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

N730334890

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| **FACILITY:** Bluewater Gas Storage Facility | | **SRN / ID:** N7303 |
| **LOCATION:** 333 South Wales Center Road, COLUMBUS | | **DISTRICT:** Southeast Michigan |
| **CITY:** COLUMBUS | | **COUNTY:** SAINT CLAIR |
| **CONTACT:** Jeff Westrick , Station Manager | | **ACTIVITY DATE:** 05/26/2016 |
| **STAFF:** Sebastian Kallumkal | **COMPLIANCE STATUS:** Compliance | **SOURCE CLASS:** SM OPT OUT |
| **SUBJECT:** Onsite Inspection | | |
| **RESOLVED COMPLAINTS:** | | |

**On Thursday, May 26, 2016, at about 11:10 AM, Michigan Department of Environmental Quality-Air Quality Division Staff Sebastian Kallumkal conducted an annual inspection at the Bluewater Gas Storage (BWGS) facility located at 333 South Wales Center Road, Columbus Township, Michigan. The purpose of the inspection was to verify facility's compliance with requirements of Article II, Air Pollution Control, Part 55 of Act 451 of 1994, Permits To Install (PTI) No. 77-14.**

**Previous PTI No. 268-03 and 175-04 were voided upon issuance of PTI No. 77-14. Consent Order (CO) No. 5-2005 was terminated upon request and compliance demonstration by the facility.**

**At the facility I met Mr. Jeff Westrick, Station Manager (Ph: 810-367-3404; Fax: 810-367-7048). I introduced myself and stated the purpose of the visit. I provided him DEQ credentials including business cards and DEQ brochure- Environmental Inspections: Rights and Responsibilities. During the pre-inspection meeting, we discussed the facility operations, the permit conditions and changes at the facility.**

**Bluewater Gas Storage is involved in the storage of natural gas received from customers such as Consumers Energy, Vector Pipeline, MichCon, Great Lakes Gas Transmission Company, American Natural Resources, and Duke Energy of Canada during warm season and its withdrawal and transfer into the pipeline during cold months. (Storage: dolomite, 3200' deep, 300' thick, up to 2012 psi) The facility also has 7 oil wells for crude oil production. During late spring through early fall season, the facility receives and stores natural gas in the underground rock formations. Later on in the storage season facility needs to use compressor engines to store the gas against the high field pressure. The withdrawal season is from late October through early May. During the initial withdrawal season, the gas into the pipeline is free flow, but later in the season, the gas usually needs to be pumped out using compressors due to the low field pressure.**

**Depending on the nature of the rock formations, the withdrawal gas may contain excess moisture than allowed by the federal regulations. In that case, the natural gas would be dehydrated to meet the requirements prior to pushing back into the pipelines. The facility also had discovered that the gas contained high concentration heavy hydrocarbons which caused to have high hydrocarbon content in the gas than that is allowed. In order to reduce the hydrocarbon content, the facility installed a J-T System installed in January 2006 that takes advantage of the cooling effects of expanding gas (Joule-Thompson effect).**

**In the Joule-Thompson system, as the high pressure gas is withdrawn from the reservoir across a Joule-Thompson valve, the pressure is reduced to 150 PSI. The gas is cooled due to Joule-Thompson effect. The cooling of the gas causes the hydrocarbons to condense and the hydrocarbons are removed from the gas stream. This cooling also causes the water vapor to condense. To prevent the condensed water from freezing, glycol is injected into the gas stream before the J-T Valve to absorb the moisture. The hydrocarbons, water/glycol mixture, and gas are then separated via two separators. The cold gas from the separator is passed through a gas to gas heat exchanger (a heat exchanger with warm flowing gas from the storage reservoir on one side, and cold flowing gas from the separator on the other side) to pre-cool the storage gas.**

