

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

N302242577

FACILITY: Eaton Rapids Gas Storage System	SRN / ID: N3022
LOCATION: 3349 S Waverly Rd, EATON RAPIDS	DISTRICT: Lansing
CITY: EATON RAPIDS	COUNTY: INGHAM
CONTACT: Bruce Bendes, R.S., CHMM, , Sr. Environmental Specialist - Great Lakes Region	ACTIVITY DATE: 10/24/2017
STAFF: Julie Brunner	COMPLIANCE STATUS: Compliance
SUBJECT: Inspection for compliance with ROP No. MI-ROP-N3022-2014 as part of an FCE	
RESOLVED COMPLAINTS:	

On October 24, 2017, I conducted a scheduled inspection of Eaton Rapids Gas Storage System (N3022) as part of a Full Compliance Evaluation (FCE). This facility was last inspected on February 16, 2016. For safety and security reasons the property is fenced with warning signs, gated, and access is recommended as appointment only. Safety gear is required including safety glasses, hardhat, steel-toed shoes, and a safety orientation is provided before staff can tour the facility. Flame resistant coveralls are no longer required.

Facility Address:

3349 S. Waverly Road, Eaton Rapids, Michigan

Contacts:

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Facility Description:

Eaton Rapids Gas Storage System (ERGSS) is a natural gas transmission and storage facility located in Section 7 of Onondaga Township, Ingham County, on the Ingham/Eaton county line, adjacent to the Grand River, and approximately one quarter mile northeast of the National VFW Home. The facility is owned and operated by TransCanada with a primary business of transmission and storage of natural gas. Natural gas is re-injected into an underground gas reservoir for storage and is withdrawn as needed for pipeline transport and sale. The reservoir, a depleted natural field, is approximately three (3) miles in length and 3,700 feet below the earth's surface. The geological formation of the storage reservoir is Gray Nigeria. The processes are seasonal, with extraction occurring November through March. The natural gas is coming from western Canada, stored in the reservoir, and transported throughout the Midwest for use. A network of pipeline is used to transport the natural gas from point to point.

Three identical natural gas-fired, spark ignition (SI) reciprocating internal combustion engines (RICE), are used to compress natural gas into the storage reservoir during injection, and into the pipeline during withdrawal. A glycol dehydration system removes water and impurities from natural gas withdrawn from the reservoir. Additional processes include a natural gas-fired withdrawal natural gas bath process heater, a natural gas-fired boiler for water heating, an emergency generator, and eight (8) liquid storage tanks.

Commencement of Operations: 1989

Number of On-site Staff: 2 Shifts: 7:00 am to 3:30 pm with one person on 24-hr call

Regulatory Review:

ERGSS is a major source of nitrogen oxides (NOx), carbon monoxide (CO), and hazardous air pollutants (HAPs). It is considered a major 40 CFR 70 source and is operating per the conditions contained in Renewable

Operating Permit (ROP) No. MI-ROP-N3022-2014. An administratively complete ROP renewal application is due between June 23, 2018 and June 23, 2019.

The process equipment at the facility is identified below:

Emission Unit ID	Emission Unit Description
EUERCOMP-A	Superior Model 16SGTB: 2650 HP (18.82 MMBtu/hr) natural gas-fired, spark ignited, 4 stroke, lean burn, reciprocating, internal combustion compressor engine. This compressor engine is used to compress natural gas for injection into or withdrawal from a natural gas storage field.
EUERCOMP-B	Superior Model 16SGTB: 2650 HP (18.82 MMBtu/hr) natural gas-fired, spark ignited, 4 stroke, lean burn, reciprocating, internal combustion compressor engine. This compressor engine is used to compress natural gas for injection into or withdrawal from a natural gas storage field.
EUERCOMP-C	Superior Model 16SGTB: 2650 HP (18.82 MMBtu/hr) natural gas-fired, spark ignited, 4 stroke, lean burn, reciprocating, internal combustion compressor engine. This compressor engine is used to compress natural gas for injection into or withdrawal from a natural gas storage field.
EUERGLYDEH	Glycol dehydration system with condenser and thermal oxidizer.
EUERGEN	Waukesha generator model F2895GU (500 kW/hr) using a 670 HP 6-cylinder natural gas-fired, spark ignited, 4 stroke, rich burn, reciprocating, internal combustion engine.
EUERBATHEATER	10.0 MMBtu/hr natural gas-fired boiler used to heat water for process needs. >process heater used to heat natural gas when extracted from the reservoir.
Natural gas-fired boiler exempt per Rule 282(2)(b)(i)	A 1.4 MMBtu/hr natural gas-fired Cleaver-Brooks boiler used for water heating.
Eight (8) liquid storage tanks exempt per Rule 284(2)(i)	Four (4) vertical and four (4) horizontal storage tanks (with new secondary containment).

