

P0262
FY2018 Sched Insp-
ROP CMS

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: Scheduled Inspection

P026241610

FACILITY: BLUE WATER RENEWABLES		SRN / ID: P0262
LOCATION: 6797 SMITHS CREEK ROAD, SMITHS CREEK		DISTRICT: Southeast Michigan
CITY: SMITHS CREEK		COUNTY: SAINT CLAIR
CONTACT: Nick Diedrich, Environmental Engineer		ACTIVITY DATE: 09/14/2017
STAFF: Iranna Konanahalli	COMPLIANCE STATUS: Compliance	SOURCE CLASS: MAJOR
SUBJECT: FY2017 ROP CMS scheduled inspection of Blue Water Renewables, LLC		
RESOLVED COMPLAINTS:		

**Blue Water Renewables, LLC (P0262)– DTE Engines
6797 Smiths Creek Road
Smiths Creek (Kimball). Michigan 48074-3506**

NAICS: 221119 & SCC: 2-01-008-02

ROP: MI-ROP-P0262-2012a expired June 5, 2017, with an application shield.

ROP Application Nos.: 201600183 Smiths Creek Landfill (N6207) as two facilities (SCL & BWR) will be consolidated and 201700078 for BWR Minor Mod to incorporate PTI No. 163-09D.

PTI No. 163-09D dated May 31, 2017

VN: September 23, 2014, Violation Notice for exceeding the Single Hazardous Air Pollutant (HAP) emission limit of 9 TPY (formaldehyde) and failing comply with NESHAP / MACT 4Z.

CO: Consent Order AQD No. 25-2015 (for exceeding single HAP limit of 9 tpy and failure to comply with NESHAP / MACT 4Z as cited in Sep 14, 2014, Violation Notice). The CO requires BWR to comply with the permit (most recent: PTI No. 163-09D), increase stack heights (25 feet to 38 feet), test for formaldehyde emissions rates from each engine (two Caterpillar G3520C SI RICE engines) by August 21, 2015. Settlement \$33,000.00. CO void request is pending.

PTI Mods: PTI No. 163-09 (approved for two Caterpillar G3520C SI RICE engines [G3520C, 2,233 bhp at 100% load] and one Caterpillar G3516 SI RICE engine [G3516, 1,148 bhp at 100% load], which was never installed) → PTI No. 163-09A (remove Sec. 112 HAP limits contained in FG-FACILITY because the Company was required to test their RICE for formaldehyde [HAP] and the emissions were greater than 10 tpy, a major source; also third engine, Caterpillar G3516, was removed as it was never installed) → PTI No. 163-09B (Denied: increase the amount of allowable hydrogen sulfide (H₂S) content of the landfill gas to 800 ppmv) → PTI No. 163-09C (increase the amount of allowable hydrogen sulfide (H₂S) content of the landfill gas to 228 ppmv) → PTI No. 163-09D (increase the amount of allowable hydrogen sulfide (H₂S) content of the landfill gas to 1,300 ppmv).

PTI voids: PTI Nos. 163-09 (approved: 10/26/2009 & voided: 02/11/2015); 163-09A (approved: 02/11/2015 & voided: 08/18/2015); 163-09B (Denied: 03/10/2016); 163-09C (approved: 10/19/2016 & voided: 06/01/2017); 163-09D (approved: 06/01/2017 & voided: will be voided upon issuing ROP).

PTI denied: PTI Application No. 163-09B

Rule 702 BACT: Compliance with NSPS 4J for VOC is deemed to satisfy this BACT.

Subject to NSPS 4J: Two (PTI No. 163-09D, FG-ICENGINES: EU- ICENGINE1 and EU- ICENGINE2) SI RICE engines are subject to New Source Performance Standard 40 CFR, Part 60, Subpart JJJJ. SI RICE NSPS 4J requires annual (every 8,760 hours based upon non-resettable hour meter) stack testing for CO, NOx, NMOC (VOC excluding methane).

Subject to NESHAP / MACT 4Z: All SI RICE engines are subject to Major Source National Emissions Standards for Hazardous Air Pollutants, as specified in 40 CFR, Part 63, Subpart A and Subpart ZZZZ, for Stationary Reciprocating Internal Combustion Engines.

NSPS 4J & MACT Z: Page 3568 Federal Register / Vol. 73, No. 13 / Friday, January 18, 2008 / Rules and Regulations / Final rule. NSPS 4J Revision: Page 37954 Federal Register / Vol. 76, No. 124 / Tuesday, June 28, 2011 / Rules and Regulations / Final rule. Amendments to the NESHAP for RICE MACT 4Z and also NSPS 4J: Page 6674 Federal Register / Vol. 78, No. 20 / Wednesday, January 30, 2013 / Rules and Regulations / Final rule. Notice of final decision on reconsideration of January 30, 2013 Final Rule: Page 48072 Federal Register / Vol. 79, No. 158 / Friday, August 15, 2014 / Rules and Regulations. Notice of final decision on reconsideration of January 30, 2013 Final Rule: Page 48072 Federal Register / Vol. 79, No. 158 / Friday, August 15, 2014 / Rules and Regulations

Contacts: Mr. Nick T. Diedrich (Phone: 734-302-5392; Cell: 734-276-8233; E-mail: Nicholas.Diedrich@dteEnergy.com), P.E., Sr. Environmental Engineer, and Mr. Daniel E. Morris (Phone: 734-389-5079; Cell: 810-434-4196; ; E-mail: Daniel.E.Morris@dteEnergy.com)

On September 14, 2017, I conducted a level-2 **FY2017 ROP CMS scheduled** inspection of Blue Water Renewables, LLC ("Blue Water" or "BWR"), located at 6797 Smiths Creek Road, Smiths Creek (Kimball). Michigan 48074-3506. The inspection was conducted to determine compliance with the Federal Clean Air Act; Article II, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451; and Michigan Department of Environmental Quality, Air Quality Division (MDEQ-AQD) administrative rules.

During the FY 2017 inspection, Mr. Nick T. Diedrich (Phone: 734-302-5392; Cell: 734-276-8233; E-mail: Nicholas.Diedrich@dteEnergy.com), P.E., Sr. Environmental Engineer, and Mr. Daniel E. Morris (Phone: 734-389-5079; Cell: 810-434-4196; ; E-mail: Daniel.E.Morris@dteEnergy.com), Facility Technician, assisted me.

Smiths Creek Landfill (owned by St. Clair County) is a municipal solid waste landfill, located at 6779 Smiths Creek Road, Smiths Creek, Michigan. Blue Water Renewables, Inc., (operated by DTE Biomass Energy) owns an electric generating facility that utilizes landfill gas as fuel; the address for this facility is also 6797 Smiths Creek Road, Smiths Creek, Michigan. Smiths

Creek Landfill (SRN: N6207) is a Type II Sanitary Landfill, owned and operated by St. Clair County. Blue Water Renewables (operated by DTE Biomass, SRN: P0262) owns an electric generating facility located at the landfill that utilizes the landfill gas as fuel. An agreement was made between AQD management and the managements of Smiths Creek Landfill and Blue Water Renewables, Inc. This agreement allowed the two entities (SCL & BWR) to have separate ROPs; together these entities comprise one single stationary source. As result of this policy being reversed, a consolidated ROP (Sec. 1: SCL & Sec. 2: BWR) is being issued under SRN N6207.

