

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

N762464830

FACILITY: VECTOR PIPELINE L.P. Washington Compressor Station		SRN / ID: N7624
LOCATION: 12708 30 MILE RD, WASHINGTON		DISTRICT: Warren
CITY: WASHINGTON		COUNTY: MACOMB
CONTACT: Matt DiPaola , Technical Supervisor		ACTIVITY DATE: 09/15/2022
STAFF: Iranna Konanahalli	COMPLIANCE STATUS: Compliance	SOURCE CLASS: MAJOR
SUBJECT: FY 2022 ROP, PSD SM CMS scheduled inspection of Vector Pipeline L.P. Washington Compressor Station ("Vector Pipeline" or "Vector"), a natural gas Compressor Station, located at 12708 30 Mile Road, Washington, Michigan 48095-2027.		
RESOLVED COMPLAINTS:		

VECTOR PIPELINE L.P. Washington Compressor Station (N7624)
12708 30 Mile Road
Washington, MI 48095-2027

NAICS Code: 486210 Pipeline transportation, natural gas

MI-ROP-N7624-2019 (Expiring November 5, 2024. Complete ROP Renewal Application Due Between May 05, 2023, and May 05, 2024) with $\text{NO}_x = 81.34 < 250$ and $\text{CO} = 219.18 < 250$ tons per year limits, Vector Pipeline has obtained PSD opt-out conditions and, obviously, is a true minor NESHAP / MACT (HAP) source ($\text{VOC} < 1$ tpy actual).

Gas Turbines subject to: 40 CFR, Part 60, subpart KKKK (NSPS 4K), Standards of Performance for Stationary Combustion Turbines; Final Rule (Thursday, July 6, 2006), Page 38482 Federal Register / Vol. 71, No. 129 / Thursday, July 6, 2006 / Rules and Regulations/ Final Rule. The standards reflect changes in nitrogen oxides (NO_x) emission control technologies and turbine design since standards for these units were originally promulgated in **40 CFR part 60, subpart GG**. The NO_x and sulfur dioxide (SO_2) standards have been established at a level which brings the emissions limits up to date with the performance of current combustion turbines. NSPS 4K is effective from July 6, 2006. Regulated entities are stationary combustion turbines with a heat input at peak load equal to or greater than 10.7 gigajoules (GJ) (10 million British thermal units (MMBtu)) per hour that commenced construction, modification, or reconstruction after February 18, 2005. The applicability of the final rule is similar to that of 40 CFR part 60, subpart GG, except that the final rule applies to new, modified, and reconstructed stationary combustion turbines, and their associated heat recovery steam generators (HRSG) and duct burners. The stationary combustion turbines subject to subpart KKKK, 40 CFR part 60, are exempt from the requirements of 40 CFR part 60, subpart GG. Heat recovery steam generators and duct burners subject to subpart KKKK are exempt from the requirements of 40 CFR part 60, subparts Da, Db, and Dc. The pollutants that are regulated by the final rule are NO_x and SO_2 (40 CFR § 60.4315). The limits are stated in 40 CFR, Subpart KKKK, Table 1 and Permit No. 419-92C, I.1: 25 ppmv dry at 15% oxygen for new turbine firing natural gas (> 50 MMBtu/h and ≤ 850 MMBtu/h HHV at peak load). Or 150 ng/J of useful output (1.2 lb/MWh) per NSPS 4K. In order to demonstrate compliance with the NO_x limit, an initial performance test is required.

VECTOR PIPELINE L.P. Washington Compressor Station (N7624) ("Vector") is prohibited from burning any fuel other than pipeline quality sweet natural gas (MI-PTI-N7624-2019, FG - TURBINES [EUTURBINE1, EUTURBINE21], III.1: only burn natural gas in FGTURBINES). According to 40 CFR § 60.4340, Vector must perform **annual (biennial** if certain conditions are met as stated in the permit, i.e. < 75% NSPS 4K NO_x limit) performance tests in accordance with 40 CFR § 60.4400 to demonstrate continuous compliance. Alternatively, Vector must either install and maintain (1) Continuous Emission Monitoring System (NO_x CEMS) as described in §§ 60.4335(b) and 60.4345, or (2) Continuous Parameter Monitoring System (NO_x CPMS). Vector must establish a valid parameter range (40 CFR § 60.4410) if it has chosen to continuously monitor parameters indicative of proper operation of NO_x emission controls in accordance with 40 CFR § 60.4340. The parameters are to be established during 40 CFR § 60.8 performance test. Vector uses Low NO_x Combustion System.

