



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

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
Solvay USA Inc., Blue Island, IL

FROM: Karyn DeFranco, Physical Scientist
AECAB (MN/OH)

THRU: Brian Dickens, Section Supervisor
AECAB (MN/OH)

TO: File

BASIC INFORMATION

Facility Name: Solvay USA Inc.

Facility Location: 14000 South Seeley Avenue, Blue Island, IL

Date of Inspection: January 31, 2023

EPA Inspector(s):

1. Karyn DeFranco, Physical Scientist
2. Victoria Nelson, Environmental Engineer

Other Attendees:

1. Lisa Caraway, Environmental Manager, Solvay USA Inc
2. Steven Lonard, Plant Manager, Solvay USA Inc.

Contact Email Address: lisa.caraway@solvay.com

Purpose of Inspection: to investigate compliance with VOC emission limits.

Facility Type: Chemical manufacturer; surfactants

Regulations Central to Inspection: Illinois State Implementation Plan (SIP), specifically: Ill. Adm. Code 201.302, Ill. Adm. Code 212.110(e), and Ill. Adm. Code Part 218; and federally enforceable production and operating limits and emission limits in the Federally Enforceable State Operating Permit (FESOP).

Facility Name: Solvay USA Inc.
Facility Location: Blue Island, IL
Date of Inspection: January 31, 2023

Arrival Time: 10:00 am
Departure Time: 12:45 pm

Inspection Type:

- ☒ Unannounced Inspection
- ☐ Announced Inspection

OPENING CONFERENCE

- ☒ Presented Credentials
- ☒ Stated authority and purpose of inspection
- ☒ Provided Small Business Resource Information Sheet
- ☒ Provided CBI warning to facility

The following information was obtained verbally from Solvay USA Inc. unless otherwise noted.

Process Description:

Solvay USA Inc. (Solvay) is a surfactant manufacturer with approximately 50 employees and operates 24 hours, seven days per week. Solvay receives raw material mainly via truck, but some from rail. Solvay has three main processes to make various surfactants: chemithon unit; amide unit; and blending unit.

Chemithon: The chemithon unit uses molten elemental sulfur, air, and various organic materials (predominately organic esters) as raw materials in the process. Molten sulfur and air is first added to the sulfur burner to generate SO₃ (sulfur trioxide). The sulfur trioxide gas stream then combines with the organic raw material, such as ethoxylated alcohols and alpha olefins, in a reactor. The mixture enters a cyclone, where the emissions vent to an electrostatic precipitator (ESP) and a caustic scrubber before venting to atmosphere. The material is further processed in a digester, a neutralizer where water and neutralizing agent is added to the mixture, and a vacuum deaeration unit. After the vacuum deaeration unit, the material either proceeds to the hydrolizer to generate alpha olefin sulphonate or enters a series of two dioxane strippers to generate lauryl sulphates and lauryl ether sulphates. The anionic surfactants produced in the chemithon process are intermediate products that are later used in the blending unit. There are no air pollution control devices associated with the digester, neutralizer, vacuum deaeration unit, dioxane strippers, or hydrolizer. Air emissions generated in the cyclone are vented to the ESP and scrubber, but air emissions generated in the digester, neutralizer, vacuum deaeration unit, dioxane strippers, and hydrolizer are vented straight to atmosphere.

Amide: The amide unit uses coconut oil, mono ethanol amine, and ammonia as raw materials in the process. The raw materials are processed in a reactor under elevated pressure and temperature to produce coco mono ethanol amide. The coco mono ethanol amide produced in the amide process is an intermediate product that is later used in the blending unit. There are no air emission control devices associated with the amide unit. All air emissions generated in the amide unit are vented to atmosphere.

Blending: The blending unit blends the intermediate products produced in the chemithon and amide units with other raw materials such as: betaines, amphotoacetate, acids/bases, preservatives, and water. Raw and intermediate materials are blended in a series of tanks.

Final surfactant products produced include, among other things, cold pearls, high and low active sulfates, low active sulfonates, detergent slurries, and agricultural blends. There are no air emission control devices associated with the blending unit. All air emissions generated in the blending unit are vented to atmosphere.

Staff Interview:

- Solvay typically produces approximately 100 million pounds of product per year;
- The chemithon unit has an ESP and caustic scrubber to comply with emission rates. The facility stated that they were not aware of any performance testing ever done on the ESP or caustic scrubber;
- The facility cleans the chemithon unit after every campaign by using NaOH and water to clean and raw material alcohol to flush the unit;
- The facility constructed an additional dioxane stripper in series with the original dioxane stripper in 2021;
- The facility conducts raw material testing per load. This testing consists of IR, refractive, moisture test, and appearance testing to determine if impurities are out of acceptable range;
- Wastewater is generated in several processes and the majority of wastewater is discharged to MWRD. Contributing wastewater streams include: condenser from the dioxane strippers; scrubber wastewater; pump flushing; cleaning; and steam condensate.
- A majority of the wastewater is treated onsite. The wastewater treatment process consists of: a sump (approximately 6,000 gallons) with oil-water separator; a heated surge tank; pH adjustment tank; and addition of defoamer;
- The facility has a 50% citric acid tank and states that citric acid is used in the generation of 99% of products. The facility also uses citric acid to adjust the pH in the onsite wastewater treatment;
- MSDS for raw materials is kept and updated on a third party server;
- One MSDS sheet for a Rhodasurf raw material reviewed on site lists ethylene oxide and acetaldehyde as reportable constituents;
- In air emissions calculations, Solvay assumes emissions of ethylene oxide are negligible;
- The facility has demolished the emission unit listed as the “multi-purpose reactor system” in their 2012 FESOP.

