

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

N652147245

FACILITY: Consumers Energy Co. - Zeeland Generating Station		SRN / ID: N6521
LOCATION: 425 Fairview Rd., ZEELAND		DISTRICT: Grand Rapids
CITY: ZEELAND		COUNTY: OTTAWA
CONTACT: J. Homer Manning III , Environmental Health & Safety Specialist		ACTIVITY DATE: 11/27/2018
STAFF: Kaitlyn DeVries	COMPLIANCE STATUS: Compliance	SOURCE CLASS: MAJOR
SUBJECT: The purpose of the inspection was to determine compliance with MI-ROP-N6521-2015a and other applicable air quality rules and regulations.		
RESOLVED COMPLAINTS:		

On Tuesday November 27, 2018 and Tuesday December 11, 2018 Air Quality Division Staff Kaitlyn DeVries (KD) conducted an unannounced, scheduled inspection of Consumers Energy Company – Zeeland Generating Station located at 425 Fairview, Zeeland Michigan. The purpose of the inspection was to determine compliance with MI-ROP-N6521-2015a and other applicable air quality rules and regulations. This inspection was done over the course of two (2) days because the facility was conducting testing on each of the two (2) days. The simple cycle turbine (EUGT1B) was tested on November 27, 2018 and the combined cycle turbine (EUGT2B) was tested on December 11, 2018.

When KD arrived on each of the days, she met with Mr. J. Homer Manning III, who accompanied her on the tour of the facility and provided her with all pertinent information for the inspection.

### Facility Description

The Consumers Energy Company – Zeeland Generating Station (ZGS) is a natural gas fired electric generating facility consisting of four (4) combustion turbines. Two (2) of the turbines are simple cycle, and the other two (2) are combined cycle, which also include duct burners and a steam generator. The total output for the facility is about 800 megawatts.

### Regulatory Analysis

ZGS is subject to the Title V program and is currently operating under MI-ROP-N6521-2015a and is a major source for Nitrogen oxides (NOx), Carbon Dioxide (CO), Particulate Matter (PM- 10, specifically), and Volatile Organic Compounds (VOC's). Each of the turbines at ZGS is also subject to Title IV, Acid Rain promulgated under 40 CFR Part 72. The turbines, and the duct burners are also subject to the provisions of the New Source Performance Standards (NSPS) 40 CFR Part 60 Subpart Da for Electric Utility Steam Generating Units and 40 CFR Part 60 Subpart GG for Stationary Gas Turbines. Details regarding compliance with the federal regulations can be found in the Compliance Evaluation portion of this report. The diesel fired emergency combustion engine, is subject to the provisions of the National Emissions Standards for Hazardous Air Pollutants (NESHAP) 40 CFR Part 63 Subpart ZZZZ for Stationary Reciprocating Internal Combustion Engines, as an area source. While AQD does not have delegation for this area source regulation, it is enforceable via the Title V permit.

### Compliance Evaluation

#### *FGSIMPLECYCLE*

This flexible group covers two (2) General Electric natural gas fired combustion turbines (EUGT1A and EUGT1B) operating in simple cycle mode. Both units are equipped with dry low-NOx combustors. Both units are subject to the Federal Acid Rain Program, and to NSPS 40 CFR Part 60 Subpart GG for Stationary Gas Turbines. Several of the emission limits or recordkeeping requirements specified in Subpart GG, or Subpart Da have been subsumed by more stringent emission limits or recordkeeping requirements. Table 1 (below) outlines the various emission limitations this flexible group is subject to. Unless otherwise noted, the emission limit applies to each turbine, individually. Additionally, some emission limits do not apply during periods of startup, shutdown, or malfunction; these limits are noted in Table 1, below.

**Table 1: Emission Limits for FGSIMPLECYCLE**

Pollutant	Emission Limit	Observed Value Unit 1A Unit 1B	Averaging Time
NOx	0.04 lb./MMBtu Heat Input	0.031 lb./MMBtu 0.028 lb./MMBtu	Average of all operating hours in a calendar day <sup>A</sup>
NOx	9.0 ppmv, at 15% oxygen, dry	8.41 ppmv 7.6 ppmv	Average of all operating hours in a calendar day <sup>A</sup>
NOx	334.6 tons per year (tpy)	35.17 tpy 29.52 tpy	12-month rolling time period
PM-10	10.8 pounds per hour (pph)	3.4 pph 6.2 pph	Average of all operating hours in a calendar day <sup>A</sup>
PM-10	47.3 tpy	2.29 tpy 3.53 tpy	12-month rolling time period
CO	0.021 pounds per MMBtu heat input	0.020 lb./MMBtu 0.001 lb./MMBtu	Average of all operating hours in a calendar day <sup>A</sup>
CO	175.6 tpy	16.37 tpy 16.50 tpy	12-month rolling time period
VOC	5.8 pph	1.21 pph 1.0 pph	Average of all operating hours in a calendar day <sup>A</sup>
VOC	25.4 tpy	0.80 tpy 0.49 tpy	12-month rolling time period
Formaldehyde (HCHO)	9.4 tpy <sup>B</sup>	2.19 tpy	12-month rolling time period

<sup>A</sup> This limit does not apply during periods of startup, shutdown, or malfunction.