The facility was built in 1989 and was not subject to Prevention of Significant Deterioration (PSD) regulations because at the time of permitting, the potential to emit of each criteria pollutant was less than 250 tons per year (tpy).

EUERGLYDEH at the stationary source is subject to the National Emission Standard for Hazardous Air Pollutants (NESHAP) for Oil and Natural Gas Production and Natural Gas Transmission and Storage promulgated in 40 CFR 63, Subpart HHH.

EUERCOMP-A, EUERCOMP-B, EUERCOMP-C, and EUERGEN at the stationary source are subject to the NESHAP for Reciprocating Internal Combustion Engines (RICE) promulgated in 40 CFR 63, Subpart ZZZZ as existing RICE.

EUERBATHEATER at the stationary source is subject to the NESHAP for Industrial, Commercial, and Institutional Boilers and Process Heaters promulgated in 40 CFR 63, Subpart DDDDD as an existing process heater. The exempt 1.4 MMBtu/hr natural gas-fired boiler is not subject to 40 CFR 63, Subpart DDDDD because it does not meet the applicability requirements of the regulation.

At present, the facility is not subject to any NSPS requirements such as Storage Vessels for Petroleum Liquids, 40 CFR 60, Subparts K, Ka, and Kb, and Subpart JJJJ for Stationary Spark Ignition Internal Combustion Engines (SI RICE) because the equipment does not meet the applicability requirements of the regulations.

Michigan Air Emissions Reporting System (MAERS):

The facility reports to MAERS. It is considered a Category I source and is fee subject. The following emissions were reported in 2016:

EUERBATHEATER

CO – 0.14 tpy
NOx – 0.16 tpy
Particulate matter
Sulfur Dioxide (SO₂) – 0.001 tpy
Volatile organic compounds (VOC) – 0.009 tpy

EUERCOMP-A

CO – 8.83 tpy
NOx – 12.84 tpy
PM10/PM2.5 – 0.20 tpy
SO₂ – 0.012 tpy
VOC – 0.16 tpy

EUERCOMP-B

CO – 7.28 tpy
NOx – 10.6 tpy
PM10/PM2.5 – 0.11 tpy
SO₂ – 0.0096 tpy
VOC – 1.96 tpy

EUERCOMP-C

CO – 4.81 tpy
NOx – 7.0 tpy
PM10/PM2.5 – 0.16 tpy
SO₂ – 0.0064 tpy
VOC – 1.30 tpy

EUERGEN

CO – 0.12 tpy
NOx – 0.097 tpy
PM10/PM2.5 – 0.0011 tpy
SO₂ – 0.000035 tpy
VOC – 0.0017 tpy

EUERGLYDEH

CO – 0.014 tpy
NOx – 0.016 tpy
PM10/PM2.5 – 0.0013 tpy
SO₂ – 0.0001 tpy
VOC – 0.22 tpy

Inspection:

Arrive: 8:53 am
Depart: 11:20 am
Weather: 49°F, overcast with light rain, calm

No visible emissions (VEs) nor odors were identified upon arrival. Staff on-site for the inspection were Mr. Bruce Bendes, and the two (2) technicians, Mr. James Thomas and Mr. Thomas Weingartz. We discussed the purpose of my inspection. I provided Bruce with the new updated booklet of permit exemptions. Since the last inspection, no new equipment or changes to process operations have occurred. Gas has not been injected into the reservoir for 2 – 3 months because the facility was down for maintenance. So currently, they are playing catch-up on injecting gas into the field for the winter heating season. Injection occurs approximately April through October, while extraction occurs November through March.

EUERCOMP-A, EUERCOMP-B, EUERCOMP-C (FGERCMPRS) - Three Compressor Engines

Three identical 16-cylinder, natural gas-fired SI RICE are used to drive the compressors to compress natural gas. The engines operate in single stage or double stage compression in order to pressurize the gas to get it

were it needs to go. EUERCOMP-A and EUERCOMP-B were installed in 1989, and EUERCOMP-C was installed later in 1994. The compressor engines were modified in 1999 on Permit to Install (PTI) No. 81-94A to increase the emission limits for NOx, CO, and VOC. The allowed emission rates were increased to better reflect the fluctuation of emissions at varying torque and speed. The engines do not have "add-on" controls. The three engine stacks vent out the side wall and turn to vent vertically at the appropriate height of 35 feet as permitted.

