

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

N123763844

FACILITY: Bakelite Chemicals LLC		SRN / ID: N1237
LOCATION: 4113 W Four Mile Rd, GRAYLING		DISTRICT: Cadillac
CITY: GRAYLING		COUNTY: CRAWFORD
CONTACT: Katie Doe , Quality Engineer		ACTIVITY DATE: 06/30/2022
STAFF: Caryn Owens	COMPLIANCE STATUS: Compliance	SOURCE CLASS: SM OPT OUT
SUBJECT: On-Site Inspection and Records Review		
RESOLVED COMPLAINTS:		

On Thursday, June 30, 2022 Caryn Owens of the Department of Environment, Great Lakes, and Energy (EGLE) – Air Quality Division (AQD) conducted a scheduled field inspection and records review of Bakelite Chemicals, LLC (Bakelite) (N1237) located at 4113 Four Mile Road in Grayling, Crawford County, Michigan. More specifically the site is located on the south side of Four Mile Road, approximately 2/3 mile east of the north-bound off-ramp of Interstate-75. The purpose of this inspection was to determine the facility's compliance with permit to install (PTIs) 363-89C, 488-95, 5-86A, and 5-86. Bakelite has opted out of major source applicability by limiting operational and/or production limits potential to emit (PTE) to be below the new source performance Standards (NSPS) limits and therefore below major source thresholds for hazardous air pollutants (HAPs). Bakelite is subject to NSPS Standards of Performance for volatile organic compound (VOC) emissions from the synthetic organic chemical manufacturing industry air oxidation unit processes (40 CFR Part 60 Subpart III); NSPS Standards of Performance for VOC liquid storage vessels for which construction, reconstruction, or modification commenced after July 23, 1984 (40 CFR Part 60 Subpart Kb), and NSPS Standards of Performance for equipment leaks of VOC in the synthetic organic chemicals manufacturing industry for which construction, reconstruction, or modification commenced after January 5, 1981, and on or before November 7, 2006 (40 CFR Part 60 Subpart VV). Additionally, the site is an area source for National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chemical Manufacturing of Area Sources (40 CFR, Part 63, Subpart VVVVVV). The State of Michigan does not have delegated authority of this area source NESHAP, and thus was not reviewed by the EGLE at this time.

Evaluation Summary

Based on the activities covered during this field inspection and records review, the facility appears to be in compliance with PTIs 363-89C, 488-95, 5-86A, and 5-86. Review of the records for the facility indicates the facility was in compliance with emission limits in accordance with the current PTIs. No further actions are necessary at this time. Specific permit conditions that were reviewed are discussed below.

On-site Inspection:

The weather conditions were partly cloudy with winds out of the southwest approximately 10 miles per hour, and approximately 78 degrees Fahrenheit. The facility consisted of: one main building that contained a formaldehyde plant and a converter with a catalyst to convert methanol into formaldehyde on the east side of the building; 2 kettles to make resin, a catalytic oxidizer, storage tanks of resin and product, and piping in the central portion of the building; and railroad and truck bays on the southern and western portions of the building. Vapor recovery is connected to all the delivery vessels used to load the tanks or receive product, and also to the resin storage tanks. The vapor recovery system is connected to the catalytic oxidizer. There are several rail cars per day that ship out to industry and receives a few hopper cars per day for raw materials. Additionally, the facility loads several trucks throughout the day for industry.

There is also a methanol above ground storage tank outside on the southern portion of the site, which uses a condenser to control the methanol vapors, which appeared to be operating properly during the inspection. The chilled water temperature was at 41 degrees Fahrenheit during the inspection.

During the inspection, methanol mixed with 10.78 percent oxygen that was entering the vaporizer at 100 degrees Celsius (212 degrees Fahrenheit), then to the superheater that operates about 150 degrees Celsius (302 degrees Fahrenheit), which then enters the converter where the methanol reacts with a catalyst and changes to formaldehyde. After the reaction, the formaldehyde flows into an aftercooler. From the aftercooler, the formaldehyde flows into three absorbers, then flows to formaldehyde storage with the product at a percentage of formaldehyde. The remaining gas stream is then recycled back to the vaporizer. The catalyst in the converter is changed out every 2 to 3 years and serviced semi-annually.

A dowtherm heater is located in the northeastern portion of the building used for start-up of the formaldehyde plant.

