COMPLIANCE TEST REPORT

for

PARTICULATE MATTER LESS THAN 10 MICRONS (PM_{10}) EMISSIONS

CTG's UNITs 12-1, 13-1, and 12-2

Belle River Power Plant
China Township, Michigan

March 15-23, 2022

Prepared By
Environmental Management & Safety
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EXECUTIVE SUMMARY

DTE Energy's Environmental Management and Safety (EMS) Ecology, Monitoring, and Remediation Group performed particulate emissions testing at the DTE Energy, Belle River Peaker facility, located in China Twp., Michigan. The fieldwork, performed during the period of March 15-23, 2022, was conducted to satisfy testing requirements of Michigan Permit to Install No. 331-98C. Emissions tests were performed on three natural gas-fired Combustion Turbine Generators (CTG's) (12-1, 12-2, & 13-1) for Particulate Matter compounds, less than 10 microns (PM_{10}).

The average results of the emissions testing are highlighted below:

Emissions Testing Summary
CTG's 12-1, 12-2, 13-1
Belle River Power Plant
March 15-23, 2022

Unit / Load	Date	Average PM_{10} Emissions (lbs/hr)[1]
12-1 (High Load)	March 22, 2022	3.93
12-1 (Mid Load)	March 23, 2022	2.74
12-2 (High Load)	March 17, 2022	3.86
12-2 (Mid Load)	March 21, 2022	2.20
13-1 (High Load)	March 15, 2022	3.25
13-1 (Mid Load)	March 16, 2022	1.74

(1) Permit limit: 9.0 lbs/hr

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1.0 INTRODUCTION

DTE Energy's Environmental Management and Safety (EMS) Ecology, Monitoring, and Remediation Group performed particulate emissions testing at the DTE Energy, Belle River Peaker facility, located in China Twp., Michigan. The fieldwork, performed during the period of March 15-23, 2022, was conducted to satisfy testing requirements of Michigan Permit to Install No. 331-98C. Emissions tests were performed on three natural gas-fired Combustion Turbine Generators (CTG's) (12-1, 12-2, & 13-1) for Particulate Matter, less than 10 micron (PM_{10}).

Testing was performed pursuant to Title 40, *Code of Federal Regulations*, Part 60, Appendix A (40 CFR §60 App. A), Methods 3A, and 5/202.

The fieldwork was performed in accordance with EPA Reference Methods and DTE Energy's Intent to Test[1], which was approved in a letter[2] by Ms. Regina Angellotti from the Michigan Department of Environment, Great Lakes, and Energy – Air Quality Division (EGLE-AQD). The following DTE Energy personnel participated in the testing program: Mr. Jason Logan, Senior Environmental Specialist, Mr. Thomas Snyder, Senior Environmental Specialist, Mr. Mark Westerberg, Senior Environmental Specialist, Mr. Fred Meinecke, Environmental Specialist, and Mr. Kenneth St. Amant, Environmental Specialist. Mr. Logan was the project leader. Mr. Dennis Farver, with the DTE Energy Peaker Group provided process coordination for the testing program. Ms. Regina Angellotti with EGLE-AQD observed portions of the testing.

2.0 SOURCE DESCRIPTION

The DTE Belle River Peakers are located in China Township, Michigan, adjacent to the DTE Belle River Power Plant. The peakers produce electricity from three (3) simple cycle natural gas-fired turbines. The turbines are designated as EU-CTG12-1-BP, EU-CTG12-2-BP and EU-CTG13-1-BP and are each rated at 82.4 Megawatts (MW).

Flue gases from each unit exhaust through a separate rectangular stack (108" x 228") that has an exit height of 56.0 feet above ground level. See Figure 1 for a diagram of the units' sampling locations and stack dimensions.

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:

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[1] DTE Test Plan, Submitted January 14, 2022. (Attached-Appendix A)

[2] EGLE Approval Letter received February 14, 2022. (Attached-Appendix A)

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Sampling Method	Parameter	Analysis
USEPA Methods 1-2	Exhaust Gas Flow Rates	Field data analysis and reduction
USEPA Method 3A	Oxygen & CO2	Instrumental Analyzer Method
USEPA Method 4	Moisture Content	Field data analysis and reduction
USEPA Method 5	Particulate Matter	Gravimetric Analysis
USEPA Method 202	PM Condensables	Gravimetric Analysis

3.1 STACK GAS VELOCITY AND FLOWRATES (USEPA METHODS 1-2)

3.1.1 Sampling Method

Stack gas velocity traverses during the PM_{10} testing were conducted in accordance with the procedures outlined in USEPA Method 1, "Sample and Velocity Traverses for Stationary Sources," and Method 2, "Determination of Stack Gas Velocity and Volumetric Flowrate." Four (4) sampling ports were utilized, sampling at six (6) points per port for a total of twenty-four (24) sampling points. Velocity traverses were conducted in conjunction with the PM_{10} sample collection. See Figure 1 for a diagram of the traverse/sampling points used.

3.1.2 Method 2 Sampling Equipment

The EPA Method 2 sampling equipment consisted of a 0-10" incline manometer, S-type Pitot tube (C_p = 0.84) and a type-K calibrated thermocouple.

3.2 OXYGEN AND CARBON DIOXIDE (USEPA METHOD 3A)

3.2.1 Sampling Method

Stack gas Oxygen (O_2) and Carbon Dioxide (CO_2) emissions were evaluated using USEPA Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Method)". The O_2/CO_2 analyzers utilize paramagnetic sensors.

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3.2.2 O_2 / CO_2 Sampling Train

The EPA Method 3A sampling system consisted of the following:

(1) Teflon™ sampling line (collecting sample at the dry gas meter exhaust)
(2) Sample pump
(3) Servomex O_2/CO_2 gas analyzer
(4) Appropriate USEPA Protocol 1 calibration gases
(5) Data Acquisition System.

3.2.3 Sampling Train Calibration

The sampling train was calibrated according to procedures outlined in USEPA Method 7E. Zero, span, and mid range calibration gases were introduced directly into the analyzer to determine the instruments linearity. An upscale and downscale gas was then introduced through the entire sampling system to determine sampling system bias and instrument drift at the completion of each test.

3.3 MOISTURE DETERMINATION (USEPA METHOD 4)

3.3.1 Sampling Method

Determination of the moisture content of the exhaust gas was performed using the method described in USEPA Method 4, "Determination of Moisture Content in Stack Gases". The moisture was collected in glass impingers (PM sampling train) and the percentage of moisture was then derived from calculations outlined in USEPA Method 4.

3.4 PARTICULATE MATTER (USEPA METHOD 5/METHOD 202)

3.4.1 Filterable Particulate Sampling Method

USEPA Method 5, "Determination of Particulate Emissions from Stationary Sources" was used to measure the filterable (front-half) particulate emissions. The back-half of the Method 5 train consisted of Method 202 glassware to collect condensable particulate matter. The results from the Method 5 sampling was considered to be filterable PM_{10} emissions.

