B2814
manila

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

B281463323

FACILITY: DETROIT THERMAL BEACON HEATING PLANT		**SRN / ID:** B2814
LOCATION: 541 MADISON AVE, DETROIT		**DISTRICT:** Detroit
CITY: DETROIT		**COUNTY:** WAYNE
CONTACT: Dale Lane , Environment, H & S & Engineering Manager		**ACTIVITY DATE:** 05/19/2022
STAFF: Samuel Liveson	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** MAJOR
SUBJECT: Scheduled inspection of a Title V major facility.		
RESOLVED COMPLAINTS:		

On May 19, 2022, AQD staff Sam Liveson conducted an unannounced, scheduled inspection of Detroit Thermal Beacon Heating Plant (DTBHP) located at 541 Madison, Detroit, Michigan. The purpose of the inspection was to determine the facility's compliance with the federal Clean Air Act; Part 55, Air Pollution Control, of the Michigan Natural Resources and Environmental Protection Act, 1994 PA 451, as amended; the Michigan Air Pollution Control Rules; the conditions of Renewable Operating Permit (ROP) No. MI-ROP-B2814-2014; and the conditions of Permit to Install (PTI) 62-21.

Pre-Inspection Meeting and Facility Overview

1. Arrival, Safety, and Records

AQD arrived at 9:30 AM. Weather was partly cloudy, and the temperature was 63 °F. From the facility gate, AQD called Dale Lane, EHSE Manager, and Phil Malara, Plant Manager. AQD provided their State of Michigan-issued employee card as identification and stated the purpose of their visit.

Personal protection equipment to have on site includes a hard hat, safety glasses, steel-toed shoes, and hearing protection.

AQD requested facility records via email on May 20, 2022. Records were provided via email on May 27, 2022.

2. General Facility Overview

DTBHP is located in downtown Detroit. The facility provides steam to residential and commercial properties for heating and other purposes such as hospital autoclaves. On-site are six boilers numbered 1, 2, 3, 4, 6, and 7. Boilers are permitted to use natural gas and fuel oil; however the fuel oil tank was emptied in 2009, and fuel oil has not been used since before then. Boilers 1 and 2 were installed in 1927 and are considered "grandfathered" from air quality regulations. Boilers 3 and 4 have not been operated since before 2012. Boilers 6 and 7 demonstrate continuous compliance using a predictive emissions monitoring system (PEMS). The site generally operates one to four boilers 24 hours a day, 7 days a week.

The facility is a Title V major source because the potential to emit nitrogen oxides (NOx) and carbon monoxide (CO) each exceeds 100 tons per year. PTI 62-21 was issued on August 31, 2021. Among other changes, the PTI updates the facility's NOx emission limit time period to "Calendar Day". No cold cleaners or emergency generators are on site. There is one portable air compressor on site that is diesel driven. The unit is on wheels. AQD did not observe this compressor during the facility inspection.

3. Compliance Overview

3.1 Facility Inspection Compliance

During recent facility inspections, the facility has been in compliance with all applicable rules and regulations, as shown below.

Air Quality Inspection Date	Inspection Result
12/7/2020	Compliance
12/11/2018	Compliance
11/18/2016	Compliance

12/2/2014	Compliance
5/31/2013	Compliance
4/13/2010	Compliance
2/16/2010	Compliance
5/12/2008	Compliance
5/1/2007	Compliance
10/20/2006	Compliance
3/17/2005	Compliance

3.2 RATA, RAA, and Stack Test Compliance

During recent relative accuracy test audits (RATA) and relative accuracy audits (RAA) of the facility's PEMS system, the facility has been in compliance. Stack tests have also been in compliance. The stack test of boiler 7 on September 13, 2015 was discontinued due to an alleged malfunction of the flue gas recirculation system. The test took place September 26, 2015, following correction of the malfunctioning equipment.