<sup>B</sup> This limit is applicable to FGSIMPLECYCLE and FGCOMBINEDCYCLE combined.

Each turbine also has an opacity limit of 10%, based upon a 6-minute average. No opacity was noted during the inspection. The most recent method 9 reading for each unit was done on April 16, 2018 with a 6-minute average opacity reading of 0%, for each turbine. Testing for VOC's, PM-10, and Formaldehyde was being conducted on the day of the visit on Unit 1B; Unit 1A had previously been tested for in 2013. Currently the permit requires only one (1) of the two (2) units to be tested per ROP cycle.

The turbines only burn pipeline quality natural gas with sulfur content at less than or equal to 0.0006 lb./MMBtu. The facility maintains a startup, shutdown, malfunction (SSM) plan. Each of the units are limited to 182 hours of startup and 85 hours for shutdown, both based upon 12-month rolling time periods. Records indicate that the 12-month rolling startup and shutdown hours for Unit 1A as of October 2018 were 29.58 hours and 21.09 hours. As of October 2018, the 12-month rolling startup and shutdown hours for Unit 1B were 24.93 hours and 19.99 hours.

KD was able to view the Continuous Emissions Monitoring (CEMS) systems for both Units 1A and 1B. Unit 1A was not in operation at the time of the visit, but Unit 1B had RAW NOx readings of 9.81 ppm, but this still needed to be corrected to 15% O<sub>2</sub>; the CO CEMS was reading at 0.150 ppm. ZGS has successfully been submitting all required reports, including the Excess Emissions Reports (EER).

KD did not measure the stack dimensions, but they appeared to be correct.

#### *FGCOMBINEDCYCLE*

This flexible group consists of two (2) combined cycle combustion turbines with heat recovery steam generators with integral duct burners. Also associated with this flexible group is mechanical cooling towers and a common steam turbine. The combustion turbines and heat recovery steam generator/duct burners are arranged in a 2-on-1 design with the steam turbine. Both turbines have Dry-Low NOx burners and selective catalytic reduction (SCR) systems. KD conducted the inspection of this flexible group on her December 11, 2018 visit. Both units were in operation with EUGT2A running at a variable load due to demand, and Unit2B running at around 125 MW (gross) or approximately 70% load. Neither unit was using the duct burners associated with the units.

Table 2 (below) outlines the various emission limitations this flexible group is subject to. Unless otherwise noted,

the emission limit applies to each turbine, individually.

**Table 2: FGCOMBINEDCYCLE Emission Limits**

Pollutant	Emission Limit	Observed Value Unit 2A Unit 2B	Averaging Time
Sulfur Dioxide (SO <sub>2</sub> )	0.20 lb./MMBtu <sup>C</sup>	The use of pipeline quality gas meets this requirement.	At all times of operation for each individual Duct Burner
NOx	0.013 pounds per MMBtu heat input	0.010 lb./MMBtu 0.010 lb./MMBtu	Average of all operating hours in a calendar day
NOx	3.5 ppmv, at 15% oxygen, dry	2.7 ppm 2.8 ppm	Average of all operating hours in a calendar day <sup>B</sup>
NOx	119.6 tons per year (tpy)	62.56 tpy 64.90 tpy	12-month rolling time period <sup>B</sup>
PM-10	14.7 pounds per hour (pph)	5.7 pph 4.6 pph	Average of all operating hours in a calendar day <sup>B</sup>
PM-10	64.4 tpy	18.54 tpy 14.65 tpy	12-month rolling time period <sup>B</sup>
PM, filterable only	0.03 lb./MMBtu	Not applicable <sup>C</sup>	Determined via Stack Testing <sup>D</sup>
CO	0.042 pounds per MMBtu heat input	0.001 lb./MMBtu 0.001 lb./MMBtu	Average of all operating hours in a calendar day <sup>B</sup>
CO	238.0 tpy	53.93 tpy 60.10 tpy	12-month rolling time period <sup>B</sup>
VOC	16.8 pph	1.3 pph 1.3 pph	Average of all operating hours in a calendar day <sup>B</sup>
VOC	73.6 tpy	4.20 tpy 4.13 tpy	12-month rolling time period <sup>B</sup>
Formaldehyde (HCHO)	9.4 tpy <sup>A</sup>	2.19 tpy	12-month rolling time period <sup>A</sup>
Ammonia	27.1 pph	1.4 pph <sup>E</sup> 3.3 pph <sup>E</sup>	Average of all operating hours in a calendar day <sup>B</sup>

<sup>A</sup> This limit is applicable to FGSIMPLECYCLE and FGCOMBINEDCYCLE combined.