The Method 5 isokinetic stack sampling system (Figure 2) consisted of the following:

(1) Stainless steel button-hook nozzle
(2) Un-Heated Inconel probe (traversed across 24 points of each stack)

(3) Heated 3" glass filter holder with a quartz filter (maintained at a temperature of 250 ± 25°F)
(4) Set of Method 202 impingers for the collection of condensable particulate matter and moisture determination
(5) Length of sample line
(6) Environmental Supply® control case equipped with a pump, dry gas meter, and calibrated orifice.

The filters used in the sampling were initially weighed to a constant weight as described in the Method to obtain the initial tare weight.

After completion of the final leak test for each test run, the 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.

At the laboratory the acetone rinses were transferred to clean pre-weighed beakers and evaporated to dryness at ambient temperature and pressure. The beakers and filters were then placed in a desiccator for a minimum of 24 hours prior to their initial final weight. Final weights were taken at 6 hour or greater intervals until two weights agreed within 0.5 mg. The data sheets containing the initial and final weights on the filters and beakers can be found in Appendix D.

Collected field blanks consisted of a blank filter and acetone solution blank. The acetone blank was collected from the rinse bottle used in sample recovery. The blank filter and acetone were collected and analyzed following the same procedures used to recover and analyze the field samples.

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

3.4.2 Condensable Particulate Sampling Method (Method 202)

USEPA Method 202, "Dry Impinger method for Determining Condensable Particulate Emissions from Stationary Sources" was used to measure the condensable particulate matter (CPM). This method includes procedures for measuring both organic and inorganic CPM. The Method 202 samples were collected in conjunction with the EPA Method 5 samples as part of the sampling train (impingers).

The Method 202 impinger configuration consisted of the following:

(1) Method 23 type condenser (capable of cooling the stack gas to less than 85 °F
(2) Condensate dropout impinger (dry) without the bubbler tube
(3) Modified Greenburg-Smith impinger (dry) with no taper as a backup impinger
(4) A 3" glass filter holder with a Teflon filter (maintained at a temperature between 65°F and 85°F)
(5) Modified Greenburg-Smith impinger containing 100 millimeters (ml) of de-ionized distilled water
(6) Modified Greenburg-Smith impinger containing approximately 300 grams of silica gel desiccant

The condensate dropout impinger and backup impinger were placed in an insulated box with water between 65°F 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 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. Prior to each sampling run, the train glassware was rinsed thoroughly with distilled deionized ultra-filtered water.

As soon as possible after the post-test leak check was completed, the Method 5 probe and heated filter box was detached from the Method 202 condenser and impinger train. The Method 202 impinger train was then carefully disassembled. The liquid volume of each impinger was measured in a graduated cylinder 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 one hour. 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 below 85°F.

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 condenser, impingers and front-half of the CPM filter holder 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.

Collected blanks consisted of an acetone rinse blank, a DDI water rinse blank and a hexane rinse blank taken directly from the bottles used during recovery of the samples. Additionally, a field train blank was assembled and recovered following the same procedures used to prepare and recover the test samples.

Analysis of the Method 202 samples and blanks were conducted by Enthalpy Analytical of Durham, NC. All analysis followed the procedures listed in Method 202. A complete laboratory report can be found in Appendix D.

3.4.3 Quality Control and Assurance

All sampling and analytical equipment was calibrated according to the guidelines referenced in EPA Method 5/202 (see Appendix C for equipment calibration).

3.4.4 Data Reduction

Filterable and condensable PM data collected during the emissions testing was calculated and reported as pounds per hour (lb/hr).

Emissions calculations are based on calculations located in USEPA Method 5. Example calculations are presented in Appendix E.

4.0 OPERATING PARAMETERS

The test program included the collection of turbine operating data during each test run. Parameters recorded included fuel flowrate (scfm), power generation (MW), and heat input rate. Unit operational data collected during each test can be found in Appendix F.

Natural gas samples were collected once during each week of testing and analyzed for gross heat content. The results of the fuel analysis can be found in Appendix F.

5.0 DISCUSSION OF RESULTS

Unit 12-1:

Table No. 1 presents the Filterable Particulate Matter (PM) emission testing results, the Condensable Particulate emissions testing results, and the Total PM_{10} emission testing results for CTG 12-1 at high and mid load conditions. Particulate emissions are presented in pounds per hour (lb/hr) for the filterable, condensable and total PM_{10}. The average total

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PM_{10} emissions of 3.93 lb/hr (high) and 2.74 lb/hr (mid) were below the permit limit of 9.0 lb/hr.

Unit 12-2:

Table No. 2 presents the Filterable Particulate Matter (PM) emission testing results, the Condensable Particulate emissions testing results, and the Total PM_{10} emission testing results for CTG 12-2 at high and mid load conditions. Particulate emissions are presented in pounds per hour (lb/hr) for the filterable, condensable and total PM_{10}. The average total PM_{10} emissions of 3.86 lb/hr (high load) and 2.20 lb/hr (mid load) were below the permit limit of 9.0 lb/hr.

Unit 13-1:

Table No. 3 presents the Filterable Particulate Matter (PM) emission testing results, the Condensable Particulate emissions testing results, and the Total PM_{10} emission testing results for CTG 13-1 at high and mid load conditions. Particulate emissions are presented in pounds per hour (lb/hr) for the filterable, condensable and total PM_{10}. The average total PM_{10} emissions of 3.25 lb/hr (high load) and 1.74 lb/hr (mid load) were below the permit limit of 9.0 lb/hr.

The Auxiliary test data presented in each Particulate Emissions Table for each test includes the Unit Load in gross megawatts (GMW), stack temperature in degrees Fahrenheit (°F), stack gas moisture in percent (%), stack gas velocity in feet per minute (ft/min), and stack gas flow rate in actual cubic feet per minute (ACFM), standard cubic feet per minute (SCFM) and dry standard cubic feet per minute (DSCFM).

The results of the testing indicate that Units 12-1, 12-2, & 13-1 are in compliance with the Permit Requirements for PM_{10}.

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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."

