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COMPLIANCE TEST REPORT

for

RESPONSE CORRELATION AUDIT (RCA)

PARTICULATE MATTER CONTINUOUS EMISSIONS MONITORING SYSTEM (PM CEMS)

UNIT 9 – Stack

Trenton Channel Power Plant
Trenton, Michigan

March 10-15, 2021

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EXECUTIVE SUMMARY

DTE Energy's Environmental Management and Resources (EMR) Ecology, Monitoring, and Remediation Group performed a Response Correlation Audit (RCA) on the Particulate Matter Continuous Emissions Monitoring System (PM CEMS). The RCA was performed on the Unit 9 exhaust stack located at the Trenton Channel Power Plant, in Trenton, Michigan. The testing is required by 40 CFR Part 63, Subpart UUUUU. Testing was performed in accordance with Procedure 2 of 40 CFR Part 60, Appendix F. Testing was conducted between March 10-15, 2021.

A summary of the emission test results is shown below. Criterion for acceptable RCA results are located in Procedure 2 Sec 10.4(5)(i-ii):

	PM CEMS (mg/acm)	RM PM (mg/acm)	PM CEMS (correlation)	Correlation (-25% Emission Limit)	Correlation (+25% Emission Limit)
Run 1	8.0	2.9	2.0	-3.06	7.14
Run 2	7.7	2.5	2.0	-3.11	7.09
Run 3	6.6	2.5	1.8	-3.29	6.91
Run 4	6.4	1.8	1.8	-3.32	6.88
Run 5	6.5	1.5	1.8	-3.31	6.89
Run 7[2]	68.7	12.6	12.2	7.08	17.28
Run 8[1]	67.7	17.0	12.0	6.91	17.11
Run 9	76.0	16.7	13.4	8.30	18.50
Run 10	77.0	14.3	13.6	8.47	18.67
Run 11[1]	72.0	20.7	12.7	7.63	17.83
Run 12[1]	40.1	8.3	7.4	2.30	12.50
Run 13	38.1	8.6	7.1	1.97	12.17
Run 14	44.7	9.1	8.2	3.07	13.27
Run 15	42.3	9.3	7.8	2.67	12.87
Run 16	41.8	8.4	7.7	2.59	12.79
PM CEMS < Greatest PM CEMS Response on correlation regression line				***≤112.4 mg/acm***	***Pass***
9 of 12 PM CEMS and RM w/in 25% of numerical emission limit on correlation regression line					***Pass***

[1]Three runs were discarded

[2]Run 6 discarded due to failed post test leak check

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1.0 INTRODUCTION

DTE Energy's Environmental Management and Safety (EMS) Ecology, Monitoring, and Remediation Group performed a Response Correlation Audit (RCA) on the Particulate Matter Continuous Emissions Monitoring System (PM CEMS). The RCA was performed on the Unit 9 exhaust stack located at the Trenton Channel Power Plant, in Trenton, Michigan. Testing is required by 40 CFR Part 63, Subpart UUUUU. Testing was performed in accordance with Procedure 2 of 40 CFR Part 60, Appendix F. The testing was conducted between March 10-15, 2021.

Testing was performed pursuant to Title 40, *Code of Federal Regulations*, Part 60, Appendix A (40 CFR §60 App. A), Methods 1-5 (MATS Modified). Criterion for acceptable RCA results are located in Part 60, Appendix F Procedure 2 Sec 10.4(5)(i-ii).

The fieldwork was performed in accordance with EPA Reference Methods and EMR's Intent to Test.[1] The following EMS personnel participated in the testing program: Mr. Jason Logan, Environmental Specialist, Mr. Fred Meinecke, Senior Environmental Technician, Mr. Mark Westerberg, Senior Environmental Specialist, Mr. Kenneth St. Amant, Senior Environmental Technician, and Mr. Thomas Snyder, Senior Environmental Specialist. Mr. Logan was the project leader. Mr. Austin Sash, Environmental Engineer at TCPP, provided process coordination for the testing program. Mrs. Regina Angellotti from EGLE was present on March 10 to observe portions of the test event.

