Reciprocating Internal Combustion Engine (RICE) National Emissions Standard for Hazardous Air Pollutants (NESHAP) Site-Specific Monitoring Plan

Compression Ignition Diesel Fuel-Fired Engine Generators Units EU-WMSENGINE1, EU-WMSENGINE2, EU-WMSENGINE3

Prepared for

Wyandotte Municipal Services
Wyandotte, Michigan

Updated August 2021

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Contents

List of Tables

List of Appendices, Attachments, or Exhibits

1.0 Introduction

This site-specific monitoring plan provides the information and procedures required to ensure proper monitoring of the operation of the emission control equipment installed on Wyandotte Municipal Services' three 1825 kW diesel generators. These procedures are also required to meet the requirements of Reciprocating Internal Combustion Engine (RICE) National Emissions Standard for Hazardous Air Pollutants (NESHAP) rule found in 40 CFR Subpart ZZZZ §63.6625 (b)(1) through (5). These requirements are as follows:

§63.6225(b) If you are required to install a continuous parameter monitoring system (CPMS) as specified in Table 5 of this subpart, you must install, operate, and maintain each CPMS according to the requirements in paragraphs (b)(1) through (6) of this section. For an affected source that is complying with the emission limitations and operating limitations on March 9, 2011, the requirements in paragraph (b) of this section are applicable September 6, 2011.

(1) You must prepare a site-specific monitoring plan that addresses the monitoring system design, data collection, and the quality assurance and quality control elements outlined in paragraphs (b)(1)(i) through (v) of this section and in §63.8(d). As specified in §63.8(f)(4), you may request approval of monitoring system quality assurance and quality control procedures alternative to those specified in paragraphs (b)(1) through (5) of this section in your site-specific monitoring plan.

(i) The performance criteria and design specifications for the monitoring system equipment, including the sample interface, detector signal analyzer, and data acquisition and calculations;

(ii) Sampling interface (e.g., thermocouple) location such that the monitoring system will provide representative measurements;

(iii) Equipment performance evaluations, system accuracy audits, or other audit procedures;

(iv) Ongoing operation and maintenance procedures in accordance with provisions in §63.8(c)(1)(ii) and (c)(3); and

(v) Ongoing reporting and recordkeeping procedures in accordance with provisions in §63.10(c), (e)(1), and (e)(2)(i).

(2) You must install, operate, and maintain each CPMS in continuous operation according to the procedures in your site-specific monitoring plan.

(3) The CPMS must collect data at least once every 15 minutes (see also §63.6635).

(4) For a CPMS for measuring temperature range, the temperature sensor must have a minimum tolerance of 2.8 degrees Celsius (5 degrees Fahrenheit) or 1 percent of the measurement range, whichever is larger.

(5) You must conduct the CPMS equipment performance evaluation, system accuracy audits, or other audit procedures specified in your site-specific monitoring plan at least annually.

(6) You must conduct a performance evaluation of each CPMS in accordance with your site-specific monitoring plan.

Additionally, this document provides information on required recordkeeping for the emission system, as well as reporting requirements as defined by the rule and the site Renewable Operating Permit (ROP). Requirements for the engines appear in the ROP under flexible group FGWMSENGINES.

2.0 Emission System Design

The installed RICE NESHAP Emission Control System consists of a diesel oxidation catalyst (DOC) and a monitoring system. The detail of the manufacturer, model numbers, operations, part numbers, and more can be found in the system Operation and Maintenance (O&M) manuals. The O&M manuals will provide back-up information in support of this site-specific monitoring plan and should be maintained as key reference documents for the emission control system.

The engines installed at WMS are CAT Model 3516 manufactured on May 3, 2006 rated at 2880 hp with a displacement volume of 69 L. The associated generators are CAT model SR4BHV with maximum capacity of 1825 KW. These engines are manufactured to meet EPA Tier 1 emission standards in 40 CFR 89 Subpart D.

2.1 Diesel Oxidation Catalyst

The NESHAP rule requires DOC used to reduce the hazardous air pollutants (HAP) which are the primary target of this regulation. The DOC may vary in physical size and configuration and may be combined with other exhaust components (such as a silencer). Despite these variations, the DOC will consist of a housing or enclosure and the catalytic filter elements. The catalyst filter elements are the active component of this system and uses heat and the chemistry of the catalyst material to change HAP found in the exhaust to non-HAP gases. The DOCs are in cartridges which can be removed for cleaning or replacement. In the typical non-emergency application, the filters should provide many years of proper operation and should not require any attention on a short-term basis. Details of the DOC filters, access, cleaning and replacement can be found in the O&M manuals.

