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DRAFT

EMISSIONS PERFORMANCE TEST PROGRAM

Performed For
Michigan South Central Power Agency

Performed At
Coldwater Peaking Plant
Engine Group (FGGEN1-3)
Emission Units: EUGEN1, EUGEN2, and EUGEN3
Coldwater, Michigan

Test Dates
October 14 and 15, 2015

Report No.
TRC Environmental Corporation Report 238252B

Report Submittal Date
November 13, 2015

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1.0 INTRODUCTION

TRC Environmental Corporation (TRC) performed an emission compliance test program on the Engine Group (FGGEN1-3) at the Coldwater Peaking Plant of Michigan South Central Power Agency (MSCPA) in Coldwater, Michigan on October 14 and 15, 2015. The tests were authorized by and performed for MSCPA.

The purpose of this test program was to determine Volatile Organic Compounds (VOC) emission rates during normal operating conditions. The results of the test program will be used in order to determine compliance with the emission limits in the Michigan Department of Environmental Quality (MDEQ) Permit to Install (PTI) 80-14. The test program was conducted according to the TRC Test Protocol 238252 Revision 1, dated September 24, 2015.

1.1 Project Contact Information

Participants		
Test Facility	Coldwater Peaking Plant 250 North Filmore Road Coldwater, Michigan 49036	Mr. Matt Burk Michigan South Central Power Agency Director of Environmental Compliance 517-542-2346 Ext. 370 (phone) burkm@mscpa.net
Air Emissions Testing Body (AETB)	TRC Environmental Corporation 7521 Brush Hill Road Burr Ridge, Illinois 60527	Mr. Gavin Lewis Field Team Leader 312-533-2042 (phone) 312-533-2070 (fax) glewis@trcsolutions.com

The tests were conducted by Ricardo Nunez and Gavin Lewis of TRC. Documentation of the on-site ASTM D7036-04 Qualified Individual(s) (QI) can be located in the appendix to this report.

1.2 Facility Description

The Coldwater Peaking Plant operates three 6,023 horsepower natural gas-fueled engines with associated 4,348 kilowatts generators for electrical generation during peak (grid) demand periods. The total nominal capacity is approximately 13.0 MWe.

2.0 SUMMARY OF RESULTS

The results of this test program are summarized in the table below. Detailed individual run results are presented in Section 6.0.

Parameter	Units	Engine 1*	Engine 2*	Engine 3	Emission Limit
VOC	lb/MMBtu	0.002	0.00	0.012	0.056

* Note – Negative value presented as zero.

The table below summarizes the test methods used, as well as the number and duration of each at each test location:

Unit ID/ Sample Location	Parameter Measured	Test Method	No. of Runs	Run Duration
EUGN1, EUGEN2, EUGEN3	Moisture	USEPA 4	3	30 min
	O2	USEPA 3A	3	60 min
	Non-Methane Organic Concentration as VOC	USEPA 25A	3	60 min

3.0 DISCUSSION OF RESULTS

No problems were encountered with the testing equipment during the test program. Source operation appeared normal during the entire test program. No changes or problems were encountered that required modification of any procedures presented in the test plan. No adverse test or environmental conditions were encountered during the conduct of this test program.

4.0 SAMPLING AND ANALYSIS PROCEDURES

All testing, sampling, analytical, and calibration procedures used for this test program were performed in accordance with the methods presented in the following sections. Where applicable, the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods, USEPA 600/R-94/038c, September 1994 was used to supplement procedures.

4.1 Determination of the Concentration of Gaseous Pollutants Using a Multi-Pollutant Sampling System

Concentrations of the pollutants in the following sub-sections were determined using one sampling system. The number of points at which sample was collected was determined in accordance with Method 7E specifications.

A straight-extractive sampling system was used. A data logger continuously recorded pollutant concentrations and generated one-minute averages of those concentrations. All calibrations and system checks were conducted using USEPA Protocol 1 gases. Three-point linearity checks were performed prior to sampling, and in the event of a failing system bias or drift test (and subsequent corrective action). System bias and drift checks were performed using the low-level gas and either the mid- or high-level gas prior to and following each test run.

4.1.1 CO_2 Determination by USEPA Method 3A

This method is applicable for the determination of CO_2 concentrations in controlled and uncontrolled emissions from stationary sources only when specified within the regulations. The CO_2 analyzer was equipped with a non-dispersive infrared (IR) detector.

4.1.2 O_2 Determination by USEPA Method 3A

This method is applicable for the determination of O_2 concentrations in controlled and uncontrolled emissions from stationary sources only when specified within the regulations. The O_2 analyzer was equipped with a paramagnetic-based detector.

4.2 Moisture Determination by USEPA Method 4

This method is applicable for the determination of the moisture content of stack gas.

A gas sample was extracted at a constant rate from the source. Moisture was removed from the sample stream by a series of pre-weighed impingers immersed in an ice bath. A minimum of 21 dry standard cubic feet of flue gas was collected during each sample run.