On September 15, 2022, I conducted a level-2 **FY 2022 ROP, PSD SM CMS** scheduled inspection of Vector Pipeline L.P. Washington Compressor Station ("Vector Pipeline" or "Vector"), a natural gas Compressor Station, located at 12708 30 Mile Road, Washington, Michigan 48095-2027. The inspection was conducted to determine compliance with the Federal Clean Air Act; Article II, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451; and Michigan Department of Environment, Great Lakes and Energy, Air Quality Division (EGLE-AQD) administrative rules.

During the inspection, Alex Smith (Phone: 952-983-1010; Fax: NA; E-mail: Alex Smith <alex.smith@enbridge.com>), Environmental Advisor, S&R Environment Operations, Safety & Reliability, Environment Operations, and Matt DiPaola (Phone: 248-889-2798; Cell: 219-218-4807; Fax: NA; E-mail: Matthew DiPaola <Matthew.DiPaola@enbridge.com>), Operations Coordinator, assisted me.

Vector Pipeline began operation on December 01, 2000, as a strategic link in the transportation of natural gas produced in the Appalachian region and Western Canada. The pipeline is a 348-mile-long natural gas pipeline between Joliet, Illinois and Dawn, Ontario. There are 274 miles of 42-inch diameter pipeline, 59 miles of 36-diameter pipeline, and an additional 15 miles of 42-inch pipeline in Canada. The Vector Pipeline is a partnership between Enbridge Inc. and DTE Energy. Enbridge Inc. owns 60% and DTE Energy owns 40%. The 59 miles of 36-inch pipeline is leased from DTE Energy. The rest of the pipeline is owned by Enbridge Inc.

On October 27, 2020, DTE Energy announced that the management has received unanimous authorization from the company's Board of Directors to pursue a plan to spin-off its Non-Utility Gas Storage and Pipelines business into a new, independent, publicly traded company. The name of the new company spun-off is 'DT Midstream, Inc. DTE Energy operates through two major business units, Utility operations and non-Utility operations. Utility operations include DTE Electric and DTE Gas while non-Utility operations include Gas Storage and Pipelines, Power and Industrial Projects and Energy Trading. Post separation of the Gas Storage and Pipelines business (DT Midstream), DTE Energy will comprise of the regulated electric and natural gas utility along with two segments belonging to the non-utility business; Power & Industrial Projects and Energy Trading business.

DT Midstream, Inc. (NYSE: DTM), a premier natural gas pipeline, storage and gathering provider, about July 2021, debuted as an independent, publicly traded company after

successfully completing its separation from DTE Energy (NYSE: DTE) (“DTE”). Shares of DT Midstream began trading on the New York Stock Exchange (“NYSE”) under the symbol “DTM.”

The Washington Compressor Station is one (1) of five (5) compressor stations located along the Vector Pipeline. Each compressor station operates a pair of turbines that each drive a compressor. The turbines at this station are Solar Mars 110S natural gas fired compressors rated at 15,000 HP and a maximum heat input of 120 MMBTU per hour. The compressors are equipped with low NO_x controls (Solar SoloNO_x). The entire facility / station including the compressors are remotely controlled by the Vector Pipeline headquarters in Houston, Texas. If the compressors are operating below the SoloNO_x levels, then an audible and visual alarm is generated in the Houston, Texas control room.

The turbine powered compressors move natural gas from one side the pipeline, increase the pressure, then reinject the gas back into the other side of the pipeline at an increased pressure. The compressors at this station are capable of sending natural gas in either direction (toward Canada or toward Illinois) depending on customer demand.

There is a natural gas fired standby power generating unit (EUSPU3) with a maximum capacity of 924 HP. This unit will automatically start in the event of a local utility power interruption. This generator is capable of starting and running both turbines as well as other important electronics at the facility.

