

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

N652130643

FACILITY: 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: 08/06/2015
STAFF: April Lazzaro	COMPLIANCE STATUS: Compliance	SOURCE CLASS: MAJOR
SUBJECT: Unannounced, scheduled inspection.		
RESOLVED COMPLAINTS:		

This was an unannounced scheduled inspection. Staff April Lazzaro arrived at the facility and met with J. Homer Manning, III and informed him that an inspection would take place. The DEQ Environmental Inspection: Rights and Responsibilities Brochure was briefly discussed, to which there have been no changes. Mr. Manning then took staff on a physical tour of the facility.

FACILITY DESCRIPTION

The Zeeland Power power plant is located in Zeeland, Ottawa County, Michigan. The plant is a natural gas fired electrical generation facility with a total of four units consisting of two combustion turbines operating in simple-cycle mode; and two combustion turbines, two duct burners and a steam generator collectively operating in combined cycle mode. Total output for the facility is about 800 megawatts. Support equipment for the facility includes two gas-fired auxiliary boilers and a 2.6 million Btu natural gas fired emergency generator.

Each of the four General Electric 7FA combustion turbines is equipped with dry low-NOx combustor systems. Nitrogen oxide (NOx) emissions from the turbines operating in combined cycle are controlled by Selective Catalytic Reduction (SCR) devices, using aqueous ammonia as the reactant. Emissions from each turbine are monitored by Continuous Emissions Monitoring Systems (CEMS) for carbon monoxide and nitrogen oxides.

The stationary source is subject to 40 CFR Part 70 because the potential to emit (PTE) for carbon monoxide, nitrogen oxides, PM-10 and volatile organic compounds exceeds 100 tons.

The stationary source is subject to Prevention of Significant Deterioration (PSD) (40 CFR 52.21) regulations because the stationary source has the potential to emit of carbon monoxide, nitrogen oxides, PM-10 and volatile organic compounds greater than 250 tons per year. In addition to PSD-required best available control technology (BACT), VOC emissions were evaluated relative to Rule 702. Emissions of individual toxic air contaminants (formaldehyde, ammonia) were evaluated relative to Michigan's Air Toxic regulations per Rule 224 and 225.

The stationary source is subject to Standards of Performance for New Stationary Sources (New Source Performance Standards (NSPS)) for the gas turbines and duct burners promulgated in 40 CFR Part 60 Subparts A, Da and GG. Certain requirements (monitoring for nitrogen content of natural gas, NOx monitoring method, NOx emission limit, sulfur content of gas, sulfur dioxide initial performance testing) were streamlined in MI-ROP-N6521-2015, based on other, more stringent applicable requirements (i.e. BACT, CEMS, use of pipeline quality natural gas). Streamlined requirements have been identified in Tables FGSIMPLECYCLE and FGCOMBINEDCYCLE of the Renewable Operating Permit (ROP). All required NSPS initial performance testing has been completed. Testing requirements in the ROP pertain to ongoing and future testing.

The stationary source has several emission units (each turbine) subject to the federal Acid Rain program promulgated in 40 CFR Part 72. The facility's Acid Rain Permit is attached to the ROP as

Appendix 9.

The stationary source has several emission units (each turbine) subject to the Clean Air Interstate Rule (CAIR) SO₂ Budget Permit, CAIR Ozone NO_x Budget Permit, and CAIR Annual NO_x Budget Permit NO_x Budget Trading program pursuant to Part 97 and Rule 802 through 816. The applicable requirements are included as Appendices 10, 11 and 12 respectively.

COMPLIANCE EVALUATION

Staff indicated that the inspection would include the facility and a visual observation of both simple cycle and combined cycle turbines was conducted. Unit 2A and 2B were in operation at the time of the inspection. Unit 2B CEMS shack was also observed.

The NO_x CO and O₂ facility emission limits are based on the CEMS data which are calibrated daily during operation. Other pollutants are based on stack test data as detailed below. A CEMS Relative Accuracy Test Audit (RATA) is conducted on each unit annually. The most recent RATA was on June 15, 2015.

