BTEC Inc.

St. Clair Unit 7
Particulate Matter
Emissions Test Summary Report

Prepared for:
DTE Energy

St. Clair Power plant
4877 M-29
East China, Michigan

Project No. 049AS-378535.00
May 25, 2018

BT Environmental Consulting, Inc.
4949 Fernlee Avenue
Royal Oak, Michigan 48073
(248) 548-8070

EXECUTIVE SUMMARY

BT Environmental Consulting, Inc. (BTEC) was retained by DTE Energy (DTE) to conduct an evaluation of particulate matter (PM), particulate matter less than 10 microns (PM_{10}), and particulate matter less than 2.5 microns ($PM_{2.5}$) from the St. Clair Unit 7 stack. The emissions test program was conducted on March 29th-April 3rd, 2018.

Testing of the Unit 7 stack consisted of triplicate test runs for each pollutant. The emissions test program was required by MDEQ Air Quality Division ROP B2796-2015b. The results of the emission test program are summarized by Table I.

Table I
Overall Emission Summary
Test Date: March 29th-April 3rd, 2018

Emission Unit	Pollutant	Permit Limit	Test Result
Unit 7	PM	0.13 lb/1,000lb*	0.011 lb/1,000lb*
	$PM_{2.5}$	No Limit	36.60 lb/hr
	PM_{10}	No Limit	39.06 lb/hr

*lb/1,000lb exhaust gas corrected to 50% excess air
$PM_{2.5}$ = Sum of $PM_{2.5}$ beaker and filter
PM_{10} = Sum of $PM_{2.5}$ and PM_{10} beakers and filter

1. Introduction

BT Environmental Consulting, Inc. (BTEC) was retained by DTE Energy (DTE) to conduct an evaluation of particulate matter (PM), particulate matter less than 10 microns (PM_{10}), and particulate matter less than 2.5 microns ($PM_{2.5}$) from the St. Clair Unit 7 stack. The emissions test program was conducted on March 29th-April 3rd, 2018.

AQD has published a guidance document entitled "Format for Submittal of Source Emission Test Plans and Reports" (December 2013). The following is a summary of the emissions test program and results in the format suggested by the aforementioned document.

1.a Identification, Location, and Dates of Test

Sampling and analysis for the emission test program was conducted on March 29th-April 3rd, 2018 at the DTE St. Clair facility located in East China, Michigan.

1.b Purpose of Testing

AQD issued ROP B2796-2015b to DTE. The permit limits are summarized by Table 1.

Table 1
Emission Limitations
DTE St. Clair Unit 7
ROP B2796-2015b Emission Limitations

Emission Unit	Pollutant	Permit Limit
Unit 7	PM	0.13 lb/1,000lb*

*lb/1,000lb exhaust gas corrected to 50% excess air

1.c Source Description

The St Clair Power Plant (SCPP) located at 4901 Pointe Drive in East China Township, Michigan, employs the use of six (6) coal-fired boilers (units 1-4, 6, and 7). Units 1-4 each have Babcock and Wilcox boilers capable of producing 1,070,000 pounds per hour of steam. Units 1 and 4 are equipped with General Electric turbine generators each with a nominally rated capability of 167 megawatts (MW). Units 2 and 3 have Allis Chalmers turbine generators each with a nominally rated capability of 170 MW. Units 6 and 7 have Combustion Engineering boilers capable of producing 2,100,000 and 3,580,000 pounds of steam per hour respectively. The turbine generators on each unit were manufactured by Westinghouse and have a nominally rated capability of 325 and 500 MW respectively.

1.d Test Program Contacts

The contacts for the source and test report are:

Mr. Mark Grigereit
Air Quality Engineer
DTE Energy
6100 West Warren Ave.
Detroit, Michigan
(313) 897-1324

Mr. Barry Boulianne
Senior Project Manager
BT Environmental Consulting, Inc.
4949 Fernlee Avenue
Royal Oak, Michigan 48073
(313) 449-2361

Names and affiliations for personnel who were present during the testing program are summarized by Table 2.

Table 2
Test Personnel

Name and Title	Affiliation	Telephone
Mr. Matt Young Client Project Manager	BTEC 4949 Fernlee Royal Oak, MI 48073	(248) 548-8070
Mr. Dave Trahan Environmental Technician	BTEC 4949 Fernlee Royal Oak, MI 48073	(248) 548-8070
Mr. Jake Zott Environmental Technician	BTEC 4949 Fernlee Royal Oak, MI 48073	(248) 548-8070
Mr. Paul Molenda Environmental Technician	BTEC 4949 Fernlee Royal Oak, MI 48073	(248) 548-8070

2. Summary of Results

Sections 2.a through 2.d summarize the results of the emissions compliance test program.

2.a Operating Data

The units at SCPP operate as base loaded units. The operating parameters used to regulate the process are the same for any coal-fired boiler. In addition, opacity, NO_x and SO_2 emissions are used to regulate the process.

