

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

P015254925

<b>FACILITY:</b> MICHIGAN DEPT OF TECHNOLOGY, MANAGEMENT AND BUDGET		<b>SRN / ID:</b> P0152
<b>LOCATION:</b> 7432 PARSONS DR., DIMONDALE		<b>DISTRICT:</b> Lansing
<b>CITY:</b> DIMONDALE		<b>COUNTY:</b> EATON
<b>CONTACT:</b> Heath Miller , Building Trades Supervisor		<b>ACTIVITY DATE:</b> 09/03/2020
<b>STAFF:</b> Michelle Luplow	<b>COMPLIANCE STATUS:</b> Compliance	<b>SOURCE CLASS:</b> SM OPT OUT
<b>SUBJECT:</b> Announced, scheduled inspection (PCE) to determine compliance with PTI's 156-10B and 60-19.		
<b>RESOLVED COMPLAINTS:</b>		

Inspected by: Michelle Luplow  
Personnel Present: Heath Miller, Supervisor (millerh11@michigan.gov)

**Purpose**

Conduct an announced, scheduled compliance inspection by determining compliance with DTMB Energy Center's (DTMB's) Permit to Install (PTI) Nos. 156-10B, 296-73, and 60-19.

**Facility Background/Regulatory Overview**

Heath Miller, Building Trades Supervisor, said that the DTMB Energy Center provides steam and chilled water (heating and cooling) to multiple DTMB properties throughout the Secondary Complex; all but the Michigan State Police Post is serviced by the Energy Center. This facility was last inspected in July 2018.

PTI 60-19 was issued September 23, 2019 for the installation of a new boiler to replace the 60,000 lb/hr boiler permitted under PTI 296-73. This will be the first time a compliance check has been conducted for the new boiler. The 60,000 lb/hr boiler has been removed to install the new boiler, EUBOILER1, and therefore PTI 296-73 will be voided.

PTI 156-10B was issued to increase the brake horsepower limit in the PTI for EUENGINE1.

DTMB is considered a Synthetic Minor source for NOx. During review of the PTI application for PTI 60-19, Melissa Byrnes, Permit Engineer, put Rule 205 restrictions on fuel oil for EUBOILER1 because without them the boiler would emit over 100 tons of NOx per year.

Rule 205 can also be an indicator that the restrictions are in place for modeling. This is not the case for PTI 60-19; however, PTI 156-10B used Rule 205 as the UAR specifically for modeling purposes. DTMB therefore became a synthetic minor source when the new boiler, EUBOILER1, was permitted

**NSPS for Compression Ignition Internal Combustion Engines, Subpart IIII**

The 2206 HP emergency engine is subject to NSPS Subpart IIII. NSPS Subpart IIII requirements were incorporated into the PTI.

**Boiler MACT NESHAP JJJJJJ for area sources of HAPs**

EUBOILER1 permitted under 60-19 is exempt from the area source Boiler MACT NESHAP Subpart JJJJJJ because it is classified as a "gas-fired boiler" as defined in 40 CFR 63.11237. To be considered a gas-fired boiler, the boiler must burn gaseous fuels not combined with any solid fuels and burn liquid fuel only during periods of gas curtailment, gas supply interruption, startups, or periodic testing on liquid fuel. The periodic testing of liquid fuel should not exceed a combined total of 48 hours during any calendar year.

**NSPS Subpart KKKK for Stationary Combustion Turbines**

The 2 turbines are subject to NOx emission limits and performance testing to demonstrate compliance with the limit in Subpart KKKK, and DTMB is required to burn only natural gas in the turbines. The performance test was conducted August 3, 2012.

**NSPS Subpart Dc for Small Industrial-Commercial-Institutional Steam Generating Units**

EUBOILER 1 is subject to the NSPS Subpart Dc, the requirements of which have been incorporated into PTI 60-

19.

**Inspection**

This was an announced, scheduled compliance inspection. Due to COVID-19 safety concerns, the inspection was conducted virtually via Microsoft Teams with Heath Miller on September 3, 2020. Prior to this we had a question and answer Teams Meeting to discuss items related to compliance but items that were not necessary to “see” during the inspection. At 10:00 a.m. on September 3, 2020, the virtual inspection commenced with Heath Miller. Table 1 contains a list of all known equipment at the DTMB Energy Center.