FGSIMPLECYCLE

FGSIMPLECYCLE includes two General Electric model 7Fa natural-gas-fired combustion turbines which operate in simple cycle mode and are referred to 1A and 1B or Phase 1. They are equipped with a dry-low-NO_x combustor and generate approximately 170 MW each of electric power. The units fire only pipeline quality natural gas. In simple-cycle operation the compressed gas is ignited and the heat energy is converted into shaft rotation. The information provided appears compliant with Appendix 3.2, and the Custom Fuel Monitoring Program (CFMP) required by 40 CFR Part 60 Subpart GG.

I. Emission Limits

Emission limits include NO_x, PM-10, CO, VOC, HCHO and opacity. Staff requested emissions records during the inspection, which were received timely.

Daily average NO_x emission limit is 9.0 ppmv based on an average of all operating hours in a calendar day and recorded via the CEMS. Data reviewed for operating hour averages for the month of June 2015 indicate the highest daily average was Unit 1B at 8.6 ppmv on June 10th. NO_x mass emission limit is 334.6 tons per 12-month rolling time period for each turbine. Unit 1A reported NO_x emissions through July 2015 were 16.733 tons, reported Unit 1B emissions were 21.729 tons. Daily average PM-10 emission limit is 10.8 lb/hr based on an average of all operating hours in a calendar day and recorded using stack test data and heat input. Data reviewed for operating hour averages for the month of June 2015 indicate the highest daily average was Unit 1B at 8.6 ppmv on June 10th. PM-10 mass emission limit is 47.3 tons per 12-month rolling time period for each turbine. Unit 1A reported PM-10 emissions through July 2015 were 1.185 tons, reported Unit 1B emissions were 2.572 tons. Daily average CO emission limit is 0.021 lb/mmBtu heat input based on an average of all operating hours in a calendar day and recorded via the CEMS. Data reviewed for operating hour averages for the month of June 2015 indicate the highest daily average was Unit 1B at 0.002 lb/mmBtu on June 10th. CO mass emission limit is 175.6 tons per 12-month rolling time period for each turbine. Unit 1A reported CO emissions through July 2015 were 10.097 tons, reported Unit 1B emissions were 8.894 tons. Daily average VOC emission limit is 5.8 lb/hr based on an average of all operating hours in a calendar day and recorded using stack test data and heat input. Data reviewed for operating hour averages for the month of June 2015 indicate the highest daily average was Unit 1A at 1.2 on 6 operating days. VOC mass emission limit is 25.4 tons per 12-month rolling time period. Unit 1A reported VOC emissions through July 2015 were 0.411 tons, reported Unit 1B emissions were 0.360 tons. HCHO emission limit is 9.4 tons per 12-month rolling time period. This limit is applicable to all combustion turbine operations. Current total facility HCHO emissions through July 2015 are 3.18 tons. Opacity was verified by Method 9 readings taken last in June 2015. Readings for units 1A and 1B were zero during the testing.

II. Material Limits

Material limits for these units include the requirement for firing only pipeline quality natural gas with a 0.0006 lb/mmBtu sulfur content, equivalent to 0.2 grains total sulfur per 100 scf, or 3.4 ppm by volume. The facility only receives this type of gas pursuant to the CFMP in Appendix 3.2. The most recent sulfur content report is attached with a sulfur content of 0.5 ppm by volume.

III. Process/Operational Restrictions

The process and operational restrictions include operating pursuant to the Startup, Shutdown, Malfunction Plan (SSMP) and restricts hours of Startup and Shutdown, which it appears the facility is in compliance. Startup hours are limited to 182 hours per turbine. Unit 1A has reported total startup hours of 13:03 on a 12-month rolling total, while Unit 2A has reported total startup hours of 12:49 on a 12-month rolling total. I clarified with Mr. Manning on the recordkeeping as it titles the hours for Unit 1A and 1B as "cold" startup hours. He stated that while it is titled "cold" the value includes any/all possible startup hours. Shutdown hours are limited to 85 hours per turbine. Unit 1A has reported total shutdown hours of 10:30 on a 12-month rolling total, while Unit 2A has reported total shutdown hours of 11:40 on a 12-month rolling total. Information submitted by the facility does not indicate non-compliance with PSD. The facility reports that they are in compliance with Part 60 and the Acid Rain Permit.

IV. Design/Equipment Parameters

The process can not operate without the low NOx burners, as they are integral to firing.