Blue Water Renewables, Inc. owns and operates two landfill gas fueled, Caterpillar, Model G3520C, spark ignition (SI) reciprocating internal combustion engines (RICE). The engines are permitted under MI-ROP-P0262-2012 (and most recent PTI No. 163-09D dated May 31, 2017) and are subject to the National Standards of Performance for Stationary Spark Ignition Internal Combustion Engines, 40 CFR Part 60 Subpart JJJJ, and the National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, 40 CFR Part 63 Subpart ZZZZ.

In October 2009, Blue Water Renewables obtained Permit to Install (PTI) No. 163-09 for the operation of three reciprocating internal combustion engines (RICES); one of three engines (Caterpillar G3516) was never installed; however, two engines (Caterpillar G3520C) operate simultaneously and continuously to generate electric power. This permit was subsequently rolled into ROP No. MI-ROP-P0262-2012. In addition, to the engines, Blue Water Renewables operated a landfill gas (LFG) treatment system which dewateres, filters, and compresses the LFG prior to combustion in the engines.

PTI No. 163-09D, EU-TREATMENTSYS is subject to the New Source Performance Standards for Municipal Solid Waste Landfills promulgated in 40 CFR, Part 60, Subparts A and WWW. Smiths Creek is primarily responsible for complying with landfill requirements. As I observed, the process is equipped with one in-line filter system and one moisture knock-out drum (reduce gas pressure such that moisture condenses).

Flexible Groups

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FG-ICENGINES	Two (2) internal combustion, lean burn engines for combusting treated landfill gas to produce electricity.	EU-ICENGINE1, EU-ICENGINE2
FG-FACILITY	All process equipment source-wide including equipment covered by other permits, grand-fathered equipment and exempt equipment.	NA

Emission Units

Emission Unit ID	Emission Unit Description (Process Equipment & Control Devices)	Installation Date / Modification Date	Flexible Group ID
EU-TREATMENTSYS	This emission unit treats landfill gas before it is used for electrical generation. The treatment system removes particulate to at least the 10 micron level, compresses the landfill gas, and removes enough moisture to ensure good combustion during subsequent use. The treatment of the LFG ensures that a high percentage of NMOC will be destroyed in the internal combustion engines.	June 1, 2011	NA
EU-ICENGINE1	Spark ignition, lean burn, reciprocating internal combustion engine (Caterpillar G3520C, 2,233 bhp at 100% load) for combusting treated landfill gas to produce electricity (1.6 megawatt gross electrical output). Model: Caterpillar G3520C, 2,233 BHP at 100% load with a generator 1.6 megawatt gross electrical output) Serial No. GZJ00491	June 1, 2011	FGICENGINES
EU-ICENGINE2	Spark ignition, lean burn, reciprocating internal combustion engine (Caterpillar G3520C, 2,233 bhp at 100% load) for combusting treated landfill gas to produce electricity (1.6 megawatt gross electrical output). Model: Caterpillar G3520C, 2,233 BHP at 100% load with a generator 1.6 megawatt gross electrical output) Serial No. GZJ00493	June 1, 2011	FGICENGINES
Changes to the equipment described in this table are subject to the requirements of R 336.1201, except as allowed by R 336.1278 to R 336.1290.			

All NSPS Engines (Nos 1 and 2): Caterpillar Model G3520C (mechanical engine work output 2,333 BHP > 500 BHP at 100% load, 1.6 MW [megawatt] gross electrical power output), Year 2011 (construction / reconstruction after December 19, 2002), lean burn SI RICE, landfill gas (LFG) only, non-emergency. Two engines are subject to SI RICE NSPS 4J (40 CFR, Part 60, Subpart JJJJ). All NSPS engines were installed about June 1, 2011 (construction / reconstruction after December 19, 2002). All engines are subject to Major Source RICE NESHAP / MACT 4Z. All engines fire only landfill gas (LFG) from Smith Creek Landfill.

PTI Mods

PTI No. 163-09 (approved: 10/26/2009 & voided: 02/11/2015): On October 26, 2009, AQD approved PTI No. 163-09 for two Caterpillar G3520C SI RICE engines [G3520C, 2,233 bhp at 100% load producing 1.6 megawatt gross electrical power output] and one Caterpillar G3516

SI RICE engine [G3516, 1,148 bph at 100% load producing 800 kilowatt gross electrical power output]. Smallest of three engines, Caterpillar G3516 engine for 0.8 MW electrical power output, was never installed.

PTI No. 163-09 → PTI No. 163-09A (approved: 02/11/2015 & voided: 08/18/2015): This mod removed the HAP limits contained in FG-FACILITY because the Company was required to test the SI RICE engines for formaldehyde and the emissions were greater than 10 tpy, a major source. Also, this mod removed Engine No. 3 (Caterpillar G3516 engine for 0.8 MW electrical power output) which was never installed. Formaldehyde testing is required every 5 years for each engine (2).

PTI No. 163-09A → PTI No. 163-09B (Denied: 03/10/2016): This mod requested to increase the amount of allowable hydrogen sulfide (H₂S) content of the landfill gas to 800 ppmv from existing 160 ppmv. AQD denied this mod request on March 10, 2016.

PTI No. 163-09B → PTI No. 163-09C (approved: 10/19/2016 & voided: 06/01/2017): This mod requested to increase the amount of allowable hydrogen sulfide (H₂S) content of the landfill gas to 228 ppmv from existing 160 ppmv. Two emission limits were added for SO₂, in pound per hour (2.18 pph) and tons per year (9.54 tpy). Weekly testing by sampling of the gas for H₂S would be used to calculate the emissions for the pound per hour and ton per year limits.

PTI No. 163-09C → PTI No. 163-09D (approved: 06/01/2017 & voided: will be voided upon issuing ROP): This mod requested to increase the amount of allowable hydrogen sulfide (H₂S) content of the landfill gas to 1,300 ppmv from existing 228 ppmv. SO₂ limits in pound per hour (pph) and ton per year (tpy) were raised to 6.21 pph (from 2.18 pph) and 54.4 tpy (from 9.54 tpy) using 1300 ppm sulfur content in the fuel. The pph limit is to protect the NAAQS and the tpy limit is to restrict the potential of SO₂ below significance levels. PTI No. 163-09D Appendix A must be used for SO₂ emissions calculations.

