



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, ILLINOIS 60604**

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
ACS Technical Products, Inc., Griffith, Indiana

FROM: Sasa Dunovic, Inspector/Enforcement Officer
AECAB (IL/IN)

THRU: Nathan Frank, Section Supervisor
AECAB (IL/IN)

TO: File

BASIC INFORMATION

Facility Name: ACS Technical Products, Inc. (ACS)

Facility Location: 420 South Colfax Avenue, Griffith, Indiana

Date of Inspection: September 26, 2023

EPA Inspector(s):

1. Sasa Dunovic, Inspector/Enforcement Officer
2. Jason Schenandoah, Environmental Engineer

Other Attendees:

1. Ramelito Biscocho, IDEM Air Compliance Inspector
2. Tom Froman, Plant Manager at ACS
3. Erik Johnson, EHS Manager at ACS

Contact Email Address: Tom Froman, tfroman@acstech.com and Erik Johnson, ejohnson@acstech.com

Purpose of Inspection: To evaluate emissions rates of Hazardous Air Pollutants (HAPs) from the facility.

Facility Type: A stationary specialty chemical manufacturing plant.

Regulations Central to Inspection: Clean Air Act (CAA), 326 IAC 8-9 Volatile Organic Liquid Storage Vessels, and Registration No. 089-36817-00020

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Arrival Time: 9:40 a.m.

Departure Time: 1:00 p.m.

Inspection Type:

- ☒ Unannounced Inspection
- ☐ Announced Inspection

OPENING CONFERENCE

- ☒ Presented Credentials
- ☒ Stated authority and purpose of inspection
- ☒ Provided Small Business Resource Information Sheet
- ☐ Small Business Resource Information Sheet not provided. Reason:
- ☒ Provided CBI warning to facility

The following information was obtained verbally from the ACS representatives unless otherwise noted.

Process Description:

ACS manufactures additives, epoxidized vegetable oil (EVO), and brominated vegetable oil (BVO). They use raw materials such as soybean and linseed vegetable oil, mineral and carboxylic acids, peroxide, bromine, nitrogen, and caustic solution to produce these products. These materials are delivered in railcars, tanker trucks, drums, or totes. Once produced, the finished products are shipped out using similar transportation means. The raw materials and finished products are stored in different fixed-roof tanks. The vapor space in some fixed roof tanks is maintained with a nitrogen blanket. The products are produced in small batches, with each batch going through separate stages of the production process.

Epoxidized vegetable oil (EVO) is made in an epoxidation facility through a chemical process that involves converting the double bonds in vegetable oils into epoxide groups. This process involves using hydrogen peroxide, carboxylic acid, and a mineral acid to epoxidize either soybean or linseed vegetable oil. During the process, toluene is used as a diluting agent, and the epoxidation chemical reactions occur in two batch reactors working in a series. The reactors are made of stainless steel and fitted with top-mounted agitators, condensers, and internal and external cooling systems. Each reactor takes about 6 hours to complete a single charge reaction. After the completion of the reaction, the product of the epoxidation process (reaction liquor) is transferred from the second reactor into the next process vessel for refining.

During the refining process, fatty acids and unreacted raw materials are removed by mixing them with a caustic solution and washing them with process water. Fatty acids with some reaction by-products (cresols and toluene) are removed as hazardous waste. Wastewater is sent to neutralization tanks to be neutralized before it's discharged to the publicly owned treatment works for final treatment. Toluene and epoxidized vegetable oil are sent to two thin film

evaporators to remove toluene. Removed toluene is recycled back into the process. In the first evaporator, the product and toluene are separated. The product is then sent to the finished product tanks, while toluene is sent to the prime toluene tank. In the second evaporator, the remaining toluene is separated from other impurities, which are treated in a fractionation tower to remove any remaining toluene from the waste stream. The wash wastewater from the refining process is neutralized in two neutralization tanks with a caustic solution and treated in one oxidation tank with hydrogen peroxide to destroy any remaining toluene.

After this, the treated wastewater is sent to Hammond Sanitary District for final treatment.

Brominated vegetable oil (BVO) is produced in the same building as EVO and utilizes some of the equipment used in the EVO process. ACO brominates only soybean oil via a process with bromine in a hexane diluting agent. The process is completed in a single reactor and takes around 24 hours. Once the bromination is complete, the reactor contents are transferred to a separation vessel where the product is separated by density. The product is washed with process water, which is sent to the neutralization tanks, neutralized by caustic solution, and discharged to Hammond Sanitary District for the final treatment. The mix of product and hexane is sent through a thin film evaporator for separation. Hexane is sent to a fractionation column to be recycled and the finished product is sent to the storage tanks.

