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

B647824300

FACILITY: BELLE RIVER COMPRESSOR STATION		**SRN / ID:** B6478
LOCATION: 5440 PUTTYGUT RD., E CHINA TWP		**DISTRICT:** Southeast Michigan
CITY: E CHINA TWP		**COUNTY:** SAINT CLAIR
CONTACT: Mollie Monaghan , Associate Engineer		**ACTIVITY DATE:** 02/04/2014
STAFF: Robert Elmouchi	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** MAJOR
SUBJECT: Scheduled inspection concurrent with CO DE emissions test of EUENGINER1 and EUENGINER2 catalysts. This report includes the March 27, 2014, follow-up inspection.		
RESOLVED COMPLAINTS:		

On February 4, 2014, and March 27, 2014, I conducted a scheduled inspection at the DTE Energy, Belle River Mills Compressor Station, (Belle River) located at 5440 Puttygut, St. Clair, Michigan. This facility is uniquely identified by the State Registration Number (SRN) of **B6478**. The purpose of this inspection was to determine the facility's compliance with the requirements of the Federal Clean Air Act; Article II, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451); the administrative rules; Permit to Install No. 141-13; and the conditions of Renewable Operating Permit (ROP) No. MI-ROP-B6478-2010.

On February 4, 2014, the inspection was conducted concurrently with an emissions test of FGENGINESR1-2 required per table FGENGINESR1-2 of ROP No. MI-ROP-B6478-2010 and 40 CFR Part 63 Subpart ZZZZ. I was accompanied by AQD employee Mr. Samuel Liveson, Environmental Quality Analyst. We entered the site, were greeted by Mr. Lawrence Maiorana, Manager, Transmission & Storage Operations; Ms. Phillis Rynne, Staff Engineer, Environmental Management & Resources; and Ms. Mollie Monaghan, Associate Engineer. We signed the visitor's log, were given safety training by Mr. Michael S. Sklar, Manager, Transmission and Storage, Belle River; and then we proceeded to the emissions testing trailer. Mr. Nathan Hude from the Air Quality Division (AQD) Technical Programs Unit (TPU) was present to observe emissions testing procedures and measurements. Also present from DTE during portions of this inspection were Mr. Mark R. Grigereit, Senior Environmental Specialist - PG EM&R Stack Testing & Ambient Monitor; Mr. Thomas Snyder, EM&R; Mr. Mike Scudder, Principal Engineer; and Mr. Dan Okon, DTE Biological Field Services. Ms. Monaghan and Ms. Rynne were our primary contacts during this inspection.

On March 27, 2014, Mr. Liveson and I returned to complete the records review and site inspection. We met with Ms. Phillis Rynne, Staff Engineer, Environmental Management & Resources; and Ms. Mollie Monaghan, Associate Engineer.

PTI 141-13

This permit was approved on November 25, 2013, for the installation of a hydrocarbon liquid condensate storage tank located at 3891 King Road, East China, Michigan. The tank has been installed but not yet used to collect condensate.

EUREGEN

NOTE: The permit conditions that apply to EUREGEN originate in PTI 155-06D. During this inspection I discovered that although EUREGEN is identified in the emission unit summary table of No. MI-ROP-B6478-2010 (ROP) and is included in the FGCOMBUSTION flexible group description, the EUREGEN permit conditions were not included in the ROP renewal; EUREGEN should have been included in the ROP renewal as an emission unit table. Per R 336.1214a, the permit to install (PTI) remains in effect until all of the conditions of a PTI have been incorporated in the source-wide permit to install. I have discussed this material mistake in the ROP renewal with Ms. Rynne and Ms. Monaghan. The EUREGEN emission unit table will be inserted in the next ROP renewal, which may begin as early as March 14, 2014.

EUREGEN, which is part of FGCOMBUSTION, has been operated only for maintenance and emission testing purposes. The records provided appear to support the assertion of minimum operation as well as indicates compliance with the permitted emission limits.

Before departing the facility, Mr. Liveson and I observed black smoke emanating from the enclosed flare that controls emissions from the refrigeration plant glycol dehydrator identified as EUREGEN (see photo). The opacity we observed was intermittent. Per my experience and per discussion with AQD staff, the black smoke we observed is not typical during normal operation of an enclosed flare that is used to control emissions from a glycol dehydration process. I discussed this concern via telephone with Ms. Monaghan and on February 14, 2014, I received the following information via email (original hard copy of email attached):