Results of Recent RAAs and RATAs

Test Date/Quarter	Test Type	Test Result
2Q2022	RAA	Compliance
1Q2022	RAA	Compliance
11/10/2021	RATA	Compliance
2Q2021	RAA	Compliance
12/7/2020	RATA	Compliance
4Q2020	RAA	Compliance
3Q2020	RAA	Compliance
2Q2020	RAA	Compliance
1Q2020	RAA	Compliance
4Q2019	RAA	Compliance
12/10/2019	RATA	Compliance
3Q2019	RAA	Compliance
2Q2019	RAA	Compliance
1Q2019	RAA	Compliance
12/11/2018	RATA	Compliance
4Q2018	RAA	Compliance
3Q2018	RAA	Compliance
2Q2018	RAA	Compliance
1Q2018	RAA	Compliance
11/6/2017	RATA	Compliance
4Q2017	RAA	Compliance
3Q2017	RAA	Compliance
2Q2017	RAA	Compliance
1Q2017	RAA	Compliance
12/7/2016	RATA	Compliance

Results of Recent Stack Tests

Test Date	Test Type	Test Result
3/6/2018	Boiler 6 and 7 CO and PM Stack Test	Compliance
9/26/2015	Boiler 7 CO and PM Stack Test	Compliance
9/13/2015	Boiler 7 CO and PM Stack Test (Discontinued)	NA
9/12/2015	Boiler 6 CO and PM Stack Test	Compliance

In the most recent RATA that started November 10 and continued through November 11, 2021, the boiler 7 RATA initially did not appear to be passing. This was due to the adjustment factor/bias factor from the 2020 RATA not being properly applied. Upon applying the bias from the 2020 RATA, the facility appeared to pass the November 10-11, 2021 RATA.

AQD discussed the PEMS results with Detroit Thermal on Tuesday, November 16, 2021. The facility had not applied the bias to relative accuracy audit reports submitted in the previous year to the AQD (downtime and EER reports for 4Q2020, 1Q2021, 2Q2021, and 3Q2021, and 2Q2021 RAA). The facility submitted revised reports applying the bias from the 4Q2020 RATA. The revised reports were received by AQD on December 8, 2021. Additionally, from the November 16 discussion, Detroit Thermal agreed to conduct an extra relative accuracy audit (RAA) in Q1 of 2022. While not required, this additional RAA is a good faith demonstration from the facility to ensure that biases are being applied properly. The 2022Q1 RAA is in addition to the mid-year RAA required per PTI 62-21, FG-Boiler_6,7, Special Condition V.4.

3.3 2014-2015 PEMS NOx Hourly Emission Limit Exceedances and CO 24-2016
On November 13, 2015, DTBHP provided AQD with hourly PEMS data for EU-BOILER7 from September 17, 2014 through September 30, 2015. The data indicated over 1,400 individual exceedances of the hourly NOx emission limit of 0.036 lb/MMBtu in MI-ROP-B2814-2014, FG-BOILER_6,7, Special Condition 1.1d during the timeframe of data provided. The facility received a violation notice for these exceedances on November 16, 2015, which was subsequently revised on February 23, 2016. The facility's violation notice response asserted that the time period for determining compliance with the emission limit was 30 days instead of hourly. On June 22, 2016, the facility entered Administrative Consent Order (ACO) AQD No. 24-2016. The Consent Order required the facility to comply with the NOx emission limit under FG-BOILER_6,7 in MI-ROP-B2814-2014 on an hourly basis and required the facility to submit quarterly NOx excess emission reports. ACO AQD No. 24-2016 was officially terminated on September 18, 2020. PTI 62-21, issued on August 31, 2021, updates the facility's NOx emission limit time period to "Calendar Day".

4. Outstanding Violations
None.

Facility Walkthrough: Process Overview and Compliance Status

1. Water Softening
Incoming city water is softened chemically via one of three tanks. Resin in the tanks removes hardness by attracting calcium and magnesium. A brine on site regenerates the resin, and the hardness (calcium and magnesium) is disposed as waste. The resin has an approximate 5-year span. This process does not involve the heating of water. It appears to be exempt from obtaining a PTI per Rule 285(2)(m) for process water treatment equipment.