2.b Applicable Permit

AQD issued ROP B2796-2015b

2.c Results

See Table 3 in Section 5.a.

3. Source Description

Sections 3.a through 3.e provide a detailed description of the process.

3.a Process Description

See Section 1.c.

3.b Process Flow Diagram

A process flow diagram is available on request.

3.c Raw and Finished Materials

The SCPP produces electricity used throughout SE Michigan.

3.d Process Capacity

Full load conditions for unit 7 is 450 MW. The unit was tested at an average load of 356 MW (M201A/202) and 350.8 MW (M5). Individual loads for each run are included in Appendix E.

3.e Process Instrumentation

The air pollution control equipment on Unit 7 consist of an American Standard electrostatic precipitator that has design collection efficiency of 99.6%. The exhaust stack is 600 feet tall with an internal diameter of 16 feet.

4. Sampling and Analytical Procedures

Sections 4.a through 4.c provide a summary of the sampling and analytical procedures used.

4.a Sampling Train and Field Procedures

Measurement of exhaust gas velocity, molecular weight, and moisture content were conducted using the following reference test methods codified at Title 40, Part 60, Appendix A of the Code of Federal Regulations (40 CFR 60, Appendix A):

- Method 1 - *"Location of the Sampling Site and Sampling Points"*
- Method 2 - *"Determination of Stack Gas Velocity and Volumetric Flowrate"*
- Method 3A - *"Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources"(Analyzer)*
- Method 4 - *"Determination of Moisture Content in Stack Gases"*

Stack gas velocity traverses were conducted in accordance with the procedures outlined in Method 1 and Method 2 (see Figure 4 for a schematic of the sampling location). S-type pitot tubes with thermocouple assemblies, calibrated in accordance with Method 2, Section 4.1.1, were used to measure exhaust gas velocity pressures (using a manometer) and temperatures during testing. The S-type pitot tube dimensions were within specified limits, therefore, a baseline pitot tube coefficient of 0.84 (dimensionless) was assigned.

A cyclonic flow check was performed at the sampling location. The existence of cyclonic flow is determined by measuring the flow angle at each sample point. The flow angle is the angle between the direction of flow and the axis of the stack. If the average of the absolute values of the flow angle is greater than 20 degrees, cyclonic flow exists. The null angle was determined to be less than 20 degrees at each sampling point.

The O_2 and CO_2 content of the gas stream was measured using a Servomex 4100 gas analyzer. An integrated bag sample was taken for each run, which was then drawn through a refrigerated Teflon® sample conditioner to remove the moisture from the sample before it entered the analyzer. Data was recorded on a PC equipped with data acquisition software. Recorded O_2 concentrations were averaged and reported for the duration of each test (as drift corrected per Method 7E). In accordance with Method 3A, a 3-point (zero, mid, and high) bias check and calibration check was performed on the analyzer prior to initiating the test program. Following each test run, a 2-point (zero and high) calibration drift check was performed. The analyzer was operated at the 0-25 ppm range.

Exhaust gas moisture content was evaluated using Method 4. Exhaust gas was extracted as part of the PM and HCl sampling trains and passed through the impinger configuration (see Figures 1-3). Exhaust gas moisture content was then determined gravimetrically.

4.b Particulate Matter (USEPA Method 5)

40 CFR 60, Appendix A, Method 5, *"Determination of Particulate Emissions from Stationary Sources"* was used to measure PM concentrations and calculate appropriate emission rates (see Figure 1 for a schematic of the sampling train). Triplicate 60-minute test runs were conducted on the Unit 7 exhaust under normal operating conditions.

BTEC's Nutech® Model 2010 modular isokinetic stack sampling system consisted of (1) a stainless steel nozzle, (2) a glass probe, (3) a set of four Greenburg-Smith (GS) impingers with the first two with 100 ml of H_2O (ii) an empty impinger, (iii) and an impinger filled with approximately 300 grams of silica gel, (4) a length of sample line, and (5) a Nutech® control case equipped with a pump, dry gas meter, and calibrated orifice.

Upon completion of the final leak test for each test run, the filter was recovered, and the nozzle, probe, and the front half of the filter holder assembly were brushed and triple rinsed with approximately 100 ml of acetone which was collected in a pre-cleaned sample container.

BTEC labeled each container with the test number, test location, and test date, then marked the level of liquid on the outside of the container. Blank samples of the filter and acetone were collected. BTEC personnel transported all samples to BTEC's laboratory in Royal Oak, Michigan, for analysis.

4.c Particulate Matter (USEPA Method 201A/202)

40 CFR 51, Appendix M, Method 201A, *"Determination of PM_{10} and $PM_{2.5}$ Emissions From Stationary Sources"* and 40 CFR 51, Appendix M, Method 202, *"Dry Impinger Method for Determining Condensable Particulate Emissions from Stationary Sources"* was used to measure $PM_{2.5}/PM_{10}$ concentrations and calculate $PM_{2.5}/PM_{10}$ emission rates (see Figure 2 for a schematic of the sampling train). Triplicate approximately 120-minute test runs were conducted for the Unit 7 exhaust.