Jason Logan, QSTI, PMP

This report prepared by: _____

Mr. Jason Logan, QSTI, PMP
Sr Environmental Specialist, Ecology, Monitoring, and Remediation
Environmental Management and Safety
DTE Energy

This report reviewed by: _____ for:

Mr. Mark Westerberg, QSTI
Sr Environmental Specialist, Ecology, Monitoring, and Remediation
Environmental Management and Safety
DTE Energy

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RESULTS TABLES

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TABLE NO. 1
PARTICULATE EMISSIONS TESTING RESULTS
Belle River Power Plant - EU-CTG12-1-BP
March 22-23, 2022

Unit 12-1 - High Load

Test	Test Date	Test Time (DAHS)	Unit Load (GMW)	Stack Temperature (°F)	Stack Moisture (%)	Stack Velocity (ft/min)	Exhaust Gas Flowrates (ACFM)	(SCFM)	(DSCFM)	Filterable PM Emissions (lbs/hr)	Condensable PM Emissions (lbs/hr)	Total PM_{10} Emissions [1] (lbs/hr)
PM-1	**22-Mar-22**	7:18-9:24	89	999	6.2	9,526	1,628,869	596,390	559,734	2.65	1.32	3.97
PM-2		9:41-11:49	88	1002	6.2	9,529	1,629,446	595,479	558,755	3.62	0.74	4.36
PM-3		12:07-14:15	88	1003	6.0	9,498	1,624,190	593,287	557,708	2.11	1.36	3.47
	Average:		*88*	*1001*	*6.1*	*9,518*	*1,627,502*	*595,052*	*558,732*	*2.79*	*1.14*	*3.93*

(1) Permit Limit = 9 lbs/hr

Unit 12-1 - Mid Load

Test	Test Date	Test Time (DAHS)	Unit Load (GMW)	Stack Temperature (°F)	Stack Moisture (%)	Stack Velocity (ft/min)	Exhaust Gas Flowrates (ACFM)	(SCFM)	(DSCFM)	Filterable PM Emissions (lbs/hr)	Condensable PM Emissions (lbs/hr)	Total PM_{10} Emissions [1] (lbs/hr)
PM-1	**23-Mar-22**	7:34-9:40	65	1056	6.5	7,903	1,351,432	470,551	440,020	2.08	1.03	3.11
PM-2		9:59-12:04	65	1057	6.6	7,922	1,354,742	471,237	440,377	2.09	1.23	3.32
PM-3		12:22-14:27	65	1058	6.8	7,968	1,362,477	473,512	441,338	1.19	0.61	1.80
	Average:		*65*	*1057*	*6.6*	*7,931*	*1,356,217*	*471,767*	*440,578*	*1.79*	*0.96*	*2.74*

(1) Permit Limit = 9 lbs/hr

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TABLE NO. 2
PARTICULATE EMISSIONS TESTING RESULTS
Belle River Power Plant - EU-CTG12-2-BP
March 17-21, 2022

Unit 12-2 - High Load

Test	Test Date	Test Time (DAHS)	Unit Load (GMW)	Stack Temperature (°F)	Stack Moisture (%)	Stack Velocity (ft/min)	Exhaust Gas Flowrates (ACFM)	(SCFM)	(DSCFM)	Filterable PM Emissions (lbs/hr)	Condensable PM Emissions (lbs/hr)	Total PM_{10} Emissions [1] (lbs/hr)
PM-1	**17-Mar-22**	7:09-9:13	86	988	6.3	9,456	1,617,020	578,870	542,672	2.44	0.29	2.73
PM-2		9:28-11:33	81	998	6.5	9,491	1,622,980	577,156	539,387	3.94	0.82	4.76
PM-3		11:48-13:53	77	1006	6.8	9,438	1,613,851	570,561	532,028	3.31	0.79	4.10
	Average:		*81*	*997*	*6.5*	*9,462*	*1,617,950*	*575,529*	*538,029*	*3.23*	*0.63*	*3.86*

(1) Permit Limit = 9 lbs/hr

Unit 12-2 - Mid Load

Test	Test Date	Test Time (DAHS)	Unit Load (GMW)	Stack Temperature (°F)	Stack Moisture (%)	Stack Velocity (ft/min)	Exhaust Gas Flowrates (ACFM)	(SCFM)	(DSCFM)	Filterable PM Emissions (lbs/hr)	Condensable PM Emissions (lbs/hr)	Total PM_{10} Emissions [1] (lbs/hr)
PM-1	**21-Mar-22**	7:41-9:48	65	1029	6.1	8,187	1,399,980	502,838	472,152	2.23	0.51	2.74
PM-2		10:13-12:18	65	1035	6.1	8,216	1,404,981	502,426	471,954	1.15	0.43	1.58
PM-3		12:43-14:50	65	1037	6.1	8,211	1,404,026	501,372	470,571	1.35	0.92	2.27
	Average:		*65*	*1034*	*6.1*	*8,205*	*1,402,996*	*502,212*	*471,559*	*1.58*	*0.62*	*2.20*

(1) Permit Limit = 9 lbs/hr

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TABLE NO. 3
PARTICULATE EMISSIONS TESTING RESULTS
Belle River Power Plant - EU-CTG13-1-BP
March 15-16, 2022

Unit 13-1 - High Load

Test	Test Date	Test Time (DAHS)	Unit Load (GMW)	Stack Temperature (°F)	Stack Moisture (%)	Stack Velocity (ft/min)	Exhaust Gas Flowrates (ACFM)	(SCFM)	(DSCFM)	Filterable PM Emissions (lbs/hr)	Condensable PM Emissions (lbs/hr)	Total PM_{10} Emissions [1] (lbs/hr)
PM-1	**15-Mar-22**	8:04-10:10	88	984	6.3	9,813	1,677,948	608,162	570,064	1.26	1.58	2.84
PM-2		10:42-12:47	87	988	6.4	9,610	1,643,288	594,177	556,235	3.54	0.74	4.28
PM-3		13:08-15:13	86	989	6.4	9,690	1,656,972	598,522	560,128	2.34	0.29	2.63
	Average:		*87*	*987*	*6.4*	*9,704*	*1,659,403*	*600,287*	*562,142*	*2.38*	*0.87*	*3.25*

(1) Permit Limit = 9 lbs/hr

Unit 13-1 - Mid Load

Test	Test Date	Test Time (DAHS)	Unit Load (GMW)	Stack Temperature (°F)	Stack Moisture (%)	Stack Velocity (ft/min)	Exhaust Gas Flowrates (ACFM)	(SCFM)	(DSCFM)	Filterable PM Emissions (lbs/hr)	Condensable PM Emissions (lbs/hr)	Total PM_{10} Emissions [1] (lbs/hr)
PM-1	**16-Mar-22**	7:20-9:26	65	1025	6.3	8,227	1,406,739	495,769	464,378	0.93	0.52	1.45
PM-2		9:45-11:50	65	1025	6.3	8,236	1,408,342	496,334	465,085	0.39	1.18	1.57
PM-3		12:05-14:10	65	1030	6.7	8,304	1,419,932	498,977	465,773	1.78	0.41	2.19
	Average:		*65*	*1027*	*6.4*	*8,256*	*1,411,671*	*497,027*	*465,079*	*1.03*	*0.70*	*1.74*

(1) Permit Limit = 9 lbs/hr

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FIGURES

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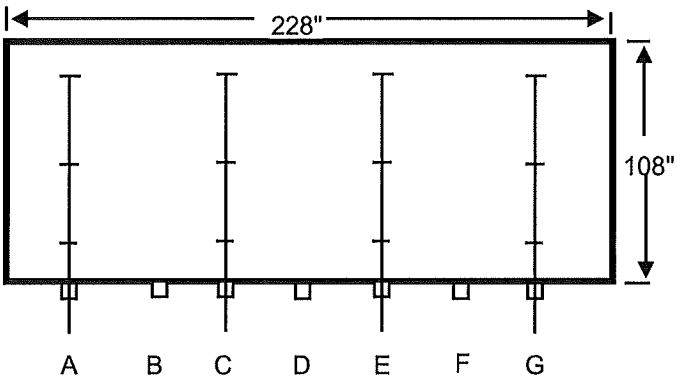
Figure 1 – Sampling Location
DTE – Belle River Peakers