2.2 Monitoring System

The NESHAP and ROP requires that the emission control system includes the ability to continuously monitor temperature and at least a monthly pressure drop of the DOC. The monitoring system tracks the performance parameters that keep the overall emission system, and specifically the DOC, within acceptable operating limits. The remainder of this document describes the operational parameters of the monitoring system and how the owner/operator interacts, controls, and responds to measurements taken with the monitoring system.

3.0 Continuous Monitoring System (CMS) Design

The Continuous Monitoring System (CMS) was designed to meet or exceed the requirements as set forth in the RICE NESHAP and ROP. This includes the ability to monitor, record and alarm the temperature of the exhaust gas coming into the catalyst on a continuous basis. The system can also monitor the pressure drop across the catalyst and record at least monthly. The system installed includes a controller, dual temperature sensors (right and left exhaust), and a differential pressure sensor.

3.1 Controller

The installed controller is designed to read the outputs from the temperature and pressure sensors, and to display warnings and alarms with regard to controller operation, temperature, or pressure readings. The controller is capable of displaying continuous operating data, and is networked to export measured data in real-time to the plant's OSIsoft Process Information (PI) database, where the monitored data is stored long-term. Measured data can then be accessed through the PI ProcessBook software by specifying the tag and date range for the desired data.

Alarms from the engine control system generate a diagnostic code that is stored in the control system's permanent memory. The control system's permanent memory stores the hour of the first occurrence of a given code, the hour of the last occurrence of the given code, and the number of occurrences of a given code. Diagnostic codes stored in the system's permanent memory are reviewed and resolved during regularly scheduled engine maintenance.

3.2 Temperature Sensors

The Monitoring System design includes temperature sensors to perform continuous monitoring. The engine exhaust temperature sensors are pre-installed type-K thermocouples that are located on the right and left exhaust from the engine prior to entry into the catalyst inlet. The make and model numbers of the temperature sensors are confidential, but they are able to operate throughout a temperature range of -40°F to 1562°F with accuracy effects up to ±8 °F (which meets the 1% of measurement range under 63.6225(b)(4)). The controller transfers temperature readings for both temperature sensors to the plant's PI database.

Each temperature sensor can be used to accomplish the temperature sensor accuracy audits. In the event that one of the temperature sensors fails, the other temperature sensor readings can be used to represent the overall catalyst temperature and comply with the continuous monitoring requirement. The average temperature readings are used for comparison to the required temperature range of ≥450˚F and ≤1350˚F (ROP FGWMSENGINES SC IV.1). In the event that the data link between an engine control system and the PI database fails, an operator is sent to the Diesel Generating Station to manually record the temperatures at a minimum of 15 minute intervals for the duration of Diesel Generator operation using a manual log (see Appendix 1).

3.3 Pressure Sensors

The Monitoring System design includes a differential pressure sensor to measure the pressure drop across the DOC. Each engine is equipped with at least one differential pressure indicating transmitter and may have a redundant transmitter for backup purposes. These differential pressure monitors can meet the recommended monitoring accuracy of ± 2 inches H_2O for recording pressure drop across the catalyst.

The differential pressure sensors are used to perform monthly monitoring to meet the ROP and NESHAP requirements of monthly checks of the catalyst pressure drop. The differential pressure monitors are networked to transfer pressure readings to the plant's PI database. In the event that the network connection fails, an operator is sent to the Diesel Generating Station to manually record the catalyst pressure using a manual log (see Appendix 1).

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4.0 Equipment Operation

The Monitoring System is designed to require little to no assistance from the owner/operator. During normal operation, the only necessary actions to be taken include regular visual inspections of the CPMS to confirm that no alarm conditions have occurred and downloading data-log information from PI on a periodic basis.

4.1 Controller Operation

The controller is networked to transfer measured data to the plant's PI database, which is accessible on various computers at the plant. The PI server, which is stored and maintained by WMS, has sufficient memory capacity to store data for more than 5 years. For redundancy, WMS may record engine temperature and pressure data stored on the PI database into Engine Tracking logs following each month that a Diesel Engine is tested.

The PI database is updated to record and display operating parameters in real-time. The PI database records the operating data at an interval that varies based upon the significance of data variability. During normal operation of each engine, temperature data is collected by the controller at an interval less than the NESHAP maximum interval of 15 minutes. Pressure data is collected monthly per the ROP and NESHAP requirements.