Manufacturing of the resins are produced in kettles, in batches. The kettles and mix tank were down during the inspection. The formaldehyde plant makes formaldehyde to be used in the resins. Generally, the resins produced in the kettles are Urea-formaldehyde in Kettle 1, and phenol-formaldehyde in kettle 2. During the inspection, the burner inlet to the catalytic

oxidizer was at 616.52 degrees Fahrenheit, and the outlet temperature was at 1002.85 degrees Fahrenheit. The change in temperature was 386.40 degrees Fahrenheit.

The facility is claiming the following exemptions at the facility:

- Cooling tower meets exemption Rule 336.1280(2)(d)
- Dowtherm heater with a firing capacity of 0.9 MMBtu/hr meets exemption Rule 336.1282(2)(b)(i).
- Standby generator in case of power failure 336.1285(2)(g)

PTI 363-89C Compliance Evaluation:

FGFORMALDEHYDE and FGRESIN: This Flexible Group contains the following emission units; EUMETHSTORAGE, EUFORMALDEHYDEPLANT, EUUREAFROMALDEHYDE and EUPHENOLFORMALDEHYDE. EUMETHSTORAGE contains the methanol storage tank controlled by a vapor balance system and chilled water condenser, and is associated with FGFORMALDEHYDE. EUFORMALDEHYDEPLANT includes all process equipment and storage tanks used to generate formaldehyde and urea formaldehyde, and is associated with FGFORMALDEHYDE. EUUREAFROMALDEHYDE includes all process equipment used to manufacture "UF" resins. The resins are mixed in batch kettle K-1. EUPHENOLFORMALDEHYDE includes all process equipment used to manufacture "PF" resins. The resins are mixed in batch kettle K-2.

- **Emission Limits:**

The reported emissions are listed in the right-hand column in the table below, which were based on the Formaldehyde Plants' Fugitive Emissions using leak detection control efficiencies and 2018 stack testing.

Pollutant	Limit	2018 Test Results at High load Conditions
Formaldehyde	0.04 pph	0.002 pph
Fugitive Formaldehyde	0.006 pph	0.005 pph
VOCs from FGFORMALDEHYDE and FGRESINS	1.8 pph	0.03 pph
VOCs from EUMETHSTORAGE	0.039 pph	0.01 pph

Based on the records reviewed, the emission were reported below the permitted emission limits.

- **Material Limits:**

No Material limits were applicable for FGFORMALDEHYDE and FGRESINS.

- **Process Operational Restrictions:**

The facility accurately calibrates each monitor and recording device to manufacturer recommendations. The facility updated and submitted a Leak Detection, Malfunction Abatement and Preventative Maintenance Plan on August 6, 2021. AQD approved the Plan on August 31, 2021. According to Ms. Doe, the plant will not operate until the inlet temperature of the catalyst bed is at least 550 degrees Fahrenheit. Bakelite records all 3-hour periods of the average temperature difference across the catalyst bed.

- **Design/Equipment Parameters:**

During the field inspection, it appeared all the equipment at the facility was working properly. All tanks containing VOCs are connected to a vapor recovery system. All the vapor recovery systems vent to the catalytic oxidizer to control the emissions. The pumps valves, connectors, pressure relief devices and sampling connection lines are monitored monthly with leak detection devices and are reported to AQD on a semi-annual basis. The vapor recovery system is inspected by on a regular basis (at least one to two times a month), and no deficiencies were observed during the inspections from June 2021 through May 2022.

The Methanol storage tank is connected to a condenser on the southern portion of the site to control breathing loss

emissions from the tank and must stay below 50 degrees Fahrenheit to assure an overall collection efficiency of 95 percent. During the inspection, the methanol tank was at 41 degrees Fahrenheit. Based on the records reviewed, the facility consistently maintains the methanol tank below 50 degrees Fahrenheit.

Historically the facility used an epichlorohydrin tank which required a nitrogen blanketing system and maintaining the pressure in the tank below 7 psia, otherwise the tank would vent to the catalytic oxidizer. The facility no longer uses the epichlorohydrin tank, and it is still onsite, but empty and located south of the railcars.

