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

N631764680

FACILITY: SEMCO ENERGY Gas Company - Collin Field		**SRN / ID:** N6317
LOCATION: ANGLING RD, STARRVILLE		**DISTRICT:** Warren
CITY: STARRVILLE		**COUNTY:** SAINT CLAIR
CONTACT: Elisabeth Barr , Engineer III		**ACTIVITY DATE:** 07/27/2022
STAFF: Iranna Konanahalli	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** SM OPT OUT
SUBJECT: FY 2022 SM CMS scheduled inspection of SEMCO Energy Gas Company -- Collins Field ("SEMCO Energy" or "SEMCO"), a natural gas storage and distribution facility, located at 6936 Angling Road, Cotrellville (Starville), Michigan 48039-2900.		
RESOLVED COMPLAINTS:		

SEMCO Energy Gas Company - Collins Field (N6317)
6936 Angling Road
Cotrellville (Starville), Michigan 48039-2900

NAICS Code: 48621 Pipeline Transportation of Natural Gas

PTI and 208a Initial Registration: LV-06-97 dated Feb 24, 1997. As the rule 208a has been rescinded, SEMCO obtained **a synthetic minor ROP-opt-out PTI No. 163-14.**

Two 1000 HP natural gas compressors at natural gas transmission industry (NAICS 48621). NESHAP Subpart ZZZZ Compliance at HAP Area Sources: Owners/operators that demonstrate compliance with either NSPS Subpart IIII or JJJJ, as appropriate, will be in compliance with the NESHAP. AQD has no delegation of these standards and therefore no attempt has been made to evaluate SEMCO Energy's compliance with NESHAP / MACT 4Z.

On July 27, 2022, I conducted a level-2 **FY 2022 SM CMS** scheduled inspection of SEMCO Energy Gas Company -- Collins Field ("SEMCO Energy" or "SEMCO"), a natural gas storage and distribution facility, located at 6936 Angling Road, Cotrellville (Starville), Michigan 48039-2900. 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, Ms. Elisabeth M. Barr (Phone: 810-887-3081 or 800-860-4277- ext. 3081; Fax: 810-887-4230; E-mail: Elisabeth.Barr@SemcoEnergy.com), Environmental Engineer, assisted me.

SEMCO Energy's Collins field station buys natural gas from pipeline companies such as ANR (mostly), Consumer, MichCon, etc. and stores gas for winter months. SEMCO buys natural gas at 400-600 psi and compresses it up to 1,100 psi for storage in geological formations (Gray Niagaran Formation) using two Waukesha 1000 bhp SI RICE natural gas fired compressors. When there is demand for natural gas in winter, SEMCO sells it to utility companies (Consumer, DTE, etc.) for delivery to consumers. Mr. Shepherd replacement divides his time between a couple of natural gas storage facilities; he visits Collins Field at least once a day in mornings. Desiccant is used to take moisture out of natural gas. Natural gas is released to buyer from the storage using its storage pressure (≈1,000 psi).

SEMCO Energy has the following equipment:

1. Two Waukesha 1000 bhp RICE natural gas fired compressors (4-cycle, 4-stroke, spark ignition [SI], rich-burn [slightly more than stoichiometric air unlike lean-burn engines which use up to 100% excess air] engines) - Area source NESHAP / MACT ZZZZ - 4-cycle rich burn engines. Model L7042 GU 1,000 BHP, 1000 rpm. AQD has not sought delegation of these standards and therefore no attempt has been made to evaluate SEMCO Energy's compliance with NESHAP / MACT 4Z. The compressors operate during non-heating seasons (Apr-Oct). Natural gas is taken out of underground bedrock formation cavity (Gray Niagaran Formation about 2,300 feet below ground surface) using its own storage pressure; very similar to a pressurized propane tank. Desiccant (salt pallets) is used to take moisture out of natural gas. As a result of repeal of Rule 208a, SEMCO obtained an ROP opt-out permit (PTI No. 163-14, SC FG-ENGINES, I.1 & 2 limits: 14.1 tpy NOx & 32.8 tpy CO). The engines are known as FG-ENGINES: EU-COMPENG1 (installed: 1988) & EU-COMPENG2 (installed: 1987). Two catalytic converters (EmeraChem NSCR, one for each engine) control the emissions. The engines are cooled by ethylene glycol (50%) coolant that circulates. The hot coolant is cooled by giant fans blowing ambient air over finned heat exchangers (air cooled) located outside the building.