5.0 System Maintenance

Necessary parts for routine repairs of the monitoring system are readily available on site. The following maintenance procedures should be followed.

Annually:

1. *Check mechanical tubing connections serving pressure sensors for leakage or condensation.*
2. *Check catalyst inlet temperature and catalyst pressure sensors*
3. *Inspect electrical connections for corrosion.*
4. *Review and address active alarms and diagnostic codes stored in the engine control system pertaining to temperature or pressure sensors.*

6.0 Recordkeeping Procedures

To comply with the NESHAP, all required CMS measurements shall be archived including the total process operating time during the reporting period. If the CMS was inoperative, out of control, or exceeded any operating parameters, the date and times of these incidents shall be recorded. If the causes of these are known, the cause shall be recorded along with any corrective actions or preventative measures taken. In addition, the following recordkeeping procedures are recommended.

Monthly (during months that Diesel Engines operate):

1. For data retention purposes, export Diesel Engine operating data from PI database into Microsoft Excel Engine Tracking spreadsheet; or
2. Maintain written copies of the WMS Power Plant Diesel Generator Operation Tracking Log.

Should one of the temperature sensors (left or right exhaust) fail to record data, the remaining temperature sensor will be used as a backup reading for the time period. Should the PI system fail to record data, the user should manually record temperature reading at least every 15 minutes and pressure reading once per month. The user will note the date and time of any such failure and investigate and correct the problem as soon as possible. However, the manually recorded data will serve as the record and the system is not inoperative or out of control.

7.0 Accuracy Audits

Accuracy Audits of the system measurement sensors are required to comply with NESHAP. Accuracy audits must be completed annually following the procedure outlined below. The annual accuracy audits may or may not correspond to the dates of the semiannual recordkeeping of EPA Semiannual Compliance Reports. If it is more convenient to do accuracy audits on a different schedule, that is acceptable.

For the purpose of developing the Accuracy Audit procedure, the out of control definitions for CMS systems under 40 CFR 63.8(c)(7) were reviewed. The out of control period definitions in 40 CFR 63.8(c)(7)(i) were determined to address conditions applying specifically to CEMS analyzers, and do not apply to monitoring required under the RICE NESHAP. The definition of "out of control" is typically based on daily calibration drift checks for CEMS. The monitoring equipment installed on the CAT engines that is used for compliance with the RICE NESHAP does not typically involve frequent periodic drift tests because the equipment is not designed for that purpose.

Annually:

1. Annual Temperature Sensor Accuracy Audit
    a. If the CAT engine maintenance vendor identifies temperature sensor alarms during annual maintenance inspection, resolve during the annual maintenance or schedule maintenance as necessary to resolve the diagnostic codes or replace the affected temperature sensors with equipment that is suitable for the conditions.
    b. File copies of CAT Engine maintenance records and any applicable correspondence with the maintenance vendor in the environmental office for future reference.
2. Annual Pressure Sensor Accuracy Audit
    a. Complete calibration procedures for all CAT engine catalyst differential pressure transmitters by following vendor recommended calibration procedures or equivalent calibration procedures. Complete an instrument calibration form for each differential pressure transmitter (example form in Appendix 2).
    b. Pressure Transmitters
        i. If the zero, span, and intermediate pressure readings are within +/- 2.0 in. H_2O of the control pressure source, the accuracy of the pressure sensor is confirmed.
        ii. If the any of the zero, span, or intermediate pressure differences between the pressure transmitter and control pressure source are greater than +/- 2.0 in. H_2O, calibrate, correct, or replace the pressure transmitter. A calibration shall not be considered to be complete until the zero, span, and intermediate pressure readings are within +/- 2.0 in. H_2O of the control pressure source.
    c. File copies of the completed instrument calibration forms at the environmental office for future reference.

For further information regarding sensor part numbers, calibration and replacement procedures refer to the provided O&M manual. If assistance is needed in calibrating or replacing the sensors, contact CAT for assistance.

8.0 Reporting Procedures

The NESHAP requires that owner/operators provide semiannual Compliance Reports. Reports are to be postmarked or delivered to the responsible authority no later than September 15 and March 15 following the end of the half year that the report covers. These dates are specified by the ROP and are not flexible.

If the system had a malfunction during the reporting period, the Compliance Report must include the number, duration, and a brief description for each type of malfunction which occurred during the reporting period and which caused or may have caused any applicable emission limitation to be exceeded. The report must also include a description of actions taken by an owner/operator during a malfunction of an affected source to minimize emissions, including actions taken to correct a malfunction. An example of the Semiannual Compliance Report can be found in Appendix 3 of this document. Copies of the Semiannual Compliance Reports must be retained for 5 years.