**The glycol/NGL/water mixture goes to a liquid heat exchanger followed by a liquid separator. The NGL goes to the NGL tank (similar to crude oil). The glycol goes to a withdrawal gas reboiler unit equipped with a flash tank to drive off excess moisture. The glycol is filtered using charcoal filter and reused. Any NGL collected goes to NGL tank. The vapors from the reboiler go to reboiler still column and then to thermal (most of the time) and sometimes to a vapor recovery unit. The NGLs are sent to an aboveground storage tank, mixed with crude oil and eventually sold to various oil refining entities. The liquid separated in VRU is sent to the NGL tank (crude oil tank).**

**The facility is also permitted extract crude oil from the ground. Facility had drilled six oil horizontal wells. Facility recently drilled another vertical well which currently produces oil. Natural gas and brine also comes with the crude oil during extraction. This natural gas that comes up with the crude is not virgin gas; instead, it is same gas the facility stores in the underground. This mixture is separated using a heater treater and an oil-water separator. The natural gas either put back to the underground if it is during storage season or will be dehydrated and put into the pipelines for transportation if it is during withdrawal season. The brine is put back to the underground and crude oil is stored in storage tanks and is transported out for processing.**

**The facility had provided information (correspondence from USEPA) to indicate that this facility is not subject to federal standards for Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants, as specified in 40 CFR, Part 60, Subpart KKK. The facility does not extract virgin natural gas while extracting crude oil. Instead, the facility extracts pipeline quality gas which was injected into the underground rock formations.**

**Inspection**

**At the time of the inspection, the facility has started storage season. The EG-GEN, EU-COMPNORTH, EU-145BHPENG, the JT System, heaters, heater treater, etc. were not operating. The thermal oxidizer in the WGDEHY was being rebuilt due to excess corrosion in the combustion chamber. The facility also has a vapor recovery unit to collect vapors from EU-WGDEHY reboiler unit. After the pre-inspection meeting, Mr. Westrick accompanied me for an inspection of the facility. Mr. Westrick explained the processes and the equipment.**

**Compliance**

**<u>EU-145BHPENG</u>:**

**In 2009, facility installed a Caterpillar, 2008 model (Mfg Date: 7/2/2008), natural gas fired, 4-stroke, rich burn, 145 HP, reciprocating internal combustion engine which runs a compressor to inject producer gas back into the field and to boost the withdrawal gas pressure to add to the pipeline. This RICE is exempt from PTI pursuant to Rule 285(g). However, the engine is subject to 40 CFR 63, Subpart ZZZZ which requires the RICE to comply with 40 CFR 60, Subpart JJJJ-NSPS for Spark Ignition RICEs. NSPS-Subpart JJJJ (40 CFR 60.6244) requires performance test within 10% of 100 percent peak (or the highest achievable) load for EU-145BHPENG. This engine was not operating at the time of the inspection.**

**The test plan for the performance test was received by AQD on July 15, 2013, and was approved on August 1, 2013. On August 13, 2013, facility conducted the required performance tests for NOx, CO and NMHC (as C3H8). AQD received the test report on September 23, 2013.**
**See the "Emissions Compliance Study"-"Report Submittal Date: September 16, 2013)" for details.**

**Permits To Install (PTI) No. 77-14**

**This permit includes Emergency Generator (EU-GEN), Withdrawal Gas Dehydration Unit (EU-WGDEHY), and FGENGINES (EU-COMPNORTH, EU-COMPWEST, EU-COMPEAST-three internal combustion engines which drive compressors). The permit also includes FG-FACILITY which sets facility wide limits for NOx, CO, VOC and single and aggregate hazardous air pollutants (HAPs). This facility is an area source (synthetic minor) for hazardous air pollutants (HAP). The VOC/HAP emissions from the**

**four engines at the facility are controlled by individual catalytic oxidation system.**

**EU-GEN**

**Stack/Vent Restrictions**

**Stack dimensions were not verified at the time of the inspection, but stack dimensions appear to be in compliance with the requirements of Special Conditions VIII.1.**