EUERCOMP-A, EUERCOMP-B, and EUERCOMP-C are existing stationary RICE with limited MACT requirements under 40 CFR 63, Subpart ZZZZ. As long as the engines are not reconstructed or replaced with a newer model engine, 40 CFR 63, Subpart JJJJ does not apply.

During my inspection, gas was being injected in the field. EUERCOMP-A and EUERCOMP-B were operating. EUERCOMP-A was operating at 874 hp and 700 rpm, and EUERCOMP-B was operating at 859 hp and 696 rpm. EUERCOMP-C was off-line. A major overhaul had just been completed on this engine and it was expected to be operating within a month. Major overhauls are done at approximately 80,000 to 85,000 hours of engine operating time. EUERCOMP-B is the next engine scheduled to be overhauled. EUERCOMP-A was overhauled (like-kind replacement) in January of 2016.

EUERCOMP-C was overhauled in-place using like-kind components, and the engine did not leave the facility during the project. The overhaul of the engine is a common maintenance practice that was performed under exemption Rule 285(2)(a) – "Routine maintenance, parts replacement, or other repairs that are considered by the department to be minor...". The cost of the engine and compressor overhaul was estimated at \$850,000, whereas the cost of a new engine and compressor is \$2,000,000. The engine is not considered reconstructed because the cost of the project (replacement of components) was less than 50% of the cost of a new engine and compressor. The overhauled engine still meets the definition of existing and is still not subject to 40 CFR 60, Subpart JJJJ.

Maintenance and records for the engines are managed by an electronic system (SAP). Maintenance is based on engine operating time and the system produces the work order for oil changes, spark plugs, overhauls, etc. The company is planning to upgrade/update the current preventative maintenance system.

Engine testing of at least one representative engine is required once during the term of the ROP per Special Conditions (SC) V.1-3. The test plan was approved on June 3, 2016. EUERCOMP-C was tested for NOx, CO and VOC on June 21, 2016. The testing was observed by Tom Gasloli (AQD-TPU) and me.

The testing results are as follows:

Pollutant	Measured	Limit
NOx	13.02 lb/hr	52.6 lb/hr
NOx	2.58 g/hp-hr	3.00 g/hp-hr
CO	7.74 lb/hr	49.1 lb/hr
CO	1.53 g/hp-hr	2.8 g/hp-hr
VOC	0.37 lb/hr	21.03 lb/hr
VOC	0.07 g/hp-hr	1.2 g/hp-hr

The engine was operating at an average of 2,292 hp or 86.5% of rated capacity during the test. Testing results indicate compliance with emission limits.

A screen shot of the facility operations "Station Piping" is attached. It shows the amount of incoming gas and the status of the equipment operations.

The required recordkeeping and calculations per SCs VI. 1 and 2 are maintained. Data is collected electronically and stored. Chris Waltman emailed the records with operational hours, horsepower hours, and calculated emissions as required by the SC VI.1 and 2.

For the ROP renewal, the conditions assessed for Rule 213 need to be reviewed and potentially updated. Testing/sampling language, monitor/recordkeeping, and other requirements such as the 40 CFR 63, Subpart ZZZZ language is all dated.

EUERGLYDEH and FGMACTHHH - Glycol Dehydrator

The glycol dehydrator strips liquids out of the natural gas. The liquids go to a condensate tank. VOC and HAP emissions such as benzene, ethyl benzene, toluene, and mixed xylenes (BTEX) are potentially emitted from the glycol dehydration system. In 1997, PTI 76-97 was issued for the system. The permit required the installation and use of a thermal oxidizer, a condenser, or an equivalent control device for VOC and HAP emissions. The permit specifically limited benzene emissions to 0.99 tpy. PTI 76-97 has been incorporated into the ROP.