2. Flameless gas catalytic heater 5,000 BTU / Hour – negligible emissions. Using this heat, a mixture of water and ethylene glycol (50% glycol, boiling point elevation and freezing point depression of water and total pressure reduction) is heated to ≈160 ºF and circulated to prevent freezing. The heater keeps the control systems from freezing in winter months. Four more flameless gas catalytic heaters for space heating at different rooms are added about 2015.

3. Pipeline heater 2.5 million BTU / Hour – negligible emissions. Ethylene glycol (50%), a heart transfer fluid (HTF) with high boiling point and low freezing point due to thermodynamic phenomena boiling point elevation and freezing point depression based upon the solute concertation (ethylene glycol), is heated and circulated via heat exchanger to heat supply natural gas.

4. Odorizing Unit – methyl mercaptan is added as natural gas as supplied to utilities for sale. There is a separate odorizing building. AQD never received an odor complaint as this area is practically unpopulated.

5. Flash gas emissions – condensate (water) and crude oil is collected in separators along distributions lines are transferred to an on-site blow-off tank – negligible VOC emissions. One 400-barrel (1 barrel = 42 gallons in petroleum industry) storage tank is present to store liquid petroleum and water. Separation of liquids is by gravity separation. One 400-barrel tank is replaced by one 1,000-gallon double walled tank for condensate about 2020.

The compressors are made by Worthington Compressors, Inc. of Buffalo, NY. Model OF5HU-2 Serial Nos. A14846 & A14857. Maximum working pressure 1,000 psig. Both non -resettable hours of operation and gas meters are present. Both compressors were installed about 1988. Natural gas is pressurized to 550-1050 psi. Two catalytic converters (one for each engine) are present to control the RICE engine NOx and CO emissions.

All process equipment are exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rules 285(2)(g), 282(2)(b)(i) and 284(2)(e). However, SEMOCO obtained PTI No. 163-14 to opt out of ROP program as AQD repealed Rule 208a.

PTI Exemption - CI RICE Engines

Fuel usage for Caterpillar Generators is as follows:

1500 kW → 105 gallons per hour diesel (DMC)
1050 kW → 74 gallons per hour diesel
750 kW → 55 gallons per hour diesel
600 kW → 46 gallons per hour diesel
300 kW → 28 gallons per hour diesel

Based upon the above information, assuming 1 MW generator consumes 75 gallons of diesel per hour, knowing 138,000 BTU per gallon of diesel, heat input of 1 MW generator is 10.4 million BTU per hour. Hence, a diesel generator up to 1 MW is exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rule 336.1285(2)(g). It may be noted that some engines convert heat to work more efficiently than others. Recent engine designs have efficiencies up to 40% for heat to shaft work conversion. Converting work to electricity is up to 95% efficient.

Rule 208a

AQD sent SEMCO (Ms. Elisabeth Barr) the June 26, 2014, letter concerning phase out of 208a registration program.

PTI No. 163-14-14

PTI No. 163-14, SC FG-ENGINES, I. Emission Limits

12-month rolling emissions for two engines for January 2017 are: NOx = **0.41** (PTI No. 163-14, SC FG-ENGINES, I.1 limit: 14.1 tpy), CO = **1.63** (PTI No. 163-14, SC FG-ENGINES, I.2 limit: 32.8 tpy), SO2 = **0** and VOC = **0.24** tons per year.

Based upon the spreadsheet calculations provided by SEMCO, CY 2021 emissions are: NOx = **0.09** (PTI No. 163-14, SC FG-ENGINES, I.1 limit: 14.1 tpy), CO = **2.39** (PTI No. 163-14, SC FG-ENGINES, I.2 limit: 32.8 tpy), SO2 = **0.005** and VOC = **0.21** tons per year.