**Other Requirements:**

**This condition requires the permittee to comply with all provisions of National Emission Standards for Hazardous Air Pollutants, 40 CFR Part 63, Subpart ZZZZ, as they apply to EU-GEN. See discussion under 40 CFR 63, Subpart ZZZZ- NESHAP for Reciprocating Internal Combustion Engines.**

**EU-WGDEHY**

**Due to the presence of high hydrocarbon content, the EU-WGDEHY does not use the glycol contact towers. Instead it is using the JT system as described previously. Glycol is sprayed in to the gas stream to absorb moisture prior to entering the JT system. The wet glycol is reclaimed and gases which include organic liquid are either incinerated using thermal oxidizer or recovered using a vapor recovery unit (VRU).**

**Emission Limits**

**Conditions 1.1a and 1.1b limits the NOx and VOC emissions to 3.9 tons per year and 0.5 tons per year based on 12-month rolling time period respectively. The records show that the total NOx emissions from this flexible group are 0.081 tons per year and the VOC emissions are 0.004 tons per year for 2015. Facility provided electronic records of the emission calculations.**

**Material Usage Limits**

**Mr. Westrick informed me that the facility is not using any stripping gas in the system. The records show that process gas flow through the dehydration system was 16,798 MMscf in 2015 and 12,109 MMscf based on 12-month rolling as of April 2016, which is in compliance with the limit of 81,900 MMSCF.**

**The natural gas fuel used in Glycol reboiler burner is 1.62 MMscf in 2015 and 12-month rolling as of April 2016 is 1.25 MMscf which is in compliance with the limit of 13.2 MMscf.**

**The natural gas fuel used in thermal oxidizer is 7.77 MMscf in 2015 and 12-month rolling as of April 2016 is 5.62 MMscf which is in compliance with the limit of 35.2 MMscf.**

**Process/Operational Limits**

**The records show that glycol re-circulation rate for FGWGDEHY is below the permit limit of 26 gallons per minute (eg. 6.68 gpm on 01/12/2016). That capacity of the recirculation pump is set at 13 gpm. The normally the recirculation rate is between 3-7 gpm.**

**Design/Equipment Parameters**

**The facility has installed the flash tank, thermal oxidizer and the vapor recovery unit. The records show that thermal oxidizer maintains a minimum temperature of 1600± 50°F while processing natural gas. Mr. Westrick told me that the VRU is not often used. The list of specifications for the VRU is attached. The thermal oxidizer was being reconstructed at the time of the inspection.**

**Testing/Sampling**

**The facility is required to conduct natural gas analysis during withdrawal season. Mr. Westrick informed me that the analysis was done. The analytical results for January 12, 2015 and January 15, 2016 sample analyses were collected during inspection and are attached for review.**

**Monitoring/Recordkeeping**

**Facility monitors the glycol recirculation rate and the natural gas processing rate. The facility has installed temperature monitor for the oxidizer. Mr. Westrick informed me that they calibrate the monitors as required. They provided the records on Friday, June 3, 2016. See attached. Facility records natural gas usage in the reboiler unit and the thermal oxidizer. The facility does not use stripping gas in the dehydration system.**

**Facility calculates NOx, VOC and BTEX emission rates from the EU-WGDEHY as necessary. It uses GRI-GLYCalc to calculate the VOC and BTEX emissions. It keeps adequate records of natural gas processing rate, wet gas composition, natural gas fuel usage, glycol recirculation rate, thermal oxidizer exhaust gas temperature, documentation for the vapor recovery unit, etc. as required by conditions VI.6.**

**The stack/vent dimensions were not verified. However the stack appears to be in compliance with the requirements of special conditions VIII.1 and 2.**

**FG-ENGINES**

**Emission Limits:**

**The conditions 1.1 through 1.9 include emission limits for NOx, CO and Formaldehyde, from the three engines. The stack tests show that the facility is in compliance with the emission limits.**