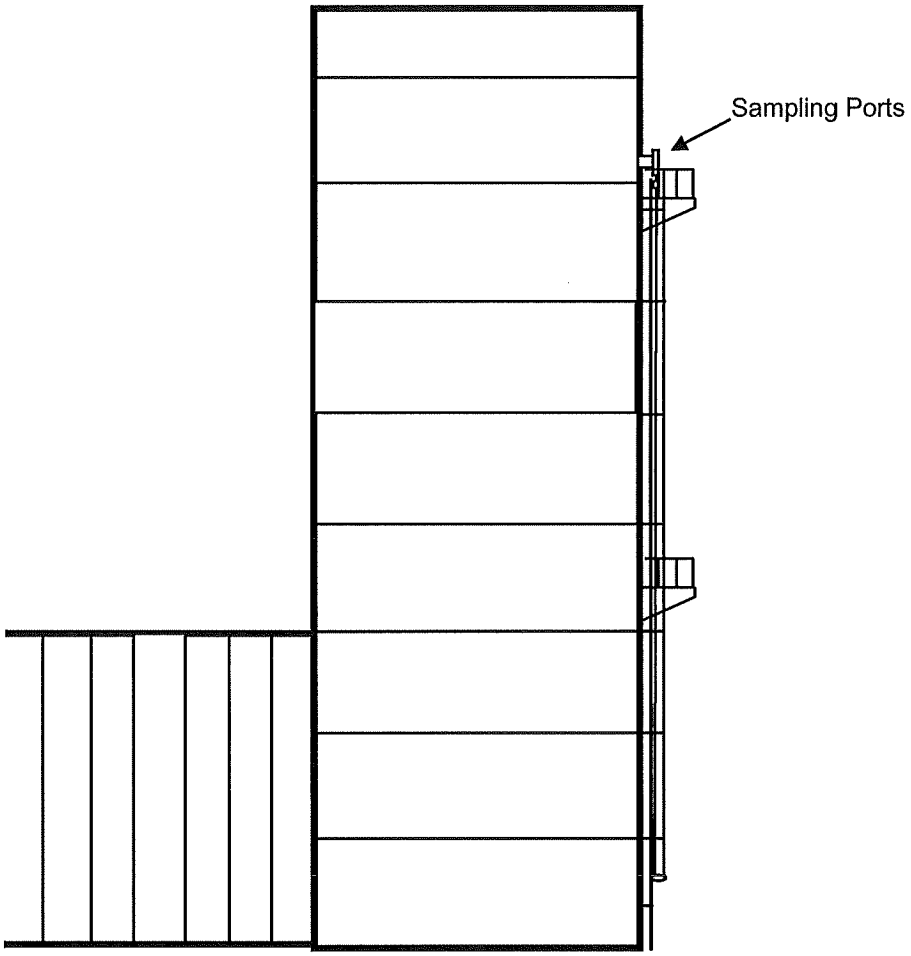


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Figure 2 – EPA Method 3A
DTE - Belle River Peakers