BTEC's Nutech® Model 2010 modular isokinetic stack sampling system consisted of (1) a stainless-steel nozzle, (2a) a stainless-steel PM_{10} head, (2b) a stainless-steel $PM_{2.5}$ head, (3) an in stack stainless-steel filter housing, (4) a borosilicate glass probe liner, (5) a vertical condenser, (6) an empty pot bellied impinger, (7) an empty modified Greenburg-Smith (GS) impinger, (8) unheated borosilicate filter holder with a teflon filter and Teflon filter support, (9) a second modified GS impinger with 100 ml of deionized water, and a third modified GS impinger containing approximately 300 g of silica gel desiccant, (10) a length of sample line, and (11) a Nutech® control case equipped with a pump, dry gas meter, and calibrated orifice.

A sampling train leak test was conducted before and after each test run. After completion of the final leak test for each test run, the filter was recovered, the nozzle, probe, PM_{10} head, and front half of the filter housing were brushed and triple rinsed with acetone. The acetone rinses were collected in a pre-cleaned sample container. The impinger train was then purged with nitrogen for one hour at a flow rate of 14 liters per minute. The CPM filter was recovered and placed in a petri dish. The back half of the filter housing, the condenser, the pot bellied impinger, the moisture drop out impinger, and the front half of the CPM filter housing and all connecting glassware were double rinsed with deionized water which was collected in a pre-cleaned sample container. The same glassware was then rinsed with acetone which was collected in a pre-cleaned sample container labeled as

the organic fraction. The glassware was then double rinsed with hexane which was added to the same organic fraction sample bottle.

BTEC labeled each container with the test number, test location, and test date, and marked the level of liquid on the outside of the container. In addition, blank samples of the acetone, DI water, hexane, and filter were collected. BTEC personnel carried all samples to BTEC's laboratory (for filter and acetone gravimetric analysis) in Ferndale, Michigan. Enthalpy personnel picked up the M202 samples and transported them to the Enthalpy laboratory in Durham, NC.

4.d Recovery and Analytical Procedures

Filterable particulate matter samples were processed at BTEC's laboratory in Royal Oak, Michigan. Condensable particulate matter samples were sent to Enthalpy in Durham, NC.

4.e Sampling Ports

Diagrams of the stack showing sampling ports in relation to upstream and downstream disturbances are included as Figure 3.

4.f Traverse Points

Diagrams of the stack indicating traverse point locations and stack dimensions are included as Figure 3.

5. Test Results and Discussion

Sections 5.a through 5.k provide a summary of the test results.

5.a Results Tabulation

The overall results of the emissions test program are summarized by Table 3. Detailed results for the emissions test program are summarized by Tables 4-6.

Table 3
Overall Emission Summary
Test Date: March 29th-April 3rd, 2018

Emission Unit	Pollutant	Permit Limit	Test Result
Unit 7	PM	0.13 lb/1,000lb*	0.011 lb/1,000lb*
	$PM_{2.5}$	No Limit	36.60 lb/hr
	PM_{10}	No Limit	39.06 lb/hr

*lb/1,000lb exhaust gas corrected to 50% excess air
$PM_{2.5}$ = Sum of $PM_{2.5}$ beaker and filter
PM_{10} = Sum of $PM_{2.5}$ and PM_{10} beakers and filter

5.b Discussion of Results

The test result for PM was less than the limit.

5.c Sampling Procedure Variations

The Tedlar bag used for Method 5 Run 1 O_2/CO_2 results leaked and was contaminated with ambient air. The O_2/CO_2 results for Run 1 were discarded. The results from Run 2 and 3 were averaged together and used for Run 1.

5.d Process or Control Device Upsets

A single Method 5 test was performed on March 30, 2018. The process went down and the run was voided. Method 5 testing was resumed on April 3, 2018 and triplicate 60-minute test runs were performed.

Full load conditions for unit 7 is 450 MW. The unit was tested at an average load of 356 MW (M201A/202) and 350.8 MW (M5). Individual loads for each run are included in Appendix E.

5.e Control Device Maintenance

No control device maintenance was performed during the stack testing.

5.f Re-Test

The emissions test program was not a re-test.

5.g Audit Sample Analyses

No audit samples were collected as part of the test program.

5.h Calibration Sheets

Relevant equipment calibration documents are provided in Appendix B.

5.i Sample Calculations

Sample calculations are provided in Appendix C.

5.j Field Data Sheets

Field documents relevant to the emissions test program are presented in Appendix A.

5.k Laboratory Data

Laboratory analytical results for this test program are presented in Appendix D.