**Table 1.** Equipment located onsite

<b><u>EU</u></b>	<b><u>Description</u></b>	<b><u>PTI No.</u></b>	<b><u>Installation Date</u></b>	<b><u>Federal Regulation</u></b>
<b>EUBOILER1</b>	<b>83.7 MMBtu/hr heat input capacity, natural gas-fired boiler with fuel oil back-up. Equipped with flue gas recirculation Serial #: SP-4596 Clever Brooks Model #: SP-NB-300D-55</b>	<b>60-19</b>	<b>9/2019</b>	<b>NSPS Subpart Dc</b>
<b>EUENGINE1</b>	<b>CAT 3512 Compression Ignition, diesel fuel-fired 2206 hp emergency backup generator, manufactured August 2010</b>	<b>156-10B</b>	<b>2/2012</b>	<b>NSPS Subpart IIII</b>
<b>EUTURBINE1</b>	<b>A nominally rated 19.0 MMBtu/hr natural gas-fired turbine with an electrical generator</b>	<b>156-10B</b>	<b>2/2012</b>	<b>NSPS Subpart KKKK</b>
<b>EUTURBINE2</b>	<b>A nominally rated 19.0 MMBtu/hr natural gas-fired turbine with an electrical generator</b>	<b>156-10B</b>	<b>2/2012</b>	<b>NSPS Subpart KKKK</b>
<b>EUHRSG1</b>	<b>A heat recovery steam generator (HRSG) with a nominally rated 20.0 MMBtu/hr natural gas-fired duct burner</b>	<b>156-10B</b>	<b>2/2012</b>	<b>NSPS Subpart KKKK</b>
<b>EUHRSG2</b>	<b>A heat recovery steam generator (HRSG) with a nominally rated 20.0 MMBtu/hr natural gas-fired duct burner</b>	<b>156-10B</b>	<b>2/2012</b>	<b>NSPS Subpart KKKK</b>

**PTI 60-19: EUBOILER1**

This unit is used for backup steam generation to support the FGTURB/HRSG systems. EUBOILER1 was not operating during the virtual inspection.

**Emission Limits & Monitoring/Recordkeeping**

CO is limited to 14.6 tpy and NOx is limited to 15.2 tpy, both on a 12-month rolling basis, as determined at the end of each calendar month. DTMB is required to keep records of the NOx and CO mass emissions and calculate those emissions according to Appendix 1. Currently the mass emissions are not calculated according to Appendix 1. For the purposes of compliance for this inspection, the records DTMB provided will be used. Additionally, CO emission calculations did not include CO emissions from combustion of natural gas. I used their reported emission factor (lb CO/MMCF) and fuel usage (MMCF) to recalculate monthly CO emissions. Additionally, CO 12-month rolling formulas were incorrect and were not calculating the 12-month rolling emissions for CO. I have used their data to determine a 12-month rolling for CO. I will be working with DTMB to ensure that the calculations are done according to Appendix 1, and that all emissions calculation formulas for CO are corrected for future inspections

Although the records indicate that 7,000 gallons of fuel oil was combusted in January 2020 (see attached), I verified with H. Miller that this was a mistake in the recordkeeping: H. Miller stated that they have not combusted

any fuel oil at the site for 3 years. Knowing this, all emissions report for NOx and CO are from the combustion of natural gas only. For October 2019 – July 2020, as determined at the end of July, NOx emissions were 0.8 tpy and CO emissions was 0.74 tpy. DTMB is in compliance with both NOx and CO emission limits at this time.

#### Material Limits & Monitoring/Recordkeeping

Distillate fuel oil is limited to 303,261 gallons per 12-month rolling time period during gas curtailment and limited to 48 hours of use per calendar year during performance testing, maintenance, or operator training. As previously mentioned DTMB has not used distillate fuel oil in EUBOILER since startup. H. Miller said they plan to use diesel fuel in this unit every 2 years for maintenance/readiness testing to ensure EUBOILER can operate during periods of natural gas curtailment.

Natural gas is limited to 714.6 MMCF per 12-month rolling time period, as determined at the end of each calendar month. Total MMCF natural gas used for October 2019 – July 2020, as determined at the end of July was 38.29 MMCF.

Sulfur in the distillate fuel oil is limited to 0.05% and DTMB is required to keep fuel supplier certification records or fuel sample test data for each delivery of distillate fuel oil used in EUBOILER1. The fuel certification record from Buckeye LP (attached) indicates a sulfur content of 11 ppm (0.0011%). The last fuel oil shipment DTMB received was in 2017.

#### Process/Operational Restrictions

DTMB is required to implement and maintain a malfunction abatement plan (MAP) for EUBOILER1, as well as for FGTURB/HRSG1 and FGTURB/HRSG2. DTMB revised their original map, dated October 12, 2012, to include a MAP for EUBOILER1 as well. The MAP containing EUBOILER1 was submitted May 7, 2020. Subsequent revisions per my request to revise the MAP were submitted August 26, 2020 and again on September 14, 2020. The September 14, 2020 version is approved by AQD.