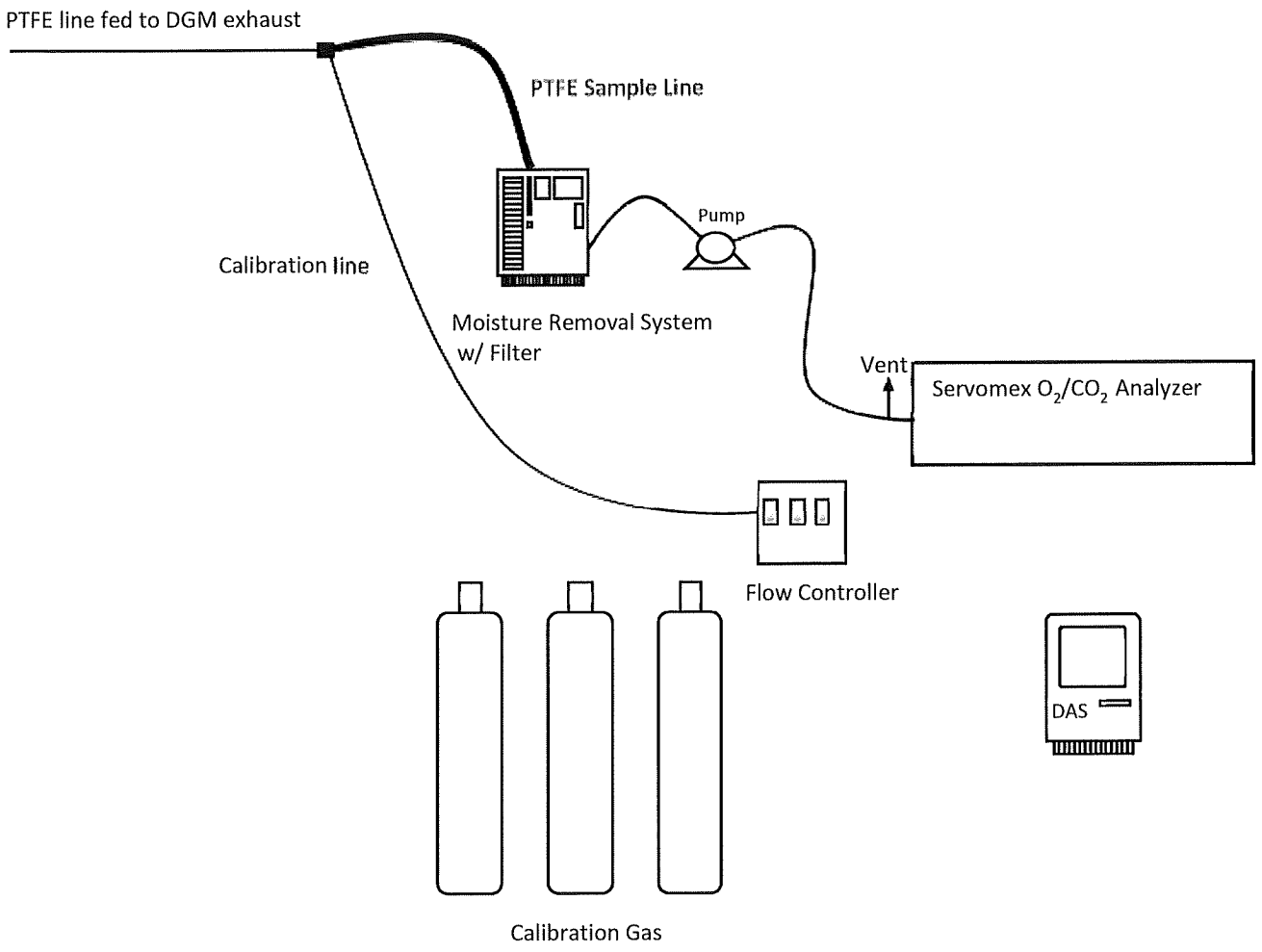
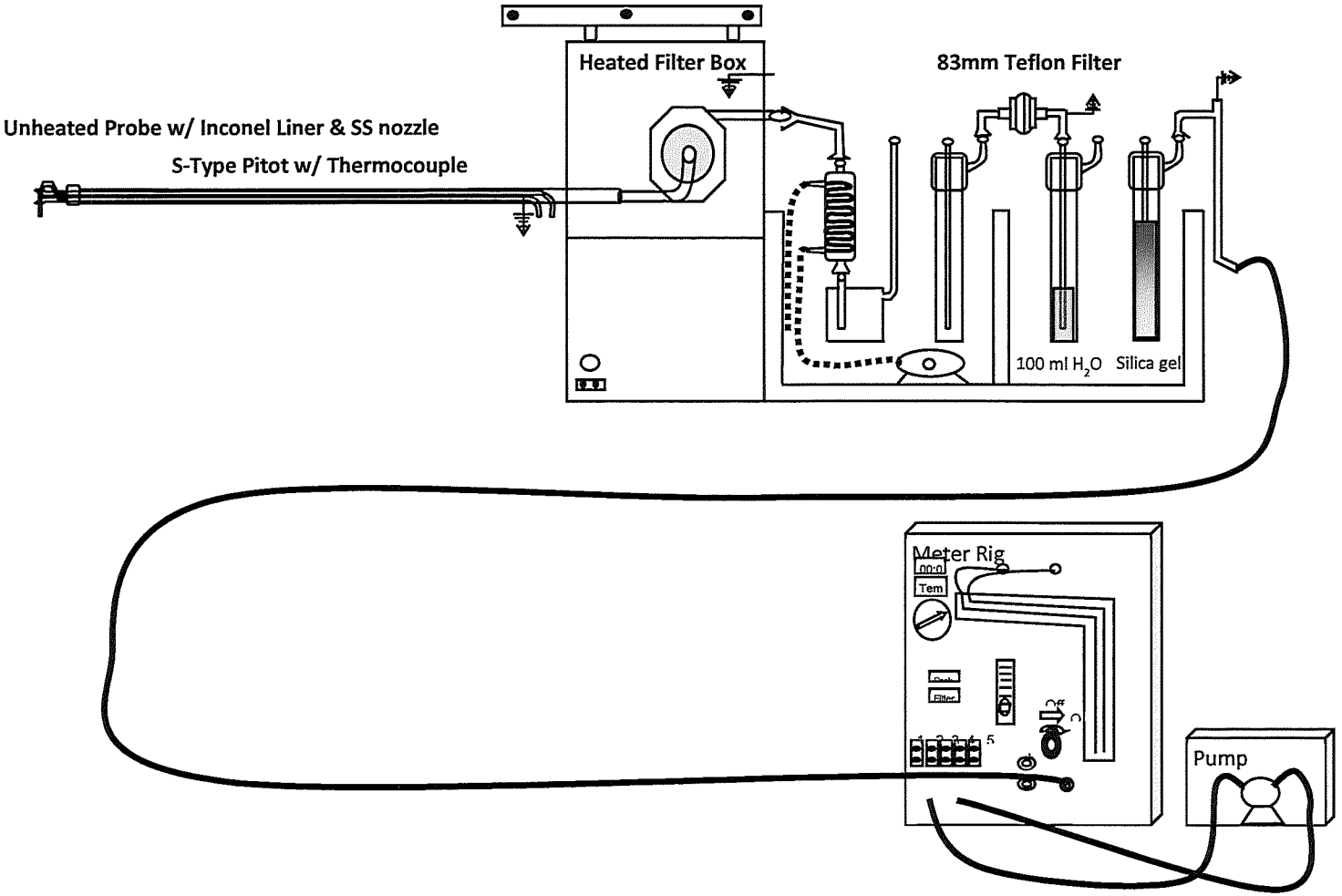


Figure 3 – EPA Method 5B / 202
DTE - Belle River Peakers



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APPENDIX A

EGLE TEST PLAN AND APPROVAL LETTER

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
DETROIT DISTRICT OFFICE

GRETCHEN WHITMER
GOVERNOR

LIESL EICHLER CLARK
DIRECTOR

February 14, 2022

Ms. Stefanie Ledesma
DTE Energy
4695 West Jefferson Avenue
Trenton, MI 48183

SRN: B2796

Dear Ms. Ledesma:

SUBJECT: DTE Belle River Peaking Facility, FG-CTG-BP Peaking Unit Turbines Emission Testing;
PTI No. 331-98C

The Department of Environment, Great Lakes, and Energy (EGLE), Air Quality Division (AQD), has completed the quality assurance review of the test plan for particulate matter (PM) with an aerodynamic diameter of 10 microns or less (PM_{10}) emissions testing on three natural-gas fired, simple cycle turbine generator peaking units (EU-CTG12-1-BP, EU-CTG12-2-BP, EU-CTG13-1-BP; FG-CTG-BP) operated at the DTE Belle River Peaking facility in China Township, Michigan received on January 14, 2022. Permit to install No. 331-98C requires this testing. All sampling will be performed according to the United States Environmental Protection Agency (US EPA) methods found at www.epa.gov/emc. Any modification to a method must be approved by the AQD.

Process

Emissions from FG-CTG-BP will be tested while operating at each of two load conditions, 70% and 100% of base load. During each run of the emissions test, the following information will be recorded:

- Power generation (MW) and percent load
- Fuel usage
- Heat input (MMBtu/hr)
- Facility CEMS data

Mr. Mark Dziadosz will coordinate the collection of process data. If you have questions about process, please contact him at 586-854-1611 or dziadoszm@michigan.gov.

Sampling

Testing for PM_{10} will be performed in accordance with US EPA reference methods 1, 2, 3A, 4, and 5/202 via three 120-minute sampling runs per unit, per condition. PM_{10} will be calculated as the sum of the methods 5 and 202 results.

Method 5 will be modified to include the use of an unheated inconel probe liner with a stainless steel nozzle. Sample recovery will include six rinses and brushes with acetone.

For Method 202, the test consultant 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.

Analyzers used for testing will be calibrated with Protocol 1 gases. The concentration of the calibration gases will meet the requirements of the method. The span of the analyzers will be selected so that the concentration of the sample is within the calibrated range of the analyzer. The calibration error, bias, response time, and analyzer drift will be determined and reported. 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. The test shall not be interrupted 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

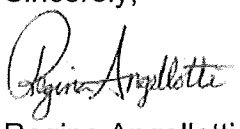
The AQD requests that the results are presented in tables in units of the permit limits. The report will include the test results, the operational data, the calibration record and quality assurance checks of the equipment used for this test, the laboratory analytical results, all handwritten field data sheets, any voided or rejected runs, and any repeated test. The AQD requests that the report include the minute and run averages of the emission measurements in ppm. The emission measurement data may be submitted in electronic format. Please submit a complete copy of the test report to both:

Ms. Joyce Zhu
EGLE-AQD
Warren District Office
27700 Donald Court
Warren, MI 48092-2793

Ms. Karen Kajiya-Mills
EGLE-AQD
Technical Programs Unit
Constitution Hall, 2nd Floor South
525 West Allegan Street
Lansing, Michigan 48933

The testing is scheduled to begin on March 15, 2022. Please notify both Mr. Dziadosz and me if there is a change in schedule.