ERGSS is a major source of formaldehyde subject to the Gas Transmission and Storage MACT, 40 CFR 63, Subpart HHH. The glycol dehydrator is the affected unit. The applicable 40 CFR 63, Subpart HHH requirements have been added to the ROP under FGMACTHHH section. According to 40 CFR 63.1270(b)(2) and 40 63.1271, EUERGLYDEH is an existing small glycol dehydrator. The ROP contains federally enforceable conditions to restrict actual average benzene emissions to below 0.90 Mg/yr (0.99 tpy) as determined by the methods contained in 40 CFR 63.1282(a).

The air emission testing and leak detection and repair (LDAR) for the small glycol dehydration system was last performed on 2/27/2015. For the LDAR assessment, no VOC readings were measured at a concentration exceeding the criteria for a leak (greater than 500 ppmv). The BTEX emission rates were measured at 0.0015 lb/hr and 0.0025 Mg/yr. This is well below the allowable permits. The thermal oxidizer combustion temperature measured during the test averaged 1434 degrees F.

Gas composition testing is required each ROP cycle per EUERGLYDEH, SC V.1. The last gas testing was performed on 3/16/2014 showing VOC and benzene content. Gas testing still needs to be performed for the current ROP cycle. This will be changed to every five years from the last test when the ROP is renewed.

The glycol dehydrator was not operating during the inspection. It is only used from November through March when the facility is withdrawing gas from storage that could contain moisture and impurities. The stack exhausting the condenser is at least 15.5 feet tall. The oxidizer stack is taller still. A minimum of 15.5 feet is required for both stacks.

The thermal oxidizer is the primary control. The thermal oxidizer is equipped with a device for monitoring temperature. The set point is 1475 degrees F and is monitored continuously when operating.

The condenser is the backup control device and glycol use is reduced as necessary to assure that the condenser exhaust temperature is in compliance with the permit restriction. The condenser has a heat exchanger to help maintain the temperature of the condenser exhaust gas below the permit restriction of 120 degrees F.

EUBATHEATER (FGMACTDDDDDD) - Process Heater

EUBATHEATER is an indirect natural gas-fired 10.0 MMBtu/hr process heater identified as the "Withdrawal Gas Bath Heater" used to heat cold natural gas. It has a heated glycol jacket and two (2) arrester vertical vents. The process heats the cold gas in the winter time to keep pipes and valves from freezing. Controls on the bath heater were redone during the shutdown for maintenance. The unit is ready to start up for the winter heating season when gas is extracted from storage.

The process heater is exempt per Rule 282(2)(b)(i) but was incorporated into the ROP because it is subject to the Boiler MACT (40 CFR 63, Subpart DDDDD). The unit is an existing process heater designed to burn Gas 1 fuels.

Boiler MACT (40 CFR 63, Subpart DDDDD) Requirements:

1. Initial notification – 5/13/2013
2. One-time energy assessment – The energy assessment was performed on 4/28/2015 by Sage Environmental Consulting, LP and is dated August 2015
3. Annual tune-up – At the end of each season (March 2017)
4. Annual compliance report submitted for 2016

For the ROP renewal, the emission unit description may need to be revised as this is not a hot water heater as listed in the ROP. The special conditions for the Boiler MACT (40 CFR 63, Subpart DDDDD) may need to be updated with any new template language.

EUERGEN (FGMACTEMERGENCY) - Emergency Generator

A Waukesha generator, model F2895GSIU (500 kW/hr) supplies electricity for the facility during power outages. The generator is a natural gas-fired 4SRB RICE. The engine vents out the side wall and turns upward

for a vertical exhaust at the roof height. The engine is exempt per Rule 285(2)(g) but is in the ROP because it is subject to the RICE MACT (40 CFR 63, Subpart DDDDD).

The RICE MACT notification was received 7/3/2006. The notification indicated that the facility would switch to "line" electricity and the generator would be restricted to emergency use only. The engine is restricted to non-emergency use at a maximum of 50 hours per year and to a total of 100 hours per year for maintenance checks and readiness testing. The engine operating logs for 10/6/2016 to 10/19/2017 showed 9.61 hours for emergency use and 10.21 hours for maintenance. Total clock time on the engine was 123374.6 hours.

Exempt Hot Water Boiler

A 1.4 MMBtu/hr Cleaver-Brooks natural gas-fired hot water boiler provides heat for the facility. The boiler has a vertical exhaust stack. The boiler is exempt per Rule 282(2)(b)(i) and not subject the Boiler MACT (40 CFR 63, Subpart DDDDD). It is located in the same building as the emergency generator and two (2) air compressors.

