

State Registration Number
N2168

**RENEWABLE OPERATING PERMIT
STAFF REPORT**

ROP Number
MI-ROP-N2168-2021

Great Lakes Gas Transmission Limited Partnership

Great Lakes Gas Transmission – Wakefield Compressor Station No. 7

State Registration Number (SRN): N2168

Located at

400 Great Lakes Road, Wakefield, Gogebic County, Michigan 49968

Permit Number: MI-ROP-N2168-2021

Staff Report Date: April 12, 2021

This Staff Report is published in accordance with Sections 5506 and 5511 of Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451). Specifically, Rule 214(1) of the administrative rules promulgated under Act 451, requires that the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Air Quality Division (AQD), prepare a report that sets forth the factual basis for the terms and conditions of the Renewable Operating Permit (ROP).

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APRIL 12, 2021 - STAFF REPORT

Purpose

Major stationary sources of air pollutants, and some non-major sources, are required to obtain and operate in compliance with an ROP pursuant to Title V of the federal Clean Air Act; and Michigan’s Administrative Rules for Air Pollution Control promulgated under Section 5506(1) of Act 451. Sources subject to the ROP program are defined by criteria in Rule 211(1). The ROP is intended to simplify and clarify a stationary source’s applicable requirements and compliance with them by consolidating all state and federal air quality requirements into one document.

This Staff Report, as required by Rule 214(1), sets forth the applicable requirements and factual basis for the draft ROP terms and conditions including citations of the underlying applicable requirements, an explanation of any equivalent requirements included in the draft ROP pursuant to Rule 212(5), and any determination made pursuant to Rule 213(6)(a)(ii) regarding requirements that are not applicable to the stationary source.

General Information

Stationary Source Mailing Address:	Great Lakes Gas Transmission, Wakefield Compressor Station No. 7 400 Great Lakes Road Wakefield, Michigan 49968
Source Registration Number (SRN):	N2168
North American Industry Classification System (NAICS) Code:	486210
Number of Stationary Source Sections:	1
Is Application for a Renewal or Initial Issuance?	Renewal
Application Number:	202000156
Responsible Official:	Keith R. Mossman Director – Great Lakes Region 248-205-4510
AQD Contact:	Michael Conklin, Environmental Engineer 906-202-0013
Date Application Received:	October 19, 2020
Date Application Was Administratively Complete:	October 19, 2020
Is Application Shield in Effect?	Yes
Date Public Comment Begins:	April 12, 2021
Deadline for Public Comment:	May 12, 2021

Source 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 Wakefield Station #7 (GLGT Station #7) in Gogebic County, Michigan.

GLGT Station #7 is located 6.5 miles southeast of Wakefield on Old US Hwy 2. The station was constructed in 1968 and operates two natural-gas-fired turbine/compressor units. Unit #701 is a General Electric LM2500 GE stationary gas turbine with a peak load rating of 31,000 HP at ISO conditions and was installed in 1990. Unit #702 is a Rolls Royce Avon 76G stationary gas turbine with a peak load rating of 16,000 HP at ISO conditions and was installed in 1969. The two turbines are housed in separate buildings, each with their own vertical stack. The station also has a service building that includes a natural gas-fired boiler, a natural gas-fired emergency engine, space heaters, and storage vessels. The facility operates 24 hours a day, 365 days per year and operates the two units on an as needed basis. The surrounding area of the facility is rural with woodlands. The facility does not operate a natural gas storage field or dehydration system.

The two units are composed of a simple cycle turbine connected to a natural gas pipeline 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 section of the turbine. The hot exhaust gases expand through the power section providing rotational force to the power shaft. The power shaft is connected to a pipeline compressor where natural gas is fed through from an initial "suction" state to a more compressed "discharge" state at higher pressure. In a simple cycle system, the combustion emissions are exhausted to the atmosphere. The two units do not have air pollution control devices.

The primary pollutants emitted from the 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), 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. A turbine can operate at higher loads than ISO ratings during ambient conditions with cooler temperatures, higher pressure, and low humidity.

