

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

N376056415

FACILITY: GREAT LAKES GAS TRANSMISSION STATION #8		SRN / ID: N3760
LOCATION: 151 OSS RD, CRYSTAL FALLS		DISTRICT: Marquette
CITY: CRYSTAL FALLS		COUNTY: IRON
CONTACT: Ruth Jensen , Air Quality Specialist		ACTIVITY DATE: 12/21/2020
STAFF: Michael Conklin	COMPLIANCE STATUS: Compliance	SOURCE CLASS: MAJOR
SUBJECT: Targeted inspection for FY 21.		
RESOLVED COMPLAINTS:		

Facility: Great Lakes Gas Transmission Station #8 (SRN: N3760)

Location: 151 OSS Rd, Crystal Falls, MI

Contact(s): Bruce Bendes, Environmental Specialist, 313-720-3665

Ruth Jensen, Air Quality Specialist, 402-639-2785

Facility Description

Great Lakes Gas Transmission Limited Partnership (GLGT), headquartered in Houston, Texas, is a natural gas pipeline company that transports natural gas from Western Canada into Minnesota, Michigan, Wisconsin, and Eastern Canada. The pipeline system is 2,115 miles long and has an average design capacity of approximately 2,400 million cubic feet per day. The company has been in operation since 1967 and is currently owned by TC Energy, a North American energy company based out of Calgary, Alberta, Canada.

Compressor stations, or booster stations, are part of the natural gas utility process that transport natural gas from well sites, to processing facilities, to end users. They are utilized to maintain pressure and flow throughout the pipeline network. GLGT operates fourteen compressor stations, with five in the Upper Peninsula of Michigan, including the Crystal Falls Station #8 (GLGT Station #8) in Iron County.

GLGT Station #8 operates three natural-gas-fired turbines/compressors. These systems are composed of a simple cycle, split-shaft gas turbine connected to a compressor. In a simple cycle turbine, ambient air is drawn in and compressed. The hot high-pressure air is then ignited with fuel in the combustors and routed to the power turbine with additional compressed air from the compressor section. The hot exhaust gases expand through the power section providing rotational force to the power shaft. Natural gas is fed through the compressor and exits at a higher pressure. The facility does not operate a natural gas storage field or dehydration system.

Other emission units/operations at the source that are considered exempt from permitting include the following: a natural gas-fired 5.02 MMBtu/hr boiler, nine natural gas-fired space heaters, two natural gas-fired water heaters, two natural gas-fired Bruest heaters, 3,000 gallon

lube oil storage tank, 1,800 gallon lube oil storage tank, 1,000 gallon Ambitrol storage tank, 300 gallon diesel storage tank, 1,000 gallon condensate storage tank, and routine and emergency venting of natural gas from gathering lines and distribution systems.

Emissions

The primary pollutants emitted from natural gas-fired turbines include nitrogen oxides (NO_x) and carbon monoxide (CO). Other pollutants emitted in lesser amounts include volatile organic compounds (VOCs), particulate matter (PM), trace amounts of hazardous air pollutants (HAPs) and sulfur dioxide (SO₂). Emissions from natural gas-fired turbines vary at different operating loads, inlet temperature, ambient pressure, and humidity.

The formation of nitrogen oxides is related to the combustion temperature. NO_x is formed and emitted primarily through one of three mechanisms: thermal, fuel, and prompt. Thermal NO_x formation occurs in the high temperature zone by the reaction of nitrogen (N₂) and oxygen (O₂) molecules in the combustion air. This is the predominant NO_x formation mechanism for natural gas-fired turbines. Higher combustion temperatures, longer residence times, and well mixing of fuel and combustion air results in greater combustion efficiency and lower emissions of CO, VOCs, and HAPs.

Emissions Reporting

The table below shows the facility's Michigan Air Emissions Reporting System (MAERS) 2019 submittal.

Pollutant	Pounds per Year (PPY)	Tons per Year (TPY)
CO	37158.73	18.5
NO _x	389973.26	195
PM ₁₀	5674.14	2.83
PM _{2.5}	5674.14	2.83
SO ₂	80.92	<1
VOC	1812.98	<1

Compliance History

The facility has not received any violation notices in the past five years. The facility was last inspected in January 2019 and found to be in compliance with all applicable air quality rules and federal regulations at that time.

Regulatory Analysis

GLGT Station #8 is currently subject to the Title V program and holds MI-ROP-N3760-2016 because the potential to emit (PTE) for nitrogen oxides and carbon monoxide exceeds 100 tpy. The facility is considered an area source for hazardous air pollutants (HAP) because the potential to emit of any single HAP is less than 10 tpy and aggregate HAP emissions are less than 25 tpy. EU-UNIT802 is subject to 40 CFR Part 60 Subpart GG-NSPS for Stationary Gas Turbines because it was constructed after October 3, 1977 and has a heat input at peak load of greater than 10 MMBtu/hr. EU-UNIT801 and EU-UNIT803 are not subject to NSPS Subpart GG because the turbines were constructed prior to October 3, 1977. EU-Unit801, EU-UUNIT802, and EU-UNIT803 are not subject to the NESHAP Subpart YYY for Stationary Combustion Turbines because the turbines are located at an area source for HAP emissions. EU-APU is subject to 40 CFR Part 63 Subpart ZZZZ-NESHAP for Stationary Reciprocating Internal Combustion Engines because the emission unit is a stationary RICE at an area source of HAP emissions. EU-APU is not subject to the NSPS Subpart JJJ for Stationary Spark Ignition Internal Combustion Engines because the engine was constructed prior to June 12, 2006.