Maintenance Shop

The maintenance shop has welding equipment (Rule 285(2)(l)), a bead blaster with dust filter that is internally vented (Rule 285(2)(vi)(B)), and a drill machine (Rule 285(2)(vi)(B)). The cold cleaners have been replaced by an aqueous cleaner that is not used.

Storage Tanks

A tank battery surrounded by a new secondary containment dike with eight (8) storage tanks. The tanks are of various sizes, all under 40,000 gallons. The tanks contain process liquids like used oil, glycol (vapor pressure of 0.0012 psia @ 20 degrees C), and waste water such as brine and condensate. The volume of materials in the tanks are monitored electronically and a print out of the monitoring screen is attached. The tanks are exempt per Rule 284(2)(l).

Records Review:

The following records were requested for the inspection --

1. Records and calculations for FGERCMPRS for the last 12-months --
 - a. Hours of operation during the month for each engine
 - b. Horse Power Hours (hp-hr) per month for each engine
 - c. The monthly average pounds/hour and the tons/calendar year of NOx emissions
 - d. The monthly average pounds/hour and the tons/calendar year of CO emissions
 - e. The monthly average pounds/hour and the tons/calendar year of VOC emissions

The operating records and calculations for 2016 and 2017 until October were provided. The emission factors had not been updated with the 6/21/2016 testing results. Below is a summary of emissions using the 6/21/2016 testing results as calculated by AQD. Corrected records were requested and received.

Summary of Engine Emissions from October 2016 to September 2017

Engine EU	Op Hours	hp-hr	NOx EF (g/hp-hr)*	CO EF (g/hp-hr)*	VOC EF (g/hp-hr)*	NOx (tpy)	CO (tpy)	VOC (tpy)	
EUERCOMP-A	3426.17	4,998,869.37	2.58	1.53	0.07	14.22	8.43	0.39	
EUERCOMP-B	1410.1	2,150,931.19	2.58	1.53	0.07	6.12	3.63	0.17	
EUERCOMP-C	0.00	0	2.58	1.53	0.07	0.00	0.00	0.00	
						20.3	12.1	0.55	
						Permit Limit:	230.3	215.0	92.11

* 6/21/2016 Testing

Emissions of NOx, CO, and VOC from the compressor engines are estimated to be below permit limits based on stack testing.

2. Records for EUERGLYDEH for the last 12-months (Section VI)

- a. Operational hours and natural gas throughput on a daily and monthly basis
- b. One month of records of the operating temperature of the thermal oxidizer or condenser including the daily average temperature for each operating day.
- c. Monthly records of VOC emissions in pounds per day and tons per year, and benzene in tons per year.
- d. Copy of the last natural gas composition testing results including VOC and benzene content.

VOC and benzene emissions are calculated through the GRI-GLYCalc software on a daily and monthly basis as required by SC 14 and Appendix 7 of the ROP. The records generated using GRI-GLYCalc show from Nov. 2016 to Oct. 2017, that annual benzene emissions were 0.042 tpy and VOC emissions were 0.271 tpy below the permit limits.

Records also indicated that the glycol dehydrator operations started in Nov. 2016 and ended in March 2017. Gas was flowing through the dehydration system again in Nov. 2017. Operating hours for 2016/17 were 1,985.7 hours for the thermal oxidizer and 664.1 hours for the condenser. The total gas flow through the dehydrator system for 2016/17 was 6,991.7 mmscf.

The records indicate that the oxidizer operated above the minimum 1400 degrees F permit limit (SC III.3). When the condenser was operated, the exhaust gas temperature was measured at less than 120 degrees as required by SC III.2. Both control units were operating properly when in use.

3. Operating records for FGMACTEMERGENCY for the last 12-months –
 - a. Beginning and ending dates.
 - b. Total number of operational hours.
 - c. Indicate whether operational instance was for emergency, readiness testing, maintenance checks, or other use.
 - d. Description of use (example: for an emergency - loss of electrical power).

The records from 10/6/2016 to 10/19/2017 are attached and are complete as required by SC VI.1.

Annual and semi-annual certifications and deviation reports are being received. No deviations have been reported since the last inspection.

Summary:

The facility appeared to be in compliance with the applicable rules and regulations, and ROP No. MI-ROP-N3022-2014.

For the ROP renewal, standard conditions for the MACTs may need to be updated and some of the Rule 213 records revised.

NAME Julie P. Brown DATE 12/6/17 SUPERVISOR B. M.