Sincerely,



Regina Angellotti
Air Quality Division

cc: Mr. Jason Logan, DTE
Ms. Karen Kajiya-Mills, EGLE
Ms. Joyce Zhu, EGLE
Mr. Mark Dziadosz, EGLE

DTE

January 14, 2022

Ms. Karen Kajiya-Mills
Michigan Department of Environment, Great Lakes, and Energy
Air Quality Division
525 West Allegan Street
Constitution Hall, 2 South
Lansing, MI 48909

Subject: **Test Plan for compliance emissions testing of three natural gas-fired combustion turbine generator (CTG) units at the Belle River Peaking Facility located in China Township, Michigan**

Dear Ms. Kajiya-Mills:

DTE Energy Corporate Services's Environmental Management & Safety (EMS), Ecology, Monitoring, and Remediation Group is pleased to provide the following Test Plan for compliance emissions testing of three General Electric natural gas-fired combustion turbine generator (CTGs) for particulate matter (as PM_{10}) located at the Belle River Peaking Facility, in China Township, Michigan. Testing is being conducted per the requirements of the Permit to Install (PTI) 331-98C. The purpose of this document is to provide the required testing information and to notify the Michigan Department of Environment, Great Lakes, and Energy (EGLE) of the upcoming testing.

Testing is tentatively scheduled for March 15-24, 2022, pending EGLE approval of the Test Plan. PM_{10} testing is required every 5 years. What follows is an item-by-item description of the information required by the EGLE for testing approval. If you have any questions regarding the testing schedule or methodology please contact me at Jason.Logan@dteenergy.com.

Sincerely,

Jason Logan

Jason Logan, QSTI
Senior Specialist – Ecology, Monitoring, and Remediation Group
DTE Energy, Environmental Management & Safety

cc: Mr. Robert Elmouchi, EGLE-AQD Warren District

Test Plan – Belle River Peakers CTG Emissions Testing

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

Name and Title	Company	Email
Ms. Stefanie Ledesma Environmental Engineer (DTE EMR)	DTE Energy Trenton Channel Power Plant 4695 W Jefferson Ave Trenton, MI 48183	Stefanie.Ledesma@dteenegy.com
Mr. Jason Logan Environmental Specialist (DTE EMR)	DTE Energy Corporate Services, LLC 7940 Livernois Avenue Room G4-S Detroit, MI 48210	Jason.Logan@dteenergy.com

1b. ***Type of industrial process or combustion facility:***
The DTE Belle River Peakers are located in China Township, Michigan, adjacent to the DTE Belle River Power Plant. The peaker produces produces electricity from three (3) simple cycle natural gas-fired turbines. The turbines are designated as EU-CTG12-1-BP, EU-CTG12-2-BP and EU-CTG13-1-BP in Michigan PTI No. 331-98C and are each rated at 82.4 Megawatts (MW) at iso conditions.

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

1d. ***Description of any cyclical or batch operations which would tend to produce variable emissions with time:***
Each of the three turbine generator units operate on an as needed basis.

1e. ***Basic operating parameters used to regulate the process:***
DTE Belle River Peaker Station is a peaking facility and runs on an intermittent basis. Each turbine is equipped with dry, low-NOx burners to control emissions.

1f. ***Rated capacity of the process and process rate during the testing:***
The Units will be tested for PM_{10} at 70% and 100% of base load.

2a. ***Type of control device associated with the process:***
Dry, low NOx burners installed on each turbine.

2b. Operating parameters of the control device:
N/A

2c. Rated capacity and efficiency of the control device:
N/A

3. Applicable permit number and emission limits for the process to be tested:
The Belle River Peaker emissions for each turbine generator are limited by the State of Michigan PTI No. 331-98C. The PM_{10} emission limits as stated in the permit are as follows: PM_{10} - 9.0 pounds/hour.

4. Identify all pollutants to be measured:
Each turbine will be tested for PM_{10} at 70% and 100% of base load.

5. Description of the sampling train(s) to be used, including schematic diagrams if appropriate:
All emissions testing will be performed according to USEPA Methodology. Sampling train diagrams are depicted in the attached figures (see Figures 2-3).

PM_{10} testing will be performed via triplicate 120-minute test runs at each load. Testing for PM_{10} will be performed utilizing USEPA Method 5/202. All particulate collected will be assumed to be PM_{10}. EM&S will modify the Method 5 sampling train to include the use of an unheated inconel probe liner and stainless steel nozzle due to stack temperatures greater than 1000°F.

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

Parameter	Method	Analytical Method
Exhaust gas flowrates (PM)	USEPA Methods 1, 2	Field Data Analysis and Reduction
Molecular weight	USEPA Method 3A	Paramagnetic Analyzer
Exhaust Moisture	USEPA Method 4	Gravimetric Analysis
Particulate Matter (PM)	USEPA Method 5	Gravimetric Analysis
Condensable PM	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 combination with other methods utilized.

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 exhaust gas moisture content.

USEPA Method 5, ***"DETERMINATION OF PARTICULATE MATTER EMISSIONS FROM STATIONARY SOURCES",*** will be used to measure total solid particulate exhaust gas emission rates.

USEPA M202, ***"DETERMINATION OF CONDENSABLE EMISSIONS FROM STATIONARY SOURCES",*** will be used to measure condensable exhaust gas particulate.

7. ***The number and length of sampling runs which will constitute a complete test:***
PM_{10} testing will consist of triplicate 120-minute sampling runs.

8. ***Dimensioned sketches showing all sampling ports in relation to the upstream and downstream disturbances or obstructions of gas flow:***
Sampling will be conducted at test locations on each combustion turbine generator's exhaust stack. Sampling traverses will be conducted using four of the existing seven sampling ports (i.e. Ports A, C, E, and G) - see Figure 1.

9. ***Estimated flue gas conditions such as temperature, moisture and velocity:***
The estimated flue gas conditions for the CTG stacks are below:

Load	Flow (scfh)	Moisture (%)	Temperature (°F)
50-90 MW	450,000-700,000	7-9	950-1100

10. ***Projected process operating conditions during which the tests will be run:***
Process data to be collected during testing will include fuel flowrate and power generation (MW).

11. ***Description of any process or control equipment data to be collected during the testing:***
N/A

12. ***Description of any monitoring data to be collected during the test period (eg – continuous emission monitoring data):***
Each turbine is equipped with a continuous emissions monitoring system (CEMS) that monitors O_2, NOx, and CO. This information will not be included in the test report for PM_{10}.