SO₂ Emissions tons per month= Monthly Average of Weekly H₂S Gas Samples ppmv1,000,000 Å—1.1733 mols

Sulfurft3 Å— 34.08 gramsmol Sulfur Å—pound453.59 grams Å— 1 ton2,000 pounds Å—1.88 SO₂H₂SMolecular

Weight Ratio Å— Total SulfurSulfur as H₂S Å— Monthly Landfill Gas Usage ft³/month '>

September 23, 2014, Violation Notice and Consent Order

AQD issued September 23, 2014, Violation Notice for exceeding the Single Hazardous Air Pollutant (HAP) emission limit of 9 TPY (formaldehyde), failing comply with NESHAP / MACT 4Z. On August 31, 2015, AQD Chief Ms. Lynn Fiedler approved Consent Order AQD No. 25-2015 (for exceeding single HAP limit of 9 tpy and failure to comply with NESHAP / MACT 4Z as cited in Sep 14, 2014, Violation Notice). The Consent Order No. 25-2015 requires BWR to comply with the permit (most recent: PTI No. 163-09D), increase stack heights (25 feet to 38 feet), test for formaldehyde emissions rates from each engine (two Caterpillar G3520C SI RICE engines) by August 21, 2015. Settlement amount is \$33,000.00. As of September 22, 2017, Consent Order void request is pending.

Based upon FY 2017 inspection, the stack height has been increased. On October 19, 2015, AQD received formaldehyde test report. See below for stack test results.

Stack Tests

January 11-12, 2012, stack test (PTI No. 163-09)

1. Engine1 (all units in pounds per hour & g/bhp-hr, respectively): NA (HCl limit: 0.51 lb/hr); 2.5 & 0.5 (NOx limit: 3.0 & 0.6); 12.5 & 2.5 (CO limit: 16.3 & 3.3) and ND (NMOC limit: 1.0 g/bhp-hr)
2. Engine2 (all units in pounds per hour & g/bhp-hr, respectively): 0.05 (HCl limit: 0.51 lb/hr); 2.5 & 0.5 (NOx limit: 3.0 & 0.6); 12.0 & 2.4 (CO limit: 16.3 & 3.3) and 0.14 (NMOC limit: 1.0 g/bhp-hr)

August 18-19, 2015, formaldehyde test

On October 19, 2015, AQD received formaldehyde test report. Formaldehyde sampling for two SI RICE engines (Engine #1 [08/18/2015] & Engine #2 [08/19/2015]) was performed on August 18-19, 2015. BWR reported emission rates of 1.7 and 1.8 pounds per hour for Engine1 and Engine2, respectively (PTI No. 163-09D, FG-ICENGINES, 1.7 limit: 2.12 pounds per hour)

Jan 25 & 31, 2017, NSPS 4J stack tests

Jan 25 & 31, 2017, annual, SI RICE NSPS 4J, Stack Test of DTE Engines (NSPS 4J Engines: EU- ICENGINE1 and EU- ICENGINE2) –

In all two (2) engines are present: ROP: MI-ROP--P0262-2012a and PTI No. 163-09D dated May 31, 2017. Two engines (FG-ICENGINES: EU- ICENGINE1 and EU- ICENGINE2) are required to be tested annually (every 8,760 hours based upon non-resettable hour meter) because these two engines, manufactured after June 12, 2006 (installed June 01, 2011), are subject to NSPS 4J. During the Jan 25 & 31, 2017, annual / 8,760-hour stack test pursuant to MI-ROP--P0262-2012a, FG-ICENGINES, V.2 TESTING/SAMPLING and PTI No. 163-09D, FG-ICENGINES, V.2 TESTING/SAMPLING (stack test every 8,760 hours of operation using non-resettable hour meter), the engines are as follows:

Emission Unit ID	Emission Unit Description (Process Equipment & Control Devices)	Installation Date / Modification Date	Flexible Group ID
EUIENGINE1	Spark ignition, lean burn, reciprocating internal combustion engine (Caterpillar G3520C, 2,233 bhp at 100% load) for combusting treated landfill gas to produce electricity (1.6 megawatt gross electrical output). Model: Caterpillar G3520C, 2,233 BHP at 100% load with a generator 1.6 megawatt gross electrical output Serial No. GZJ00491	June 1, 2011	FGICENGINES

Emission Unit ID	Emission Unit Description (Process Equipment & Control Devices)	Installation Date / Modification Date	Flexible Group ID
EUCENGINE2	Spark ignition, lean burn, reciprocating internal combustion engine (Caterpillar G3520C, 2,233 bhp at 100% load) for combusting treated landfill gas to produce electricity (1.6 megawatt gross electrical output). Model: Caterpillar G3520C, 2,233 BHP at 100% load with a generator 1.6 megawatt gross electrical output Serial No. GZJ00493	June 1, 2011	FGICENGINES

All NSPS Engines (Nos 1 and 2): Caterpillar Model G3520C (mechanical engine work output 2,333 BHP > 500 BHP at 100% load, 1.6 MW [megawatt] gross electrical power output), Year 2011 (construction / reconstruction after December 19, 2002), lean burn SI RICE, landfill gas (LFG) only, non-emergency. Two engines are subject to SI RICE NSPS 4J (40 CFR, Part 60, Subpart JJJJ). All NSPS engines were installed about June 1, 2011 (construction / reconstruction after December 19, 2002). All engines are subject to Major Source RICE NESHAP / MACT 4Z. All engines fire only landfill gas (LFG) from Smith Creek Landfill.

Smiths Creek Landfill (N6207) is currently producing nearly 1000 scfm of LFG (800-920 scf). Unless either of the RICE engines are malfunctioning or shut down for scheduled maintenance, all of the LFG produced by the landfill is combusted by the DTE engines. Smiths Creek does have two flares (open flares with shrouds): a 10" diameter flare with a 2000 scfm capacity, a 3" diameter flare with a 30-200 scfm capacity. When in operation the flow and temperature are recorded every 15 minutes as required by the ROP. Blue Water Renewables keeps electronic copies of the data for the flares; Smiths Creek still maintains the flow/temp data chart at the flares.

Mechanical engine work output BHP is not measured but calculated using the following equation:

Engine work output

$$= (\text{generator output power (kW)}) * (\text{HP} / 0.7457 \text{ kW}) * (1 / \text{generator efficiency } 96\%)$$

Generator electrical output power 1,600 kW \approx engine work output 2,233 HP

Smiths Creek Landfill (N6207) supplies conditioned landfill gas (LFG \approx 50% methane) to the DTE engines (2).

Mr. Mark Grigereit (Phone: 313-897-1324; Cell: 734-276-8233; E-mail: GrigereitM@dteEnergy.com), Principal Engineer, Field Services, DTE Energy, Environmental Management and Resources, submitted test plan via letter dated December 21, 2016. The test plan is for verification of carbon monoxide (CO), nitrogen oxides (NOx) and non-methane organic compounds (NMOC or VOC excluding methane) concentrations in exhaust gases and emission rates from NSPS 4I engines (FG-ICENGINES: EU- ICENGINE1

PTI voids: PTI Nos. 163-09 (approved: 10/26/2009 & voided: 02/11/2015); 163-09A (approved: 02/11/2015 & voided: 08/18/2015); 163-09B (Denied: 03/10/2016); 163-09C (approved: 10/19/2016 & voided: 06/01/2017); 163-09D (approved: 06/01/2017 & voided: will be voided upon issuing ROP).