**(Unit 1- EUCOMPNORTH, Unit 3-EUCOMPWEST, Unit 4-EUCOMPEAST)**

**<u>Process/Operational Limits & Material Usage Limits:</u>**

**Mr. Westrick informed me that they are burning pipeline quality natural gas in FG-ENGINES. The 2015 records show that the EU-COMPEAST and EU-COMPWEST together used 141.98 MMSCF natural gas based on a 12-month rolling average. This is in compliance with the permit limit of 323 MMSCF.**

**Design/Equipment Parameters**

**This condition requires that the FGENGINES shall not be operated unless the catalytic oxidation system on each engine is installed, maintained and operated in a satisfactory manner. Satisfactory operation includes cleaning of the catalyst panels. Each of the engines is installed with a catalytic oxidation system.**

**Mr. Westrick told me that currently the catalysts are being sent out to be cleaned on an annual basis. This year's cleaning and maintenance was performed on January 6, 2016. The log is attached. He informed me that they follow the requirements in the IV.1 for the catalyst maintenance.**

**Unit 1 –EUCOMPNORTH was not operating at the time of my inspection. The following readings were taken from Unit 3-EUCOMPWEST and Unit 4-EU-COMPEAST.**

| | Unit 4-EU-COMPEAST | Unit 3-EU-COMPWEST |
|---|---|---|
| Speed = | 942 rpm | 957 rpm |
| Pre-Cat Temp.- | 897.4 oF | 848.7 |

| | | |
|---|---|---|
| Post-Cat. Temp. | 819 oF | 806.9 |
| Differential Pressure | 1.8" WC | 3.1 |
| Torque = | 74% | 96 |
| Fuel Flow | 25341 MSCFH | 32597.8 |
| A/F Raio = | 18.5 | 19.3 |
| | | |
| Right Turbine Out T | 993 oF | 1085 |
| Right Turbine In T | 1090 oF | 951 |
| | | |
| Left Turbine Out T | 1094 oF | 1097 |
| Left Turbine In T | 905 oF | 845 |

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Testing/Sampling

The five-year stack tests for NOx, CO, and formaldehyde were conducted on August 13, 14 and 15, 2013. AQD received the test report on September 23, 2013. See the "Emissions Compliance Study"-"Report Submittal Date: September 16, 2013)" for details. Formaldehyde test for EU-COMPNORTH was conducted on February 26, 2015. Annual CO and NOx emissions testing pursuant to PTI No. 77-14 and 40 CFR 63, Subpart ZZZZ was conducted on February 25 and 26, 2015 and report was submitted on March 26, 2015 (Received on 3/27/2015, entered in MACES). Later the CO and NOx emission tests repeated on September 30, 2015 and report was received on October 27, 2015. The reports show compliance with emission limits

Monitoring/Recordkeeping

SC VI.1 requires facility to keep records of each measurement of NOx for each engine and keep on file for five years. The facility is keeping the emission measurement records.

SC VI.2 requires the facility to monitor the natural gas usage for EUCOMPEAST and EUCOMPWEST on a monthly basis. The facility is monitoring and keeping records as required.

SC VI.3 requires the facility to keep records of all maintenance on each catalytic system and keep records for five years. The facility is keeping necessary records. See attached.

Stack/Vent Restrictions

Stack dimensions were not verified at the time of the inspection, but stack dimensions appear to be in compliance with the requirements of Special Conditions VIII.1, 2 and 3.

Other Requirements:

SC IX.1 requires that all engines in FGENGINES comply with applicable requirements of 40 CFR 63, Subpart ZZZZ-NESHAP for RICE. See discussion under 40 CFR 63, Subpart ZZZZ- NESHAP for Reciprocating Internal Combustion Engines.

FG-FACILITY

Emission Limits:

SC I.1 through I.5 limit the annual emission rates for NOx, CO, VOC, Individual HAP and Total HAPs to 97.3 TPY, 52 TPY, 48 TPY, less than 10 TPY, less 25 TPY, respectively based on a 12-month rolling period. The records show that annual emissions for NOx, CO, VOC, Individual HAP and Total HAPs are 21.0 tons, 5.4 tons, 5.0 tons, 0.5 tons, and 1.2 tons respectively as of April 2016.