NO_x and CO emissions are a function of the combustion temperatures, pressure, and mass flows. The formation of nitrogen oxides is strongly related to the combustion temperature. At higher operating loads, the firing temperature increases resulting in higher NO_x emissions. 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, but higher emissions of NO_x. Lower ambient temperatures and the use of water or steam injection can decrease the firing temperature thereby lowering NO_x emissions.

The following table lists stationary source emission information as reported to the Michigan Air Emissions Reporting System (MAERS) for the year 2019.

TOTAL STATIONARY SOURCE EMISSIONS

Pollutant	Tons per Year
Carbon Monoxide (CO)	18.4
Lead (Pb)	<1
Nitrogen Oxides (NO _x)	84.9
Particulate Matter less than 10 microns (PM10)	1.7
Particulate Matter less than 2.5 microns (PM2.5)	1.7
Sulfur Dioxide (SO ₂)	<1
Volatile Organic Compounds (VOCs)	<1

This source is a true minor source of HAP(s), thus no HAP emissions data is listed.

See Parts C and D in the ROP for summary tables of all processes at the stationary source that are subject to process-specific emission limits or standards.

Regulatory Analysis

The following is a general description and history of the source. Any determinations of regulatory non-applicability for this source are explained below in the Non-Applicable Requirement part of the Staff Report and identified in Part E of the ROP.

The stationary source is in Gogebic County, which is currently designated by the United States Environmental Protection Agency (USEPA) as attainment/unclassified for all criteria pollutants.

The stationary source is subject to Title 40 of the Code of Federal Regulations (CFR) Part 70, because the potential to emit of nitrogen oxides and carbon monoxide exceeds 100 tons per year.

The stationary source is a minor source of HAP emissions because the potential to emit of any single HAP regulated by Section 112 of the federal Clean Air Act, is less than 10 tons per year and the potential to emit of all HAPs combined are less than 25 tons per year.

No emission units at the stationary source are currently subject to the Prevention of Significant Deterioration regulations of Part 18, Prevention of Significant Deterioration of Air Quality of Act 451, because at the time of New Source Review permitting the removal of one existing turbine resulted in an emissions reduction which offsets the increase from EUUNIT701, such that the overall modification was not significant. Therefore, EUUNIT701 is not subject to the Prevention of Significant Deterioration regulations.

Although EUUNIT702 was installed after August 15, 1967, this equipment was exempt from New Source Review (NSR) permitting requirements at the time it was installed. However, future modifications of this equipment may be subject to NSR.

EUUNIT701 at the stationary source is subject to the Standards of Performance for Stationary Gas Turbines promulgated in 40 CFR Part 60, Subparts A and GG.

EUAPU at the stationary source is subject to the National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines promulgated in 40 CFR Part 63, Subparts A and ZZZZ. The AQD is not delegated the regulatory authority for area source MACT ZZZZ.

The monitoring conditions contained in the ROP are necessary to demonstrate compliance with all applicable requirements and are consistent with the "Procedure for Evaluating Periodic Monitoring Submittals."

No emission units have emission limitations or standards that are subject to the federal Compliance Assurance Monitoring rule pursuant to 40 CFR Part 64, because all emission units at the stationary source either do not have a control device or those with a control device do not have potential pre-control emissions over the major source thresholds.

The following is a discussion of significant changes made from the 2016 ROP.

EUPIPEMAINT, EUFIELDMAINT, FGRULE285(2)(mm)

The emission units EUPIPEMAINT and EUFIELDMAINT were added along with flexible group FGRULE285(2)(mm). GLGT performs routine and emergency venting of natural gas from transmission and distribution systems for field gas from gathering lines. GLGT requested these emission units and flexible group be added as exempt processes from the requirements of Rule 201 under Rule 285(2)(mm).

EUUNIT702

Under EUUNIT702, the condition SC II.1 in the 2016 ROP was moved to SC III.1 since the condition is an operational condition, not a material limit. The UARs were also changed to R 336.1213(2) since the emission units were never permitted and the conditions were added through the ROP process. SC VI.1 was added to make SC III.1 practically enforceable by recording the amount of fuel consumed during hours of operation.