MEASUREMENT UNCERTAINTY STATEMENT

Both qualitative and quantitative factors contribute to field measurement uncertainty and should be taken into consideration when interpreting the results contained within this report. Whenever possible, Montrose Air Quality Services, LLC, (MAQS) personnel reduce the impact of these uncertainty factors through the use of approved and validated test methods. In addition, MAQS personnel perform routine instrument and equipment calibrations and ensure that the calibration standards, instruments, and equipment used during test events meet, at a minimum, test method specifications as well as the specifications of our Quality Manual and ASTM D 7036-04. The limitations of the various methods, instruments, equipment, and materials utilized during this test have been reasonably considered, but the ultimate impact of the cumulative uncertainty of this project is not fully identified within the results of this report.

Limitations

All testing performed was done in conformance to the ASTM D7036-04 standard. The information and opinions rendered in this report are exclusively for use by DTE Energy. BTEC will not distribute or publish this report without DTE Energy's consent except as required by law or court order. BTEC accepts responsibility for the competent performance of its duties in executing the assignment and preparing reports in accordance with the normal standards of the profession, but disclaims any responsibility for consequential damages.

This report was prepared by: _____

for Steve Smith
Project Manager

This report was reviewed by: Brandon Chase

Brandon Chase
QA/QC Manager

Table 4
Unit 7 USEPA Method 5 Particulate Matter Emission Rates

Company	**DTE St. Clair**			
Source Designation	**Stack 7**			
Test Date	**4/3/2018**	**4/3/2018**	**4/3/2018**	
Meter/Nozzle Information	Run 1	Run 2	Run 3	Average
Meter Temperature Tm (F)	65.7	72.3	73.3	70.4
Meter Pressure - Pm (in. Hg)	29.5	29.4	29.4	29.4
Measured Sample Volume (Vm)	59.0	58.3	57.7	58.4
Sample Volume (Vm-Std ft3)	58.0	56.6	55.8	56.8
Sample Volume (Vm-Std m3)	1.64	1.60	1.58	1.61
Condensate Volume (Vw-std)	5.724	5.880	6.747	6.117
Gas Density (Ps(std) lbs/ft3) (wet)	0.0753	0.0751	0.0747	0.0750
Gas Density (Ps(std) lbs/ft3) (dry)	0.0781	0.0781	0.0781	0.0781
Total weight of sampled gas (m g lbs) (wet)	4.80	4.69	4.68	4.72
Total weight of sampled gas (m g lbs) (dry)	4.53	4.42	4.36	4.44
Nozzle Size - An (sq. ft.)	0.000236	0.000236	0.000236	0.000236
Isokinetic Variation - I	101.1	99.7	100.7	100.5
Stack Data				
Average Stack Temperature - Ts (F)	275.1	276.0	277.4	276.2
Molecular Weight Stack Gas- dry (Md)	30.2	30.2	30.2	30.2
Molecular Weight Stack Gas-wet (Ms)	29.1	29.1	28.9	29.0
Stack Gas Specific Gravity (Gs)	1.006	1.003	0.998	1.002
Percent Moisture (Bws)	8.98	9.41	10.78	9.72
Water Vapor Volume (fraction)	0.0898	0.0941	0.1078	0.0972
Pressure - Ps ("Hg)	29.0	29.0	28.9	29.0
Average Stack Velocity -Vs (ft/sec)	106.6	106.2	105.7	106.2
Area of Stack (ft2)	201.0	201.0	201.0	201.0
Oxygen (%)	7.61	7.77	7.45	7.61
Carbon Dioxide (%)	11.95	11.82	12.07	11.95
Carbon Monoxide (%)	0.00	0.00	0.00	0.00
Nitrogen (%)	80.44	80.41	80.48	80.44
% Excess Air	55.8	57.7	54.0	55.9
Exhaust Gas Flowrate				
Flowrate ft^3(Actual)	1,285,231	1,280,197	1,274,737	1,280,055
Flowrate ft^3 (Standard Wet)	895,213	889,061	882,348	888,874
Flowrate ft^3 (Standard Dry)	814,854	805,372	787,213	802,480
Flowrate m^3 (standard dry)	23,074	22,806	22,292	22,724
Total Particulate Weights (mg)				
Nozzle/Probe/Filter	24.8	25.9	20.5	23.7
Total Particulate Concentration				
lb/1000 lb (wet)	0.011	0.012	0.010	0.011
lb/1000 lb (wet) corrected to 50% Excess Air	0.012	0.013	0.010	0.011
lb/1000 lb (dry)	0.012	0.013	0.010	0.012
mg/dscm (dry)	15.1	16.2	13.0	14.7
gr/dscf	0.0066	0.0071	0.0057	0.0064
Total Particulate Emission Rate				
lb/ hr	46.23	48.95	38.38	44.52