9.0 Performance Tests

The NESHAP and ROP permit conditions require that WMS conduct performance tests each engine every 8,760 operating hours or every three years (whichever comes first) to demonstrate that the required CO percentage reduction is achieved, and one engine every five years to verify the NOx emission rates.

10.0 Maintenance/Audit/Recordkeeping/Reporting Summary

The following table summarizes the owner/operator requirements to comply with the site-specific monitoring plan as outlined in this document. The summary below applies to the CAT engines.

Table 10-1 Owner/Operator Compliance Requirements

Time	Description
After Each Run	Ensure temperature and pressure drop monitoring systems are operational and information is being collected in PI. Log operational information as a backup method, if required.
September 15th	Submit semiannual Subpart ZZZZ monitoring deviation report (1-2Q)
March 15th	Submit semiannual Subpart ZZZZ monitoring deviation report (3-4Q)
Annually	Check temperature and pressure sensor calibration/operation
8,760 operating hours or every three years (Whichever comes first)	Complete compliance stack testing for CO destruction efficiency

Appendix 1

Example WMS Power Plant Diesel Generator Operation Tracking Log

Wyandotte Municipal Services Power Plant - Diesel Generator Operation Tracking Log

Date:	
Start Time:	
End Time:	

Diesel Generator #	

10,000 Gal Diesel Tank Level After Running: _____

Record operating parameters **every 10 minutes** while running. Provide copy of log to Environmental.

Description	Atmospheric Pressure	Left Exhaust Temperature	Right Exhaust Temperature	Fuel Consumption	Boost Pressure	KW	Catalytic Converter In/Out Diff Pressure	Cooling Water In	Tower Water Out
PI Tag	DIESEL.GEN3.ATM.PSI	DIESEL.GEN3.LEFT.EXH.TEMP	DIESEL.GEN3.RIGHT.EXH.TEMP	DIESEL.GEN3.FUEL.CONSUMPTIOM	DIESEL.GEN3.BOOST.PRESSURE	DIESEL.GEN3.KW	DIESEL.GEN3.CC.DP		
Units	PSI	Deg F	Deg F	gal/hour	PSI	KW	IN H2O		
Limit Value		450 - 1350 F					2 - 6 "H2O Engine 1; 3 - 7 "H2O Engines 2 - 3		
Time							Monthly Reading: _____ Time of Pressure Reading: _____		

Grey cells are required by air permit to be reported

Appendix 2

Example WMS Power Plant Instrument Calibration Form

Wyandotte Municipal Power Plant
Instrument Calibration Form

Initials:	KPS	Building:	Diesel #2
Date:	10/12/2015	Floor Number:	n/a
Location Description:	East wall differential		

Device Information:

Instrument Type:	Differential	Range:	0-30
Tag:	n/a	Engineering Units:	in/H2O
Manufacturer:	Dwyer	Serial #:	n/a
Model Number:	605-30		

Calibration Data:

As-Found Data

Ideal Input		As-Found Readings				
% Span	Actual	Inst. Reading	Span %	DCS Readings	Span %	Error %
0	0	0.09	0	n/a	n/a	0
25	7.51	7.52	25.06	n/a	n/a	0.12
50	14.990	14.944	49.81	n/a	n/a	-0.31
75	22.5	22.331	74.44	n/a	n/a	-0.75
100	29.99	29.70	99.00	n/a	n/a	-0.97

As-Left Data

Input		As-Left Readings				
% Span	Actual	Inst. Reading	Span %	DCS Readings	Span %	Error %
0	0	0.06	0	n/a	n/a	0
25	7.51	7.52	25.06	n/a	n/a	0.12
50	14.990	14.981	49.94	n/a	n/a	-0.06
75	22.49	22.538	75.13	n/a	n/a	0.21
100	30.01	30.11	100.38	n/a	n/a	0.34

Notes: Applied input. Adjusted span and re-applied input.