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations:

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EPA toured the facility and saw the emission units for the chemithon, amide, blending, and wastewater operations. No emission units were operating at the time of our inspection. EPA took several FLIR videos during the tour that showed VOC emissions from Tank #317, the wastewater sump room, and the cooling tower.

Pursuant to Ill. Adm. Code 201.302, the Illinois SIP requires the facility to submit Annual Emission Reports (AERs). EPA requested Solvay to submit copies of the 2020 and 2021 AERs.

Pursuant to Ill. Adm. Code 212.110(e), the Illinois SIP requires the facility to retain records of all tests performed for at least three years. Solvay told EPA that they were unaware of any performance test ever being conducted on the chemithon ESP or scrubber.

Pursuant to Ill. Adm. Code Part 218 and the 2012 FESOP, the facility is required to operate their chemithon, amide, and blending units, among others, below specific VOC tons/yr emission limits. EPA requested a copy of the internal calculations for VOC emissions from 2020 and 2021 and documents regarding the emission factor calculation from the dioxane stripper installed in 2021.

Pursuant to item 17(a)(iii) of Permit No. 031024AAY, Solvay is required to maintain records of, among other things, MSDS of raw materials used in the processes at the facility. EPA requested Solvay to submit copies of the MSDS sheets for the most-used raw materials in the processes.

Photos and/or Videos: were taken during the inspection.
Videos were taken with the FLIR. 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:

- AER spreadsheets (including throughput) for 2020 and 2021;
- MSDS sheets for all raw material listed in AER spreadsheets;
- Copy of the presentation shown in the Opening Conference of the inspection;
- Process flow diagrams for Amide and Sulfation processes;
- Dioxane discharge spreadsheet for 2020 and 2021;
- BI Dioxane Stripper Emission Calculation Spreadsheet;
- Copy of Blue Island SPCC Plan 2022;
- Lab testing (confirmation testing) results for Rhodasurf L-1, L-2, and T-3; and
- Temperature and pressure ranges for all emission units listed under the Amide synthesis Unit Operations and Continuous Sulfation Unit Operation in the FESOP.

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Concerns: EPA saw emissions with the FLIR from Tank #317. Solvay informed EPA that Tank #317 is an old HCl tank that has been decommissioned for at least 15 years. Solvay informed EPA that they will investigate the emissions seen from Tank #317.

DIGITAL SIGNATURES

Report Author: **KARYN**
DEFRANCO

 Digitally signed by KARYN
DEFRANCO
Date: 2023.02.23 08:08:10
-06'00'

Section Supervisor: **Brian Dickens**

 Digitally signed by Brian Dickens
Date: 2023.02.23 08:48:37
-06'00'

Facility Name: Solvay USA Inc.
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APPENDICES AND ATTACHMENTS

- 1.* Appendix A: FLIR Video Log

Facility Name: Solvay USA Inc.

Facility Location: Blue Island, IL

Date of Inspection: January 31, 2023

CONFIDENTIAL BUSINESS INFORMATION ATTACHMENT

Facility Name: Solvay USA Inc

Facility Location: 14000 Seeley Avenue, Blue Island, IL

Date of Inspection: January 31, 2023

Solvay requested the six FLIR videos be treated as CBI.

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APPENDIX A: FLIR VIDEO LOG

1. Inspector Name: Victoria Nelson	2. Archival Record Location: <i>ERC>AECAB Library>Enf_SolvayUSA_IL_23</i>
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Video Number	File Name	Date and Time (incl. Time zone and DST)	Description of Video
1	MOV_3031.mp4	1/31/2023 15:41	Emissions captured on FLIR from around Tank #317
2	MOV_3032.mp4	1/31/2023 15:41	Emissions captured on FLIR from goose neck vent to atmosphere from the molten sulfur pit
3	MOV_3033.mp4	1/31/2023 15:41	Emissions captured on FLIR from around Tank #317
4	MOV_3034.mp4	1/31/2023 15:42	Potential emissions captured on FLIR from the top of the wastewater sump
5	MOV_3035.mp4	1/31/2023 15:42	Emissions captured on FLIR from around Tank #317
6	MOV_3036.mp4	1/31/2023 15:42	Emissions captured on FLIR from the cooling tower on top of the roof of the reactor room