

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

N216851773

FACILITY: GREAT LAKES GAS TRANSMISSION STATION #7		SRN / ID: N2168
LOCATION: 400 GREAT LAKES RD, WAKEFIELD		DISTRICT: Upper Peninsula
CITY: WAKEFIELD		COUNTY: GOGEBIC
CONTACT: Bruce Bendes , Environmental Specialist		ACTIVITY DATE: 12/18/2019
STAFF: Michael Conklin	COMPLIANCE STATUS:	SOURCE CLASS: MAJOR
SUBJECT: Targeted inspection for FY 20.		
RESOLVED COMPLAINTS:		

Facility: Great Lakes Gas Transmission Station #7 (SRN: N2168)
Location: 400 Great Lakes Road, Wakefield, Gogebic County, MI
Contacts: Bruce Bendes, Environmental Specialist
 Chris Waltman, Senior Environmental Specialist
 Chris Gierl, Technician

Regulatory Authority

Under the Authority of Section 5526 of Part 55 of NREPA, The Department of Environment, Great Lakes, and Energy (EGLE) may upon the presentation of their card, and stating the authority and purpose of the investigation, enter and inspect any property at reasonable times for the purpose of investigating either an actual or suspected source of air pollution or ascertaining compliance or noncompliance with NREPA, Rules promulgated thereunder, and the federal Clean Air Act.

Facility Description

Great Lakes Gas Transmission (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 business since 1967 and is currently owned by the TransCanada Corporation, 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 strategically utilized to maintain pressure and flow throughout the pipeline network. GLGT operates fourteen compressor stations, with five in the Upper Peninsula of Michigan.

The Wakefield Station #7 is one of five in the Upper Peninsula and is used to maintain pressure throughout GLGT's pipeline to end users. Station #7 is situated between the Iron River, WI station and the Crystal Falls, MI station of the pipeline. The station has a capacity of 2.2 BCF of natural gas and 974 PSI of pressure. This facility is located 3 miles southeast of Wakefield in Gogebic County, an area that is in attainment for all criteria pollutants. The source operates two natural-gas-fired turbine/compressor units. These systems are composed of a simple cycle gas turbine connected to a compressor by a shaft.

Gas turbines consist mainly of three components: compressor, combustor, and power turbine. 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 connected to the compressor. Natural gas is fed through the compressor and exits at a higher pressure.

The facility also contains a natural gas-fired emergency engine, a natural gas-fired boiler, two natural gas-fired space heaters, and two above-ground storage tanks. The table below summarizes the emission units at this source.

Emission Unit ID	Description
EU-UNIT701	General Electric model LM2500 stationary gas turbine with a peak power rating of 31,000 HP at ISO conditions (59 degrees F at sea level).

EU-UNIT702	Rolls Royce Avon model 76G stationary gas turbine with a peak power rating of 16,000 HP at ISO conditions (59 degrees F at sea level).
EU-APU	Waukesha Model F1197G natural gas-fired four stroke rich burn emergency genset with an engine power output of 255 HP.
EU-DIESELTANK	500 gallon diesel storage tank
EU-BOILER	York Shipley M303338M natural gas-fired boiler with a heat input rate of less than 50 MMBtu/hr.
EU-CONDENSATETK	1100 gallon natural gas condensate tank
FG-SPACEHEATERS	Two natural gas-fired space heaters, each with a heat input less than 50 MMBtu/hr

Emissions

The primary pollutants emitted from the combustion process of gas turbines include nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOCs), particulate matter (PM), and sulfur oxides (SOx). The formation of nitrogen oxides is related to the combustion temperature in the cylinder. NOx is formed and emitted primarily through one of three mechanisms: thermal, fuel, and prompt. Thermal NOx 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 NOx formation mechanism for natural gas-fired turbines. Fuel NOx formation occurs through the reaction of nitrogen molecules in the fuel and the oxygen molecules in the combustion air. This form of NOx formation is low when burning natural gas since there is a low nitrogen content in the fuel. Prompt NOx is formed through the reaction of nitrogen molecules in the combustion air and hydrocarbon radicals from the fuel. Higher temperatures of burning and longer residence time results in higher NOx emissions. CO, VOC, and HAP emissions are directly related to combustion efficiency. 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. Sulfur oxides emissions are directly related to the sulfur content of the fuel. PM emissions can include trace amounts of metals and condensable, semi-volatile organics which result from incomplete combustion. Emissions from gas turbines vary at different inlet temperature, pressure, and humidity.