4.3 Total Organic Concentration Determination by USEPA Method 25A

This method is applicable for the determination of total gaseous organic concentration of vapors consisting primarily of alkanes, alkenes, and/or arenes (aromatic hydrocarbons). The concentration is expressed in terms of propane (or other appropriate organic calibration gas) or in terms of carbon.

A gas sample was extracted from the source through a heated sample line and glass fiber filter to a flame ionization analyzer (FIA). If necessary, a source-

specific response factor was developed for the FIA. The FIA used for the test was equipped with a methane cutter, as described in 40 CFR 1065.265, in order to determine non-methane organic concentrations, which were considered as VOC. Propane certified standards were utilized to calibrate the FIA.

5.0 QUALITY ASSURANCE PROCEDURES

TRC integrates our Quality Management System (QMS) into every aspect of our testing service. We follow the procedures specified in current published versions of the test Method(s) referenced in this report. Any modifications or deviations are specifically identified in the body of the report. We routinely participate in independent, third party audits of our activities, and maintain:

- Accreditation from the Louisiana Environmental Laboratory Accreditation Program (LELAP);
- Accreditation from the Stack Testing Accreditation Council (STAC) and the American Association for Laboratory Accreditation (A2LA) that our operations conform with the requirements of ASTM D 7036 as an Air Emission Testing Body (AETB).

These accreditations demonstrate that our systems for training, equipment maintenance and calibration, document control and project management will fully ensure that project objectives are achieved in a timely and efficient manner with a strict commitment to quality.

All calibrations are performed in accordance with the test Method(s) identified in this report. If a Method allows for more than one calibration approach, or if approved alternatives are available, the calibration documentation in the appendices specifies which approach was used. All measurement devices are calibrated or verified at set intervals against standards traceable to the National Institute of Standards and Technology (NIST). NIST traceability information is available upon request.

ASTM D7036-04 specifies that: *"AETBs shall have and shall apply procedures for estimating the uncertainty of measurement. Conformance with this section may be demonstrated by the use of approved test protocols for all tests. When such protocols are used, reference shall be made to published literature, when available, where estimates of uncertainty for test methods may be found."* TRC conforms with this section by using approved test protocols for all tests.

6.0 TEST RESULTS SUMMARY

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Method 25A Test Results Summary

Project Number:	238252	Test Date(s):	10/14/15
Customer:	MSCPA	Facility:	Coldwater, MI
Unit Identification:	Engine 1	Recorded by:	Gavin Lewis

Location	Source 1			
Test Run No.	1	2	3	Average
Test Date	10/14/2015	10/14/2015	10/14/2015	
Test Time - Start	9:10	10:37	12:05	
Test Time - End	10:09	11:36	13:04	
NMHC (ppmvw as Propane)	2.46	0.00	0.00	0.82
Moisture Content (%)	7.7	10.4	10.5	9.5
NMHC (ppmvd as Propane)	2.67	0.00	0.00	0.89
O_2 (% dry)	10.9	11.0	10.9	10.9
F_d	8710	8710	8710	8710
NMHC - F_d Basis (lb/MMBTU)	0.006	0.000	0.000	0.002

Note: Negative value presented as zero.

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Method 25A Test Results Summary

Project Number:	238252	Test Date(s):	10/14/15
Customer:	MSCPA	Facility:	Coldwater, MI
Unit Identification:	Engine 2	Recorded by:	Gavin Lewis

Location	Source 1			
Test Run No.	1	2	3	Average
Test Date	10/14/2015	10/14/2015	10/14/2015	
Test Time - Start	13:55	15:21	16:55	
Test Time - End	14:54	16:20	17:54	
NMHC (ppmvw as Propane)	0.00	0.00	0.00	0.00
Moisture Content (%)	10.7	11.0	11.1	10.9
NMHC (ppmvd as Propane)	0.00	0.00	0.00	0.00
O_2 (% dry)	11.0	11.0	11.0	11.0
F_d	8710	8710	8710	8710
NMHC - F_d Basis (lb/MMBTU)	0.000	0.000	0.000	0.000

Note: Negative value presented as zero.

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Method 25A Test Results Summary

Project Number:	238252	Test Date(s):	10/15/15
Customer:	MSCPA	Facility:	Coldwater, MI
Unit Identification:	Engine 3	Recorded by:	Gavin Lewis

Location	Source 1			
Test Run No.	1	2	3	Average
Test Date	10/15/2015	10/15/2015	10/15/2015	
Test Time - Start	9:05	10:35	12:05	
Test Time - End	10:04	11:34	13:04	
NMHC (ppmvw as Propane)	7.16	4.45	4.52	5.38
Moisture Content (%)	10.7	11.0	11.1	10.9
NMHC (ppmvd as Propane)	8.02	5.00	5.08	6.03
O_2 (% dry)	10.8	11.0	10.8	10.9
F_d	8710	8710	8710	8710
NMHC - F_d Basis (lb/MMBTU)	0.017	0.010	0.010	0.012