#### Design/Equipment Parameters

The device that monitors and records the natural gas usage in EUBOILER1 is required to be installed, calibrated, maintained and operated in a satisfactory manner. H. Miller said that Consumers will come on an annual basis to calibrate the gas flow meter for EUBOILER1. Natural gas usage is required to be recorded on a monthly basis. H. Miller said the natural gas usage is recorded from EUBOILER1's natural gas meter on a daily basis, once every 3<sup>rd</sup> shift.

The flue gas recirculation system is required to be installed, maintained, and operated in a satisfactory manner. This includes operating and maintaining the flue gas recirculation system in accordance with the MAP. H. Miller explained that the system is designed so that all parameters are tuned and work together to ensure that the deviation from the programmed operating conditions is not more than +/- 1%. If the system collectively deviates from the +/-1% at any time, H. Miller said the boiler automatically shuts down. The MAP contains various parameters that are checked on a daily basis.

#### Testing/Sampling

NOx and CO emissions from EUBOILER1 are only required to be tested upon request by the AQD. At this time it is AQD's professional judgment that testing of EUBOILER1 is not necessary because actual emissions are greater than 50% lower than the 12-month rolling limits.

### **PTI 156-10B: EUENGINE1, FGTURB/HRSG1, FGTURBHRSG2**

#### **EUENGINE1**

EUENGINE1 is a diesel-fired emergency backup generator. H. Miller said it is used to power pumps, EUBOILER1, and the chillers in order to maintain steam to the complex.

#### Emission Limits & Monitoring/Recordkeeping

DTMB is limited to 3.63 tpy NOx per 12-month rolling period on EUENGINE1, as determined at the end of each calendar month. The 3.63 tpy NOx limit is based on 300 hours of operation, and technically, if DTMB is in compliance with their hours of operation they are also in compliance with their NOx emission limits. For the 12-month rolling period August 2019 – July 2020 is 0.05 tons per year NOx as determined at the end of July.

#### Material Limits & Monitoring/Recordkeeping

Sulfur in the distillate fuel oil is limited to 0.0015% and a cetane index of 40. DTMB is required to keep fuel

supplier certification records or fuel sample test data for each delivery of distillate fuel oil used in EUENGINE1. The fuel certification record from Buckeye LP (attached) indicates a sulfur content of 11 ppm (0.0011%) and a cetane index of 40 (see attached). The last fuel oil shipment DTMB received was in 2017.

#### Process/Operational Restrictions, Design/Equipment Parameters & Monitoring/Recordkeeping

The engine is limited to 300 hours of operation per 12-month rolling time period, as determined at the end of each calendar month, and includes hours for maintenance checks and readiness testing. DTMB is also limited to 100 hours per calendar year for maintenance checks and readiness testing, and 50 of those hours can be designated for non-emergency use. Records for emergency and non-emergency services is required to be recorded on a calendar year basis and must include a record of why the engine was operated during each operational period. Total hours of operation are also required to be recorded on a monthly and 12-month rolling time period.

The engine is allowed up to 100 operating hours per calendar year for maintenance and readiness testing, where 50 of those hours can be used for non-emergency situations. The records for the hours of operation must be kept, in addition to recording the reason why the engine was operated.

Lillian Woolley, consultant, provided me with a spreadsheet that includes all times where the engine was operated, the duration of operation, and the reason for operation, as well as calendar-year and 12-month rolling operating hour totals. All hours of operation were for maintenance/readiness testing (conducted once per month) or non-emergency operation. Total 12-month rolling operating hours, as determined at the end of July 2020 (August 2019 – July 2020) was 0.33 hours. Highest 12-month rolling total was 1.82 hours as determined at the end of February 2019.

Calendar year operating hour totals for 2018, 2019 and 2020 (through June 2020) 8.08, 8.52, 3.42, respectively. Total hours, as recorded during the virtual inspection via the nonresettable hours meter was 75.6.

DTMB is also required to maintain the engine according to manufacturer's emission-related written instructions in order for the engine to maintain its certified status. H. Miller provided me with a copy of Michigan CAT inspections and preventative maintenance on the generator (Generator System Preventative Maintenance: Inspection and Preventative Maintenance Checklist") once per year (attached). The most recent inspection/maintenance activities were conducted January 8, 2020.

AQD retains a copy of the CAT Operation and Maintenance Manual used to ensure that the engine is maintained as a certified engine.