Material Limits:

**SC II.1 limits facility wide natural gas usage to 1.064 MMscf based on a 12-month rolling period. This limit appears to be a typographical error. This number does not appear accurate based on the allowed material usage for other EUs in the permit (323 MMSCF for FGENGINES and 48.4 MMSCF for EUWGDEHY). I discussed this issue with the AQD permit engineer who reviewed PTI No. 77-14 and he offered to look into it. At this time compliance with this limit is not verified. The limit would be evaluated by the permit engineer. The records show that the facility wide fuel usage is 120 MMscf as of April 2016.**

**Process and Operational Restrictions:**

**SC III.1 requires the facility to comply with all applicable provisions of federal New Source Performance Standards for New Stationary Sources as specified in 40 CFR 60, Subparts A, Dc and JJJJ. The facility is monitoring fuel gas usage, conducted the initial testing for NSPS RICE engine, etc. The facility appears to be compliance with the applicable NSPS requirements.**

**Monitoring/Recordkeeping:**

**SC VI.1 & 2 requires the facility to keep monthly and 12-month rolling time period emission rate calculations for NOx, CO, VOC, single HAP and Total HAP and complete the calculations by the 30$^{th}$ of the calendar month. The facility is keeping adequate records and preparing calculations as necessary They emailed the electronic records.**

**SC VI.3 requires the facility to keep monthly and 12-month rolling time period fuel usage for each emission unit in FGFACILITY. The facility is keeping adequate fuel usage records.**

**40 CFR 63, Subpart ZZZZ- NESHAP for Reciprocating Internal Combustion Engines**

**40 CFR 63.6590(a) (iii)-For stationary RICE located at an area source of HAP emissions, a stationary RICE is existing if you commenced construction or reconstruction of the stationary RICE before June 12 2006. FG-ENGINES (EU-COMPNORTH, EU-COMPWEST, and EU-COMPEAST) and EU-GEN were installed prior to 2006 and are considered existing sources.**

***RICE MACT for existing RICEs (> 500 hp, 4-Stroke Lean Burn, Non-emergency, (operates more than 24 hrs/year) at area sources requires installation of an oxidation catalyst to reduce HAP emissions from the stationary RICE, install a CPMS to continuously monitor catalyst inlet temperature according to the requirements in 40 CFR 63.6625(b), or install equipment to automatically shut down the engine if the catalyst inlet temperature exceeds 1350 °F, conduct initial performance test or other initial compliance demonstration according to 40 CFR 63.6630(e) within 180 days after the compliance date (October 29, 2013). The RICE MACT also requires to demonstrate continuous compliance pursuant to 40 CFR 63.6640 and keep records as required in 40 CFR 63.6655.***

**EU-COMPNORTH, EU-GEN, EU-COMPWEST and EU-COMPEAST are subject to National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines (RICE), 40 CFR 63, Subpart ZZZZ (RICE MACT) located at an area source of HAP emissions. The compliance date for the facility was October 19, 2013. The MACT standards require initial testing for these engines which was done during August 13-15, 2013 and test report was received on September 23, 2014. Further annual testing for EU-COMPNORTH, EU-COMPWEST and EU-COMPEAST were done on February 25 and 26 2015 and the report was submitted on March 26, 2015 (Received on 3/27/2015, entered in MACES). Later the CO and NOx emission tests repeated on September 30, 2015 and report was received on October 27 2015.**

**Conclusion: Based on the records review and the inspection, facility appears to be in compliance with the applicable air quality regulations. Please review attached records for details. MDEQ-AQD does not have delegated authority to enforce RICE MACT for area sources. Therefore compliance with RICE MACT was not verified.**

NAME Sebastian Pallmtag DATE 7/13/16 SUPERVISOR CJE