2.0 SOURCE DESCRIPTION

The Trenton Channel Power Plant (TCPP) located at 4695 W. Jefferson Avenue, Trenton, Michigan, employs the use of one coal-fired boiler. Boiler 9A is a Combustion Engineering Boiler that has a nameplate capacity of 520 gross megawatts (GMW) and produces 3,915 klb/hr of steam at full load. However, current operating conditions normally limits operations to around 250 GMW and 2,085 klb/hr steam production.

Unit 9A is outfitted with dry sorbent injection system (DSI) to reduce sulfur dioxide and acid gas emissions, and an activated carbon injection (ACI) system to reduce mercury emissions.

Trenton Channel Power Plant utilizes a Sick AG Maihak SP100 dust measuring system. The analyzers utilize a measuring technique based on scattered light principal. The SP100 model is specific for low to medium dust collections.

[1] EGLE, Test Plan, Submitted February 12, 2021. (Attached-Appendix A)

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The following unit was audited:

Unit	Analyzer	Manufacturer/ Model	Analyzer Range	Serial Number
Unit 9	PM	Sick/ Maihak SP100	200 mg/acm	15318415

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	Exhaust Gas Flow Rates	Field data analysis and reduction
USEPA Method 3A	O_2 & CO_2	Instrumental Analyzer Method
USEPA Method 4	Moisture Content	Field data analysis and reduction
USEPA Method 5 - MATS Modified	Particulate Matter	Gravimetric Analysis

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

3.1.1 *Sampling Method*

Stack gas velocity traverses 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 on each unit's exhaust stack, sampling at six (6) points per port for a total of twenty-four (24) points. Velocity traverses were conducted simultaneously with the particulate sampling. See Figure 1 for a diagram of the traverse/sampling points used.

Cyclonic flow checks were performed on each stack during the initial flow monitor certification RATAs. Testing at the sampling location demonstrated that no cyclonic flow was present at either location. No changes to the stacks have occurred since the cyclonic flow checks were performed. Additionally, verifications of null angle at 0° were observed while performing static pressure checks on each unit.

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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 & CARBON DIOXIDE (USEPA Method 3A)

3.2.1 *Sampling Method*

Oxygen (O_2) and carbon dioxide (CO_2) emissions were evaluated using USEPA Method 3A, "Gas Analysis for Carbon Dioxide, Oxygen, Excess Air, and Dry Molecular Weight (Instrumental Analyzer Method)".

3.2.2 *O_2/CO_2 Sampling Train*

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

(1) PTFE sampling line (collecting gas sample from the meter rig exhaust)
(2) Universal® gas conditioner with particulate filter
(3) PTFE connecting line
(4) Servomex 1400 O_2/CO_2 gas analyzer
(5) Appropriate USEPA Protocol 1 calibration gases

3.2.3 *Sampling Train Calibration*

The O_2 and CO_2 analyzers were calibrated per procedures outlined in USEPA Methods 3A. Zero, span, and mid-range calibration gases were introduced directly into the analyzer to verify the instruments linearity, prior to sampling. Upscale and downscale gases were reintroduced to verify instrument drift at the completion of the testing.

3.3 MOISTURE DETERMINATION (USEPA Method 4)

3.3.1 *Sampling Method*

Determination of the moisture content of the exhaust gas was performed using USEPA Method 4, "Determination of Moisture Content in Stack Gases". The moisture was collected in the Method 5 glass impingers, and the percentage of water was then derived from calculations outlined in USEPA Method 4.

3.4 PARTICULATE MATTER (USEPA Method 5 - MATS Modified)

3.4.1 *Filterable Particulate Sampling Method*

USEPA Method 5 - MATS Modified, "Determination of Particulate Emissions from Stationary Sources" was used to measure the filterable (front-half) particulate

emissions (see Figure 2 for a schematic of the sampling train). Triplicate, 60-minute test runs were conducted.