Site-specific emissions factors are not used as stack test has never been done. US EPA / MAERS emissions factors are used.

Engine1: Name Plate Rating = 1000 bhp @ 1170 rpm. Rated fuel consumption at 100% load = 7.14 MMBtu per hour. 99.7% NOx reduction. 92.0% CO reduction.

Engine2: Name Plate Rating = 1000 bhp @ 1170 rpm. Rated fuel consumption at 100% load = 7.14 MMBtu per hour. 98.9% NOx reduction. 88.6% CO reduction

PTI No. 163-14, SC FG-ENGINES, II. Material Limits

SEMCO burns only pipeline quality sweet natural gas and no other gas (PTI No. 163-14, SC FG-ENGINES, II.1 & 2 limits: only NG and not sour gas). No. ULSD.

CY 2021: Engine1 = 9,919 M SCF NG per year with 1661 annual hours of operation. Engine2 = 5,399 M SCF NG per year with 933 annual hours of operation.

PTI No. 163-14, SC FG-ENGINES, III. Process / Operational restrictions

SEMCO submitted MAP about November 2015 and operates the engines accordingly. Operating and maintenance logs are kept (PTI No. 163-14, SC FG-ENGINES, III.1 limit: a preventative maintenance / malfunction abatement plan (PM / MAP) for FG-ENGINES). SEMCO never operated the engines without controls in CY 20201 (PTI No. 163-14, SC FG-ENGINES, III.2 limit: SEMCO shall not operate any engine for more than 200 hours per engine per year without the control device).

PTI No. 163-14, SC FG-ENGINES, IV. Design Parameters

Two catalytic converters (EmeraChem NSCR) are installed and operating properly and one common natural gas meter is present (PTI No. 163-14, SC FG-ENGINES, IV.1 & 2: operate exhaust controls and monitor natural gas usage). The controlled exhaust gases are discharged via two (2) 28-feet stacks. Two (2) catalytic converters (EmeraChem NSCR) with sound mufflers are present. Usually, only one of two engines operates.

PTI No. 163-14, SC FG-ENGINES, V. Testing

Testing for NOx and CO is deemed unnecessary at this time (FY 2022).

PTI No. 163-14, SC FG-ENGINES, VI. Monitoring and Recordkeeping

SEMCO is keeping natural gas usage records for two engines (natural gas meter reading on June 28, 2017 = 009006 M SCF, CY 2021 annual NG usage and hours of operation is stated above) (PTI No. 163-14, SC FG-ENGINES, VI. 2: natural gas usage), performing the required calculations (PTI No. 163-14, SC FG-ENGINES, VI. 1, 5 & 6: CO & NOx emission calculations), keeping records of maintenance activities (PTI No. 163-14, SC FG-ENGINES, VI. 3: log of maintenance), never operates without controls (PTI No. 163-14, SC FG-ENGINES, VI. 4: hours engines operated without control).

June 28, 2017, non-resettable hours meter readings: **6,435.9** hours for Engine1 and **4,763.6** hours for Engine2. CY 2021 hours of operation is noted above.

Note: The emissions are calculated using natural gas burn rates of 7,199.8 cf/hr for Engine #1 and 7,290.6 cf/hr for Engine #2 at maximum capacity. The uncontrolled emission factors of 2.21 lbs. of NOx per MMBtu and 3.72 lbs. of CO per MMBtu were used along the LHV of 991 Btu/cf for natural gas. Based upon testing, emissions were reduced by 92% of NOx for engines (2), 87% of CO for Engine 1, and 89% of CO for Engine 2 when operating with catalyst emission controls.

Conclusion

SEMCO obtained an ROP synthetic minor permit (PTI No. 163-14) due to the repeal of Rule 208a and operates in compliance with the permit. SEMCO operates in compliance with the permit.

NAME _____ DATE September 20, 2022 SUPERVISOR _____