Additionally, the facility is required to maintain, and operate the catalytic oxidizer in a satisfactory manner for all organic raw material tanks (excluding the methanol storage tank), all finished product tanks, routine process equipment vents, and absorber off-gas vents, to assure the total organic compounds (TOC) destruction efficiency is 99 percent reduction. Based on the April 10 and 11, 2018 stack testing, the destruction efficiency was at 99.97 percent at the high load Conditions, and within the permitted limits.

- **Testing/Sampling:**

There are no specific stack testing requirements associated with the facility, however, the facility does complete stack testing when necessary to show compliance of the catalytic oxidizer. The most recent stack test was completed April 10 and 11, 2018. Results were received May 21, 2018.

- **Monitoring/Recordkeeping:**

The facility monitors and records the temperature immediately before and after the catalyst bed of the oxidizer on a continuous basis. Additionally, the facility monitors all pumps, compressors, pressure relief devices, sampling connections, and all valves on a monthly basis. The facility monitors the production of formaldehyde and urea formaldehyde on a continuous basis, and recorded on a daily basis. The facility maintains the emissions reporting, records of all calibration activities, and a list of each VOC liquid storage tank. The facility maintains a log of all significant activities at the facility and keeps the records in a satisfactory manner.

- **Reporting:**

Based on the records reviewed, the before and after catalyst temperatures were continuously recorded as well as the 3-hour average temperatures. The facility reported all monitoring and recordkeeping requirements to AQD. The semi-annual 40 CFR Part 60 Subparts A, III, VV, & Kb; Excess Emissions summary for Formaldehyde Plant, Excess Emissions summary of Methanol storage tank, and NSPS Reporting appears to be in compliance and submitted on a timely basis.

From the time period June 2021 through May 2022, the facility reported four Rule 912 notifications to AQD. The occurrences were reported to the AQD within the appropriate time limits, and corrective actions were taken.

Based on the records reviewed, the most recent date the catalytic oxidizer was shut down and serviced was May 24, 2022 when they replaced the thermocouples in the catalyst.

- **Stack/Vent Restrictions:**

During the field inspection, the stack heights for SVMETHVENT, SVCATINC, SVDOWTHERNVENT and SVRELIEFVENT appeared to be within the permitted stack height limits.

- **Other Requirements:**

Although the PTI does not address "Other Requirements" associated with FGFORMALDEHYDE and FGRESINS, this Flexible Group is subject to:

- NSPS Standards of Performance for volatile organic compound (VOC) emissions from the synthetic organic chemical manufacturing industry (SOCMI) air oxidation unit processes (40 CFR Part 60 Subpart III);
- NSPS Standards of Performance for VOC liquid storage vessels for which construction, reconstruction, or modification commenced after July 23, 1984 (40 CFR Part 60 Subpart Kb),
- NSPS Standards of Performance for equipment leaks of VOC in the synthetic organic chemicals manufacturing industry for which construction, reconstruction, or modification commenced after January 5, 1981, and on or before November 7, 2006 (40 CFR Part 60 Subpart VV).
- Area source for National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chemical Manufacturing of Area Sources (40 CFR, Part 63, Subpart VVVVVV).

FGFACILITY: Conditions that include all source-wide activities at the facility including equipment covered by other permits, grand-fathered equipment and exempt equipment.

- **Emission Limits:**
The Emission Limits for FGFACILITY are individual hazardous air pollutant (HAP) emissions shall be below 10 tons per year and total HAPs shall be below 25 tons per year based on a 12-month rolling time period. Based on the records reviewed from June 2021 through May 2022, the individual and total HAPs were reported below the emission limits.
- **Materials/Fuels:**
No Material limits were applicable for FGFACILITY.
- **Process/Operational Parameters:**
No Process/Operational Parameters were applicable for FGFACILITY.
- **Design/Equipment Parameters:**
No Design/Equipment Parameters were applicable for FGFACILITY.
- **Testing/Sampling Equipment:**
No Testing/Sampling Equipment were applicable for FGFACILITY.
- **Monitoring/Recordkeeping:**
The facility completes the required calculations for the HAP limits for Methanol, Formaldehyde, and Phenol, as well as Total HAPs. The hours of operation is recorded on a daily basis. The monthly and 12-month rolling time period emissions records are attached.
- **Reporting, Stack/Vent Restrictions, Other Requirements:**
There are no "Reporting, Stack/ Vent Restrictions, or Other Requirements" applicable with FGFACILITY.