The Method 5 - MATS Modified modular isokinetic stack sampling system consisted of the following:

(1) PTFE coated stainless-steel button-hook nozzle
(2) Heated glass-lined probe
(3) Heated 3" glass filter holder with a quartz filter (Maintained at a temperature of 320 ± 25 °F)
(4) Set of impingers for the collection of condensate for moisture determination
(5) Length of sample line
(6) Environmental Supply® control case equipped with a pump, dry gas meter, and calibrated orifice.

The quartz filters used in the sampling were initially baked for 3 hours at 320 °F, desiccated for 24 hours and weighed to a constant weight as described in Method 5 - MATS Modified 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 PTFE beaker liners and evaporated to dryness at ambient temperature and pressure. The beakers and filters were desiccated for 24 hours and weighed to a constant weight (within 0.5 mg). The data sheets containing the initial and final weights on the filters and beakers can be found in Appendix C.

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 - MATS Modified sampling can be found in Appendix B.

3.4.2 *Quality Control and Assurance*

All sampling and analytical equipment was calibrated per the guidelines referenced in EPA Method 5 - MATS Modified. All Method 1-5 calibration data is in Appendix D.

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3.4.3 *Data Reduction*

The filterable PM emissions data collected during the testing were calculated and reported as mg/acm @ stack conditions.

4.0 OPERATING PARAMETERS

The test program included the collection of PM CEMs emission data and load (GMW) data during each PM emissions test. Operational data collected during the testing is presented in Appendix E.

5.0 DISCUSSION OF RESULTS

Table 1 presents the Unit 9 Reference Method particulate emission testing results (RM PM), particulate matter continuous emissions monitoring system (PM CEMS) results, PM CEMS correlation (expected point on the correlation regression line) value, and ±25% of the emission limit along the correlation regression line. Particulate emissions are presented in milligram per actual cubic meter calculated at stack conditions (mg/acm). In order to pass an RCA, All of the following criteria must be met: Procedure 2 10.4(5)(i-ii).

i) For all 12 data points, the PM CEMS Correlation value can be no greater that the greatest PM CEMS Correlation value used to develop your correlation curve.

ii) At least 75% of a minimum number of 12 sets of PM CEMS and Reference Method measurements must fall within the same specified area on a graph of the correlation regression line. The specified area on the graph of the correlation regression line is defined by two lines parallel to the correlation regression line, offset at a distance of ±25% of the numerical emission limit value from the correlation regression line.

The Procedure 2 10.4(5)(i-ii) criteria were met. Test results are located in Table 1 "Unit 9 PM CEMS RCA Results" and Table 2 "Unit 9 PM CEMS RCA – Summary Graph)."

The auxiliary test data presented in the results 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).

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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

This report prepared by: _____

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RESULTS TABLES

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TABLE NO. 1
RCA TEST RESULTS
PARTICULATE MATTER CONTINUOUS EMISSIONS MONITORING SYSTEM
Trenton Channel Power Plant - EU-BOILER_9A
March 10-15, 2021

Test ID	Date (2019)	Test Time DAHS (24 hour)	Unit Load (GMW)	PM CEMS (mg/acm)[1]	PM CEMS Correlation (mg/acm)[1]	PM RM (mg/acm)[1]	PM Load Range
PM-1	10-Mar	8:07-9:13	189	8.0	2.0	2.9	Low
PM-2	10-Mar	9:45-10:50	189	7.7	2.0	2.5	Low
PM-3	10-Mar	11:38-12:44	189	6.6	1.8	2.5	Low
PM-4	10-Mar	13:17-14:22	189	6.4	1.8	1.8	Low
PM-5	10-Mar	14:40-15:43	189	6.5	1.8	1.5	Low
PM-7[2]	12-Mar	15:51-17:02	396	68.7	12.2	12.6	High
PM-8[3]	12-Mar	17:22-18:27	396	67.7	12.0	17.0	High
PM-9	13-Mar	8:38-9:42	395	76.0	13.4	16.7	High
PM-10	13-Mar	10:06-11:09	396	77.0	13.6	14.3	High
PM-11[3]	13-Mar	11:25-12:29	396	72.0	12.7	20.7	High
PM-12[3]	15-Mar	6:43-7:47	360	40.1	7.4	8.3	Mid
PM-13	15-Mar	8:13-9:16	360	38.1	7.1	8.6	Mid
PM-14	15-Mar	9:37-10:40	360	44.7	8.2	9.1	Mid
PM-15	15-Mar	11:01-12:04	360	42.3	7.8	9.3	Mid
PM-16	15-Mar	12:17-13:20	360	41.8	7.7	8.4	Mid