V. Testing/Sampling

The facility conducts visible emissions testing appropriately and has provided the records to demonstrate this. The facility conducted the required stack testing in October 2013, where Unit 1A was evaluated. The next stack test must be conducted on Unit 2A

VI. Monitoring/Recordkeeping

There are many things that the facility is required to monitor continuously. While the units were not in operation the day of the inspection, previous observations have proved that the requirements are being met and while the facility has a new CEMS operating system no issues have arisen based on conversations with Mr. Manning. In fact, the new system seems to have reduced downtime due to the scheduling of the daily calibrations. The CEMS monitor NOx, CO and O2 for the simple cycle units. This is required both by Part 60 and Part 75. Due to the more stringent requirements, the facility operates them pursuant to Part 75 and that requirement subsumes the Part 60 regulation. Daily average emissions are taken on a continuous basis by the CEMS, and then the DAHS takes the information and converts it to the daily averages. This information is then calculated and recorded on a monthly and 12-month rolling time period. This information by pollutant was requested for the past year and received timely.

The records for PM10 are based upon the most recent stack test data emissions factors with corrections for load, fuel burned and hours operated. The VOC records are based upon the most recent stack test data emissions factors.

VII. Reporting

The facility has currently met all reporting requirements of this permit.

VIII. Stack/Vent Restrictions

The stack height limits are based on design and modeling information provided during permitting and they have not changed since installation.

IX. Other Requirements

Other requirements pertain to the Acid Rain Permit, CAIR SO₂ Trading Program, CAIR NO_x Trading Program, CAIR Ozone NO_x Trading Program and the allowances the facility is required to maintain at all times. At the time of the inspection, these were acceptable.

FGCOMBINEDCYCLE

FGCOMBINEDCYCLE includes two General Electric model 7FA combustion turbines, heat recovery steam generators (HRSG) with integral duct burners which operate in tandem in combined cycle mode and are referred to 2A and 2B or CC3 and CC4. A combined cycle unit operates like a simple-cycle unit with the addition of a HRSG. Following the turbine, the exhaust gases flow through the HRSG, which is supplementally fired with a duct burner. The exhaust is cooled by heating high pressure water from a liquid at ambient temperature up to a temperature where the fluid becomes superheated steam. The steam is supplied to a steam generator, condensed to a liquid state, recovered, and pumped along with make-up water through the HRSG again. The units fire only pipeline quality natural gas. The information provided appears compliant with Appendix 3.2 and the CFMP required by 40 CFR Part 60 Subpart GG.

I. Emission Limits

Emission limits include SO₂, NO_x, PM-10, CO, VOC, HCHO, opacity and ammonia. Staff requested emissions records for monthly emissions including 12-month rolling average. Ammonia is used in the combined-cycle operations because of the reaction of ammonia with NO_x to produce nitrogen and water vapor. Generally NO_x reduction is directly proportional to the amount of ammonia injected. This is true until a certain point, at which some of the ammonia is unreacted. This is called ammonia slip. The facility is required to maintain daily records of the daily average ammonia slip for each unit.

SO₂ emission limit is 0.80lb/mmBtu. This emission limit is met via the use of pipeline quality natural gas. Daily average NO_x emission limit is 3.5 ppmv based on an average of all operating hours in a calendar day and recorded via the CEMS. Data reviewed for operating hour averages for the month of June 2015 indicate the highest daily average was Unit 2B 0.01 lb/mmBtu on several days. NO_x mass emission limit is 119.6 tons per 12-month rolling time period for each turbine. Unit 2A reported NO_x emissions through July 2015 were 57.163 tons, reported Unit 2B emissions were 58.970 tons. Daily average PM-10 emission limit is 14.7 lb/hr based on an average of all operating hours in a calendar day and recorded using stack test data and heat input. Data reviewed for operating hour averages for the month of June 2015 indicate the highest daily average was Unit 2A at 5.9 lb/hr on 3 days in June. PM-10 mass emission limit is 64.4 tons per 12-month rolling time period for each turbine. Unit 2A reported PM-10 emissions through July 2015 were 15.455 tons, Unit 2B reported emissions were 12.411 tons. Daily average CO emission limit is 0.042 lb/mmBtu heat input based on an average of all operating hours in a calendar day and recorded using stack test data and heat input. Data reviewed for operating hour averages for the month of June 2015 indicate the highest daily average was Unit 2A and 2B equal for the month at 0.001 lb/mmBtu. CO mass emission limit is 238.0 tons per 12-month rolling time period for each turbine. Unit 2A reported CO emissions through July 2015 were 79.725 tons, reported Unit 2B emissions were 66.370 tons. VOC emission limit is 73.6 tons per 12-month rolling time period. Unit 2A reported VOC emissions through July 2015 were 3.409 tons, reported Unit 2B were 3.472 tons. HCHO emission limit is 9.4 tons per 12-month rolling time period. This limit is applicable to all combustion turbine operations. Current total facility emissions through July 2015 are 3.18 tons. Opacity was verified by Method 9 readings taken last in June 2015. Readings for units 1A and 1B were zero during the testing.