PTI denied: PTI Application No. 163-09B

Rule 702 BACT: Compliance with NSPS 4J for VOC is deemed to satisfy this BACT.

Subject to NSPS 4J: Two (PTI No. 163-09D, FG-ICENGINES: EU- ICENGINE1 and EU- ICENGINE2) SI RICE engines are subject to New Source Performance Standard 40 CFR, Part 60, Subpart JJJJ. SI RICE NSPS 4J requires annual (every 8,760 hours based upon non-resettable hour meter) stack testing for CO, NOx, NMOC (VOC excluding methane).

Subject to NESHAP / MACT 4Z: All SI RICE engines are subject to Major Source National Emissions Standards for Hazardous Air Pollutants, as specified in 40 CFR, Part 63, Subpart A and Subpart ZZZZ, for Stationary Reciprocating Internal Combustion Engines.

NSPS 4J & MACT Z: Page 3568 Federal Register / Vol. 73, No. 13 / Friday, January 18, 2008 / Rules and Regulations / Final rule. NSPS 4J Revision: Page 37954 Federal Register / Vol. 76, No. 124 / Tuesday, June 28, 2011 / Rules and Regulations / Final rule. Amendments to the NESHAP for RICE MACT 4Z and also NSPS 4J: Page 6674 Federal Register / Vol. 78, No. 20 / Wednesday, January 30, 2013 / Rules and Regulations / Final rule. Notice of final decision on reconsideration of January 30, 2013 Final Rule: Page 48072 Federal Register / Vol. 79, No. 158 / Friday, August 15, 2014 / Rules and Regulations. Notice of final decision on reconsideration of January 30, 2013 Final Rule: Page 48072 Federal Register / Vol. 79, No. 158 / Friday, August 15, 2014 / Rules and Regulations

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In October 2009, Blue Water Renewables obtained Permit to Install (PTI) No. 163-09 for the operation of three reciprocating internal combustion engines (RICES); one of three engines (Caterpillar G3516) was never installed; however, two engines (Caterpillar G3520C) operate simultaneously and continuously to generate electric power. This permit was subsequently rolled into ROP No. MI-ROP-P0262-2012. In addition, to the engines, Blue Water Renewables operated a landfill gas (LFG) treatment system which dewater, filters, and compresses the LFG prior to combustion in the engines.

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Flexible Groups

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
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FG-FACILITY	All process equipment source-wide including equipment covered by other permits, grand-fathered equipment and exempt equipment.	NA

Emission Units

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EU-ICENGINE1	Spark ignition, lean burn, reciprocating internal combustion engine (Caterpillar G3520C, 2,233 bhp at 100% load) for combusting treated landfill gas to produce electricity (1.6 megawatt gross electrical output). Model: Caterpillar G3520C, 2,233 BHP at 100% load with a generator 1.6 megawatt gross electrical output) Serial No. GZJ00491	June 1, 2011	FGICENGINES
EU-ICENGINE2	Spark ignition, lean burn, reciprocating internal combustion engine (Caterpillar G3520C, 2,233 bhp at 100% load) for combusting treated landfill gas to produce electricity (1.6 megawatt gross electrical output). Model: Caterpillar G3520C, 2,233 BHP at 100% load with a generator 1.6 megawatt gross electrical output) Serial No. GZJ00493	June 1, 2011	FGICENGINES
Changes to the equipment described in this table are subject to the requirements of R 336.1201, except as allowed by R 336.1278 to R 336.1290.			

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SI RICE engine [G3516, 1,148 bph at 100% load producing 800 kilowatt gross electrical power output]. Smallest of three engines, Caterpillar G3516 engine for 0.8 MW electrical power output, was never installed.

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PTI No. 163-09A → PTI No. 163-09B (Denied: 03/10/2016): This mod requested to increase the amount of allowable hydrogen sulfide (H₂S) content of the landfill gas to 800 ppmv from existing 160 ppmv. AQD denied this mod request on March 10, 2016.

PTI No. 163-09B → PTI No. 163-09C (approved: 10/19/2016 & voided: 06/01/2017): This mod requested to increase the amount of allowable hydrogen sulfide (H₂S) content of the landfill gas to 228 ppmv from existing 160 ppmv. Two emission limits were added for SO₂, in pound per hour (2.18 pph) and tons per year (9.54 tpy). Weekly testing by sampling of the gas for H₂S would be used to calculate the emissions for the pound per hour and ton per year limits.

PTI No. 163-09C → PTI No. 163-09D (approved: 06/01/2017 & voided: will be voided upon issuing ROP): This mod requested to increase the amount of allowable hydrogen sulfide (H₂S) content of the landfill gas to 1,300 ppmv from existing 228 ppmv. SO₂ limits in pound per hour (pph) and ton per year (tpy) were raised to 6.21 pph (from 2.18 pph) and 54.4 tpy (from 9.54 tpy) using 1300 ppm sulfur content in the fuel. The pph limit is to protect the NAAQS and the tpy limit is to restrict the potential of SO₂ below significance levels. PTI No. 163-09D Appendix A must be used for SO₂ emissions calculations.

SO₂ Emissions tons per month= Monthly Average of Weekly H₂S Gas Samples ppmv1,000,000 Å—1.1733 mols

Sulfurft3 Å— 34.08 gramsmol Sulfur Å—pound453.59 grams Å— 1 ton2,000 pounds Å—1.88 SO₂H₂SMolecular

Weight Ratio Å— Total SulfurSulfur as H₂S Å— Monthly Landfill Gas Usage ft³/month >

September 23, 2014, Violation Notice and Consent Order

AQD issued September 23, 2014, Violation Notice for exceeding the Single Hazardous Air Pollutant (HAP) emission limit of 9 TPY (formaldehyde), failing comply with NESHAP / MACT 4Z. On August 31, 2015, AQD Chief Ms. Lynn Fiedler approved Consent Order AQD No. 25-2015 (for exceeding single HAP limit of 9 tpy and failure to comply with NESHAP / MACT 4Z as cited in Sep 14, 2014, Violation Notice). The Consent Order No. 25-2015 requires BWR to comply with the permit (most recent: PTI No. 163-09D), increase stack heights (25 feet to 38 feet), test for formaldehyde emissions rates from each engine (two Caterpillar G3520C SI RICE engines) by August 21, 2015. Settlement amount is \$33,000.00. As of September 22, 2017, Consent Order void request is pending.

Based upon FY 2017 inspection, the stack height has been increased. On October 19, 2015, AQD received formaldehyde test report. See below for stack test results.

Stack Tests

January 11-12, 2012, stack test (PTI No. 163-09)

PTI voids: PTI Nos. 163-09 (approved: 10/26/2009 & voided: 02/11/2015); 163-09A (approved: 02/11/2015 & voided: 08/18/2015); 163-09B (Denied: 03/10/2016); 163-09C (approved: 10/19/2016 & voided: 06/01/2017); 163-09D (approved: 06/01/2017 & voided: will be voided upon issuing ROP).

PTI denied: PTI Application No. 163-09B

Rule 702 BACT: Compliance with NSPS 4J for VOC is deemed to satisfy this BACT.