#### **FGTURB/HRSG1 and FGTURB/HRSG2 (Cogenerators)**

Scott. Davis, at the 2017 inspection, explained that the cogenerators burn natural gas to power the turbine; the heat from these is sent to the heat recovery system where it is transferred to water in the boiler to produce steam for the secondary complex.

These two flexible groups have the exact same permitted requirements and will therefore be reviewed for compliance together. Each TURB/HRSG unit is a nominally rated 19.0 MMBtu/hr natural gas-fired turbine with an associated heat recovery system (HRS) nominally rated at 20.0 MMBtu/hr using a natural gas-fired duct burner and electrical generator operating in combined-cycle mode.

During the virtual inspection, H. Miller said the turbines were running but the duct burners for the HRS were not. He said the turbines are always running, but it varies on when the HRS are running; HRS operation is dependent on the demand for steam around the secondary complex.

H. Miller said that SOLAR, the company who maintains the system for DTMB, is constantly monitoring DTMB's system. H. Miller said if the fuel:water ratio goes up to 2, SOLAR usually calls to let them know. DTMB conducts annual shutdowns of the system, checks pressure gauges, low pressure sensors, change seals and air filters on the gas system, the DI water monitored, leaky steam valves are replaced. SOLAR also conducts annual inspections that include lube oil and fuel oil checks/maintenance, water injection system checks, and to run diagnostics on turbines.

#### Emission Limits & Monitoring/Recordkeeping

Each TURB/HRSG unit is limited to 5% opacity on a 6-minute average. DTMB is required to perform and

document non-certified visible emissions (VE) observations once per month. H. Miller provided me with monthly work orders (see attached) that state VEs were checked and the work log requires follow up if VE's are seen. I asked that DTMB begin recording the VE observations again, similar to how they were during the last inspection (recording "no visible emissions were seen") when no visible emissions were seen. There were no visible emissions at the stacks during the virtual inspection. See attached photo.

During the virtual inspection, H. Miller showed me the stacks, which I screen-shot on the computer, attached for reference. I saw no signs of visible emissions from these stacks during the inspection.

#### Material Limits

DTMB is required to only combust pipeline quality natural gas in the TURB/HRSG units. Natural gas is provided to DTMB by Consumers Energy, who only deliver pipeline-quality natural gas to customers.

#### Process/Operational Restrictions

DTMB is required to implement and maintain a malfunction abatement plan (MAP) for both cogenerator sets. During the August 3, 2012 inspection, Brad Myott documented that DTMB was out of compliance for not having this MAP within 180 days after initial startup. On October 12, 2012, the MAP was received; the current version is the September 3, 2020 MAP.

I have reviewed the MAP and verified that the MAP contains all information required by the permit.

The permit also requires that DTMB develop a plan that will describe how the emissions will be minimized during startup and shutdown events, based on procedures recommended by the equipment manufacturer. The 2012 violation letter included non-compliance with this condition. In the 2012 violation response letter, Keith Paasch of DTMB explained that startup and shutdown cycles on the two cogenerators are fully automated and cannot be altered. He also said that the system is configured in such a way that if a malfunction occurs the system will not start.

#### Design/Equipment Parameters & Monitoring/Recordkeeping

A continuous monitoring system for each cogenerator set is required to monitor and record the fuel consumption and the ratio of water or steam to fuel being fired. The MAP provides a water:fuel ratio of 0.4-4.5 as an acceptable operating range for these units. Records are required to be kept on a continuous (at least every 15 minutes) basis. H. Miller provided me with continuous records (data point generated every 10 seconds) for July and August 2020 (attached) for both units. I reviewed these records to ensure that the water:fuel ratio was maintained within the appropriate operating range. The records indicate that the water:fuel ratio was maintained between 0.41 – 1.80 (HRSG1) and 0.41 – 0.55 (HRSG2).

The NSPS Subpart KKKK considers there to be excess emissions when the monitored water:fuel ratio is lower, on a 4-hour rolling period, than the established water:fuel ratio during the performance test (0.5, see "Testing/Sampling Requirements"). Further internal discussions will ensue to determine DTMB's compliance with this requirement, considering there were multiple 4-hour periods where the water:fuel ratio for both cogenerators was less than 0.5.