> **"Black Smoke from Thermal Oxidizer at Belle River Propane Refrigeration Plant**
> The black smoke was due to incomplete combustion which was triggered by overloading the [enclosed flare] thermal oxidizer with hydrocarbon gas (mostly methane), containing some ethylene glycol entrainment. We have identified the root cause of the overload as malfunctioning level control system which resulted in inconsistent dumping of gas/liquid from the high pressure side of the plant (cold separator) to the low pressure side (flash tank and reboiler). The cause of the malfunction has been identified as debris affecting the operation of level sensors. To address this, the following actions are being taken:
> (1) Continue to clean plant piping by frequently replacing filter elements in the glycol system during operation
> (2) Periodically isolate and clean cages for level sensing equipment to assure reliable operation
> (3) Adjustment of the air/gas ratio controller for the thermal oxidizer
> (4) If overload of thermal oxidizer and hence black smoke is not completely eliminated by the actions above, we are looking into controlled routing of the flash gas to the fuel gas heater as heater fuel gas.
>
> Please note that since the state's visit, the situation has significantly improved (not completely eliminated) due to items 1 to 3 above and the plant is able to run for longer durations without emitting black smoke from the thermal oxidizer."

Steps 1 through 3 outlined above appear to be part of an appropriate response but the option of, "routing of the flash gas to the fuel gas heater as heater fuel gas" would require the permittee to obtain an approved permit modification before taking such action. I discussed this

compliance concern via telephone with Ms. Monaghan and she stated that she would take the appropriate actions to ensure the flash gas would not be routed to the fuel gas heater burner.

ROP No.: MI-ROP-B6478-2010

EMISSION TEST of FGENGINESR1-2 and observations of EUREGEN control device.
NOTE: EUENGINER1 and EUENGINER2 (FGENGINESR1-2) are the engines that drive the refrigeration plant process. The refrigeration plant engines have multiple names which are cross referenced as follows:
EUENGINER1 = EN100A = engine train A - Unit 7,
EUENGINER2 = EN100B = engine train B - Unit 8.

Background:
Prior to the installation of the propane refrigeration plant, the typical pressure of the field gas varied from about 2,000 pounds per square inch (psi) to 700 psi. The propane refrigeration plant, originally permitted per 155-06D, is designed to process field gas when withdrawal pressures are between 700 psi and 300 psi. At this low pressure range, the field gas is expected to contain more moisture and more heavy hydrocarbons (C_2 to C_9) than acceptable for pipeline quality natural gas. The propane refrigeration plant uses propane as a refrigerant to cool the field gas to temperatures low enough to condense the heavier volatile hydrocarbons out of the gas stream. The refrigeration plant is also designed to scrub excess moisture from the field gas by using glycol ether. The glycol ether not only performs the typical dehydration process but also prevents moisture from becoming a solid slug in the refrigeration plant, which would damage the process equipment. The load on the propane refrigeration plant engines depends significantly on the concentration of the heavier molecular weight hydrocarbons in the field gas.

Emissions Test on February 4, 2014:
The 2013 - 2014 heating season was unusually cold, which resulted in a higher than typical customer demand for natural gas and a historically low field pressure. These conditions appeared to present an opportunity for the permittee to conduct the emissions test while the refrigeration plant operated near the maximum design load. Unfortunately, the predicted hydrocarbon dew point of the field gas at low field pressure was an engineering estimate and the actual hydrocarbon dew point measured on the day of the test was not much above the dew point at typical field pressures. Therefore the refrigeration plant engine load did not achieve 100 percent of the design capacity. Mr. Sklar and I discussed the regulatory implication of the permittee's inability to test the refrigeration plant engines at 100% of the design load plus or minus 10%. I informed Mr. Sklar that, for purposes of a compliance determination, the load during the test will be considered the de facto 100% load and another emissions test will need to be conducted before the permittee operates either engine at any load greater than the load during the most recent emissions test plus 10%. In effect, the

engine load during the most recent emissions test becomes a derated 100% load for the purposes of compliance evaluation. **During this test the average load on EUENGINER1 was 48.8%.** EUENGINER2 was scheduled to be tested on the following day. The reported CO destruction efficiency for the two refrigeration plant engines exceeds the permitted minimum of 93%.

COMPLIANCE INSPECTION

EUDEHY – Glycol dehydration unit with an enclosed flare.
NOTE: This glycol dehydration unit is not associated with EUREGEN or the refrigeration plant.

Records provided indicate that the glycol recirculation rate did not exceed 30 gallons per minute, which appears to demonstrate compliance with the permit established process/operational restriction.

Per the testing and sampling requirement, the permittee provided an analysis of the wet gas stream, which included analysis of the permit specified components.

Records of the glycol recirculation rate indicate the permittee records the required parameters on an hourly basis when the glycol dehydration unit is operating, which is more frequent than the permit required monthly monitoring and recording of the glycol recirculation rate.

This emission unit only needs to be operated when withdrawing natural gas from the storage field and only when the moisture content of the natural gas exceeds pipeline quality standards.

Emission records provided appear to indicate annual benzene emissions were below the permit limit of 0.43 tons per year (860 pounds per year). The maximum 12-month rolling total emissions of benzene from January 2013 through December 2013 was 5.3 pounds, which is less than .0.7% of the permitted limit.