Subject to NSPS 4J: Two (PTI No. 163-09D, FG-ICENGINES: EU- ICENGINE1 and EU- ICENGINE2) SI RICE engines are subject to New Source Performance Standard 40 CFR, Part 60, Subpart JJJJ. SI RICE NSPS 4J requires annual (every 8,760 hours based upon non-resettable hour meter) stack testing for CO, NOx, NMOC (VOC excluding methane).

Subject to NESHAP / MACT 4Z: All SI RICE engines are subject to Major Source National Emissions Standards for Hazardous Air Pollutants, as specified in 40 CFR, Part 63, Subpart A and Subpart ZZZZ, for Stationary Reciprocating Internal Combustion Engines.

NSPS 4J & MACT Z: Page 3568 Federal Register / Vol. 73, No. 13 / Friday, January 18, 2008 / Rules and Regulations / Final rule. NSPS 4J Revision: Page 37954 Federal Register / Vol. 76, No. 124 / Tuesday, June 28, 2011 / Rules and Regulations / Final rule. Amendments to the NESHAP for RICE MACT 4Z and also NSPS 4J: Page 6674 Federal Register / Vol. 78, No. 20 / Wednesday, January 30, 2013 / Rules and Regulations / Final rule. Notice of final decision on reconsideration of January 30, 2013 Final Rule: Page 48072 Federal Register / Vol. 79, No. 158 / Friday, August 15, 2014 / Rules and Regulations. Notice of final decision on reconsideration of January 30, 2013 Final Rule: Page 48072 Federal Register / Vol. 79, No. 158 / Friday, August 15, 2014 / Rules and Regulations

Contacts: Mr. Nick T. Diedrich (Phone: 734-302-5392; Cell: 734-276-8233; E-mail: Nicholas.Diedrich@dteEnergy.com), P.E., Sr. Environmental Engineer, and Mr. Daniel E. Morris (Phone: 734-389-5079; Cell: 810-434-4196; ; E-mail: Daniel.E.Morris@dteEnergy.com)

On September 14, 2017, I conducted a level-2 **FY2017 ROP CMS scheduled** inspection of Blue Water Renewables, LLC ("Blue Water" or "BWR"), located at 6797 Smiths Creek Road, Smiths Creek (Kimball). Michigan 48074-3506. The inspection was conducted to determine compliance with the Federal Clean Air Act; Article II, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451; and Michigan Department of Environmental Quality, Air Quality Division (MDEQ-AQD) administrative rules.

During the FY 2017 inspection, Mr. Nick T. Diedrich (Phone: 734-302-5392; Cell: 734-276-8233; E-mail: Nicholas.Diedrich@dteEnergy.com), P.E., Sr. Environmental Engineer, and Mr. Daniel E. Morris (Phone: 734-389-5079; Cell: 810-434-4196; ; E-mail: Daniel.E.Morris@dteEnergy.com), Facility Technician, assisted me.

Smiths Creek Landfill (owned by St. Clair County) is a municipal solid waste landfill, located at 6779 Smiths Creek Road, Smiths Creek, Michigan. Blue Water Renewables, Inc., (operated by DTE Biomass Energy) owns an electric generating facility that utilizes landfill gas as fuel; the address for this facility is also 6797 Smiths Creek Road, Smiths Creek, Michigan. Smiths

Creek Landfill (SRN: N6207) is a Type II Sanitary Landfill, owned and operated by St. Clair County. Blue Water Renewables (operated by DTE Biomass, SRN: P0262) owns an electric generating facility located at the landfill that utilizes the landfill gas as fuel. An agreement was made between AQD management and the managements of Smiths Creek Landfill and Blue Water Renewables, Inc. This agreement allowed the two entities (SCL & BWR) to have separate ROPs; together these entities comprise one single stationary source. As result of this policy being reversed, a consolidated ROP (Sec. 1: SCL & Sec. 2: BWR) is being issued under SRN N6207.

Blue Water Renewables, Inc. owns and operates two landfill gas fueled, Caterpillar, Model G3520C, spark ignition (SI) reciprocating internal combustion engines (RICE). The engines are permitted under MI-ROP-P0262-2012 (and most recent PTI No. 163-09D dated May 31, 2017) and are subject to the National Standards of Performance for Stationary Spark Ignition Internal Combustion Engines, 40 CFR Part 60 Subpart JJJJ, and the National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, 40 CFR Part 63 Subpart ZZZZ.

In October 2009, Blue Water Renewables obtained Permit to Install (PTI) No. 163-09 for the operation of three reciprocating internal combustion engines (RICES); one of three engines (Caterpillar G3516) was never installed; however, two engines (Caterpillar G3520C) operate simultaneously and continuously to generate electric power. This permit was subsequently rolled into ROP No. MI-ROP-P0262-2012. In addition, to the engines, Blue Water Renewables operated a landfill gas (LFG) treatment system which dewateres, filters, and compresses the LFG prior to combustion in the engines.

PTI No. 163-09D, EU-TREATMENTSYS is subject to the New Source Performance Standards for Municipal Solid Waste Landfills promulgated in 40 CFR, Part 60, Subparts A and WWW. Smiths Creek is primarily responsible for complying with landfill requirements. As I observed, the process is equipped with one in-line filter system and one moisture knock-out drum (reduce gas pressure such that moisture condenses).

Flexible Groups

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FG-ICENGINES	Two (2) internal combustion, lean burn engines for combusting treated landfill gas to produce electricity.	EU-ICENGINE1, EU-ICENGINE2
FG-FACILITY	All process equipment source-wide including equipment covered by other permits, grand-fathered equipment and exempt equipment.	NA

Emission Units

Emission Unit ID	Emission Unit Description (Process Equipment & Control Devices)	Installation Date / Modification Date	Flexible Group ID
EU-TREATMENTSYS	This emission unit treats landfill gas before it is used for electrical generation. The treatment system removes particulate to at least the 10 micron level, compresses the landfill gas, and removes enough moisture to ensure good combustion during subsequent use. The treatment of the LFG ensures that a high percentage of NMOC will be destroyed in the internal combustion engines.	June 1, 2011	NA
EU-ICENGINE1	Spark ignition, lean burn, reciprocating internal combustion engine (Caterpillar G3520C, 2,233 bhp at 100% load) for combusting treated landfill gas to produce electricity (1.6 megawatt gross electrical output). Model: Caterpillar G3520C, 2,233 BHP at 100% load with a generator 1.6 megawatt gross electrical output) Serial No. GZJ00491	June 1, 2011	FGICENGINES
EU-ICENGINE2	Spark ignition, lean burn, reciprocating internal combustion engine (Caterpillar G3520C, 2,233 bhp at 100% load) for combusting treated landfill gas to produce electricity (1.6 megawatt gross electrical output). Model: Caterpillar G3520C, 2,233 BHP at 100% load with a generator 1.6 megawatt gross electrical output) Serial No. GZJ00493	June 1, 2011	FGICENGINES
Changes to the equipment described in this table are subject to the requirements of R 336.1201, except as allowed by R 336.1278 to R 336.1290.			