13. ***Chain of Custody procedures:***
Standard chain of custody procedures will be followed for all testing.

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. To ensure accuracy of the O_2 and CO_2 analyzers, a set of three (3) calibration gases per analyzer will be injected through the reference sampling system to demonstrate the linearity of the analyzers. The three gases will consist of a known concentration of CO_2 and O_2 in nitrogen for instrument span (high level), at 40-60% of span (mid), and at <20% of span (low). All gases will be documented EPA Protocol 1,

traceable to National Institute of Standards and Technology (NIST) reference materials.

EPA Methods 5, and 202 will follow QA/QC standards as described in the methodology. A field recovery blank will be collected and submitted to be analyzed with the condensable particulate samples. A nitrogen purge will be conducted on the Method 202 sample train at the conclusion of each test period prior to recovering the sample.

15. Laboratory quality assurance/quality control procedures utilized as part of the testing:

Calibrations for USEPA Methods 3A will follow protocol stated in USEPA Methods and will utilize appropriate calibration gases. 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). Methods 5 samples will be weighed to 0.0005g constant weight and Method 202 samples will be weighed to 0.0001g constant weight.

The third party laboratory contracted to perform Method 202 extractions will be instructed to perform all analysis and QA/QC procedures according to the appropriate methodology.

16. Names and titles of personnel who will be performing the testing:

The testing will be performed by DTE's Ecology, Monitoring, and Remediation Group.

Methods 1, 2, 3A, 4, 5, and 202

Mr. Jason Logan, Senior Specialist – QSTI	EMS	Project Leader
Mr. Thomas Snyder, Senior Specialist – QSTI	EMS	
Mr. Mark Westerberg, Senior Specialist – QSTI	EMS	
Mr. Fred Meinecke, Specialist	EMS	
Mr. Ken St.Amant, Specialist	EMS	

The following laboratories will perform analytical services.

Method 202

Enthalpy Analytical
800 Capitola Drive, Suite 1
Durham, NC 27713

Phone 919.850.4392

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.

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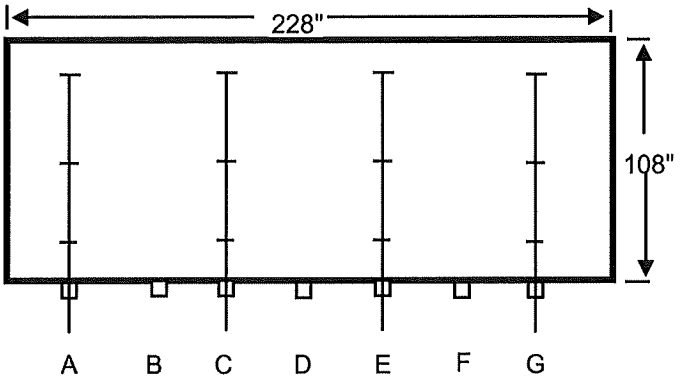
Figure 1 – Sampling Location
DTE – Belle River Peakers



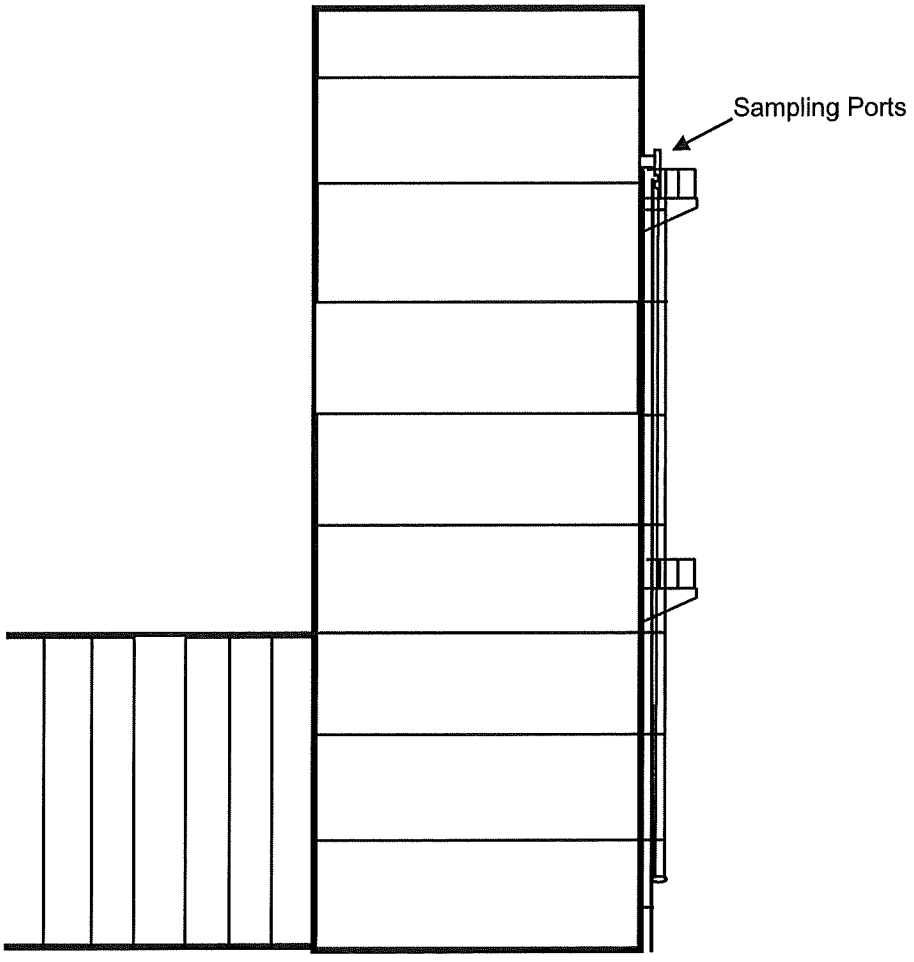


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Figure 2 – EPA Method 3A
DTE - Belle River Peakers