#### Testing/Sampling Requirements

DTMB was required to test for CO and NOx from both cogenerators within 180 days of initial startup. Stack testing was conducted on August 3, 2012 and the test report was received September 21, 2012. CO is limited to 50 ppmv dry at 15% oxygen and 3.7 lb/hr; NOx is limited to 42 ppmv dry at 15% oxygen and 5.0 lb/hr. The following table shows results from the test report in compliance with emission limits:

	CO (ppmv dry @ 15% oxygen)	CO (lb/hr)	NOx (ppmv dry @15% oxygen)	NOx (lb/hr)
TURB/HRSG1	25	0.9	32	1.9
TURB/HRSG2	35	1.4	29	1.9

The operating parameters recorded by Brad Myott during the stack testing are as follows: 0.5 water:fuel ratio, 16

MMBtu/hr heat input capacity, and 17,000 scf/hr. The water:fuel ratio is what regulates NOx emissions.

During the 2017 inspection the following operating parameters were recorded:

FGTURB/HRSG1: 16,000 scf/hr, 0.5 water:fuel ratio, 16 MMBtu/hr  
 FGTURB/HRSG2: 17,000 scf/hr, 0.4 water:fuel ratio, 17 MMBtu/hr

During the 2018 inspection the following operating parameters were recorded:

FGTURB/HRSG1: 17,000 scf/hr, 0.4 water:fuel ratio, 16 MMBtu/hr  
 FGTURB/HRSG2: 17,000 scf/hr, 0.4 water:fuel ratio, 16 MMBtu/hr

**During this virtual inspection, the following operating parameters were recorded (nothing that these heat recovery units were not operating):**

FGTURB/HRSG1: 0.5 water:fuel ratio, 12 MMBtu/hr – no flow  
 FGTURB/HRSG2: 0.9 water:fuel ratio, 15 MMBtu/hr – no flow

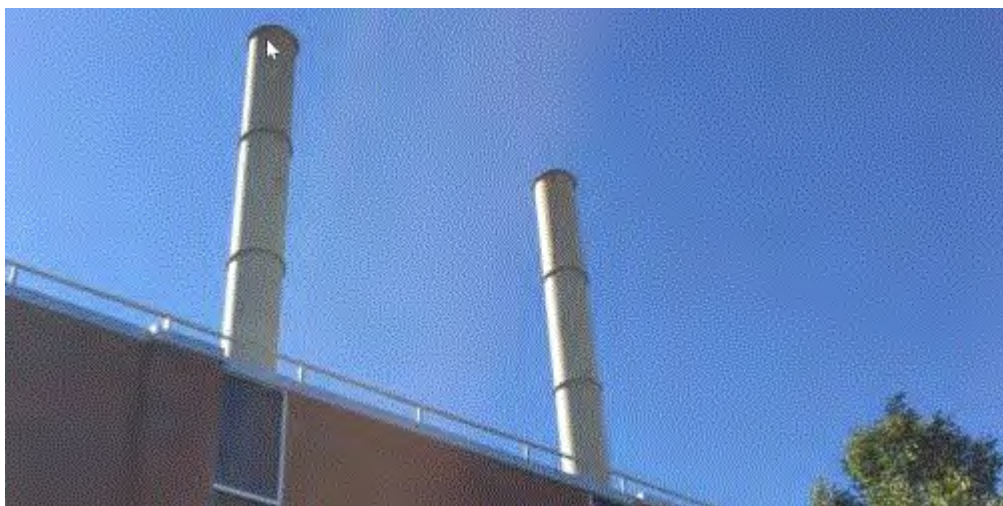
#### Monitoring/Recordkeeping

Monthly operating hours for each cogenerator set is required to be recorded in a satisfactory manner. I was provided with monthly operating hours for each cogenerator set for 2018, 2019, and 2020 through June. See attached for records.

DTMB is required to maintain documentation from the utility specifying that the maximum total sulfur content for the natural gas burned in the cogenerator units is 20 grains of sulfur or less per 100 scf. H. Miller received a statement from Consumers Energy's Tim Voss that the last natural gas test conducted in the area had no sulfur content in it, but that it should not contain more than 0.3 grains of H<sub>2</sub>S or more than 20 grains of total S per 100 ft<sup>3</sup>.

On a calendar-month basis DTMB is required to identify the type and amounts of fuel combusted in both cogenerator sets. L. Woolley provided me with monthly records of natural gas usage for the entire calendar year 2018, 2019, and 2020 through June (attached).

**Compliance Statement:** DTMB is currently in compliance with the requirements under PTI's 156-10B and 60-19, pending the NSPS Subpart KKKK and recordkeeping fixes as noted throughout the report.



**Image 1(TURB/HRSG Stacks)** : No opacity seen from stacks during virtual inspection

NAME Michelle Luylow DATE 9/30/20 SUPERVISOR B.M.