Rev. 14.0
3-20-15 BC

Table 5
Unit 7 USEPA Method 201A/202 $PM_{2.5}$ Emission Rates

Company	**DTE STCPP**			
Source Designation	**Unit 7**			
Test Date	**3/29/2018**	**3/29/2018**	**3/30/2018**	
Meter/Nozzle Information	Run 1	Run 2	Run 3	Average
Meter Temperature Tm (F)	67.2	69.4	58.6	65.1
Meter Pressure - Pm (in. Hg)	29.3	29.2	29.5	29.3
Measured Sample Volume (Vm)	42.0	41.5	42.8	42.1
Sample Volume (Vm-Std ft3)	40.7	40.0	42.5	41.1
Sample Volume (Vm-Std m3)	1.15	1.13	1.20	1.16
Condensate Volume (Vw-std)	4.715	4.574	4.206	4.498
Gas Density (Ps(std) lbs/ft3) (wet)	0.0750	0.0749	0.0754	0.0751
Gas Density (Ps(std) lbs/ft3) (dry)	0.0782	0.0782	0.0783	0.0782
Total weight of sampled gas (m g lbs) (wet)	3.40	3.34	3.53	3.42
Total weight of sampled gas (m g lbs) (dry)	3.18	3.13	3.33	3.21
Nozzle Size - An (sq. ft.)	0.000102	0.000102	0.000102	0.000102
Isokinetic Variation - I	99.9	98.4	92.8	97.0
Stack Data				
Average Stack Temperature - Ts (F)	270.2	270.0	265.0	268.4
Molecular Weight Stack Gas- dry (Md)	30.3	30.2	30.3	30.3
Molecular Weight Stack Gas-wet (Ms)	29.0	29.0	29.2	29.1
Stack Gas Specific Gravity (Gs)	1.001	1.001	1.008	1.003
Percent Moisture (Bws)	10.38	10.27	9.00	9.88
Water Vapor Volume (fraction)	0.1038	0.1027	0.0900	0.0988
Pressure - Ps ("Hg)	29.0	29.0	29.3	29.1
Average Stack Velocity -Vs (ft/sec)	89.4	89.3	92.6	90.4
Area of Stack (ft2)	201.0	201.0	201.0	201.0
Exhaust Gas Flowrate				
Flowrate ft^3(Actual)	1,077,803	1,076,790	1,116,869	1,090,487
Flowrate ft^3 (Standard Wet)	756,568	754,468	796,102	769,046
Flowrate ft^3 (Standard Dry)	678,029	677,011	724,477	693,172
Flowrate m^3 (standard dry)	19,200	19,171	20,515	19,629
Total Particulate Weights (mg)				
Total Nozzle/Probe/Filter	4.6	4.7	5.4	4.9
Organic Condensible Particulate	1.4	1.6	1.2	1.4
Inorganic Condensible Particulate	12.6	11.0	12.6	12.1
Condensible Blank Correction	2.0	2.0	2.0	2.0
Total Condensible Particulate	11.9	10.6	11.8	11.4
Total Filterable and Condensible Particulate	16.5	15.3	17.2	16.3
Filterable Particulate Concentration				
lb/1000 lb (wet)	0.003	0.003	0.003	0.003
lb/1000 lb (dry)	0.003	0.003	0.004	0.003
mg/dscm (dry)	4.0	4.2	4.5	4.2
gr/dscf	0.0017	0.0018	0.0020	0.0018
Filterable Particulate Emission Rate				
lb/ hr	10.17	10.57	12.21	10.98
Condensible Particulate Concentration				
lb/1000 lb (wet)	0.008	0.007	0.007	0.007
lb/1000 lb (dry)	0.008	0.007	0.008	0.008
mg/dscm (dry)	10.4	9.4	9.8	9.8
gr/dscf	0.0045	0.0041	0.0043	0.0043
Condensible Particulate Emission Rate				
lb/ hr	26.39	23.86	26.61	25.62
Total Particulate Concentration				
lb/1000 lb (wet)	0.011	0.010	0.011	0.011
lb/1000 lb (dry)	0.011	0.011	0.011	0.011
mg/dscm (dry)	14.3	13.5	14.3	14.0
gr/dscf	0.0063	0.0059	0.0062	0.0061
Total Particulate Emission Rate				
lb/ hr	36.56	34.43	38.82	36.60