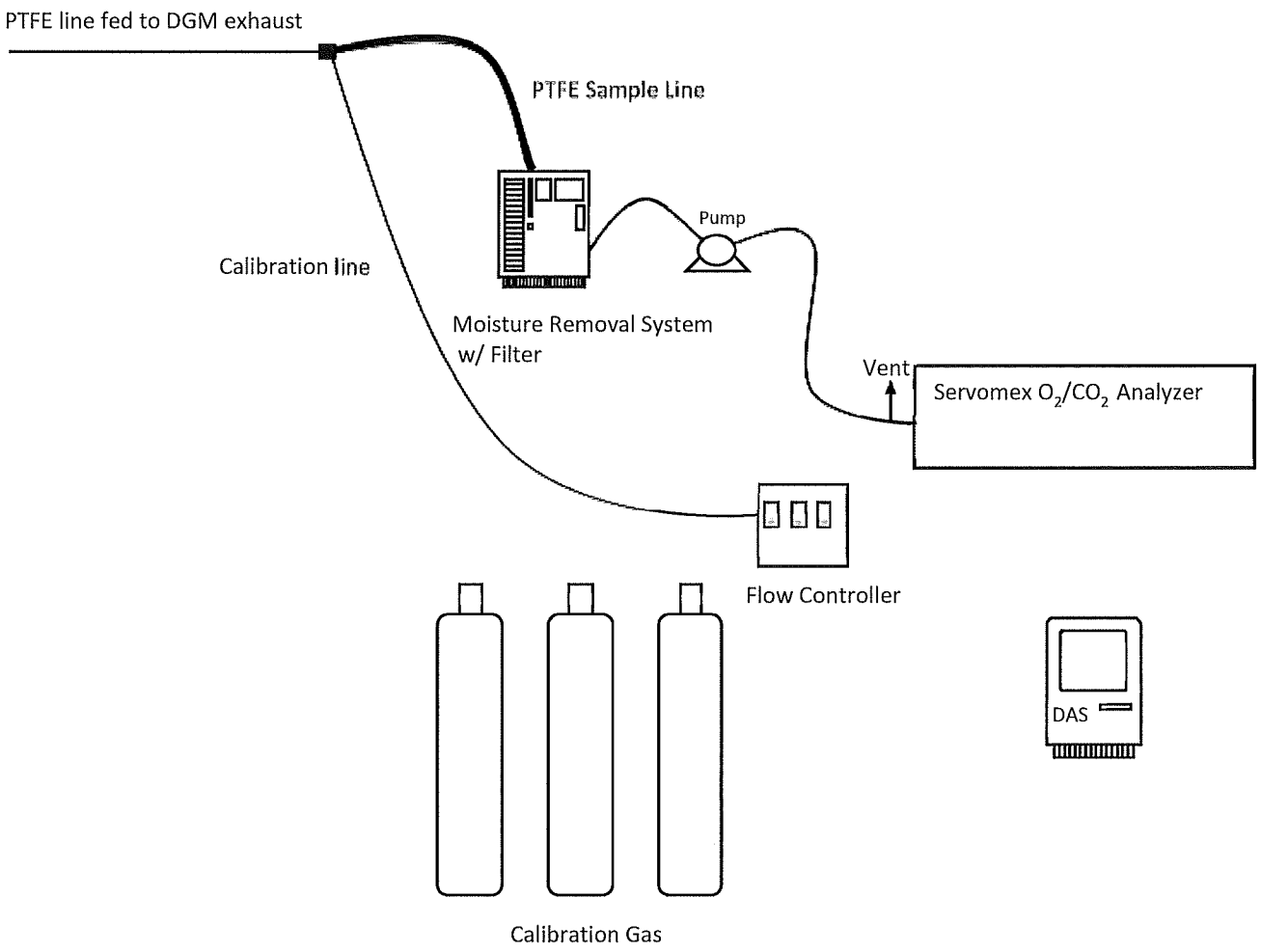
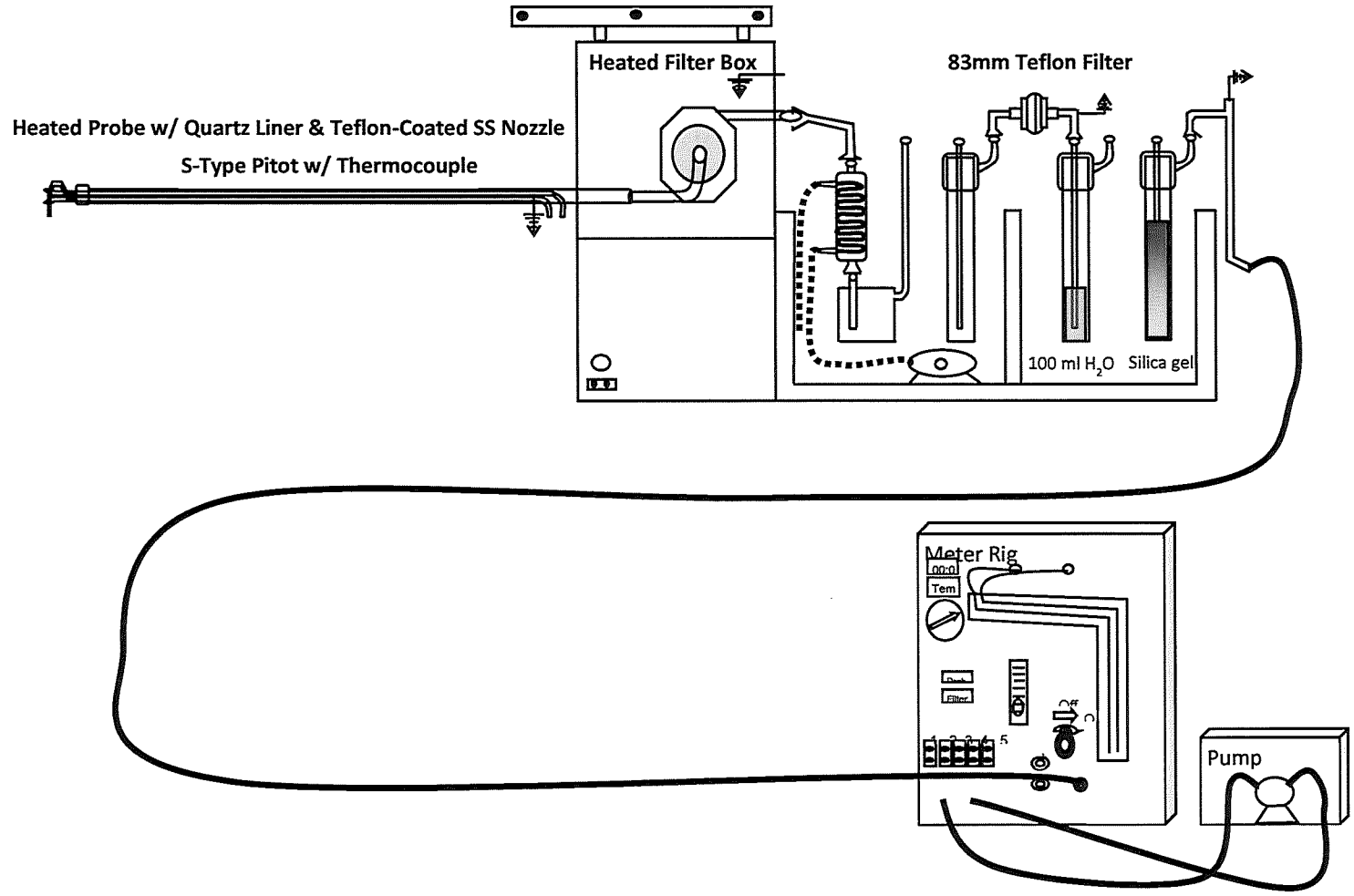


Figure 3 – EPA Method 5B / 202
DTE - Belle River Peakers



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APPENDIX B

Field Data