR
Mr. Fred Meineke, Technician	EMR

Method 202

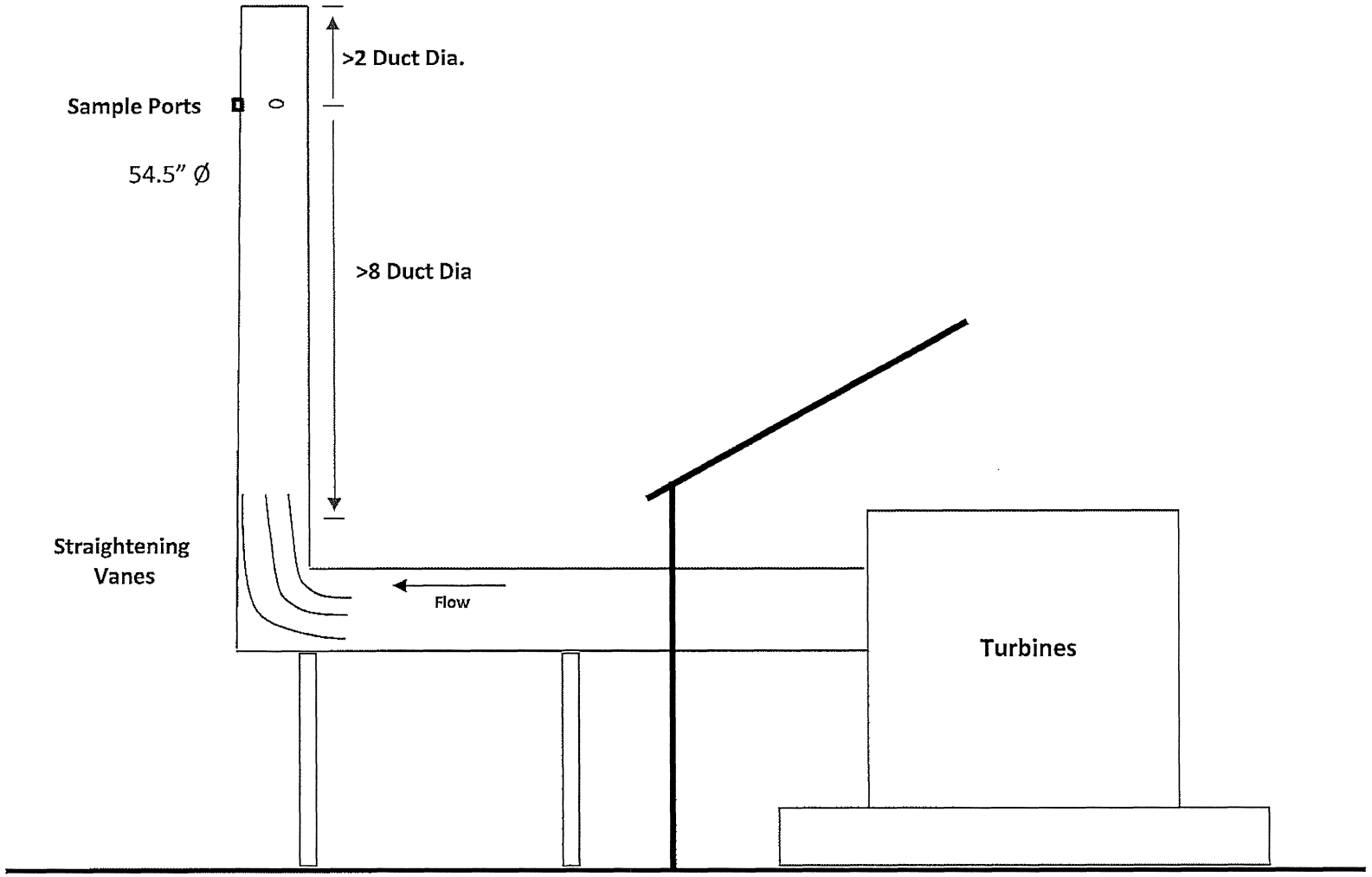
Maxxam Analytics
6740 Campobella Rd
Mississauga ON L5N 2LB

Phone	905.817.5712
Fax	905.817.5775

The emission test report will include the items found on pages 3 and 4 of the MDEQ/Air Quality Division's Format for Submittal of Source Emission Test Plans and Reports. Included in the report will be a site description with the reason for testing, source descriptions, a summary of results, our sampling and analytical procedures, and test results and discussion.