The facility is a true minor source for HAP emissions and is therefore not subject to the National Emission Standards for Hazardous Air Pollutants for turbines. Based 2018 Michigan Air Emission Reporting System, the total VOC emissions in 2018 were 1,571 lbs.

MAERS-2018: 0.7855 tons of VOC per year

MAERS-2020: 0.666 tons of VOC per year

MAERS-2021: 0.678 tons of VOC per year

Fee: Category B Facility (major source, non-utility, emissions >6 - <60 TPY). 2021 fee based upon: NO_x = 10.9, PM₁₀ = 2.1, SO_x = 0.3, VOC = 0.7 tpy.

MI-ROP-N7624-2019, SOURCE-WIDE CONDITIONS

Pollutant	Limit	Time Period/Operating Scenario	Equipment	MAERS-2020 tpy	MAERS-2021 tpy
1. CO	219.18 Tons ²	Rolling 12-month time period	Source-Wide	1.98	3.665
2. NO _x	81.34 Tons ²	Rolling 12-month time period	Source-Wide	13.71	10.923
Theses carbon monoxide (CO) and nitrogen oxides limits appear to be to opt-out of Prevention of Significant Deterioration (PSD) regulations.					

Whenever venting natural gas events occur in amounts greater than 1,000,000 (1 million SCF) standard cubic feet, Vector has been notifying EGLE-AQD of such an event (MI-ROP-N7624-2019, SOURCE-WIDE, III.1 & 4-5: venting natural gas)

One such venting natural gas occurred during Monday, September 12, 2022, through Tuesday, September 13, 2022, due to Annual DOT Emergency Shut Down (ESD) Testing along with other maintenance. Notification was sent via email (Vector Washington Compressor Station (9/12-13/2022) - Planned Blowdown Event, Alex Smith alex.smith@enbridge.com, Thu 9/8/2022 8:33 PM). Other examples are below:

April 01, 2021: The Vector Washington Compressor Station experienced an emergency shut down in the afternoon of April 1, 2021. The shut-down resulted in the venting of 1.123 million standard cubic feet of natural gas. An E-mail was sent to BognarA1@michigan.gov from Shane.Yokom@enbridge.com on Thursday, April 1, 2021 7:03:01 PM)

May 28, 2021: The Vector Washington Compressor Station experienced an emergency shut down at approximately 5pm, Friday May 28th. The shut-down resulted in the venting of 1.111 million standard cubic feet of natural gas. An E-mail was sent to BognarA1@michigan.gov from Shane.Yokom@enbridge.com on Saturday, May 29, 2021 10:21:52 AM

Vector has been submitting **Semi-annual** (Semi1 Jan-Jun & Semi2 Jan-Dec) deviation and Annual (Jan-Dec) certification of compliance reports as required (MI-ROP-N7624-2019, SOURCE-WIDE, VII, 1-3). e.g., September 8, 2022, letter with Semi1 (Jan-Jun 2022) – no deviation; March 12, 2022, letter with Semi2 (Jul-Dec 2021) – no deviation – and Annual Cert & MAERS (Jan-Dec 2021) certification.

MI-ROP-N7624-2019, Emission Units (EUs)

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EUTURBINE1	Solar Mars 110S natural gas fired No. 1 rated at 15,000 HP and maximum heat input of 120 MMBTU/hr with low NOx controls.	11-13-2006	FGTURBINES
EUTURBINE2	Solar Mars 110S natural gas fired No. 1 rated at 15,000 HP and maximum heat input of 120 MMBTU/hr with low NOx controls.	11-13-2006	FGTURBINES

The Vector Pipeline, L.P., Washington Compressor Station is used to maintain pressure of pipeline quality natural gas in order to transport it along Vector's 348-mile 42-inch pipeline which extends from Joliet, Illinois to parts of Indiana and Michigan, and into Ontario, Canada. This Compressor Station consists of two SOLAR MARS 110S natural gas fired turbines equipped with Low NOx controls. The turbines drive SOLAR C65 compressors which force the natural gas along the pipeline.