Appendix 3

Example Semiannual Deviation Report

Wyandotte Municipal Services - Diesel Generators MACT ZZZZ Semiannual Reporting

Stationary Reciprocating Internal Combustion Engines – 40 CFR Part 63, Subpart ZZZZ				
Semiannual Compliance Report (63.6650)				
Company Name:	**Beginning date of**		**Ending date of**	
City of Wyandotte Municipal Power Plant	**reporting period:**		**reporting period:**	
Address of Affected Source:	**2555 Van Alstyne**			
	Wyandotte, MI 48192			
Person to Contact Regarding Submittal:	**Mailing Address:**			**Telephone No:**
Paul LaManes	**3200 Biddle Ave, Suite 200**			**(734) 324-7194**
Identification of each hazardous air pollutant monitored at the affected source:		**NA**		

Name, Title and Signature of Responsible Official Who is Certifying Accuracy of Report:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (63.3400(c)(2)(ii))

Signature:	**Date of report:**

Printed Name:	**Title:**
Paul LaManes	**General Manager**

X There were no deviations from any applicable emission or operating limitation during the reporting period.

X There were no periods during which the continuous monitoring system (CMS) was out-of-control during the reporting period. [1]

[1] A CMS is out of control if:

— The zero (low-level), mid-level (if applicable), or high-level calibration drift (CD) exceeds two times the applicable CD specification in the applicable performance specification or in the relevant standard; or

— The CMS fails a performance test audit (e.g., cylinder gas audit), relative accuracy audit, relative accuracy test audit, or linearity test audit.

Wyandotte Municipal Services - Diesel Generators MACT ZZZZ Semiannual Reporting

Summary of Sources and Continuous Monitoring Systems (CMS) (63.6650(d),(e)) [1]						
Source ID	**Source Description**	**Total Source Operating Time During Period (hours)**	**CMS Description**	**Parameter(s) Monitored**	**Date of Latest CMS Certification or Audit**	**Description of Any Changes in CMS, process, or controls since the last reporting period.**
EU-WMSENGINE1	1825 kW standby compression ignition diesel fuel fired engine generator with a catalytic oxidation emission control system.		The system is equipped with a catalyst inlet temperature sensors and pressures drop measurement across the catalyst.	Temperature, pressure drop, and CO		None
EU-WMSENGINE2	1825 kW standby compression ignition diesel fuel fired engine generator with a catalytic oxidation emission control system.		The system is equipped with a catalyst inlet temperature sensors and pressures drop measurement across the catalyst.	Temperature, pressure drop, and CO		None
EU-WMSENGINE3	1825 kW standby compression ignition diesel fuel fired engine generator with a catalytic oxidation emission control system.		The system is equipped with a catalyst inlet temperature sensors and pressures drop measurement across the catalyst.	Temperature, pressure drop, and CO		None

Wyandotte Municipal Services - Diesel Generators MACT ZZZZ Semiannual Reporting

Description of Malfunctions (63.6650(c)) [1]						
Source ID	**Date**	**Malfunction Start Time**	**Malfunction End Time**	**Malfunction Duration**	**Description of Malfunction**	**Corrective Action(s) Taken to Remedy Malfunction and to Minimize Air Emissions**
EU-WMSENGINE1	--	--	--	--	No malfunctions during reporting period.	--
EU-WMSENGINE2	--	--	--	--	No malfunctions during reporting period.	--
EU-WMSENGINE3	--	--	--	--	No malfunctions during reporting period.	--

[1] Malfunction means any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner which causes, or has the potential to cause, the emission limitations in an applicable standard to be exceeded. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.

Wyandotte Municipal Services - Diesel Generators MACT ZZZZ Semiannual Reporting

Deviations from Emission or Operating Limitations Where Using a CMS (63.6650(e))
(Also complete the Deviation Breakdown Table below.)

Source ID	Deviation or CMS Inoperative[1] or CMS Out-of-Control Date	Deviation or CMS Inoperative[1] or CMS Out-of-Control Start Time	Deviation or CMS Inoperative[1] or CMS Out-of-Control End Time	Deviation or CMS Inoperative[1] or CMS Out-of-Control Duration (hours)	Total Duration of the Deviation or CMS Downtime During the Reporting Period (hours)	Total Duration as a Percent of Total Source Operating Time During the Reporting Period	Description and Cause of Deviation	Corrective Action(s) Taken and Actions Taken to Minimize Air Emissions
EU-WMSENGINE1, EU-WMSENGINE2, EU-WMSENGINE3	NA	NA	NA	0	0	0	NA	NA

Deviation Breakdown Table

Total Duration of Deviations During the Reporting Period From:

A. Control Equipment Problems	0
B. Process Problems	0
C. Other Known Causes	0
D. Other Unknown Causes	0

[1] CMS inoperative time does not include zero (low-level) and high-level checks.