Emissions Reporting

The table below shows the facility's Michigan Air Emissions Reporting System (MAERS) 2018 submittal.

Pollutant	Pounds per Year (PPY)	Tons per Year (TPY)
CO	54218.08	27.1
NOx	33007.96	16.5
PM10	863.95	<1
PM2.5	863.95	<1
SO2	77.00	<1
VOC	275.16	<1

Regulatory Analysis

GLGT Station #7 is currently subject to the Title V program and holds MI-ROP-N2168-2016 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-UNIT702 is not subject to 40 CFR Part 60 Subpart GG-NSPS for Stationary Gas Turbines because the turbine was constructed in 1969, prior to the date of October 3, 1977 for subject units. EU-UNIT701 and EU-UNIT702 are not subject to the NESHAP Subpart YYYY 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 JJJJ for Stationary Spark Ignition Internal Combustion Engines because the engine was constructed prior to June 12, 2006.

Compliance History

The facility has not received any violation notices in the past five years. The facility was last inspected in 2018 and was found to be in compliance with all applicable air quality rules and regulations at that time.

Inspection

On December 18, 2019, I (Michael Conklin) conducted a targeted, unannounced inspection on the GLGT Station #7 in Wakefield, MI. I arrived at the facility at 10:30 AM CST and met with station technician, Chris Gierl. I explained to Mr. Gierl that the purpose of the inspection was to ensure compliance with the facility's ROP (MI-ROP-N2168-2016). We began by inspecting the permitted equipment held in the ROP and then reviewed equipment considered to be exempt from permitting. Mr. Gierl stated that the only changes to the facility have been the change out of EU-UNIT701 for an equivalent General Electric model LM2500. Mr. Gierl also stated that the facility is considering replacing the current emergency generator with a newer unit. I explained to Mr. Gierl that a Permit To Install (PTI) may be needed prior to the installation of the unit.

EU-UNIT701

This emission unit is a General Electric LM2500 stationary gas turbine. The unit is housed in its own warehouse building with a vertical stack through the roof that appeared to be at least 39 feet in height. At the time of the inspection, the unit was not operating. As stated in the ROP, this emission unit is required to burn only pipeline quality natural gas. During the inspection of this unit, it was observed that the only source of fuel was piped gas from the main pipeline. The nameplate of the current unit stated a 1984 General Electric LM2500 with a peak power rating of 33,700 HP at ISO conditions (59 degrees F at sea level).

This emission unit contains emission limits for NOx. NOx emissions shall not exceed 184 parts per million by volume corrected to 15% oxygen on a dry gas basis and shall not exceed 123 pounds per hour. These emission limits are enforced through emissions testing that is to occur at least once during the 5-year term of the permit. Testing for this unit was conducted on December 18, 2018. A summary of the test results are shown in the table below.

Parameter	High Load	Mid-High Load	Mid-Low Load	Low Load
NOx ppmvd @ 15% O2	139.60	114.07	104.25	89.57
NOx lb/hr	98.56	66.64	54.17	37.83

During the test, the highest load the unit was operated at was 58.9% (18,263.7 HP). The sulfur content of the natural gas was well below 0.8 percent by weight. Per Special Condition (SC) III.1, the unit shall not be operated above the percent load/fuel consumption range established during the most recent test to ensure compliance with the emission limits. In a follow up email, Mr. Waltman provided the maximum horsepower that EU-UNIT701 operated at since the most recent stack test. The maximum horsepower recorded during operation was 16,385 HP on September 6th, 2019. Since the unit has been operating below the highest load recorded during the most recent emissions test, this shows compliance with SC III.1.

EU-UNIT702

This emission unit is a Rolls Royce Model Avon 76G stationary gas turbine. The unit is housed in its own warehouse building with a vertical stack through the roof. At the time of the inspection, the unit was not operating. As stated in the ROP, this emission unit is required to burn only pipeline quality natural gas. During the inspection of this unit, it was observed that the only source of fuel was piped gas from the main pipeline. The nameplate of the current unit stated: Rolls-Royce Avon Mark: 1533-76G/13. This unit has a peak power rating of 16,000 HP at ISO conditions (59 degrees F at sea level).