II. Material Limits

Material limits for these units include the requirement for firing only pipeline quality natural gas with a 0.0006 lb/mmBtu sulfur content, equivalent to 0.2 grains total sulfur per 100 scf, or 3.4 ppm by volume. The facility only receives this type of gas pursuant to the CFMP in Appendix 3.2. The most recent sulfur content report is attached with a sulfur content of 0.5 ppm by volume.

III. Process/Operational Restrictions

The process and operational restrictions include operating pursuant to the SSMP and restricts hours of Startup and Shutdown which it appears the facility is in compliance. Information submitted by the facility does not indicate non compliance with PSD. The facility reports that they are in compliance with Part 60 and the Acid Rain Permit. The most consecutive hours the turbines operated at 60% load or less for the time frame evaluated was four continuous hours. See attached records.

IV. Design/Equipment Parameters

The process can not operate without the low NOx burners, as they are integral to firing.

V. Testing/Sampling

The facility conducts visible emissions testing appropriately and has provided the records to demonstrate this. The facility conducted stack testing October 8, 2013, which was within the required timeframe.

VI. Monitoring/Recordkeeping

There are many things that the facility is required to monitor continuously. While the units were not in operation the day of the inspection, previous observations have proved that the requirements are being met. The CEMS monitor NOx, Co and O2 for the combined cycle units. This is required both by Part 60 and Part 75. Due to the more stringent requirements, the facility operates them pursuant to Part 75 and that requirement subsumes the Part 60 regulation. Daily average emissions are taken on a continuous basis by the CEMS, and then the DAHS takes the information and converts it to the daily averages. This information is then calculated and recorded on a monthly and 12-month rolling time period. This information by pollutant was requested for the past year and was received timely. The facility is required to calculate ammonia slip for each unit. This is conducted using the calculations provided and agreed upon located in Appendix-7 of the ROP. The facility measures how much ammonia is injected into the HRSG, which is then determined via the calculation how much "slip" or excess ammonia has been used/emitted.

The records for PM10 are based upon the most recent stack test data emissions factors with corrections for load, fuel burned and hours operated. The VOC records are based upon the most recent stack test data emissions factors.

VII. Reporting

The facility has currently met all reporting requirements of this permit.

VIII. Stack/Vent Restrictions

The stack height limits are based on design and modeling information provided during permitting and they have not changed since installation.

IX. Other Requirements

Other requirements pertain to the Acid Rain Permit, CAIR SO2 Trading Program, CAIR NOx Trading Program, CAIR Ozone NOx Trading Program and the allowances the facility is required to maintain at all times. At the time of the inspection, these were acceptable.

FGPARTSWASHERS

At the time of the inspection, there was one parts washer present at the facility.

NON-APPLICABLE REQUIREMENTS

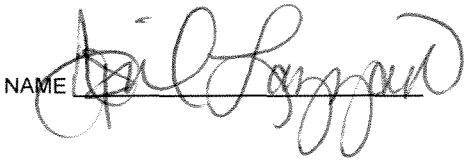
At the time of the ROP issuance, the AQD has determined that the facility is not subject to Part 11 Rules as they are not fossil fuel-fired steam generators as detailed in Section E of the ROP.

A typo was identified in Appendix 5 of the ROP that appears to be an AQD mistake going back to the 2012 modification. Instead of MDEQ-AQD, it reads MEDQ-AQD.

EVALUATION SUMMARY

Based on the information received and data reviewed, the facility appeared to be in compliance at the time of the inspection.

NAME



DATE

8-17-15

SUPERVISOR

PAB