All NSPS Engines (Nos 1 and 2): Caterpillar Model G3520C (mechanical engine work output 2,333 BHP > 500 BHP at 100% load, 1.6 MW [megawatt] gross electrical power output), Year 2011 (construction / reconstruction after December 19, 2002), lean burn SI RICE, landfill gas (LFG) only, non-emergency. Two engines are subject to SI RICE NSPS 4J (40 CFR, Part 60, Subpart JJJJ). All NSPS engines were installed about June 1, 2011 (construction / reconstruction after December 19, 2002). All engines are subject to Major Source RICE NESHAP / MACT 4Z. All engines fire only landfill gas (LFG) from Smith Creek Landfill.

PTI Mods

PTI No. 163-09 (approved: 10/26/2009 & voided: 02/11/2015): On October 26, 2009, AQD approved PTI No. 163-09 for two Caterpillar G3520C SI RICE engines [G3520C, 2,233 bhp at 100% load producing 1.6 megawatt gross electrical power output] and one Caterpillar G3516

1. Engine1 (all units in pounds per hour & g/bhp-hr, respectively): NA (HCl limit: 0.51 lb/hr); 2.5 & 0.5 (NOx limit: 3.0 & 0.6); 12.5 & 2.5 (CO limit: 16.3 & 3.3) and ND (NMOC limit: 1.0 g/bhp-hr)
2. Engine2 (all units in pounds per hour & g/bhp-hr, respectively): 0.05 (HCl limit: 0.51 lb/hr); 2.5 & 0.5 (NOx limit: 3.0 & 0.6); 12.0 & 2.4 (CO limit: 16.3 & 3.3) and 0.14 (NMOC limit: 1.0 g/bhp-hr)

August 18-19, 2015, formaldehyde test

On October 19, 2015, AQD received formaldehyde test report. Formaldehyde sampling for two SI RICE engines (Engine #1 [08/18/2015] & Engine #2 [08/19/2015]) was performed on August 18-19, 2015. BWR reported emission rates of 1.7 and 1.8 pounds per hour for Engine1 and Engine2, respectively (PTI No. 163-09D, FG-ICENGINES, 1.7 limit: 2.12 pounds per hour)

Jan 25 & 31, 2017, NSPS 4J stack tests

Jan 25 & 31, 2017, annual, SI RICE NSPS 4J, Stack Test of DTE Engines (NSPS 4J Engines: EU- ICENGINE1 and EU- ICENGINE2) –

In all two (2) engines are present: ROP: MI-ROP--P0262-2012a and PTI No. 163-09D dated May 31, 2017. Two engines (FG-ICENGINES: EU- ICENGINE1 and EU- ICENGINE2) are required to be tested annually (every 8,760 hours based upon non-resettable hour meter) because these two engines, manufactured after June 12, 2006 (installed June 01, 2011), are subject to NSPS 4J. During the Jan 25 & 31, 2017, annual / 8,760-hour stack test pursuant to MI-ROP--P0262-2012a, FG-ICENGINES, V.2 TESTING/SAMPLING and PTI No. 163-09D, FG-ICENGINES, V.2 TESTING/SAMPLING (stack test every 8,760 hours of operation using non-resettable hour meter), the engines are as follows:

Emission Unit ID	Emission Unit Description (Process Equipment & Control Devices)	Installation Date / Modification Date	Flexible Group ID
EUICENGINE1	Spark ignition, lean burn, reciprocating internal combustion engine (Caterpillar G3520C, 2,233 bhp at 100% load) for combusting treated landfill gas to produce electricity (1.6 megawatt gross electrical output). Model: Caterpillar G3520C, 2,233 BHP at 100% load with a generator 1.6 megawatt gross electrical output Serial No. GZJ00491	June 1, 2011	FGICENGINES

SI RICE engine [G3516, 1,148 bph at 100% load producing 800 kilowatt gross electrical power output]. Smallest of three engines, Caterpillar G3516 engine for 0.8 MW electrical power output, was never installed.

PTI No. 163-09 → PTI No. 163-09A (approved: 02/11/2015 & voided: 08/18/2015): This mod removed the HAP limits contained in FG-FACILITY because the Company was required to test the SI RICE engines for formaldehyde and the emissions were greater than 10 tpy, a major source. Also, this mod removed Engine No. 3 (Caterpillar G3516 engine for 0.8 MW electrical power output) which was never installed. Formaldehyde testing is required every 5 years for each engine (2).

PTI No. 163-09A → PTI No. 163-09B (Denied: 03/10/2016): This mod requested to increase the amount of allowable hydrogen sulfide (H₂S) content of the landfill gas to 800 ppmv from existing 160 ppmv. AQD denied this mod request on March 10, 2016.

PTI No. 163-09B → PTI No. 163-09C (approved: 10/19/2016 & voided: 06/01/2017): This mod requested to increase the amount of allowable hydrogen sulfide (H₂S) content of the landfill gas to 228 ppmv from existing 160 ppmv. Two emission limits were added for SO₂, in pound per hour (2.18 pph) and tons per year (9.54 tpy). Weekly testing by sampling of the gas for H₂S would be used to calculate the emissions for the pound per hour and ton per year limits.

PTI No. 163-09C → PTI No. 163-09D (approved: 06/01/2017 & voided: will be voided upon issuing ROP): This mod requested to increase the amount of allowable hydrogen sulfide (H₂S) content of the landfill gas to 1,300 ppmv from existing 228 ppmv. SO₂ limits in pound per hour (pph) and ton per year (tpy) were raised to 6.21 pph (from 2.18 pph) and 54.4 tpy (from 9.54 tpy) using 1300 ppm sulfur content in the fuel. The pph limit is to protect the NAAQS and the tpy limit is to restrict the potential of SO₂ below significance levels. PTI No. 163-09D Appendix A must be used for SO₂ emissions calculations.

SO₂ Emissions tons per month= Monthly Average of Weekly H₂S Gas Samples ppmv1,000,000 Å—1.1733 mols

Sulfurft³ Å— 34.08 gramsmol Sulfur Å—pound453.59 grams Å— 1 ton2,000 pounds Å—1.88 SO₂H₂S Molecular

Weight Ratio Å— Total SulfurSulfur as H₂S Å— Monthly Landfill Gas Usage ft³/month '>

September 23, 2014, Violation Notice and Consent Order

AQD issued September 23, 2014, Violation Notice for exceeding the Single Hazardous Air Pollutant (HAP) emission limit of 9 TPY (formaldehyde), failing comply with NESHAP / MACT 4Z. On August 31, 2015, AQD Chief Ms. Lynn Fiedler approved Consent Order AQD No. 25-2015 (for exceeding single HAP limit of 9 tpy and failure to comply with NESHAP / MACT 4Z as cited in Sep 14, 2014, Violation Notice). The Consent Order No. 25-2015 requires BWR to comply with the permit (most recent: PTI No. 163-09D), increase stack heights (25 feet to 38 feet), test for formaldehyde emissions rates from each engine (two Caterpillar G3520C SI RICE engines) by August 21, 2015. Settlement amount is \$33,000.00. As of September 22, 2017, Consent Order void request is pending.