EU-APU

This emission unit is a 1969 natural gas-fired Waukesha F1197G emergency generator. GLGT is required to keep records of operation of EU-APU per calendar year. EU-APU can 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. During the inspection the hour meter read 552 hours (SC IV.1 and VI.1). For the calendar years 2018 and

2019, the engine was operated a total of 5.5 and 5.3 hours for maintenance and readiness testing (SC III.4).

A RICE MACT maintenance record sheet was submitted that notes maintenance activity and completion date. Maintenance activities include inspecting spark plugs, air cleaner, belts, and hoses. The sheet also notes when an oil sample was taken and submitted for analysis or if the oil was changed. This unit utilizes the oil analysis program to extend the specified oil change requirement in the RICE MACT. For calendar years 2018 and 2019, an oil sample was taken on 07/23/2018 and 01/16/2019. Both samples were submitted to Fluid Life for an oil analysis. The report states that all tests were within the RICE MACT specifications.

The following table lists equipment that is considered to be exempt at the source.

Emission Unit	Description	ROP Exemption	PTI Exemption
EU-BOILER	York Shipley M303338M natural gas-fired boiler with a heat input rate of less than 50 MMBtu/hr	R 336.1212(4)(b)	R 336.1282(2)(b)(i)
EU-CONDENSATETK	1100 gallon natural gas condensate tank	R 336.1212(4)(c)	R 336.1284(2)(c)
FG-SPACEHEATERS	Two natural gas-fired space heaters, each with a heat input less than 50 MMBtu/hr	R 336.1212(4)(b)	R 336.1282(2)(b)(i)

Compliance

Based on this inspection, the Great Lakes Gas Transmission Station #7 is in compliance with MI-ROP-N2168-2018.



Image 1(EU-UNIT701) : General Electric LM2500

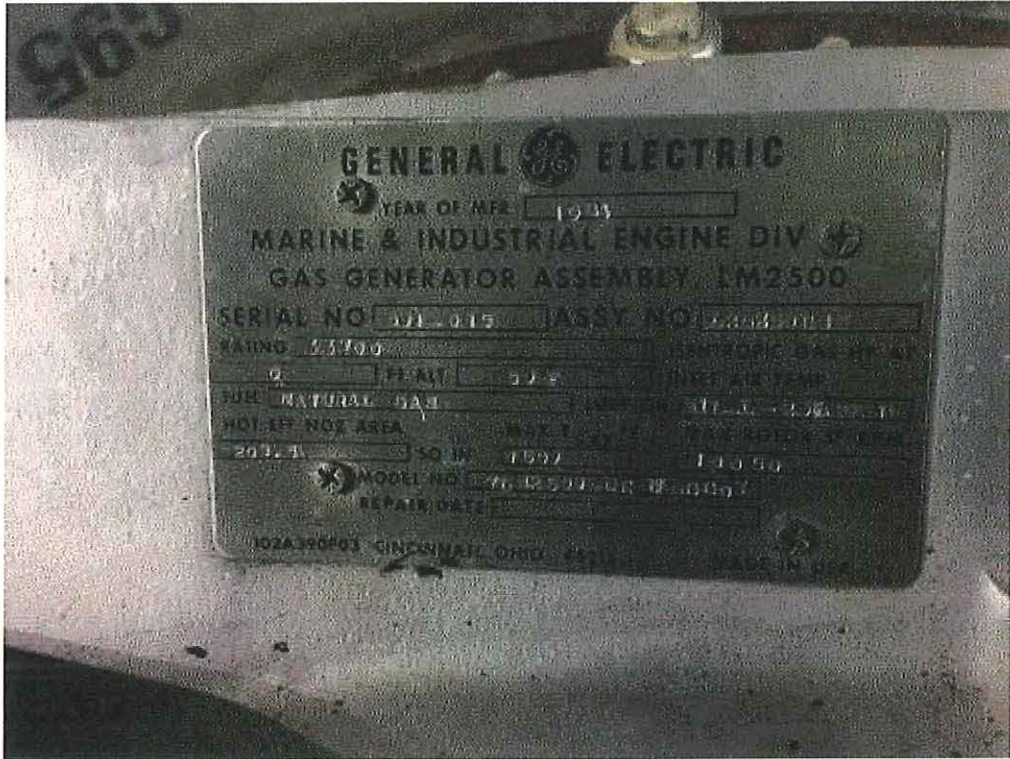


Image 2(Nameplate) : Nameplate of EU-UNIT701.

NAME Michael Ablin

DATE 12/30/2019

SUPERVISOR EJF