[1]milligrams per actual cubic meter

[2]PM-6 was discarded due to a failed leak check

[3]Three runs were discarded

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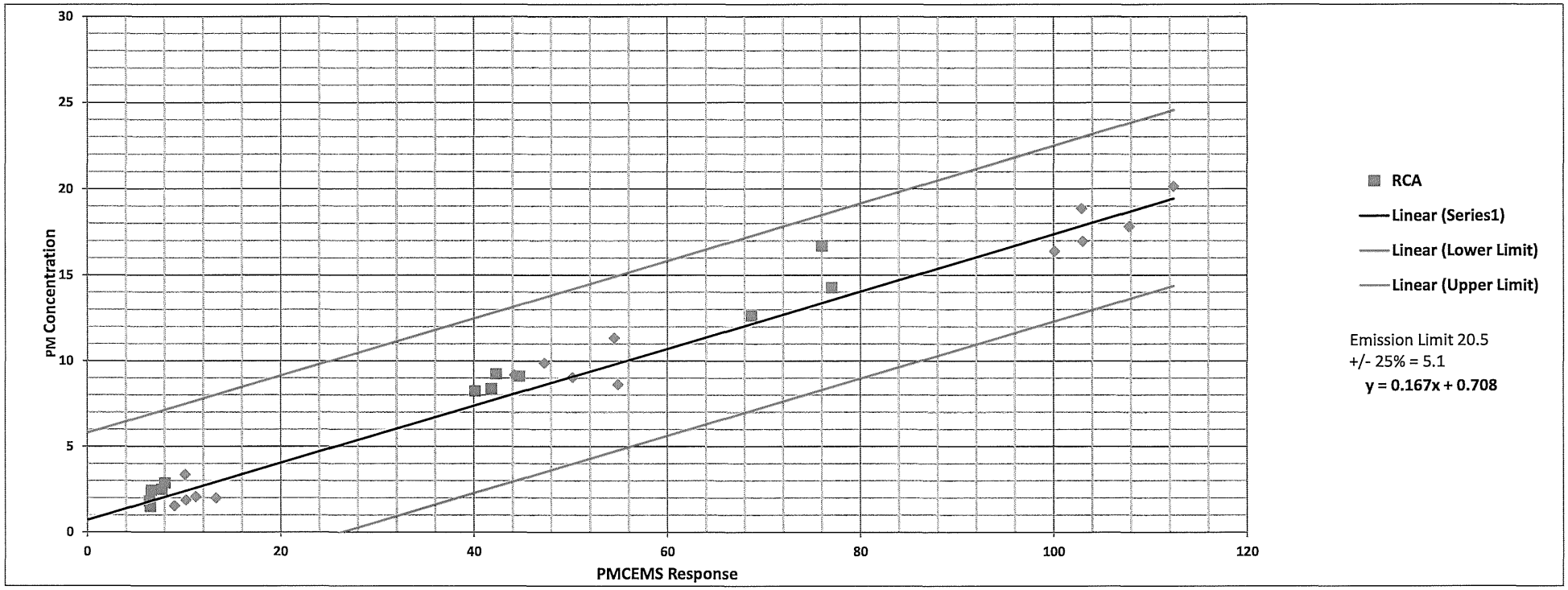
TABLE No. 2
TRENTON CHANNEL POWER PLANT
UNIT 9
PM CEMS RCA
SUMMARY GRAPH
March 10-15, 2021