Based upon FY 2017 inspection, the stack height has been increased. On October 19, 2015, AQD received formaldehyde test report. See below for stack test results.

Stack Tests

January 11-12, 2012, stack test (PTI No. 163-09)

Emission Unit ID	Emission Unit Description (Process Equipment & Control Devices)	Installation Date / Modification Date	Flexible Group ID
EUIENGINE2	<p>Spark ignition, lean burn, reciprocating internal combustion engine (Caterpillar G3520C, 2,233 bhp at 100% load) for combusting treated landfill gas to produce electricity (1.6 megawatt gross electrical output).</p> <p>Model: Caterpillar G3520C, 2,233 BHP at 100% load with a generator 1.6 megawatt gross electrical output</p> <p>Serial No. GZJ00493</p>	June 1, 2011	FGICENGINES

All NSPS Engines (Nos 1 and 2): Caterpillar Model G3520C (mechanical engine work output 2,333 BHP > 500 BHP at 100% load, 1.6 MW [megawatt] gross electrical power output), Year 2011 (construction / reconstruction after December 19, 2002), lean burn SI RICE, landfill gas (LFG) only, non-emergency. Two engines are subject to SI RICE NSPS 4J (40 CFR, Part 60, Subpart JJJJ). All NSPS engines were installed about June 1, 2011 (construction / reconstruction after December 19, 2002). All engines are subject to Major Source RICE NESHAP / MACT 4Z. All engines fire only landfill gas (LFG) from Smith Creek Landfill.

Smiths Creek Landfill (N6207) is currently producing nearly 1000 scfm of LFG (800-920 scf). Unless either of the RICE engines are malfunctioning or shut down for scheduled maintenance, all of the LFG produced by the landfill is combusted by the DTE engines. Smiths Creek does have two flares (open flares with shrouds): a 10" diameter flare with a 2000 scfm capacity, a 3" diameter flare with a 30-200 scfm capacity. When in operation the flow and temperature are recorded every 15 minutes as required by the ROP. Blue Water Renewables keeps electronic copies of the data for the flares; Smiths Creek still maintains the flow/temp data chart at the flares.

Mechanical engine work output BHP is not measured but calculated using the following equation:

Engine work output

$$= (\text{generator output power (kW)}) * (\text{HP} / 0.7457 \text{ kW}) * (1 / \text{generator efficiency } 96\%)$$

Generator electrical output power 1,600 kW \approx engine work output 2,233 HP

Smiths Creek Landfill (N6207) supplies conditioned landfill gas (LFG \approx 50% methane) to the DTE engines (2).

Mr. Mark Grigereit (Phone: 313-897-1324; Cell: 734-276-8233; E-mail: GrigereitM@dteEnergy.com), Principal Engineer, Field Services, DTE Energy, Environmental Management and Resources, submitted test plan via letter dated December 21, 2016. The test plan is for verification of carbon monoxide (CO), nitrogen oxides (NOx) and non-methane organic compounds (NMOC or VOC excluding methane) concentrations in exhaust gases and emission rates from NSPS 4I engines (FG-ICENGINES: EU- ICENGINE1

and EU- ICENGINE2). On January 05, 2017, Mr. Tom Gasloli of AQD-TPU approved the test plan. On January 25 & 31, 2017, Field Services, DTE Energy, Environmental Management and Resources DTE Corporate Services, LLC, of Detroit conducted sampling. On March 15, 2017, AQD received the test report dated March 15, 2017.

LFG RICE generator power output averaged 1,627 kW for Engine1 / Generator1 1,592 kW for Engine2 / Generator2 during the testing. RICE fuel consumption was 531 SCFM for Engine1 and 513 SCFM for Engine2. Lower Heating Value (LHV) of LFG are 435 BTU per SCF for Engine1 (Jan 25, 2017) and 455 BTU per SCF for Engine2 (Jan 31, 2017). US EPA Reference Methods 3A and 320 were used.

PTI No. 163-09D, FG-ICENGINES (EU- ICENGINE1 and EU- ICENGINE2), I. EMISSION LIMIT(S) and TESTED EMISSIONS with OPERATING PARAMETERS

Pollutant	Limit	Average tested emission rate	Equipment		Underlying Applicable Requirements
1. CO	16.3 pph (applies to each engine)		EUICENGINE1, EUICENGINE2	SC V.1	R 336.1205, 40 CFR 52.21 (d)
2. CO	5.0 g/bhp-hr or 610 ppmvd corrected to 15% O ₂ (applies to each engine)	Engine1 = 264.6 Engine2 = 330.6 ppmv at 15% O ₂ dry	<u>EU-ICENGINE1 (Jan 25)</u> 1610-1650 kW Power 1201 rpm 113 °F inlet air temp 43 psi inlet air pressure 532 SCF LFG <u>EU-ICENGINE2 (Jan 31)</u> 1586-1597 kW Power 1201 rpm 130 °F inlet air temp 44 psi inlet air pressure 513 SCF LFG	SC V.2	40 CFR Part 60 Subpart JJJJ, 40 CFR 60.4233 (e) and Table 1
3. NO _x	3.0 pph (applies to each engine)	Hourly	EUICENGINE1, EUICENGINE2	SC V.1	40 CFR 52.21 (c) & (d)
4. NO _x	2.0 g/bhp-hr or 150 ppmvd corrected to 15% O ₂ (applies to each engine)	Engine1 = 45.7 Engine2 = 67.3 ppmv at 15% O ₂ dry	<u>EU-ICENGINE1 (Jan 25)</u> 1610-1650 kW Power 1201 rpm 113 °F inlet air temp 43 psi inlet air pressure 532 SCF LFG <u>EU-ICENGINE2 (Jan 31)</u> 1586-1597 kW Power 1201 rpm 130 °F inlet air temp 44 psi inlet air pressure 513 SCF LFG	SC V.2	40 CFR Part 60 Subpart JJJJ, 40 CFR 60.4233 (e) and Table 1
5. Hydrogen Chloride (HCl)	0.51 pph (applies to each engine)	Engine1 = NA Engine2 = 0.05 Jan 11-12, 2012, stack test	EUICENGINE1, EUICENGINE2	SC V.1	R 336.1225

Pollutant	Limit	Average tested emission rate	Equipment		Underlying Applicable Requirements
6. VOC or NMOC	1.0 g/bhp-hr or 80 ppmvd corrected to 15% O ₂ (applies to each engine)	Engine1 = 8 Engine2 = 7.5 ppmv at 15% O ₂ dry	<u>EU-ICENGINE1 (Jan 25)</u> 1610-1650 kW Power 1201 rpm 113 °F inlet air temp 43 psi inlet air pressure 532 SCF LFG <u>EU-ICENGINE2 (Jan 31)</u> 1586-1597 kW Power 1201 rpm 130 °F inlet air temp 44 psi inlet air pressure 513 SCF LFG	SC V.2	40 CFR Part 60 Subpart JJJJ, 40 CFR 60.4233 (e) and Table 1
7. Formaldehyde	2.12 pph ¹ (applies to each engine)	Engine1 = 1.7 Engine2 = 1.8 Pounds per hour Aug 18-19, 2015 stack tests	EUICENGINE1, EUICENGINE2	SC V.3	R 336.1225(2)
8. SO ₂	6.21 pph (applies to each engine)	Weekly sampling and calculations	EUICENGINE1, EUICENGINE2	SC V.1	40 CFR 52.21 (c) & (d)
9. SO ₂	54.4 tpy ^A	Weekly sampling and calculations	FGICENGINES	SC V.4, VI.2, and Appendix A	R 336.1205(3)
A This limit is based on the calculation in Appendix A. Also, included in this table are results of formaldehyde (August 18-19, 2015) and hydrogen chloride (January 11-12, 2012) stack tests.					