Rev. 14.0
3-20-15 BC

Table 6
Unit 7 USEPA Method 201A/202 PM_{10} Emission Rates

Company	**DTE STCPP**			
Source Designation	**Unit 7**			
Test Date	**3/29/2018**	**3/29/2018**	**3/30/2018**	
Meter/Nozzle Information	Run 1	Run 2	Run 3	Average
Meter Temperature Tm (F)	67.2	69.4	58.6	65.1
Meter Pressure - Pm (in. Hg)	29.3	29.2	29.5	29.3
Measured Sample Volume (Vm)	42.0	41.5	42.8	42.1
Sample Volume (Vm-Std ft3)	40.7	40.0	42.5	41.1
Sample Volume (Vm-Std m3)	1.15	1.13	1.20	1.16
Condensate Volume (Vw-std)	4.715	4.574	4.206	4.498
Gas Density (Ps(std) lbs/ft3) (wet)	0.0750	0.0749	0.0754	0.0751
Gas Density (Ps(std) lbs/ft3) (dry)	0.0782	0.0782	0.0783	0.0782
Total weight of sampled gas (m g lbs) (wet)	3.40	3.34	3.53	3.42
Total weight of sampled gas (m g lbs) (dry)	3.18	3.13	3.33	3.21
Nozzle Size - An (sq. ft.)	0.000102	0.000102	0.000102	0.000102
Isokinetic Variation - I	99.9	98.4	92.8	97.0
Stack Data				
Average Stack Temperature - Ts (F)	270.2	270.0	265.0	268.4
Molecular Weight Stack Gas- dry (Md)	30.3	30.2	30.3	30.3
Molecular Weight Stack Gas-wet (Ms)	29.0	29.0	29.2	29.1
Stack Gas Specific Gravity (Gs)	1.001	1.001	1.008	1.003
Percent Moisture (Bws)	10.38	10.27	9.00	9.88
Water Vapor Volume (fraction)	0.1038	0.1027	0.0900	0.0988
Pressure - Ps ("Hg)	29.0	29.0	29.3	29.1
Average Stack Velocity -Vs (ft/sec)	89.4	89.3	92.6	90.4
Area of Stack (ft2)	201.0	201.0	201.0	201.0
Exhaust Gas Flowrate				
Flowrate ft^3(Actual)	1,077,803	1,076,790	1,116,869	1,090,487
Flowrate ft^3 (Standard Wet)	756,568	754,468	796,102	769,046
Flowrate ft^3 (Standard Dry)	678,029	677,011	724,477	693,172
Flowrate m^3 (standard dry)	19,200	19,171	20,515	19,629
Total Particulate Weights (mg)				
Total Nozzle/Probe/Filter	6.1	5.8	6.1	6.0
Organic Condensible Particulate	1.4	1.6	1.2	1.4
Inorganic Condensible Particulate	12.6	11.0	12.6	12.1
Condensible Blank Correction	2.0	2.0	2.0	2.0
Total Condensible Particulate	11.9	10.6	11.8	11.4
Total Filterable and Condensible Particulate	18.0	16.4	17.9	17.4
Filterable Particulate Concentration				
lb/1000 lb (wet)	0.004	0.004	0.004	0.004
lb/1000 lb (dry)	0.004	0.004	0.004	0.004
mg/dscm (dry)	5.3	5.1	5.1	5.2
gr/dscf	0.0023	0.0022	0.0022	0.0023
Filterable Particulate Emission Rate				
lb/ hr	13.49	13.04	13.79	13.44
Condensible Particulate Concentration				
lb/1000 lb (wet)	0.008	0.007	0.007	0.007
lb/1000 lb (dry)	0.008	0.007	0.008	0.008
mg/dscm (dry)	10.4	9.4	9.8	9.8
gr/dscf	0.0045	0.0041	0.0043	0.0043
Condensible Particulate Emission Rate				
lb/ hr	26.39	23.86	26.61	25.62
Total Particulate Concentration				
lb/1000 lb (wet)	0.012	0.011	0.011	0.011
lb/1000 lb (dry)	0.012	0.012	0.012	0.012
mg/dscm (dry)	15.6	14.5	14.8	15.0
gr/dscf	0.0068	0.0063	0.0065	0.0066
Total Particulate Emission Rate				
lb/ hr	39.88	36.90	40.41	39.06

Rev. 14.0
3-20-15 BC

BTEC Inc.