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FIGURES

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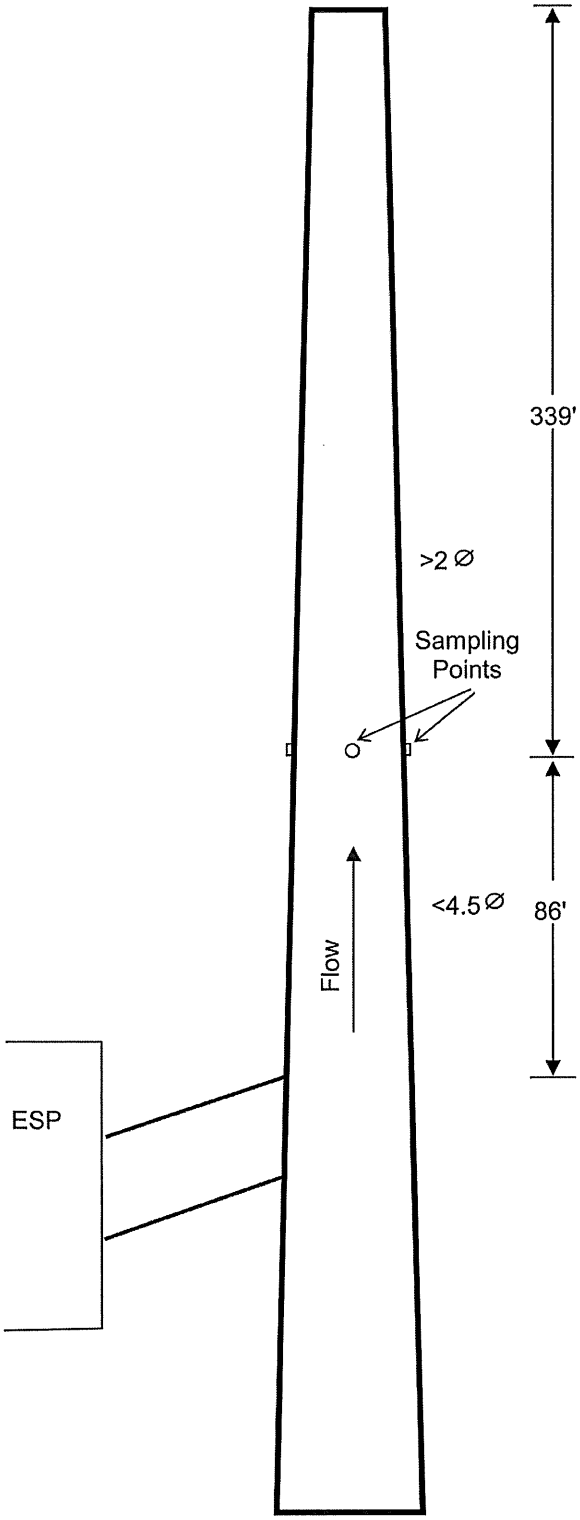
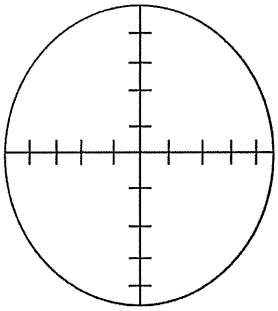
Figure 1 – Sampling Location
Trenton Channel Power Plant – Unit 9



Stack Diameter 221.5"



Velocity Measurement Points

Points	Distance From Inner Wall
1	4.7
2	14.8
3	26.1
4	39.2
5	55.4
6	78.9

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Figure 2 – EPA Method 3A
Trenton Channel Power Plant – EU-BOILER_9A