Records Review

GLGT Station #8 is a targeted inspection source for fiscal year 2021. Recently, EPA Region V has provided guidance on Compliance Monitoring Strategy (CMS) inspections during the ongoing COVID-19 pandemic. EPA Region V will consider certain off-site compliance monitoring activities to satisfy AQD fiscal year targeted inspection requirements for the EPA CMS policy. With GLGT Station #8 having no recent compliance violations, there being no changes to the facility, and operations being intermittent, it was determined a records review would be acceptable for determining compliance and meeting AQD targeted inspection objectives for fiscal year 2021. A request for records required to be maintained in MI-ROP-N3760-2016 was sent on 11/17/2020 and were provided on 11/19/2020 via email from Mr. Bendes.

EU-UNIT801 and EU-UNIT803

EU-UNIT801 is a Rolls Royce Avon Model 101G with a peak load power rating of 18,000 HP at ISO conditions (59 degrees Fahrenheit at sea level). EU-UNIT803 is a General Electric Model MS3000 with a peak load power rating of 14,600 HP at ISO conditions. These emission units are required to burn only pipeline quality natural gas. Records were provided for the monthly run hours and

fuel usage for the period 02/01/2019 through 07/31/2020. EU-UNIT801 operated a total of 353 hours and burned 49,614 MCF of natural gas. EU-UNIT803 operated a total of 4,244 hours and burned 310,289 MCF of natural gas. No changes have occurred on these emission units.

EU-UNIT802

EU-UNIT802 is a General Electric LM1600 with a peak load power rating of 23,000 HP at ISO conditions. This emission unit was permitted under PTI #286-93 and is subject to NSPS Subpart GG. EU-UNIT802 is required to burn only pipeline quality natural gas. For the period 02/01/2019 through 07/31/2020, EU-UNIT802 operated a total of 7,919 hours and burned 836,609 MCF of natural gas.

Emission limits for carbon monoxide and nitrogen oxides are enforced through emissions testing that occurs during the 5-year term of the ROP. Testing was conducted in March 2017 and fulfilled the requirement of testing during the 5-year term of MI-ROP-N3760-2016. SC III.1 requires EU-UNIT802 to be operated at all times within the percent load/fuel consumption ranges established by testing to ensure compliance with the respective limits. This condition did not originate out of PTI #286-93 but was introduced in the 2006 ROP renewal. The condition is thought to provide parametric monitoring by establishing acceptable ranges of operating parameters that are indicative of emissions. The percent load range established during the 2017 test was 9,444 HP (41.1%) to 22,659 HP (98.5%). The fuel consumption rate established during the 2017 test was 85,440 SCFH to 145,347 SCFH. At high load, the unit tested at 77.85 lb/hr NO_x (87.4% of the emission limit) and at low load, the unit tested at 3.05 lb/hr CO (20% of the emission limit).

A detailed spreadsheet was provided for EU-UNIT802 that notes the date, hours of operation, fuel flow, and shaft horsepower (BHP). The *Crystal Falls Unit Detail Report 2-1-2019 to 10-31-2020* indicates several dates where Unit 802 appears to have operated over and under the percent load range established during the 2017 performance test. On 06/14/2019 and 06/15/2019, the unit was operating at an average 29,429 BHP and 32,057 BHP over 24-hour periods, along with reaching an average BHP of 33,286 over a 2.5 hour period on 09/26/2019. These findings were brought to the attention of the company. Ms. Jensen stated that the average shaft horsepower values in the spreadsheet are not calculated correctly and to review the hourly fuel consumption values. In the spreadsheet, there are still several dates where the turbine was operating over the established fuel consumption range. The spreadsheet notes that on 02/14/2020 the unit was operating at 162.6 MCFH for 3.8 hours. Plotting the 2017 performance test data, it best fits a linear regression with an R-squared value of 0.995. Extrapolating on the regression line to 162,600 SCFH results in NO_x emissions of 97.55 lb/hr.