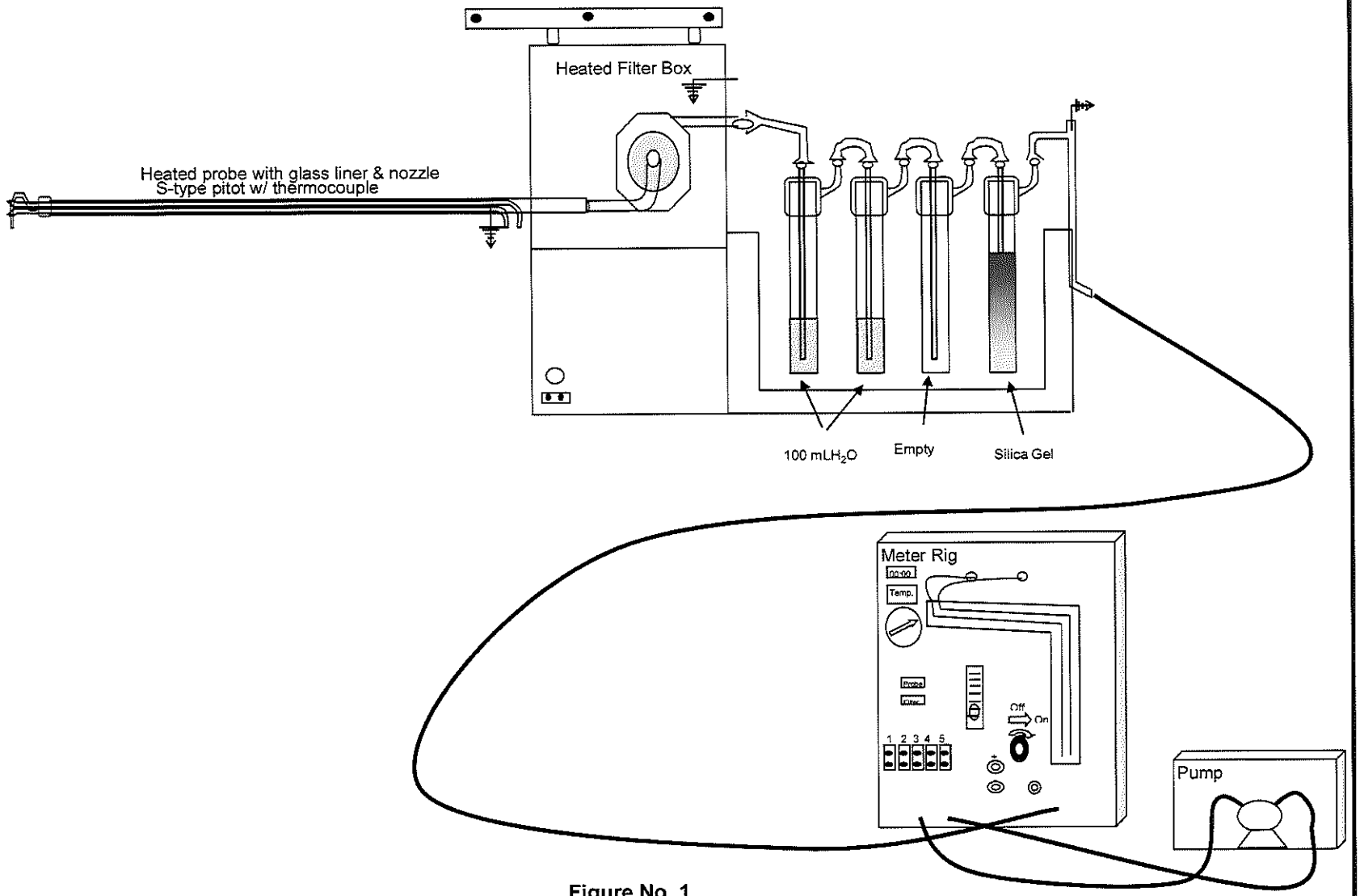


Figure No. 1

Site: **USEPA Method 5** **DTE Energy SCPP** **East China, MI**	**Sampling Date:** **April 3, 2018**	**BT Environmental Consulting, Inc.** **4949 Fernlee Avenue** **Royal Oak, Michigan 48073**

BTEC Inc.