Records provided appear to indicate annual VOC emissions were below the permit limit of 9 tons per year (18,000 pounds per year). The maximum 12-month rolling total emissions of VOC from January 2013 through December 2013 was 150 pounds, which is less than 9% of the permitted limit.

EUREFRIGPLANT
This emission unit is subject to 40 CFR Part 60, Subparts A and KKK, Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants for which Construction, Reconstruction, or Modification Commenced after January 20, 1984, and on or before August 23, 2011. Per the gas analysis conducted during the emissions test on Tuesday, February 4, 2014, the refrigeration plant is not in VOC service.

EUREFRIGPLANT

I was provided requested copies of leak detection records (see attached), which appear to indicate compliance with the 40 CFR Part 60 Subpart KKK leak testing requirement.

FGCOLDCLEANERS

This facility has one parts cleaner (model no. AL100, serial no. 1010430) located in the maintenance building , which is not vented to the outside of the building. The original cold solvent parts cleaner was replaced with a new model in September 1998. The reported solvent-air interface is 7.96 square feet. Dyna 143 is used as the parts cleaning solvent and that the solvent is not heated. A previous review of the MSDS appeared to confirm that this solvent does not contain any halogenated solvents.

FGCOMBUSTION

The conditions in this flexible group are limited to addressing 12-month rolling total NOx, CO and VOC emissions from this group. Conditions addressing other aspects of compliance are addressed in the specific emission unit or flexible group associated with each emission unit. This flexible group consists of the following emission units:
EUENGINER1, EUENGINER2. EUHMOHEATER, EULSTANK, EUREFRIGPLANT, EUREGEN, EUTURBINE1 and EUTURBINE2 (not installed). The records provided (see attached) appear to indicate compliance with the emission limits for this flexible group.

FGEMERGENS

This facility currently has two emergency electrical generators installed in 2006 and 2007. An older generator that was previously located in the GMVC utility building located near the west gate entrance to Puttygut Road has been removed.

EUBUGENSETTURBIN generator was installed in the Turbine MCC (Motor Control Center) building in September of 2007. This emission unit is a Caterpillar model G3516B 1,818 horsepower (1,356 kilowatt) 4-cycle lean-burn natural gas-fired emergency generator that is located in the turbine annex building. The operating hours are continuously logged electronically and can be read on a LCD control panel display. Records provided indicate this generator operated 60 hours in 2013 calendar year.

The second generator, EUEMERGENZBLDG, is located in a small building near the northwest corner of the property. This emergency generator replaces a smaller older generator. This emission unit is a Caterpillar 1,818 horsepower (1,356 kilowatt) 4-cycle lean-burn Natural gas-fired emergency generator for backup power in the event primary power is lost from the electric grid. This emission unit powers Plant 2, the Z330 building, and appropriate ancillary equipment. Records provided indicate this generator operated 61 hours in 2013 calendar year.

FGENGINES

Five various sized 2-cycle natural gas reciprocating internal combustion engines are used to power natural gas pipeline compressors for injection into natural gas storage field.
Three of the engines (Unit #1 = EU014, Unit #2 = EU015 and Unit #3 = EU016) were installed in 1964 and are considered grandfathered. These engines are in a building designated as the GMVC building.

The remaining two engines in this flexible group are in a building designated as the Z building because the engines are model Z-330 Cooper engines. EU017 (Z330 COMPRESSOR ENGINE Unit #4) and EU018 (Z330 COMPRESSOR ENGINE Unit #5) were installed in 1972 and at that time all natural gas fired engines were exempt from the requirement to obtain a permit to install but, per R 336.1818 *Emission Limitations for Stationary Internal Combustion Engines*, became subject to new regulations. The permit required records of natural gas consumption for each emission unit listed in FGENGINES were provided.

FGENGINESR1-2
Two 1,480 HP natural gas-fired 4-cycle lean-burn reciprocating internal combustion engines (RICE), each with a catalyst oxidation system operating at a minimum of 93% efficiency on CO oxidation. These engines are located in the refrigeration plant and are used to drive propane refrigerant compressors. These engines have been operated for the purposes of emission testing and maintenance since the engines were installed in 2008, because the conditions which would motivate operation of the refrigeration plant had not occurred. These engines were undergoing emission testing on the day of the inspection. Initial emission data for EUENGINER1 appeared to demonstrate compliance with the minimum CO destruction efficiency requirement. The reported emissions test CO destruction efficiency for the two refrigeration plant engines exceeds the permitted minimum of 93%.

FGRULE285(mm)
Any emission unit that emits air contaminants and is exempt from the requirements of Rule 201 pursuant to Rules 278 and R285(mm). R285(mm) requires reporting only if the venting of natural gas is greater than 1,000,000 standard cubic feet per event. A summary of releases and AQD notifications was provided, which appears to indicate the permittee was in compliance with this requirement.