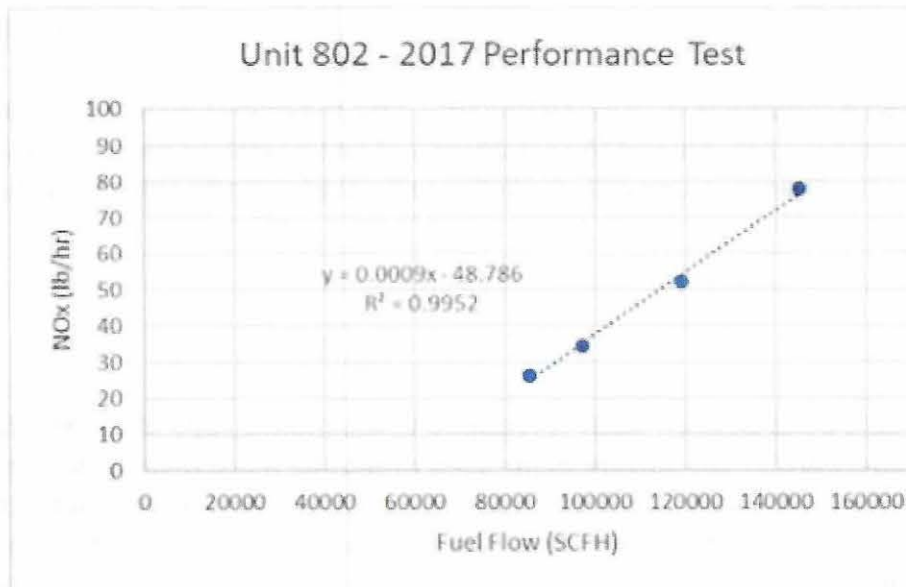


Figure 1. Comparison of NOx emissions to fuel flow rate from EU-UNIT802 during the 2017 test.

On 12/07/2020, a discussion was scheduled with TC Energy (Ruth Jensen and Chris Waltman) regarding records reviewed for compliance with MI-ROP-N3760-2016. During the discussion, the company expressed how there has not been a clear understanding of SC III.1 and that they have sought clarification from EGLE in the past regarding what is required to establish “percent load/fuel consumption range” and how to monitor it for ongoing compliance. The company stated that for a given fuel firing rate, emissions can vary across ambient conditions, such as temperature, pressure, and humidity, along with pipeline conditions.

NOx and CO emissions are dependent on combustion temperatures, pressure, and mass flows. At higher loads, the firing temperature is higher resulting in more thermal NOx and lower CO. Ambient conditions and load demand do play a role in affecting the firing temperature in the combustors. Without a PEMS/CEMS, it is difficult to correct emissions to ambient conditions. However, from testing and research, NOx emissions are strongly dependent on firing temperature which increases with load, fuel/air flow, and gas producer speed. Given the potential operational fluctuations, there still needs to be operational parameters monitored that are indicative of emissions especially when the unit can operate at loads higher than ISO ratings, along with the unit testing at nearly 90% of its emission limit for NOx. The NSPS Subpart GG regulations do not require continuous parameter monitoring but do consider testing at different load ranges. For new turbines, it does suggest establishing four parameters indicative of the unit’s NOx formation and establishing acceptable values and ranges through testing. This may have been the similar thinking for additional monitoring through the ROP.

Another discussion was scheduled on 12/21/2020 to discuss the outcome going forward. It was decided that a violation notice would not be issued since the company did not have a clear

understanding of the condition, has sought clarification on the condition and never heard back from EGLE, and that the condition was not made practically enforceable through monitoring/recordkeeping conditions to show compliance with the operational condition. The ROP is currently in the renewal process and the condition will be updated to have operational parameters indicative of emissions, along with explicit monitoring/recordkeeping conditions to show compliance.

EU-COLDCLEANER

This emission unit is a cold parts cleaner. GLGT is required to maintain a copy of the SDS for each solvent used in EU-COLDCLEANER. The solvent being used cannot be more than 5% by weight of the following chemicals or combination thereof: methylene chloride, perchloroethylene, 1,1,1-trichloroethane, trichloroethylene, chloroform, and carbon tetrachloride. Mr. Bendes provided the SDS of the solvent being used in the parts cleaner. The solvent is ArmaKleen MPC Cleaning Solution that is an aqueous alkaline solution with 0% by weight VOC content. None of the chemicals listed above are in this solution.

EU-APU

EU-APU is a Caterpillar SP-4 emergency engine with a rated power output of 962 HP. The engine is subject to the RICE MACT, however, EGLE does not have delegated enforcement for area source RICE MACT compliance. Mr. Bendes did provide records to show compliance with the RICE MACT. GLGT is required to keep records of operation of EU-APU per calendar year. EU-APU is allowed to operate up to 100 hours per calendar year for maintenance and readiness testing, and 50 of those hours can be used for non-emergency situations. Hours of operation are tracked through a non-resettable hour meter on the unit. For 2019, the engine operated at total of 41.2 hours, with 5.8 hours being for maintenance purposes. For the period 01/03/2019 through 11/06/2020, the engine operated a total of 26.3 hours, with 5 hours being for maintenance purposes. A maintenance log was shown that states which engine parameters were last checked and what they were reporting. An engine oil analysis was also provided. The oil analysis shows a sample was submitted on 04/22/2019 and 01/03/2020. All tests were within the RICE MACT specifications.

GLGT has been prompt and complete in submitting semi-annual and annual report certifications.

Compliance

Based on this inspection, it appears that the Great Lakes Gas Transmission Station #8 is in compliance with MI-ROP-N3760-2016.

NAME Michael Klein

DATE 1/7/2021

SUPERVISOR E.L.