<sup>B</sup> This limit applies individually to each turbine either with or without the duct burner

<sup>C</sup> The facility is exempt from this emission limit. See discussion below.

<sup>D</sup> This limit is applicable to each duct burner, individually.

<sup>E</sup> This limit is the ammonia slip associated with the SCR and is calculated pursuant to Appendix 7.

Each turbine, individually, has an opacity limit of 10%, based upon a 6-minute average. No opacity was noted during the inspection. The most recent method 9 reading for each unit was done on April 16, 2018 with a 6-minute average opacity reading of 0%, for each turbine. Testing for VOC's, PM-10, and Formaldehyde was being conducted on the day of the visit on Unit 2B; Unit 2A had previously been tested for in 2013. Currently the permit requires only one (1) of the two (2) units to be tested per ROP cycle.

During the December 11 stack test KD asked Mr. Manning about the duct burners. Mr. Manning explained that the duct burners are not used until the turbine is at max capacity. So, unless they need to generate the extra Megawatts that the use of the duct burners can provide, they are not used. KD then asked that if the duct burners were not being used during the testing how is ZGS demonstrating compliance with the 0.03 lb./MMBtu emission limitation identified in FGCOMBINEDCYCLE Special Condition I.7, which originates from 40 CFR 60.42 (Da). While on site, Mr. Manning and KD looked through the stack test report and data from the 2013 stack test and confirmed that the duct burners had not been tested during that test either. Further inquiry into Subpart Da revealed that per 60.42Da(a)(f)(1), ZGS is exempt from this emission limit as the facility combusts only gaseous fuel with potential SO<sub>2</sub> emission rates of 0.060 lb/MMBtu or less and does not use post-combustion technology to reduce emissions of SO<sub>2</sub> or PM. The requirement to use pipeline quality natural gas restricts the SO<sub>2</sub> emission rate to 0.0006 lb/MMBtu, therefore exempting the ductburners from this emission limit. This will be clarified during the next ROP renewal, in 2019.

The turbines only burn pipeline quality natural gas with sulfur content at less than or equal to 0.0006 lb./MMBtu. The facility follows and maintains a startup, shutdown, malfunction (SSM) plan. Each of the units are have startup and shutdown limitations. The limits for the various start conditions and the shutdown are listed in Table 3 below. Each unit is limited individually, and the limits are based upon a 12-month rolling time period.

**Table 3: FGCOMBINEDCYCLE startup and shutdown hours**

	Cold Start	Warm Start	Hot Start	Shutdown
Limit	564 Hrs.	456 Hrs.	341 Hrs.	85 Hrs.
Unit 2A	12.10 Hrs.	55.73 Hrs.	71.52 Hrs.	11.74 Hrs.
Unit 2B	10.97 Hrs.	53.32 Hrs.	58.23 Hrs.	13.34 Hrs.

Additionally, the two (2) units are not operated simultaneously at loads of greater than 60% for longer than 16 continuous hours.

KD was able to view the Continuous Emissions Monitoring (CEMS) systems for both Units 2A and 2B. Unit 2A was running with NOx emission of 2.7 ppm and 0.010 lbs/MMBtu, CO at 0.7 ppm, with an ammonia slip (for the SCR) of 1.4. The SCR had an injection rate of 64.9 pph. Unit 2B was running with NOx emissions of 2.8 ppm and 0.011 lbs/MMBtu, CO at 1.0 ppm, with an Ammonia Slip of 2.8 and an Ammonia injection rate of 55.1 pph. ZGS has successfully been submitting all required reports, including the Excess Emissions Reports (EER).

KD did not measure the stack dimensions, but they appeared to be correct.

#### *FGCIRICEMACT*

This flexible group includes one (1) emergency stationary compression ignition reciprocating internal combustion engine. This unit is currently subject to the provisions of NESHAP 40 CFR Part 63 Subpart ZZZZ. This engine was installed prior to June 12, 2006; therefore, it is not currently subject to a NSPS.

The diesel fired engine is equipped with an hour meter, which read 95.9 hours. Records indicate that it operates approximately 20 – 25 hours per year, having ran 22.2 hours thus far in calendar year 2018. ZGS conducts regular maintenance on the unit, with the most recent maintenance done in July 2018. Fuel analysis records also indicate ultra-low sulfur diesel fuel is used in the engine.

#### *FGPARTSWASHER*

This flexible group applies to any cold cleaner that is grandfathered or exempt from Rule 201 permitting pursuant to Rule 278 and Rule 281(2)(h) or Rule 285(2)(r)(iv). ZGS currently has one (1) of these types of units, the unit was closed and not in use at the time of the inspection.

#### **Compliance Determination**

Based upon the observations made during the inspection and a subsequent review of the records, it appears that Consumers Energy Company – Zeeland Generating Station is in compliance with MI-RQP-N6521-2015a.

NAME

Karleen D. Smith

DATE

12/17/18

SUPERVISOR

[Signature]