

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: Off-site Inspection

N652156578

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| 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: 12/07/2020 |
| STAFF: Kaitlyn DeVries | COMPLIANCE STATUS: Compliance | SOURCE CLASS: MAJOR |
| SUBJECT: The purpose of the inspection was to determine compliance with MI-ROP-N6521-2020 and other applicable air quality rules and regulations. | | |
| RESOLVED COMPLAINTS: | | |

On Monday December 7, 2020 Department of Environment, Great Lakes, and Energy (ELGE) Air Quality Division (AQD) Staff Kaitlyn DeVries (KD) conducted an announced, scheduled virtual 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-N6521-2020 and other applicable air quality rules and regulations. This inspection was conducted virtually due to additional safety precautions necessary due to the Covid-19 pandemic and the desire to minimize any potential spread of Covid-19. KD met over a teleconference with Mr. J. Homer Manning III, who supplied KD with all of the pertinent records as well as provided virtual access to the facility.

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-N6521-2020 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. The AQD does not have delegation for this area source regulation.

Compliance Evaluation

FGSIMPLECYCLE

This flexible group covers two (2) General Electric natural gas fired combustion turbines (EUGT1A and EUGT1B) operating in simple cycle mode. At the time of the inspection only EUGT1A was

running. Both units are equipped with dry low-NO_x 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 |
|---------------------|-----------------------------------|--------------------------------------|---|
| NO _x | 0.04 lb./MMBtu Heat Input | 0.029 lb./MMBtu 0.030 lb./MMBtu | Average of all operating hours in a calendar day ^A |
| NO _x | 334.6 tons per year (tpy) | 74.11 tpy 39.81 tpy | 12-month rolling time period |
| PM-10 | 10.8 pounds per hour (pph) | 3.31 pph 4.09 pph | Average of all operating hours in a calendar day ^A |
| PM-10 | 47.3 tpy | 5.02 tpy 3.32 tpy | 12-month rolling time period |
| CO | 0.021 pounds per MMBtu heat input | 0.001 lb./MMBtu 0.001 lb./MMBtu | Average of all operating hours in a calendar day ^A |
| CO | 175.6 tpy | 9.797 tpy 8.45 tpy | 12-month rolling time period |
| VOC | 5.8 pph | 1.16 pph 0.50 pph | Average of all operating hours in a calendar day ^A |
| VOC | 25.4 tpy | 1.76 tpy 0.39 tpy | 12-month rolling time period |
| Formaldehyde (HCHO) | 9.4 tpy ^B | 2.18 tpy | 12-month rolling time period |

^A This limit does not apply during periods of startup, shutdown, or malfunction.

^B This limit is applicable to FGSIMPLECYCLE and FGCOMBINEDCYCLE combined.

Each turbine also has an opacity limit of 10%, based upon a 6-minute average. Since this inspection was done virtually, other days that KD was in the vicinity of the facility KD observed the stacks for opacity. Only steam was noted on some of the days. The most recent method 9 reading for each unit was done on May 4, 2020 with a 6-minute average opacity reading of less than 10%, for each turbine.

Testing is required for VOC's, PM-10, and Formaldehyde. Testing is required for one (1) of the two (2) units every five (5) years from the date of the last test date. Testing was most recently done on Unit 1 B in November of 2018 for Unit 1B having emission rates of 0.33 pph for VOC, 3.34 pph for PM-10, and 0.0002 lb./MMBtu for Formaldehyde. Unit 1A was most recently tested in 2013.

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 November 2020 were 14.41 hours and 10.33 hours. As of November 2020, 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 via Mr. Manning virtually taking KD to the control room where the CEMS values could be observed. Unit 1B was not in operation at the time of the inspection, but Unit 1A had RAW NOx readings of 7.4 ppm, but this still needed to be corrected to 15% O2; the CO CEMS was reading at 0.7 ppm. KD also collected the daily calibration data for the CEMS unit, with no issues noted. 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. Both units were in operation at the time of the virtual inspection.

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 ₂) | 0.20 lb./MMBtu ^C | The use of pipeline quality gas meets this requirement. | At all times of operation for each individual Duct Burner |
| NO _x | 0.013 pounds per MMBtu heat input | 0.010 lb./MMBtu 0.010 lb./MMBtu | Average of all operating hours in a calendar day |
| NO _x | 119.6 tons per year (tpy) | 73.69 tpy 72.99 tpy | 12-month rolling time period ^B |
| PM-10 | 14.7 pounds per hour (pph) | 5.94 pph 4.6 pph | Average of all operating hours in a calendar day ^B |
| PM-10 | 64.4 tpy | 21.56 tpy 15.96 tpy | 12-month rolling time period ^B |
| 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 ^B |
| CO | 238.0 tpy | 22.74 tpy 26.10 tpy | 12-month rolling time period ^B |
| VOC | 16.8 pph | 1.37 pph 0.26 pph | Average of all operating hours in a calendar day ^B |
| VOC | 73.6 tpy | 4.95 tpy 0.89 tpy | 12-month rolling time period ^B |
| Formaldehyde (HCHO) | 9.4 tpy ^A | 2.18 tpy | 12-month rolling time period ^A |
| Ammonia | 27.1 pph | 6.07 pph ^C 9.98 pph ^C | Average of all operating hours in a calendar day ^B |

^A This limit is applicable to FGSIMPLECYCLE and FGCOMBINEDCYCLE combined.

^B This limit applies individually to each turbine either with or without the duct burner

^C 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. As previously mentioned, since this was a virtual inspection, opacity observations were not made on the day of the inspection, but rather on varying days that KD was in the vicinity of the facility. No opacity was noted during any of KD's observations, but rather just steam. The most recent method 9 reading for each unit was done on May 4, 2020 with a 6-minute average opacity reading of less than 10%, for each turbine.

Testing for VOC's, PM-10, and Formaldehyde was conducted in 2018, while Unit 2A had previously been tested in 2013. The permit requires only one (1) of the two (2) units to be tested every five (5) years from the date of the last test date.

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 | 27.20 Hrs. | 23.58 Hrs. | 13.11 Hrs. | 5.38 Hrs. |
| Unit 2B | 22.96 Hrs. | 18.08 Hrs. | 13.89 Hrs. | 4.14 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 via Mr. Manning virtually taking KD into the control room where the CEMS readings could be observed. Unit 2A was running with NOx emission of 2.9 ppm and 0.011 lbs/MMBtu, CO at 0.1 ppm, with an ammonia slip (for the SCR) of 4.1. Unit 2B was running with NOx emissions of 4.0 ppm and 0.011 lbs/MMBtu, CO at 1.0 ppm, with an Ammonia Slip of 5.2. 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 AQD does not have delegation for 40 CFR Part 63 Subpart ZZZZ, and since this was a virtual inspection, this emission unit was not observed. However, previous inspections conducted by KD revealed that the diesel fired engine is equipped with an hour meter. ZGS conducts regular maintenance on the unit, with the most recent maintenance done on December 7, 2020 with the hour meter reading 138.3 hours. 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.

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 in compliance with MI-ROP-N6521-2020 and other applicable air quality rules and regulations.

NAME Kaitlyn DeVries

DATE 1/5/2021

SUPERVISOR HH