

Total Particulate Matter Compliance Emissions Test Report

Consumers Energy Company
Covert Generating Station
Combustion Turbine 3 Stack
Covert, Michigan
Project No. M243808
September 17 and 18, 2024





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**Report Submittal Date
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1.0 EXECUTIVE SUMMARY

Mostardi Platt conducted a compliance emissions test program for Consumers Energy Company at the Covert Generating Station in Covert, Michigan, on the Combustion Turbine 3 Stack. This report summarizes the results of the test program and test methods used.

TEST INFORMATION			
Test Location	Test Dates	Test Parameter	Test Methods
Combustion Turbine 3 Stack	September 17 and 18, 2024	Total Particulate Matter (TPM)	Method 5 and Method 202

Consumers Energy Company owns and operates the Covert Generating Station located at 26000 77th Street in Covert, Michigan. The facility consists of three natural gas-fired Mitsubishi 501G turbines with heat recovery steam generators (HRSGs), designated as Emission Unit (EU) EU-TURBINE1, EU-TURBINE2 and EU-TURBINE3. Each HRSG contains a duct burner designated as EU-DB1, EU-DB2 and EU-DB3, respectively, to provide additional steam generating capability and increase the maximum power generating capability of the HRSG. Each duct burner is rated at approximately 256 million British thermal units per hour (MMBtu/hr). Each turbine and duct burner set are equipped with a dry low-NO_x combustor, and each HRSG is equipped with a selective catalytic reduction (SCR) system and an oxidation catalyst to control NO_x and CO emissions.

The stacks are circular and measure 21.792 feet (ft) (261.5 inches) in diameter at the test ports which are approximately 140 ft above grade level with an exit elevation of approximately 160 ft above grade level. The test ports are located approximately 61 ft (732.2 inches) downstream and approximately 20 ft (240 inches) upstream from the nearest disturbances.

A single, dedicated continuous emissions monitoring system (CEMS) is installed at each unit. The CEMS configuration includes a NO_x analyzer, a CO analyzer, and a diluent gas O₂ monitor for measurements at the outlet stack, and a data acquisition and handling system (DAHS).

The purpose of the test program was to demonstrate compliance with PM₁₀ and PM_{2.5} emission limits. In this report, total particulate matter (TPM) is equivalent to particulate matter less than 10 and 2.5 microns (PM_{10/2.5}). Selected results of the test program are summarized below. A complete summary of emission test results follows the narrative portion of this report.

Reference method (RM) run times were recorded in Eastern Standard Time, consistent with the time convention for the plant data acquisition and handling system (DAHS). Also, note that the ending time for DAHS process data in Appendix A is one minute earlier than the listed RM end times. This simply reflects a difference in convention where the RM end time is when the last value was recorded, not the actual last minute of sampling, whereas the process data end time coincides with the last full minute of RM sampling.

TEST RESULTS			
Test Condition	Test Parameter	Measured Emission Rate	Emission Limit
Normal	TPM*	7.834 lb/hr	10.7 lb/hr

* All Particulate Collected was considered less than 2.5 micrometers in diameter

The identification of individuals associated with the test program is summarized below.

TEST PERSONNEL INFORMATION		
Location	Address	Contact
Test Facility	Consumers Energy Covert Generating Facility 26000 77 th Street Covert, Michigan 49043	Chris Head Operations Manager (616) 286-6305 (phone) Chris.A.head@cmsenergy.com
Testing Company Representative	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Nicholas Colangelo Project Manager 630-993-2100 (phone) ncolangelo@mp-mail.com

The test crew consisted of A. Meza, A. Johnsrud, and N. Colangelo of Mostardi Platt.

2.0 TEST METHODOLOGY

Emission testing was conducted following the methods specified in 40 CFR, Part 60, Appendix A, and 40 CFR, Part 51, Appendix M. Plant Operating Data can be found in Appendix A. Schematics of the test section diagram and sampling train used are included in Appendices B and C, respectively. Calculation examples and nomenclature are included in Appendix D. Sample analysis data are located in Appendix E. Reference method data and field data sheets are found in Appendices F and G, respectively.

The following methodologies were used during the test program:

Method 1 Traverse Point Determination

Test measurement points were selected in accordance with Method 1. The characteristics of the measurement location are summarized below.

TEST POINT INFORMATION						
Location	Diameter (Feet)	Area (Square Feet)	Upstream Distance (Diameters)	Downstream Distance (Diameters)	Test Parameter	Number of Sampling Points
Combustion Turbine 3 Stack	21.792	372.97	0.9	2.8	TPM	24

Method 2 Volumetric Flowrate Determination

Gas velocity was measured following Method 2, for purposes of calculating stack gas volumetric flow rate. An S-type pitot tube, differential pressure gauge, Thermocouple and temperature readout were used to determine gas velocity at each sample point. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix F.