2. Shell and Tube Heat Exchanger
AQD observed the facility shell and tube heat exchanger. This is a red horizontal cylinder that reuses hot water from boilers to heat the water going to the boilers. It serves the whole plant.

3. FG-BOILER_6,7 – PTI 62-21
FG-BOILER_6,7 are package boilers (Nebraska boilers). They have a forced draft (FD) fan. They do not require an induced draft (ID) fan. These boilers 6 and 7 have flue gas recirculation and low NOx boilers. AQD observed boilers 6 and 7. Both boilers were operating during the facility inspection. Each boiler appears to have a flow meter for monitoring natural gas. AQD observed the fuel flow meter for boiler 6. The meter does not have a display.

3.1 Control Room
AQD observed the control room. Boiler 6 (EU-BOILER6) and boiler 7 (EU-BOILER7) were currently operating. EU-BOILER6 was in manual mode, or "locked in" to a certain load, while EU-BOILER7 was in "movement", or adjusting its load to the steam demand.

AQD observed the following operating parameters for these boilers around 11:00 AM. Each unit of natural gas below represents a thousand standard cubic feet per hour:

Parameter	EU-BOILER6	EU-BOILER7
Steam load (lbs/hour)	103,000	66,000
Natural gas (MSCFH)	114	72

3.2 Predictive Emissions Monitoring System (PEMS)
In the control room, along the side, AQD observed the two touch panels that support the facility PEMS system (one for EU-BOILER6 and one for EU-BOILER7), as well as the computer tower workstation and hard disk drive for secure PEMS data storage. A sign displaying AMP Cherokee vendor contact information is located near the PEMS displays.

3.2.1 Sensors and Sensor Validation
From a discussion on site, the facility's PEMS appears to monitor the eight parameters listed on pages 9 and 10 of the facility's Alternative Monitoring Protocol (AMP) for PEMS which have a range of low validation and high validation numbers. These eight parameters are (1) fuel gas flow; (2) steam flow rate; (3) combustion air differential pressure; (4) oxygen analyzer; (5) gas flow transmitter; (6) boiler demand; (7) air damper position; and (8) air flow percentage with O2 trim.

The two levels to sensor validation are (1) that sensors are operating within the valid range indicated in the AMP, and (2) that a minimum of 3 sensors are operating. A minimum of three valid sensors are needed for a valid calculation of NOx emissions. The boilers cannot be started if these validations don't pass. The facility receives a daily sensor report indicating if any sensors are outside of their ranges. Daily reports are put into an excel spreadsheet that highlights any invalid sensors each minute, and provides a daily summary of total valid and invalid sensors out of the 1440 minutes. From daily reports reviewed the following day, facility staff can notice if there is a drift based on whether sensors are outside of their range for any time during the day. If several hours of data show an issue, the facility would contact the PEMS vendor about it. For example, the facility contacted the vendor about the 13 hours of monitor downtime on 1/12/22 due to communication issues that were identified in the facility's quarterly monitor downtime report. Beyond air quality requirements, these sensors also important for proper boiler operation and process control.

AQD observed the following emissions information from the PEMS display:

Parameter	EU-BOILER6	EU-BOILER7
NOx (PPM)	12.1	8.6
NOx (lb/MMBtu)	0.0165	0.0142
O2 (%)	5.2	7.7

3.3 FG-BOILER_6,7 Special Conditions and Compliance Status

SC(s)	Brief Condition Summary	Determination	Explanation
I.1 and V.1	CO emission limit of 0.073 lb/MMBtu when burning natural gas; stack testing upon request.	Compliance	On March 6, 2018, the facility completed stack testing on Boiler 6 (0.0012 lb CO/MMbtu) and Boiler 7 (0.0011 lb CO/MMBtu).
I.2, I.5, I.9, I.12; II.1; IV.4; V.2; VI.1, VI.4, VI.5	CO, NOx, PM emission limits and opacity limit when burning fuel oil; opacity plan; stack testing required upon request.	Not evaluated	Fuel oil was removed from the facility in 2009. Because the facility has not used fuel oil since before then, testing is not required. AQD did not request the fuel oil opacity monitoring plan per SC IV.4.
I.3, V.1, and V.2	CO emission limit of 84.6 lb/hour hourly and on a calendar month	Compliance	On March 6, 2018, the facility completed stack testing for CO on Boiler 6 (0.15 lb CO/hour) and Boiler 7 (0.13 lb CO/hour).