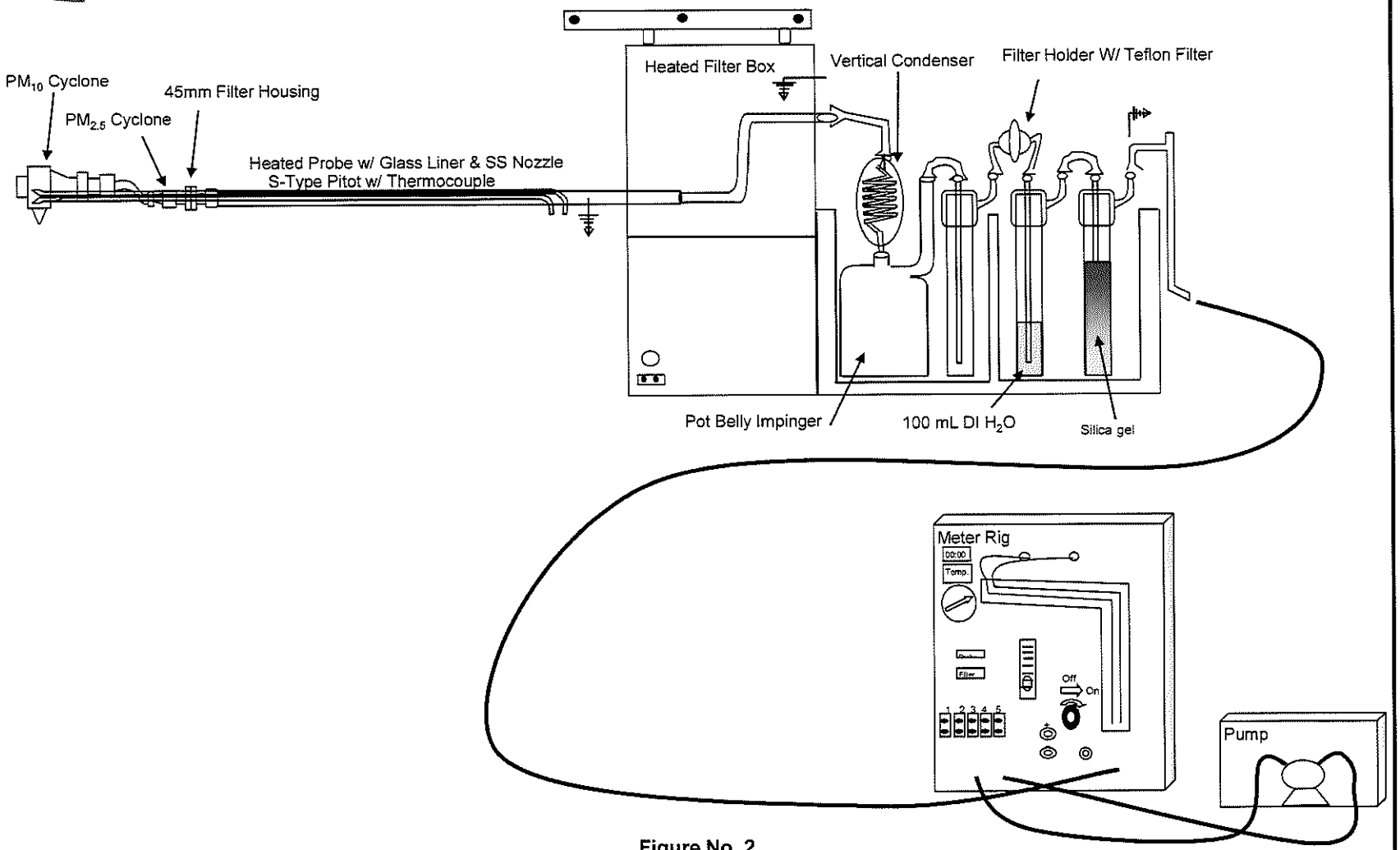
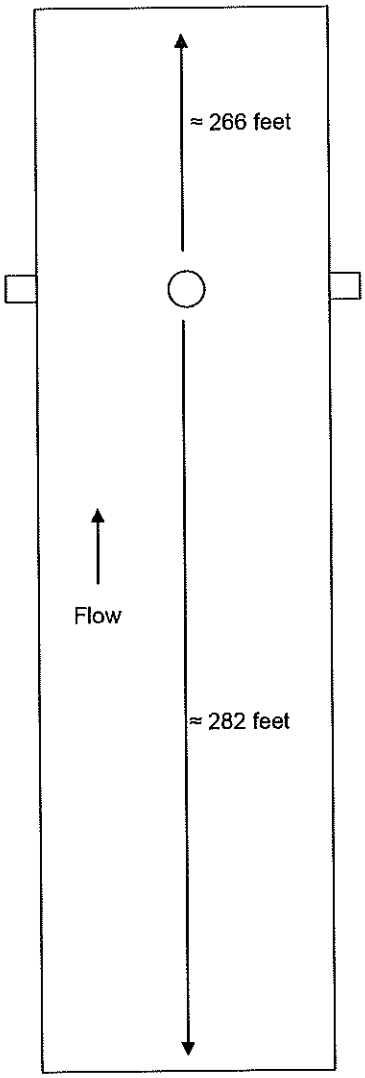


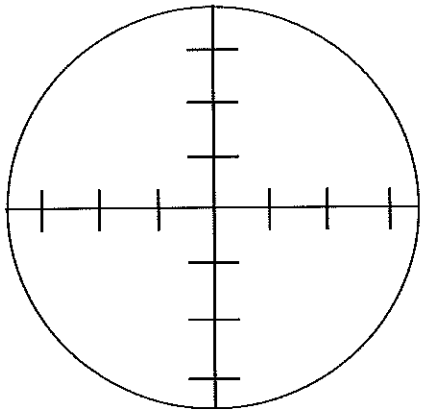
Figure No. 2

Site: **USEPA Method 201A/202** **DTE Energy SCPP** **East China, MI**	**Sampling Date:** **March 29-30, 2018**	**BT Environmental Consulting, Inc.** **4949 Fernlee Avenue** **Royal Oak, Michigan 48073**

BTEC Inc.

diameter = 192 inches





Not to Scale

Points	Distance "
1	8.4
2	28.0
3	56.8
4	135.2
5	164.0
6	183.6

Figure No. 3

Site: **Unit 7** **DTE Energy SCPP** **East China, MI**	**Sampling Date:** **March 29-April 3, 2018**	**BT Environmental Consulting, Inc.** **4949 Fernlee Avenue** **Royal Oak, Michigan 48073**