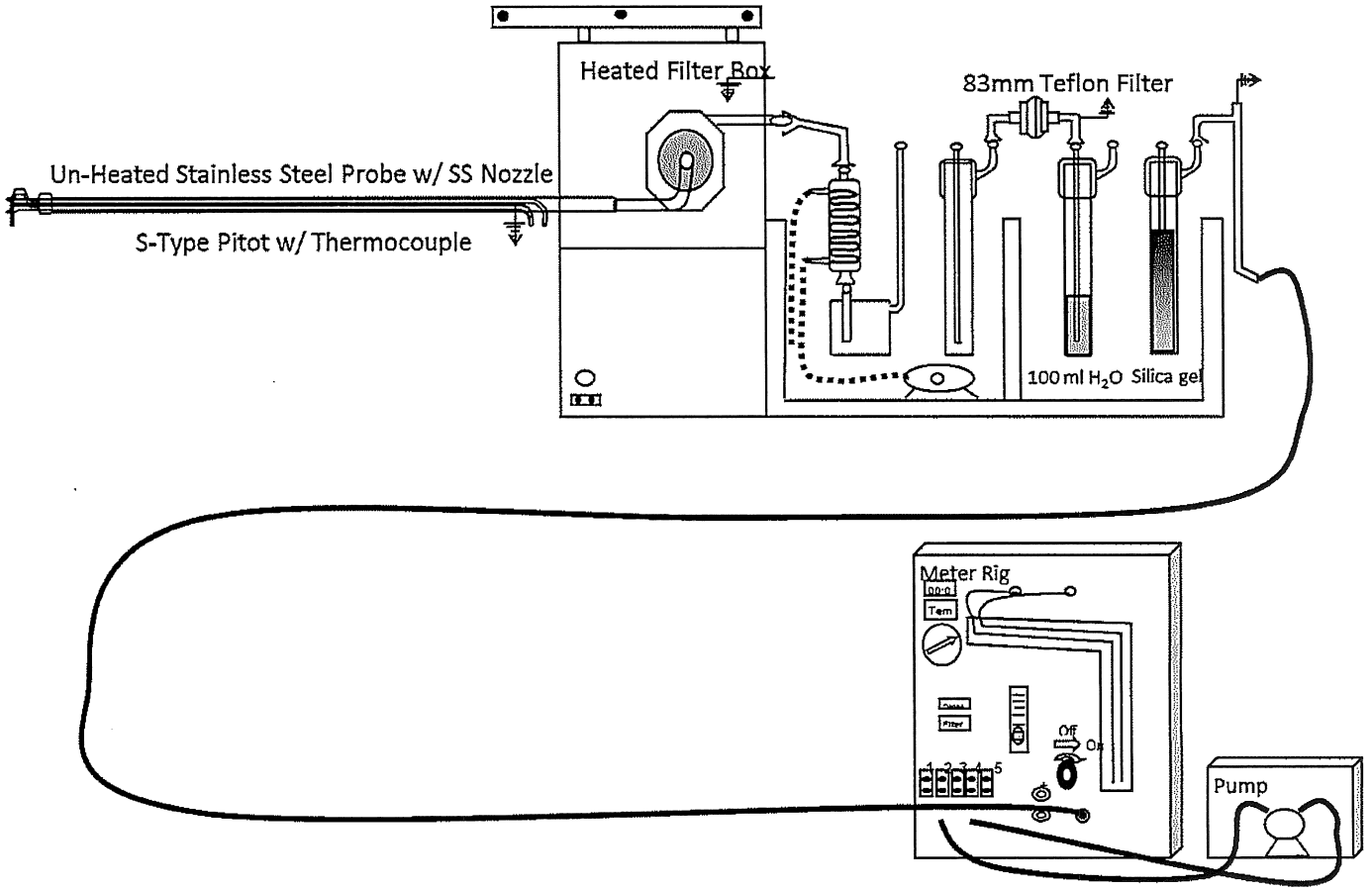
DTE Energy

Figure 1 – Sampling Location
Milford Compressor Station – EUTurbines 1-3
April-May, 2019



DTE Energy

Figure 2 – EPA Methods 5/202
Milford Compressor Station – EUTurbines1-3
April-May, 2019



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APPENDIX B

RAW ANALYZER DATA