	average; stack testing upon request.		
I.4	NOx emission limit of 0.036 lb NOx/MMBtu over a Calendar Day	Compliance	On May 27, 2022, the facility provided hourly NOx emissions calculations in lbs NOx/MMBtu for January 1, 2022 through March 31, 2022. The highest hourly NOx emissions for boiler 6 were 0.0258 lbs NOx/MMBtu on 2/1/22 at 11:00 PM. The highest for boiler 7 were 0.0320 lbs NOx/MMBtu on 2/20/22 at 7:00 PM. Because every hourly value is below the calendar day emission limit of 0.036 lb NOx/MMBtu, compliance with the daily limit is demonstrated.
I.6	NOx emission limit of 76.4 lb NOx/hour on a calendar day average	Compliance	With the facility complying with the calendar day NOx limit of 0.036 lb NOx/MMBtu per SC I.4, they also comply with the 76.4 pound NOx per hour limit averaged over a calendar day for boilers 6 and 7 collectively. Each boiler's heat input is 180.2 MMBtu/hour. The maximum NOx hourly emissions when complying with the NOx limit of 0.036 lb NOx/MMBtu are [0.036 lb NOx/MMBtu] * [360.4 MMBtu/hr] = 13 lb NOx/hour. This is below the permit limit of 76.4 lb NOx/hour.
I.7, VI.2.e	NOx emission limit of 155.3 tons/year collectively.	Compliance	On May 27, 2022, the facility provided monthly and 12-month rolling NOx emissions for boilers 6 and boiler 7 for January of 2021 through April of 2022. The maximum NOx emissions were 21.6 tons NOx/year in April of 2022. This is below the facility limit of 155.3 tons NOx/year.
I.8, I.10, and V.1	PM10 emission limit of 0.007 lb PM10/MMBtu hourly and 21.8 lb PM10/hour when burning natural gas; stack testing upon request.	Compliance	On March 6, 2018, the facility completed stack testing for PM10 on Boiler 6 (< 0.003 lb PM10/MMBtu; <0.4 lb PM10/hour) and Boiler 7 (< 0.005 lb PM10/MMBtu; <0.6 lb PM10/hour). The results are below the emission limits in SC I.8 and I.10.
I.11; VI.1, VI.2.f	SO_2 emission limit of 39 tons/year collectively.	Compliance	Fuel oil was removed from the facility in 2009. On May 27, 2022, the facility provided monthly and 12-month rolling SO_2 emissions for boilers 6 and boiler 7 for January of 2021 through April of 2022. The maximum 12-month rolling SO_2 emissions were 0.35 tons SO_2/year in April of 2022. This is below the facility limit of 39 tons SO_2/year.
III.1	Only burn natural gas and/or No. 2 fuel oil in EU-BOILER6 and EU-BOILER7.	Compliance	Fuel oil was removed from the facility in 2009. Boilers have fired only natural gas since before then.
IV.1, IV.2	Install, calibrate, certify, maintain, and operate a PEMS to monitor and record NOx and O_2 continuous emissions.	Compliance	According to the facility, sensors are calibrated every year. The facility provided a sensor calibration report for 2021. Page 11 of the AMP discusses how the PEMS boiler 6 and 7 system parameters were developed from October 29 to November 2, 2016. From talking with facility staff, it appears that PEMS collects process (sensor) data every second. The sensor report provides minute values that are an average of the second data. Hourly numbers provided for NOx values are an average for the