FGRULE290
This flexible group consists of EUPIGTANK and EUSUMPTANK. The pig tank contains material cleaned out of the natural gas pipelines. The sump tank contains oil that is separated from the natural gas. This oil is introduced into the natural gas piping from the compressor piston lubricating system. Per a previous demonstration by the permittee, emissions from the sump tank are considered to be insignificant.

FGRULE818ENGINES
The EU017 and EU018 emission units are the two Z330 engines described in **FGENGINES**

above. These engines are fired with only pipeline quality natural gas and have been retrofitted as determined per the original PTI (165-07). The emission tests conducted September 2011 indicate compliance with the permitted limits. The most recent emissions test was conducted on August 6 and 7, 2014. Raw test data appears to indicate compliance with emission limits. The final report is pending submittal to the AQD.

FGTURBINES1-2

PTI 155-06D approved the installation of, two 15,000 hp turbines (EUTURBINE1 and EUTURBINE2). Only one of the two permitted turbines had been installed in a separate building along the west boundary.

The turbines were initially intended to be used strictly for the withdrawal of natural gas from the underground storage field. MichCon engineering staff had determined that by substituting the centrifugal compressor attached to the turbine, the same turbine could also be used to inject natural gas into the storage field. Centrifugal compressors must be designed to match the inlet and outlet pressures therefore one centrifugal compressor design cannot be used for both injection and withdrawal conditions. It takes about two days to switch a centrifugal compressor. I reviewed the permit and determined it appears that the switching of centrifugal compressors would not violate permit conditions.

The permittee appeared to be in compliance with material usage limits. Only natural gas is used to fuel the turbine engine.

CONCLUSION

Per observations during the field inspection and a records review, this source appears to be in compliance with the evaluated permit conditions.

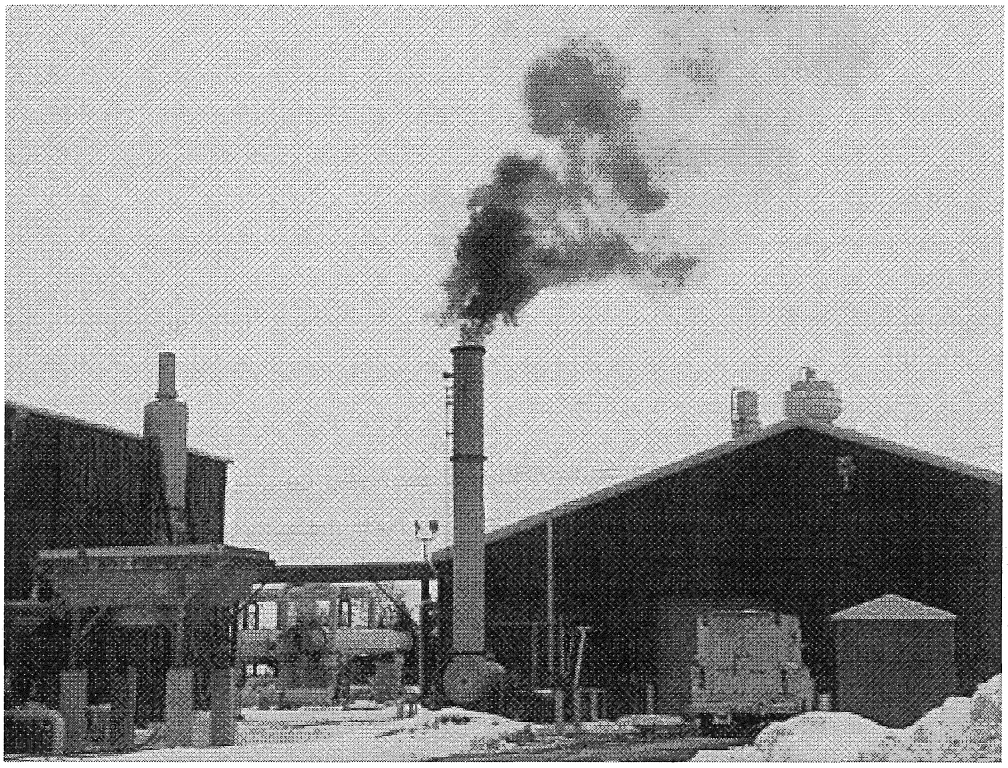

Image 1(20140204_161529_Putt) : Cropped single-frame image from 20140204_161529_Puttygut Rd.mp4 video. The opacity in this image was emitted from the enclosed flare control device for EUREGN, which is a natural gas-fired ethylene glycol regenerator with thermal oxidation controls.

NAME _____ DATE 9/17/14 SUPERVISOR CJE