FGMACTZZZZ

The flexible group, FGMACTZZZZ, was updated with MACT language from 40 CFR Part 63, Subpart ZZZZ applicable to EUAPU.

EUUNIT701

The NSPS Subpart GG underlying applicable requirements for the NO_x 184 ppmv at 15% oxygen emission limit were removed. This is a streamlined emission limit established in PTI No. 382-89 with the NSPS emission limit (302 ppmv at 15% oxygen) subsumed within the condition. Correct streamlined emission limit language and UAR placement in the table were used.

The sulfur dioxide limits in the emission limit table were removed. These conditions were not emission limits and were not established through PTI No. 382-89. The company is electing to comply with 40 CFR 60.333(b) instead of the sulfur dioxide emission limit in 40 CFR 60.333(a). This condition was moved to the MATERIAL LIMIT(s) section.

GLGT requested the removal of SC III.1 stating the condition was unclear in terms of what is required to establish the “percent load/fuel consumption range” and unclear on how to monitor ongoing compliance for it. GLGT also believed the condition did not ensure continuous compliance with the NO_x lb/hr emission limit for EUUNIT701. The company proposed an alternative compliance method.

The AQD believes the monitoring of operational parameters is needed to ensure emission limits are being met especially when the turbine can operate at loads higher than ISO ratings, along with the unit testing at 80% of its emission limit for NO_x in the 2018 performance test. The emissions are strongly dependent on combustion temperatures, pressure, and mass flows. NO_x emissions increase with 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.

The AQD requested GLGT to provide a parameter monitoring plan (PMP) that would ensure continuous compliance with the emission limits for EUUNIT701. The company provided a PMP for establishing a fuel consumption rate range based on performance testing. From the 2018 performance test results, there is a strong linear relationship between the fuel consumption rate and NO_x emissions, as seen below in Figure 1.

Unit 701 (GE LM2500)

Wakefield Compressor Station No. 7

12/18/18

Emission Test and Operating Data Summary

Operating Load (range)	Fuel Usage (MSCFH)	NOx lb/hour
Low	111.70	37.83
Low-mid	137.55	54.17
Mid-high	154.52	66.64
High	186.90	98.56

Note: Heat input calculated based on actual fuel usage and actual heat content during test

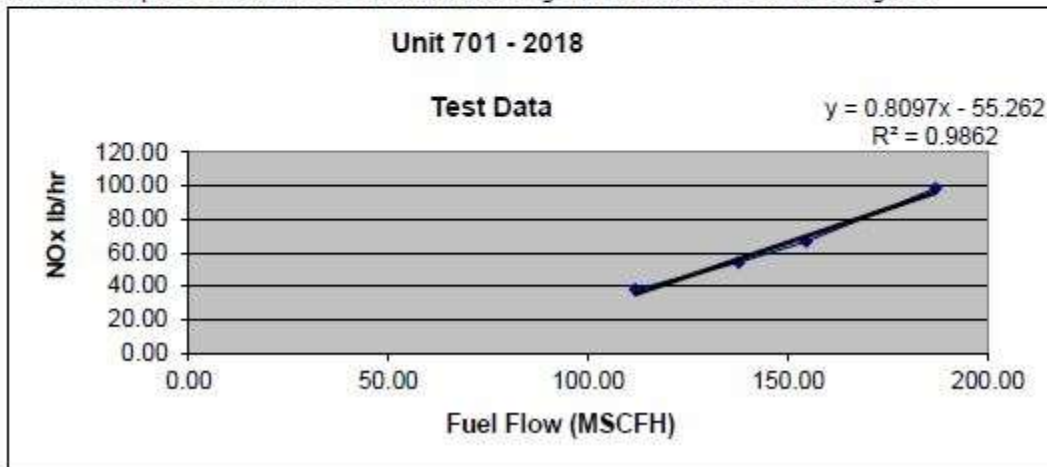


Figure 1. Test results from the 2018 performance test on EUUNIT701.