			hour. Minute records from 4/3/22 through 4/9/22 show O_2 data each minute.
IV.3.a-c	Maintain a Plan, currently named the "Alternative Monitoring Plan" for PEMS.	Compliance	AQD did not request an updated version of the AMP. The plan is dated November 2016. The AMP appears to include the operating indicators to be monitored, the range of each indicator, data reporting formats, and ongoing quality assurance.
V.3	Conduct a NOx relative accuracy test audit (RATA) once every four quarters.	Compliance	RATAs appear to be conducted once every four quarters. DTBHP last conducted a RATA November 10-11, 2021. The previous RATA was conducted December 7-11, 2020.
V.4	Conduct NOx relative accuracy audits (RAA) quarterly and, if all quarterly RAAs pass, then mid-year.	Compliance	Since the installation of the facility PEMS, RAAs were completed and passed all four quarters of 2016, 2017, 2018, 2019, and 2020. A mid-year RAA was conducted in 2021. 1Q and 2Q 2022 RAAs were conducted this year.
V.5	Ensure NOx PEMS sensor evaluation system checks input integrity at least once per day.	Compliance	According to DTBHP, staff receive a daily report the following day that flags any validation issues. AQD received daily reports for the week of 4/3 through 4/9/22. The final page of each daily report contains a summary of valid data points and a percentage of data availability.
VI.6	Continuously monitor and record PEMS parameters	Compliance	Sensor values are provided by the PEMS system and recorded every minute. DTBHP provided records for the week of 4/3 through 4/9/22.
VI.7, VII.1, VII.2, IX.1	Monitor PEMS when operating except during maintenance and malfunctions; submit quarterly excess emissions and monitoring systems performance reports; comply with 40 CFR Part 60, Subpart Db.	Compliance	The facility provides quarterly excess emissions and monitor downtime reports to AQD. For the 1Q2022 report, 15 hours of downtime was reported for both boiler 6 and 7 due to a communication error. This appears to be a malfunction.
VIII.1,2	Stack/vent restrictions	Compliance	AQD observed the two large stacks for boilers 6 and 7 from street level. Stacks are vertical and unobstructed. Measurements appeared accurate from visual observation.

4. FG-BOILER_1,2 – ROP MI-ROP-B2814-2014

Boilers 1 and 2 were not operating during the facility inspection. Boiler 2 was undergoing annual maintenance. Boiler 1 was on standby and is run a few hours at night. These are each Stirling boilers, which are water-tube boilers each with three steam drums and two mud drums according to drawings provided by the facility. Boilers were installed in 1927. These are large boilers that take up several stories. Boilers have both a FD and ID fan. AQD traveled from the fourth floor to the first floor via elevator during the facility inspection as part of boiler observation. AQD observed boiler 1 and 2's forced draft fans; boiler 2's induced draft fan since it was undergoing maintenance; one of boiler 2's mud drums; the flow meter for boiler #2 to record natural gas usage (this meter measures differential pressure, which is taken along with temperature to measure flow); as well as burners for the boilers from the outside (three south and three north burners). Boilers are rated at 450,000 pounds of steam per hour.

4.1 FG-BOILER_1,2 Special Conditions and Compliance Status

SC(s)	Brief Condition Summary	Determination	Explanation
I.1, VI.1	NOx emission limit of 0.30 lb NOx/MMBtu from	Compliance	DTBHP provided monthly NOx emissions calculations for both boilers 1 and 2 from January

	May 1 to September 30th; calculate emissions via Appendix 7A and 7B		2021 through April of 2022. Calculations for the 5-month period of May 2021 through September 2021 indicate emissions of 0.188 lb NOx/MMBtu for boiler 1 and boiler 2.
I.2	NOx emission limit for fuel oil.	Not evaluated	Fuel oil was removed in 2009. Boilers operate using natural gas.
III.1	Fire only natural gas and/or No. 2 fuel oil in boilers 1 and 2	Compliance	Fuel oil was removed in 2009. Boilers fire natural gas. AQD observed natural gas lines leading to boiler burners.

5. EU-BOILER3 and EU-BOILER4 – MI-ROP-B2814-2014

According to DTBHP, burners for boilers 3 and 4 have been removed. Those burners are used in boilers 1 and 2. From the outside of the boiler, natural gas lines are connected to each burner and the boilers appear to be in similar condition to boilers 1 and 2. There are three south and three north burners. AQD observed natural gas lines leading to the location of the south burners.