The turbines at this station are Solar Mars 110S natural gas fired compressors rated at 15,000 HP and a maximum heat input of 120MMBTU/hr. Model No. MARS 100. Version 15000SA. GP Serial No. OH21-M4414. Power Turbine Serial No. TUI21-74415 & OHI19-M7679. 15,000 HP. NGP (RPM) = 11,168. NPT (RPM) = 9,500. Every 30,000 operating hours or as needed, Solar swaps the engine with a like-for-like overhauled / refurbished engine. Overhauling takes place in factory conditions with attendant efficiencies. Solar Turbines provides overhaul support for its entire gas turbine product line such that turbomachinery can run reliably for years to come. Solar delivers more than 800 exchange engines from Solar's extensive fleet every year. Vast majority of Solar customers select this program of like-for-like engine swap / exchange. Solar has completed more than 30,000 overhauls since the 1960s at world-wide facilities (16,000 gas turbine units operating in 100 countries).

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
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The turbines are equipped with low NO_x controls (SoloNO_x). Solar's SoLoNO_x technology reduces nitrogen oxides (NO_x) and carbon monoxide (CO) emissions since its introduction in 1992. Advances in combustor liner, fuel injector, and bleed shield design, along with primary zone temperature control are some of the advancements allowing Solar to offer a robust 9ppm NO_x, 15ppm CO, and 15 ppm UHC emissions warranty for natural gas fuel.

DLE (dry low emissions) or lean-premix combustion reduces the conversion of atmospheric nitrogen to NO_x by reducing the combustor's flame temperature. Since NO_x formation rates are strongly dependent on flame temperature, lowering this temperature is an effective strategy for reducing NO_x emissions. Lean combustion is enhanced by premixing the fuel and combustor airflows upstream of the combustory primary zone. DLE eliminates the need for water or steam injection or exhaust cleanup, which benefits the environment at a lower cost.

There are three types of NO_x:

1. **Thermal NO_x** is based on temperature and makes up most of the NO_x formed during combustion
2. **Prompt NO_x** is formed when molecular nitrogen in the air combines with the fuel in fuel-rich conditions
3. **Fuel-bound NO_x** is based off nitrogen in the fuel and is a natural occurrence during combustion

The type of NO_x that is reduced most with burner technology is thermal NO_x. This can be achieved by lowering the temperature of the flame or by eliminating prompt NO_x, some of which can be reduced by optimizing the fuel-to-air mixture in the burner. There are different types of burner technologies and combustion systems that can be implemented today, and each one has its own characteristics to reduce NO_x and increase efficiency.

Solar Turbines provided certifications as follows:

2021-09-14: Solar Turbines Incorporated at DeSoto certified Solar MARS 100 (Gas Producer S/No. OHI21-M4414 & Power Turbine S/No. TUI21-74415) OVERHAUL to meet Eng. Spec.

2019-09-19: Solar Turbines Incorporated at DeSoto certified Solar MARS 100 (S/No. OHI19-M7679) REPAIR (Test Spec. ES2141) to meet Eng. Spec.

2021-09-14: Solar Turbines Incorporated at DeSoto certified Solar MARS 100 (Gas Producer S/No. OHI21-M4414 & Power Turbine S/No. TUI21-74415) OVERHAUL (Test Spec. ES2141) to meet Eng. Spec.

Maximum design gas producer speed (103 percent) of EUTURBINE1 and EUTURBINE2 is defined as the operation of each of the two (2) gas producer turbines at a rotational speed of **10,780 revolutions per minute (RPM)**.

EUSPU3	Standby power unit with rating 924 hp max and provides back-up power in the event of a local utility power interruption. Limited to 5,000 hours of operation per year.	02-2007	NA
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Waukesha Model No. L36GLD. Serial No. C-17216/1. Compression ratio 11.1. Natural gas only. Hours Meter reading = 413.9 (Jan 2021). Hours Meter reading = 448 (Dec 2021). Ran 25.3 hrs Emergency & 9.3 hrs Non-Emergency in CY 2021. Hours of operation Emergency Non-Emergency Hours-Meter readings are tracked using ENV-F-SPU Run Log (Effective: 02/01/13)

This is a natural gas fired internal combustion engine (914 BHP) standby power unit. 924 > 500 hp and manufactured before July 1, 2007, is NOT subject to NSPS 4J (40 CFR Part 60, Subpart JJJJ).