PTI 488-95 Compliance Evaluation:

PTI 488-95 was issued to add two 23,000-gallon storage tanks to increase the plants storage capacity of aqueous resins. Majority of the Conditions are covered by PTI 363-89C. Emissions for the storage tanks are controlled by connecting the tanks to the vapor recovery system at the facility, which is routed to the catalytic oxidizer prior to exiting the stack.

- **Emission Limits:**
There shall be no Visible Emissions from the aqueous resin storage tanks. The aqueous resin storage tanks are located inside the plant and connected to the vapor recovery system that is routed to the catalytic oxidizer. No visible emissions were observed from the storage tanks during the onsite inspections.
- **Material Limits:**
No Material limits were applicable for the storage tanks.
- **Process Operational Restrictions:**
No Process/Operational Parameters were applicable for the storage tanks.
- **Design/Equipment Parameters:**
During the field inspection, it appeared all the equipment at the facility was working properly. All tanks containing VOCs are connected to a vapor recovery system. All the vapor recovery systems vent to the catalytic oxidizer to control the emissions
- **Testing/Sampling:**
No stack testing requirements are associated with the storage tanks.
- **Monitoring/Recordkeeping:**
As previously stated, the facility maintains a list of each VOC liquid storage tank with the dimensions, capacity, and installation date. The record of storage tanks at the facility is attached.
- **Reporting:**
The facility reported all monitoring and recordkeeping requirements to the AQD. The semi-annual 40 CFR Part 60 Subparts A, III, VV, & Kb; Excess Emissions summary for Formaldehyde Plant, Excess Emissions summary of

Methanol storage tank, and NSPS Reporting appears to be in compliance and submitted on a timely basis.

- **Stack/Vent Restrictions:**

During the field inspection, the stack height for SVCATINC appeared to be within the permitted stack height limits.

- **Other Requirements:**

Although the PTI does not address "Other Requirements" associated with the storage tanks, they are subject to the NSPS Standards of Performance for VOC liquid storage vessels for which construction, reconstruction, or modification commenced after July 23, 1984 (40 CFR Part 60 Subpart Kb).

PTI 5-86A Compliance Evaluation:

PTI 5-86A was issued to for a 42.2 MMBtu/hr boiler system that has the potential to use natural gas or #2 oil, and used for space heating and process steam requirements. This boiler replaced the permitted boiler in PTI 5-86, and the boiler was installed in 1986. Emissions from the boiler exit out the catalytic converter stack, after the catalyst.

- **Emission Limits:**

Visible Emissions shall not exceed 20 percent opacity during a six-minute average. No visible emissions were observed from the stack during the onsite inspection.

- **Material Limits:**

The sulfur dioxide emissions are not to exceed 0.51 pounds per million BTUs heat input. The facility uses natural gas from a natural gas supplier, which is low in sulfur. The facility has not been, and currently does not use #2 fuel oil.

- **Process Operational Restrictions:**

No Process/Operational Parameters were applicable with PTI 5-86A.

- **Design/Equipment Parameters:**

There were no Design/Equipment Parameters applicable with PTI 5-86A.

- **Testing/Sampling:**

As of the date of this inspection report, AQD has not requested the facility to test the sulfur dioxide emission rates. No stack testing requirements are associated with the storage tanks.

- **Monitoring/Recordkeeping:**

There were no Monitoring/Recordkeeping requirements applicable with PTI 5-86A.

- **Reporting:**

The facility has been using natural gas in the boiler. As of the date of this inspection report, AQD has not received notification indicating the facility would like to use a different fuel than what the boiler was permitted for.

- **Stack/Vent Restrictions:**

During the field inspection, the stack height for SVCATINC appeared to be within the permitted stack height limits.

- **Other Requirements:**

The facility installed the boiler addressed in PTI 5-86A, and the original boiler permitted in PTI 5-86 was never installed at the facility.

PTI 5-86 Compliance Evaluation:

PTI 5-86 was issued for manufacturing thermosetting resins, specifically urea-formaldehyde resins, phenol-formaldehyde resins, and polyamide resins. This permitted Conditions are similar to PTI 363-89C, so please refer to PTI 363-89C evaluation. Please refer to 5-86A for the boiler evaluation, since the boiler system in 5-86 was never installed at the facility.

NAME *Camp Owens*

DATE _____

SUPERVISOR _____