Additives are manufactured in a facility specifically designed for additive production. The raw material used in this process is epoxidized soybean oil and methanol. A caustic catalyst facilitates the process. Methanol serves as both a reactant and a diluting agent, and the entire process takes around four hours to complete. Once the reaction is complete, the resulting material is transferred to a separation vessel, where it is neutralized using citric acid. Any unreacted methanol is evaporated using heat and vacuum and then condensed in two condensers to be reused. The remaining product is washed with water, and the wastewater is directly discharged to the Hammond Sanitary District for final treatment. Finally, the product is dried under vacuum and nitrogen-stripped to create the final product.

Staff Interview:

The facility employs 32 people that work three shifts, seven days a week.

During the inspection, Mr. Froman explained the process of removing toluene from epoxidized oil. He mentioned that they use thin film evaporators to remove toluene until the final product has less than one part per million. The evaporators are operated at about 250°F with a vacuum of approximately 25 mm Hg. The temperature of the reaction process in the two EVO reaction vessels is controlled at 155°F. The bromination process and additive manufacturing occur at about 88°F and 130°F, respectively. All processes are carried out under normal atmospheric pressure.

According to Mr. Froman, there are seven condensers on the main process vessels (reactors, refining, evaporators) used in EVO, BVO, and additive manufacturing. The condensers are used to recover toluene, hexane, and methane. All exhausts from the condensers are routed to the atmosphere. However, he mentioned that the facility has not conducted any stack tests to qualify or quantify emissions and assess the condenser's effectiveness.

Mr. Froman mentioned that there are tank pairs for toluene, hexane, and methanol storage. One tank in each pair is for prime solvent, while the other is for recovered solvent. Although some raw materials and finished product tanks are nitrogen-blanketed, he could not identify the specific tanks.

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations:

During the site tour, the EPA inspected various areas of the property, including the epoxidation and bromination facility, loading and unloading areas, additive manufacturing, and storage tanks. Only the epoxidation facility was operational. While inspecting the production building, the EPA discovered emissions coming from the second reactor agitator housing using a forward-looking infrared (FLIR) camera (Appendix A, video no. 2).

The storage tanks appeared to be in good working condition, with no visible emissions, except for oxidation tank 6009 which was emitting visible emissions from the top. Mr. Froman explained that these emissions were water vapors generated from the oxidation reaction that created heat. Furthermore, the EPA observed emissions from one of the 500-gallon storage tanks at the gasoline dispensing facility using the FLIR camera (Appendix A, video no. 1).

Videos: were taken during the inspection. *See* Appendix A.

Field Measurements: were not taken during this inspection.

CLOSING CONFERENCE

☒ Provided U.S. EPA point of contact to the facility.

Requested documents:

- Plant layout.
- Process flow diagrams for all current processes.
- List of nitrogen blanketed tanks, along with the set pressures for each tank.
- Throughput data for all storage tanks between October 2022 and September 2023.
- Wastewater laboratory analysis reports between October 2021 and September 2023.
- Records of Toluene, Hexen, and Methanol purchases between October 2020 and September 2023.
- Potential to emit calculations that were submitted along with the air permit application.
- TANKS Emission calculations with all necessary inputs.
- Inlet and outlet temperature settings for all condensers and associated process vessels.
- 2021 and 2022 TRI emissions reporting calculations, along with all the relevant input information used to derive the reported values.

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Concerns:

- Emissions from the second reactor agitator housing.
- Emissions from the 500-gallon gasoline storage tank.

DIGITAL SIGNATURES

Report Author: Dunovic, Sasa Digitally signed by Dunovic, Sasa
Date: 2023.10.20 15:52:20 -05'00'

Section Supervisor: NATHAN FRANK Digitally signed by NATHAN
FRANK
Date: 2023.10.26 13:39:40 -05'00'

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APPENDICES AND ATTACHMENTS

1. Appendix A: Digital Video Log

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APPENDIX A: DIGITAL IMAGE LOG

1. Inspector Name: Jason Schenandoah		2. Archival Record Location: Region 5's Electronic Records Center	
Image Number	File Name	Date and Time	Description of Image
1	MOV_3149.mp4	9/26/2023 12:57	Emissions from the gasoline tank
2	MOV_3150.mp4	9/26/2023 13:09	Emissions from the second epoxidation reactor