40 CFR 60.4230(a)(4): [Owners](#) and [operators](#) of stationary SI ICE that commence [construction](#) after June 12, 2006, where the stationary SI ICE are manufactured:

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
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(i) On or after July 1, 2007, for engines with a [maximum engine power](#) greater than or equal to 500 HP (except [lean burn engines](#) with a [maximum engine power](#) greater than or equal to 500 HP and less than 1,350 HP).

MI-ROP-N7624-2019, Flexible Group (FG)

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FGTURBINES	FGTURBINES includes the emission units EUTURBINE1 and EUTURBINE2, which are both Solar Mars 110S natural gas fired turbines.	EUTURBINE1 EUTURBINE2

MI-ROP-N7624-2019, EUSPU3

MI-ROP-N7624-2019, EUSPU3, III,1-2

Standby power unit burning natural gas **only** with rating of 924 HP (Maximum) and provides back-up power in the event of the local utility power interruption.

As stated above in the table, hours of operations are significantly less than 500 hours and SI RICE is capable of burning **only** natural gas. Natural gas usage is recorded and reported to MAERS.

CY 2021: 25.3 hours Emergency & 9.3 hours non-Emergency.

CY 2020: 0.1106 MM SCF natural gas usage in emergency generator (EUSPU3)

CY 2021: 0.2995MM SCF natural gas usage in emergency generator (EUSPU3)

MI-ROP-N7624-2019, FGTURBINES (EUTURBINE1, EUTURBINE2)

The flexible group includes two Solar Mars 110S natural gas fired turbines, EUTURBINE1 and EUTURBINE2.

Low NOx Combustion System reduces NOX emissions from natural gas combustion.

MI-ROP-N7624-2019, FGTURBINES, I.1-4

Pollutant	Limit	Time Period or Operating Scenario	Equipment	11/05/2019 test	11/02/2021 test
1. NOx	25 ppmvd at 15% O ₂	Hourly	FGTURBINES ^d	Turbine1: 8 ppmvd at 93% NGP and 7 ppmvd at 100% NGP Turbine2: 13 ppmvd at 93% NGP and	Turbine1: 9.7 ppmvd at 93% NGP and 9.7 ppmvd at 103% NGP Turbine2: 15.1 ppmvd at 93% NGP and

Pollutant	Limit	Time Period or Operating Scenario	Equipment	11/05/2019 test	11/02/2021 test
				6 ppmvd at 100% NGP	9.8 ppmvd at 103% NGP
2. SO ₂	0.06 lb/MMBTU ²	NA	FGTURBINES		
3. CO	800 pounds per hour ²	Hourly	FGTURBINES ^{a,b}		
4. CO	18.8 pounds per hour ²	Hourly	FGTURBINES ^{a,c}	Turbine1: 0.33 lb/hr at 93% NGP and 0.57 lb/hr at 100% NGP Turbine2: 0.28 lb/hr at 93% NGP and 0.24 lb/hr at 100% NGP Total (Turbine 1 + Tubine2): 0.61 lb/ hr @ 93% NGP And 0.81 lb/hr @ 100% NGP	

On or about **November 5, 2019**, Vector conducted a performance test using Montrose Air Quality Services, LLC of Royal Oak (248-548-8070), Michigan 48073 (Montrose Document Number: 049AS-523672-RT-227R0. Document Date: December 20, 2019. Test Plan: 049AS-523762 dated 8/16/2019). Sampling of Nitrogen Oxides (NO_x) and Carbon Monoxide (CO) occurred November 05, 2019, utilizing US EPA Reference Methods 3A, 7E, 10, and 19. This an annual stack testing for Turbine 1 (Unit 100) and Turbine 2 (Unit 200) according to MI-ROP-N7624-2019, FGTURBINES, V.1 and NSPS 4K (40 CFR 60.8, 40 CFR 60.4400, and 40 CFR 60.4340(a)). Sebastian Kallumkal of AQD-SEMI-Warren and Ragina Anggellotti of AQD-TPU observed the stack sampling. Biennial testing may be performed if the stack test result is less than or equal to 75 percent of the NO_x limit. AQD-received Test Protocol on August 19, 2019, and sent the approval letter on September 3, 2019, approving the tests to be conducted while the turbine operates at two loads: one load near the greatest achievable load and the other near the lowest stable load within the SoLo NO_x range of the turbine. The **November 2019** test results are as follows:

EUTURBINE1: 8 ppmvd NO_x corrected to 15% oxygen (2.89 pounds of NO_x as (NO₂)) when operating at 93% NGP (87.53 kscf per hour natural gas flow rate). 7 ppmvd NO_x corrected to 15% oxygen (2.85 pounds of NO_x as (NO₂)) when operating at 100% NGP (108.03 kscf per hour natural gas flow rate). At each operating condition, carbon monoxide (CO) emission rate is <0.3 pound per hour.

EUTURBINE2: 13 ppmvd NO_x corrected to 15% oxygen (4.39 pounds of NO_x as (NO₂)) when operating at 93% NGP (87.08 kscf per hour natural gas flow rate). 6 ppmvd NO_x corrected to 15% oxygen (2.42 pounds of NO_x as (NO₂)) when operating at 100% NGP (107.20 kscf per hour natural gas flow rate). At each operating condition, carbon monoxide (CO) emission rate is <0.3 pound per hour.

N7624_TEST_20191105 is available on Michigan.gov: [N7624_TEST_20191105.pdf \(state.mi.us\)](https://www.michigan.gov/n7624_TEST_20191105.pdf)

On or about **November 2, 2021**, Vector conducted a performance test using Montrose Air Quality Services, LLC of Royal Oak (248-548-8070), Michigan 48073 (Montrose Document Number: MW049AS-006873-RT-869. Document Date: **December 8, 2021**). Sampling of Nitrogen Oxides and Carbon Monoxide occurred November 2, 2021 utilizing US EPA Reference Methods 3A, 7E, 10, and 19. The **November 2021** test results are as follows:

Pollutant	Limit	Time Period or Operating Scenario	Equipment	11/05/2019 test	11/02/2021 test
<p>EUTURBINE1: At 93% NGP, 9.7 ppmvd NO_x corrected to 15% oxygen, 3.3 pounds of NO_x per hour as NO₂ and 0.33 pounds of CO per hour. At 103% NGP, 9.7 ppmvd NO_x corrected to 15% oxygen, 4.2 pounds of NO_x per hour as NO₂ and 0.57 pounds of CO per hour.</p> <p>EUTURBINE2: At 93% NGP, 15.1 ppmvd NO_x corrected to 15% oxygen, 5.0 pounds of NO_x per hour as NO₂ and 0.28 pounds of CO per hour. At 103% NGP, 9.8 ppmvd NO_x corrected to 15% oxygen, 4.4 pounds of NO_x per hour as NO₂ and 0.24 pounds of CO per hour.</p> <p>Sulfur dioxide emissions are determined using the total sulfur content of the fuel burned as measured by a gas chromatograph on-site. Sulfur content of the fuel gas and total fuel flow are used in the calculation of sulfur dioxide emissions.</p>					
<p>a. Represents the total emission limit for both turbines. Individual turbine limits are one half the listed values.</p> <p>b. This limit is applicable at any time that the turbine is operating in the range of 87% to 92% of NGP. An exceedance of this hourly limitation will further restrict operating hours under SoLoNOx-OFF mode but will not constitute a violation. NGP is defined as the rotational speed [measured in revolutions per minute (RPM)] of the gas producer. Startup is defined as the period of time from first ignition to when the turbine reaches 87% of NGP. Shutdown is defined as that period of time from the initial lowering of the turbine's speed to below with the intent to shut down.</p> <p>c. This limit is applicable any time the turbines are operating at or above 92% of NGP.</p> <p>d. 40 CFR 60 Subpart KKKK limits emissions to 25 ppm NO_x at 15% O₂ at any turbine load.</p>					

MI-ROP-N7624-2019, FGTURBINES, III.1-4: natural gas only, > 87 % of NGP, operate within the compliance range of gas producer speed, maintain properly Low NOx Combustion System

Vector fires **only** natural gas in turbines (not designed for liquid fuels such as ULSD), keeps Natural Gas Tariff sheet, generally operates turbines above 87% of NGP (Vector maintains records of the NGP speed on an hourly basis). Routine tests and maintenance activities are done.