To determine if boilers are considered permanently shut down, AQD used a November 1997 publication from the USEPA titled "Questions and Answers Regarding the 1997 State Plan Requirements for Hospital, Medical, and Infections Waste Incinerators (HMIWI)". The document discusses how if one of the four questions below answers "yes", the incinerator would not be included in the state inventory because it is shut down. The same guidance for incinerators appears to be applicable to boilers.

1. Are the doors welded shut?
2. Is the main stack and/or bypass stack removed?
3. Have the blowers been removed?
4. Have the burners and/or fuel supply been removed?

Because burners have been removed for boilers 3 and 4, per question 4 above, these boilers appear to be permanently shut down per Rule 201(5). Permit conditions related to boilers 3 and 4 appear to be void. AQD did not observe where burners are removed during the facility inspection. On July 8, 2022, the facility provided images of where burners were removed. AQD has not made a final determination about boilers 3 and 4 being permanently shut down at the time of this staff report. Because EU-BOILER3 and EU-BOILER4 have not been used in several years, AQD did not evaluate their permit conditions.

6. FG-BOILER_3,6,7

6.1 FG-BOILER_3,6,7 Special Conditions and Compliance Status

SC(s)	Brief Condition Summary	Determination	Explanation
III.1, VI.1	Don't operate EU-BOILER3 while either EU-BOILER6 or EU-BOILER7 are operating; keep records of boiler operation.	Compliance	Boiler 3 is considered shut down. ADQ did not request records of date and times that boilers 3, 6, and 7 were in operation.

7. FG-BOILER_4,6,7

7.1 FG-BOILER_4,6,7 Special Conditions and Compliance Status

SC(s)	Brief Condition Summary	Determination	Explanation
I.1, VI.2	Emission limit of 39 tons SO_2/year from burning on-spec oil in	Compliance	Boiler 4 is shut down. DTBHP provided monthly natural gas usage as well as 12-month rolling SO_2 emissions for boilers 6 and 7. The maximum 12-

	boiler 4 and any fuel in boilers 6 and 7; keep records.		month rolling SO_2 emissions are 0.35 tons SO_2/year. This is well below the emission limit of 39 tons SO_2/year.
III.1	Fire only natural gas and/or No. 2 fuel oil in boilers 4, 6, and 7.	Compliance	Fuel oil was removed in 2009. Boilers fire natural gas. AQD observed natural gas lines leading to boiler burners.
VI.1	Fuel receipt which certify that on-spec oil meets the definition in Appendix 3.	Compliance	The facility does not combust on-spec oil. AQD did not request fuel receipts for this oil.

8. Maintenance Area

Between boilers, there is a maintenance area. From talking with Dale and from the facility walkthrough, there is no stack associated with this area. Some welding occurs. Welding appears to be exempt from obtaining a PTI per Rule 285(2)(i) for welding equipment. There is also a sand abrasive blaster and pedestal grinder. This equipment appears to be exempt per Rule 285(2)(l)(vi)(B) for sand blast cleaning and surface grinding released into the in-plant environment.

9. Fuel Oil Underground Storage Tank

AQD observed the outdoor fuel oil underground storage tank. The tank appears to be 500,000 gallons. It is currently empty. From talking with facility staff, it appears fuel oil was removed from the facility in 2009. This tank supplied all boilers. Breakers and pumps and pressure relief valves have been removed. There are no longer fuel lines leading to the boilers. Boilers themselves still appear to have fuel lines. While observing the underground storage tank, AQD observed the delivery of salt brine for water softening.

AQD departed off site at 12:10 PM.

Conclusion

Based on the AQD inspection and records review, it appears that DTBHP is in compliance with the federal Clean Air Act; Part 55, Air Pollution Control, of the Michigan Natural Resources and Environmental Protection Act, 1994 PA 451, as amended; the Michigan Air Pollution Control Rules; the conditions of ROP No. MI-ROP-B2814-2014; and the conditions of PTI 62-21.

NAME _____ DATE 8/8/22 SUPERVISOR JK