The maximum fuel consumption rate shall be calculated from a linear regression model developed by plotting the average NOx lb/hr emissions against the average fuel consumption rate at each load point and extrapolating the average fuel rate to 116.85 lb/hr NOx (5% below the permit limit). GLGT believes the turbine should not be limited to the highest fuel rate during the performance test due to ambient and pipeline conditions at the time of the test affecting the load the engine can achieve. Based on the information provided in the PMP, SC III.2 was added to ensure continuous compliance with the emission limits while also allowing flexibility for operation at different conditions than was tested at.

The sulfur dioxide testing requirement in SC V.1 of the 2016 ROP was removed. The company is complying with 40 CFR 60.333(b) instead of 40 CFR 60.333(a) and is being monitored through 40 CFR 60.334(h)(3) requirements. These requirements were added as a condition in the Monitoring/Recordkeeping section.

The requirement of 40 CFR 60.335(b)(2) was added as condition SC V.2. GLGT requested this condition be added. The condition establishes the operating loads the turbine is required to test at.

SC V.3 was added to make SC III.2 practically enforceable by having the requirement of monitoring and recording the fuel consumption rate during each run of the performance test for the purposes of the PMP.

SC V.5 of the 2016 ROP was removed. Emissions testing will be required at least every five years.

SC VI.1 and SC VI.2 were added to the ROP for the monitoring and recording of operating parameters to show ongoing compliance with the emission limits. These conditions make SC III.2 and the emission limits practically enforceable at all times.

SC VI.3 was added to the ROP. This condition is required, per 40 CFR 334(h)(3), if the owner is electing the fuel meets the definition of natural gas as stated in 40 CFR 60.331(u).

NON-APPLICABLE REQUIREMENTS

The non-applicable requirements listed in the 2016 ROP were removed per GLGT’s request. GLGT requested these be removed to reduce confusion should non-applicability of the requirements change at the site.

Please refer to Parts B, C and D in the draft ROP for detailed regulatory citations for the stationary source. Part A contains regulatory citations for general conditions.

Source-Wide Permit to Install (PTI)

Rule 214a requires the issuance of a Source-Wide PTI within the ROP for conditions established pursuant to Rule 201. All terms and conditions that were initially established in a PTI are identified with a footnote designation in the integrated ROP/PTI document.

The following table lists all individual PTIs that were incorporated into previous ROPs. PTIs issued after the effective date of ROP No. MI-ROP-N2168-2016 are identified in Appendix 6 of the ROP.

PTI Number			
382-89			

Streamlined/Subsumed Requirements

The following table lists explanations of any streamlined/subsumed requirements included in the ROP pursuant to Rules 213(2) and 213(6). All subsumed requirements are enforceable under the streamlined requirement that subsumes them.

Emission Unit/Flexible Group ID	Condition Number	Streamlined Limit/ Requirement	Subsumed Limit/ Requirement	Stringency Analysis
EUUNIT701	I.1	184 ppmv NOx at 15% oxygen on a dry gas basis – Hourly at 100% load (R 336.1201(3))	302 ppmv NOx at 15% oxygen on a dry gas basis – Hourly at 100% load (40 CFR 60.332(a)(2))	The nitrogen oxides emission limit determined through NSR permitting and listed in I.1 (184 ppmv NOx at 15% oxygen on a dry gas basis – Hourly at 100% load) is more stringent than the nitrogen oxides limit in NSPS Subpart GG.

Non-applicable Requirements

Part E of the ROP lists requirements that are not applicable to this source as determined by the AQD, if any were proposed in the ROP Application. These determinations are incorporated into the permit shield provision set forth in Part A (General Conditions 26 through 29) of the ROP pursuant to Rule 213(6)(a)(ii).

Processes in Application Not Identified in Draft ROP

The following table lists processes that were included in the ROP Application as exempt devices under Rule 212(4). These processes are not subject to any process-specific emission limits or standards in any applicable requirement.