Method 3A Oxygen (O₂)/Carbon Dioxide (CO₂) Determination

Stack gas molecular weight was determined in accordance with Method 3A. An ECOM analyzer was used to determine stack gas oxygen and carbon dioxide content and, by difference, nitrogen content. All of the equipment used was calibrated in accordance with the specifications of the Method and calibration data are included in Appendix H. Copies of the gas cylinder certifications are included in Appendix I.

Method 5 Particulate Determination

Stack gas particulate concentrations and emission rates were determined in accordance with Method 5, 40 CFR, Part 60, Appendix A at the test location. An Environmental Supply Company, Inc. sampling train was used to sample stack gas at an isokinetic rate, as specified in the Method. Particulate matter in the sample probe was recovered using an acetone rinse. The probe wash and filter catch were analyzed by Mostardi Platt in accordance with the Method in the Elmhurst, Illinois laboratory. Laboratory data are found in Appendix E. All of the equipment used was calibrated in accordance with the specifications of the Method. Field data sheets are provided in Appendix G and calibration data are presented in Appendix H.

Method 202 Condensable Particulate Determination

Stack gas condensable particulate matter concentrations and emission rates were determined in accordance with USEPA Method 202, in conjunction with Method 5 filterable particulate sampling. This method applies to the determination of condensable particulate matter (CPM) emissions from stationary sources. It is intended to represent condensable matter as material that condenses after passing through a filter and as measured by this method.

The CPM was collected in the impinger portion of the Method 5 (Appendix A, 40CFR60) type sampling trains. The impinger contents were immediately purged after each run with nitrogen (N₂) to remove dissolved sulfur dioxide (SO₂) gases from the impinger contents. The impinger contents were collected and rinsed with DI water, acetone, and hexane. The impinger solution was then extracted with hexane. The organic and aqueous fractions were then taken to dryness and the residues weighed. The total of both fractions represents the CPM.

All sample recovery was performed at the test site by the test crew. Mostardi Platt personnel at the laboratory in Elmhurst, Illinois, performed all final particulate sample analyses. Laboratory data are found in Appendix E. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H.

3.0 TEST RESULTS SUMMARIES

Client: Consumers Energy
 Facility: New Covert Generating Facility
 Test Location: CT 3 Stack
 Test Method: 5/202

Source Condition	Normal	Normal	Normal	
Date	9/17/24	9/17/24	9/18/24	
Start Time	8:42	14:05	8:40	
End Time	13:27	18:25	13:08	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	199.2	198.1	198.6	198.6
Flue Gas Moisture, percent by volume	7.4%	9.6%	9.7%	8.9%
Average Flue Pressure, in. Hg	29.41	29.41	29.31	29.38
Gas Sample Volume, dscf	183.057	182.291	171.359	178.902
Average Gas Velocity, ft/sec	64.123	61.692	58.261	61.359
Gas Volumetric Flow Rate, acfm	1,434,939	1,380,546	1,303,759	1,373,081
Gas Volumetric Flow Rate, dscfm	1,046,013	984,153	924,269	984,812
Gas Volumetric Flow Rate, scfm	1,129,795	1,088,867	1,023,855	1,080,839
Average %CO ₂ by volume, dry basis	4.7	4.8	4.8	4.8
Average %O ₂ by volume, dry basis	12.7	12.7	12.7	12.7
Isokinetic Variance	99.4	105.2	105.3	103.3
Standard Fuel Factor Fd, dscf/mmBtu	8,710.0	8,710.0	8,710.0	8,710.0
Filterable Particulate Matter (Method 5)				
grams collected	0.01447	0.00400	0.00267	0.00705
grains/acf	0.0009	0.0002	0.0002	0.0004
grains/dscf	0.0012	0.0003	0.0002	0.0006
lb/hr	10.936	2.856	1.905	5.232
lb/mmBtu (Standard Fd Factor)	0.0039	0.0011	0.0008	0.0019
Condensable Particulate Matter (Method 202)				
grams collected	0.00394	0.00301	0.00375	0.00357
grains/acf	0.0002	0.0002	0.0002	0.0002
grains/dscf	0.0003	0.0003	0.0003	0.0003
lb/hr	2.978	2.149	2.675	2.601
lb/mmBtu (Standard Fd Factor)	0.0011	0.0008	0.0011	0.0010
Total Particulate Matter (5/202)				
grams collected	0.01841	0.00701	0.00642	0.01061
grains/acf	0.0011	0.0004	0.0004	0.0006
grains/dscf	0.0015	0.0006	0.0005	0.0009
lb/hr	13.914	5.005	4.580	7.833
lb/mmBtu (Standard Fd Factor)	0.0050	0.0019	0.0019	0.0029