The January 25 and 31, 2017, tested emission rates show compliance with the limits. Although pounds per hour (pph) values are not reported, these pph values are deemed to be in compliance since the engines (2) operated at maximum capacity and ppmv values are well within the limits.

ROP: MI-ROP--P0262-2012a and PTI No. 163-09D dated May 31, 2017 – Compliance Determination

PTI No. 163-09D modified MI-ROP--P0262-2012a especially for sulfur dioxide and hydrogen sulfide limits.

PTI No. 163-09DEU-TREATMENTSYS

This emission unit treats landfill gas before it is used for electrical generation. The treatment system removes particulate to at least the 10-micron level, compresses the landfill gas, and removes enough moisture to ensure good combustion during subsequent use. The treatment of the LFG ensures that a high percentage of NMOC will be destroyed in the internal combustion engines.

I observed an in-line filter that removes particulate matter. Also, one knock drum is present to remove moisture by lowering pressure. BWR submitted a maintenance plan.

PTI No. 163-09D FG-ICENGINES, I. EMISSION LIMITS

See above under Jan 25 & 31, 2017, NSPS 4J stack tests. Also, included in this table are results of formaldehyde (August 18-19, 2015) and hydrogen chloride (January 11-12, 2012) stack tests.

BWR submitted MAP.

PTI No. 163-09D FG-ICENGINES, III. PROCESS/OPERATIONAL RESTRICTION(S)

Engines burn only landfill gas (LFG) to generated electric power. Engines are not certified, and, hence, BWR conducts annual NSPS 4J stack tests.

PTI No. 163-09D FG-ICENGINES, IV. DESIGN/EQUIPMENT PARAMETER(S)

Air-to-fuel ratio control is working properly (PTI No. 163-09D FG-ICENGINES, IV.1: Air-to-fuel ratio). The engines are equipped with non-resettable hours meters to track the operating hours (PTI No. 163-09D FG-ICENGINES, IV.2: non-resettable hours meters). Operating hours readings on September 14, 2017 are: Engine1 = 49,091 & Engine2 = 49,153 hours. The engines are equipped with one common device to monitor and record the total landfill gas fuel (LFG: landfill gas) usage for FG-ICENGINES on a continuous basis (PTI No. 163-09D FG-ICENGINES, IV.3: a device to monitor and record the total landfill gas fuel usage). LFG readings on September 13, 2017 are: 1.332932 MM SCF per day for engines (2) and 0.000285 MM SCF per day for flares (2); only one of two flares is used depending upon volume of landfill gas. Original 2011 engines: Caterpillar G3520C, 2,233 BHP at 100% load with a generator 1.6 megawatt gross electrical output Serial No. GZJ00491 (EUCENGINE1) & GZJ00493 (EUCENGINE2) (PTI No. 163-09D FG-ICENGINES, IV.4: max. HP = 2,233 BHP)

PTI No. 163-09D FG-ICENGINES, V. TESTING/SAMPLING

On March 1, 2012, BWR conducted stack test for NOx, CO & HCl (PTI No. 163-09D FG-ICENGINES, V.1: 1/5yr testing for NOx, SO2, CO & HCl). Weekly sulfur sampling is performed according to the plan dated November 01, 2016. On Jan 25 & 31, 2017, annual NSPS 4J testing for NMOC, NOx & CO was performed (PTI No. 163-09D FG-ICENGINES, V.2: annual NSPS 4J tests for NMOC, NOx & CO). On August 18-19, 2015, formaldehyde tests were performed (PTI No. 163-09D FG-ICENGINES, V.3: 1/5yr tests for formaldehyde). Weekly H2S sampling is done using Draeger Tubes (PTI No. 163-09D FG-ICENGINES, V.4: weekly H2S sampling).

PTI No. 163-09D FG-ICENGINES, VI. MONITORING/RECORDKEEPING

LFG usage and hours of operation is monitored (PTI No. 163-09D FG-ICENGINES, VI.1: landfill gas fuel usage and the hours of operation). SO2 emission rates are calculated and tabulated (PTI No. 163-09D FG-ICENGINES, VI.2 & 3: calculate and record the SO2 emission rates). Engines information is maintained (PTI No. 163-09D FG-ICENGINES, VI.4: engines info). The required records are maintained (PTI No. 163-09D FG-ICENGINES, VI.5: records).

CY2017-YTD-Aug2017 Emission Summary

1. LFG =293.8 MM CF for two engines CY2017-YTD-Aug2017
2. Rolling 12-month LFG usage = 218 MM CF for Engine1 and 214 MM CF for Engine2
3. Methane content = 57-58 % CH4
4. Heat content = 578-596 BTU per SCF
5. Sulfur content = 102 (Feb 2017) -293 (Jul 2017) mg per m3
6. Rolling 12-month SO2 emissions = 3.94–5.61 tons per year ((PTI No. 163-09D FG-ICENGINES, 1.9 limit: 54.4 tpy)
7. Rolling 12-month CO emissions = 92-94.5 tons per

During my inspection, I recorded the following engine parameters:

September 14, 2017, operating data

	Engine #1	Engine #2
Serial #	GZJ00491	GZJ00493
Engine Hours	49091	49154
Correction Factor %	97	98
LFG Btu	455	440
Fuel Temp (°F)	78.8	80.6
Fuel Pressure (psi)	16.2	16.3
Inlet Air Temp (°F)	131	141
Manifold Air Pressure (psi)	44.9	43.8
Air-Fuel Ratio	8.3	7.9
Air Flow (scfm)	4254	4037
Fuel Flow (scfm)	514	510
Oil Pressure (psi)	68.7	68.4
Oil Differential (psi)	7.2	6
Oil Temp(°F)	204	208
Battery Voltage	26	25.5
Speed (RPM)	1200	1199
Throttle %	57	55
Load %	100	100
Coolant Temp (°F)	221	226
Cylinder Temps (°F)	1131	1180

Conclusion

BWR operates its electric power generating engines (Nos. 1-2) in compliance with the permit and incorporated federal regulations (NSPS 4J and SI RICE MACT 4Z).

NAME W. McManis DATE 09/22/2017 SUPERVISOR Joyce E.