PTI Exempt Emission Unit ID	Description of PTI Exempt Emission Unit	Rule 212(4) Citation	PTI Exemption Rule Citation
EU-BOILER	York Shipley M303338M natural gas-fired boiler	R 336.1212(4)(c)	R 336.1282(b)(i)
EU-SPACEHEATER	Two natural gas-fired space heaters	R 336.1212(4)(c)	R 336.1282(b)(i)
EU-DIESELTK	Diesel storage tank	R 336.1212(4)(d)	R 336.1284(2)(i)
EU-CONDENSATETK1	Natural gas condensate storage tank	R 336.1212(4)(d)	R 336.1284(2)(e)
EU-EUPIPEMAINT	Routine and emergency venting of natural gas from transmission and distribution systems.	R 336.1212(4)(e)	R 336.1285(2)(mm)
EU-EUFIELDMAINT	Routine and emergency venting of field gas from gathering lines.	R 336.1212(4)(e)	R 336.1285(2)(mm)

Draft ROP Terms/Conditions Not Agreed to by Applicant

This draft ROP does not contain any terms and/or conditions that the AQD and the applicant did not agree upon pursuant to Rule 214(2).

Compliance Status

The AQD finds that the stationary source is expected to be in compliance with all applicable requirements as of the effective date of this ROP.

Action taken by EGLE, AQD

The AQD proposes to approve this ROP. A final decision on the ROP will not be made until the public and affected states have had an opportunity to comment on the AQD's proposed action and draft permit. In addition, the USEPA is allowed up to 45 days to review the draft ROP and related material. The AQD is not required to accept recommendations that are not based on applicable requirements. The delegated decision maker for the AQD is Ed Lancaster, Marquette District Supervisor. The final determination for ROP approval/disapproval will be based on the contents of the ROP Application, a judgment that the stationary source will be able to comply with applicable emission limits and other terms and conditions, and resolution of any objections by the USEPA.

State Registration Number
N2168

RENEWABLE OPERATING PERMIT
MAY 17, 2021 - STAFF REPORT ADDENDUM

ROP Number
MI-ROP-N2168-2021

Purpose

A Staff Report dated April 12, 2021, was developed to set forth the applicable requirements and factual basis for the draft Renewable Operating Permit (ROP) terms and conditions as required by Rule 214(1) of the administrative rules promulgated under Act 451. The purpose of this Staff Report Addendum is to summarize any significant comments received on the draft ROP during the 30-day public comment period as described in Rule 214(3). In addition, this addendum describes any changes to the draft ROP resulting from these pertinent comments.

General Information

Responsible Official:	Keith R. Mossman Director – Great Lakes Region 248-205-4510
AQD Contact:	Michael Conklin, Environmental Engineer 906-202-0013

Summary of Pertinent Comments

No pertinent comments were received during the 30-day public comment period.

Changes to the April 12, 2021 Draft ROP

No changes were made to the draft ROP.

State Registration Number
N2168

RENEWABLE OPERATING PERMIT
JULY 6, 2021 - STAFF REPORT ADDENDUM

ROP Number
MI-ROP-N2168-2021

Purpose

A Staff Report dated April 12, 2021, was developed to set forth the applicable requirements and factual basis for the draft Renewable Operating Permit (ROP) terms and conditions as required by Rule 214(1) of the administrative rules promulgated under Act 451. The purpose of this Staff Report Addendum is to summarize any significant comments received on the draft ROP during the 45-day EPA comment period as described in Rule 214(6). In addition, this addendum describes any changes to the proposed ROP resulting from these pertinent comments.

General Information

Responsible Official:	Keith R. Mossman Director – Great Lakes Region 248-205-4510
AQD Contact:	Michael Conklin, Environmental Engineer 906-202-0013

Summary of Pertinent Comments

No comments were received from the EPA.

During the 45-day EPA comment period, a comment was received from TC Energy regarding Special Condition (SC) VII.4, under FGMACTZZZZ. TC Energy stated the reporting conditions in 40 CFR Subpart ZZZZ are not applicable to their emergency engines. TC Energy requested this condition be removed.

AQD agrees with TC Energy's comment. The semiannual reporting condition of SC VII.4 was incorrectly included in the AQD RICE MACT template. AQD has recently modified the RICE MACT template and removed the reporting condition.

Changes to the May 17, 2021 Proposed ROP

SC VII.4, under FGMACTZZZZ, has been removed from the proposed ROP.