MI-ROP-N7624-2019, FGTURBINES, IV.1: dry low-NO_x combustors

The turbines (FGTURBINES) have been equipped with Solar's SoLoNOx technology.

MI-ROP-N7624-2019, FGTURBINES, V.1-5: CO and NOx tests

Annual (at least every 14 calendar months) or **Biennial** (at least every 26 calendar months, if and only if NO_x emissions not greater than 75 percent ($\leq 75\%$) of the NO_x limit in most recent performance test) NO_x & **Quinquennial or Pentennial (1/5Yr)** CO performance tests conducted as detailed above.

MI-ROP-N7624-2019, FGTURBINES, VI.1-3: Monitoring and recordkeeping

Vector maintains continuous hourly records for each turbine indicating whether SoloNOx mode was **ON**. Total sulfur is measured on a continuous basis by a gas chromatograph (GC). Vector maintains records of the hourly Natural Gas Producer Speed (%NGP) for each turbine. Federal Energy Regulatory Commission Gas Tariff sheets are maintained. The required records are kept. DiPaola and Alex Smith were able to produce all of these records during my inspection and copies via e-mail (Vector Washington Compressor Station Air Inspection Records, Alex Smith alex.smith@enbridge.com, Wed 9/21/2022 12:46 PM). The records of carbon monoxide (CO) and nitrogen oxides (NO_x) emissions calculations for

each turbine are maintained and reported to MAERS. Natural gas usage and hours operations records are kept on a daily basis.

MI-ROP-N7624-2019, FGTURBINES, VII.1-5: Reporting

As stated above (Source-Wide), Semi1 (Jan-Jun), Semi2 (Jul-Dec), annual certifications are submitted. As stated above, the required NSPS 4K performance (stack) tests were submitted within 60 days calendar days of sampling / tests.

MI-ROP-N7624-2019, FGTURBINES, IX.1-3: NSPS 4K, SSM, PMP

Vector Pipeline operates in compliance with NSPS 4K based upon review of the records and the performance test reports. Vector implements and maintains a Preventative Maintenance Plan (PMP) that ensures that FGTURBINES can operate in compliance. The startup, shutdown, or malfunction (SSM) records are maintained.

As stated above, Solar's maintenance activities are maintained. The turbine washing procedure is essentially to run soapy water through the turbine while the turbine internals are actuated by the electric starter. Turbine wash water is collected in a 2,000-gallon floor drain tank that is emptied by a waste carrier service once per year. Any waste oil from filter changes or otherwise is also taken away by a waste carrier service as needed. In the winter months, there is a risk of the soapy water freezing during this cleaning. To get around this issue, maintenance staff occasionally add isopropyl alcohol to the water. The isopropyl alcohol lowers the freezing point of the cleaning solution. The isopropyl alcohol is allowed to evaporate after the cleaning. However, Mr. DiPaola, on or about September 15, 2022, stated that Solar recently recommended that the turbines never be cleaned when the temperature is below freezing. Per DiPaola Vector Pipeline will never use isopropyl alcohol in their turbine cleaning process again by avoiding freezing days.

Conclusion

Based upon FY 2022 inspection and records review, Vector Pipeline is in compliance with MI-ROP-N7624-2019 and NSPS 4K for Standards of Performance for Stationary Combustion Turbines (40 CFR, Part 60, Subpart KKKK, 71 FR 38497, July 6, 2006). The actual emissions are significantly lower than the limits ($\text{NO}_x = 81.34 < 250$ and $\text{CO} = 219.18 < 250$ tons per year)

NAME

L. S. MarshallDATE September 28, 2022

SUPERVISOR

Joyce