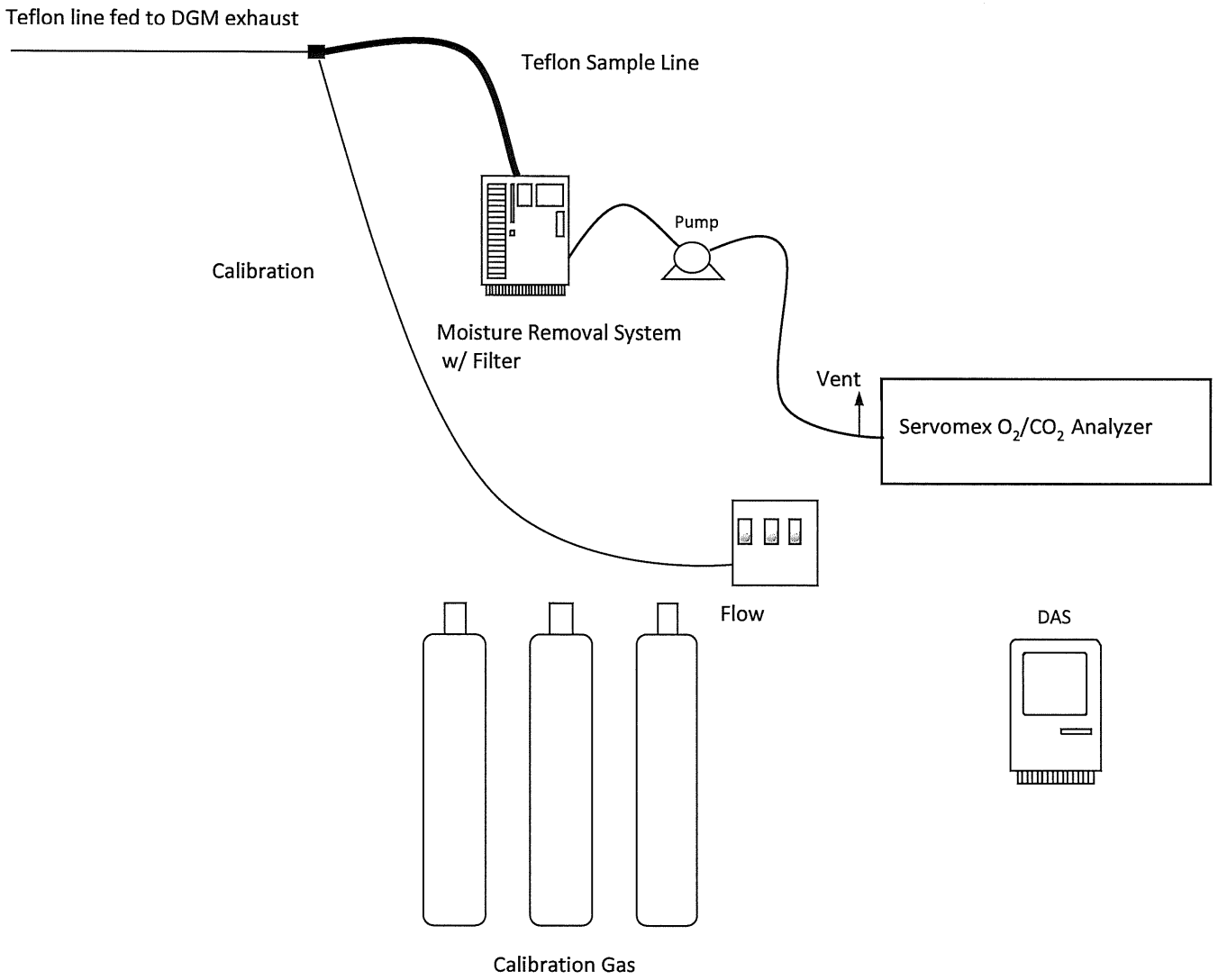

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Figure 3 –Method 5 (MATS Modified)
Trenton Channel Power Plant – EU-BOILER_9A