



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

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
Vertellus Zeeland, LLC, Zeeland, MI

FROM: Karyn DeFranco, Inspector
AECAB (MN/OH)

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

TO: File

BASIC INFORMATION

Facility Name: Vertellus Zeeland, LLC

Facility Location: 215 N. Centennial St., Zeeland, MI

Date of Inspection: January 24, 2023

EPA Inspector(s):

1. Karyn DeFranco, Inspector
2. Virginia Galinsky, Inspector
3. Kaitlyn DeVries, EGLE Inspector

Other Attendees:

1. Jeff Voorhies, EHS Manager, Vertellus Zeeland
2. Steve Pohler, Engineer Manager, Vertellus Zeeland

Contact Email Address: jvoorhies@vertellus.com

Purpose of Inspection: to investigate compliance with the synthetic minor limits established in the Permit to Install (PTI or permit) and investigate corrective action taken after incident reports filed by the company

Facility Type: Chemical manufacturer.

Regulations Central to Inspection: National Emission Standards for Hazardous Air Pollutants for Chemical Manufacturing Area Sources (Subpart VVVVVV); PTI No. 104-09G. Specifically,

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pursuant to Subpart VVVVVV, at 40 C.F.R. § 63.11494(a), chemical manufacturing operations that process, use, or produce the HAP shown in Table 1 of the NESHAP are subject to Subpart VVVVVV. Included in Table 1 are nickel compounds and methylene chloride.

Arrival Time: 9:00 am

Departure Time: 1:15 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 Vertellus Zeeland unless otherwise noted.

Company Ownership: In 2021 Pritzker Private Capital purchased Vertellus.

Process Description:

Vertellus Zeeland is a specialty chemical manufacturer that operates dozens of different batch processes. However, Vertellus Zeeland has four main chemical processes: Vitride, EMA, WS5, and CPC, all of which are batch processes. Vitride and EMA run continuously, and WS5 and CPC are campaigns but run the majority of the time.

Vitride: The Vitride process, located in Building 26, reacts a mixture of sodium metal, aluminum powder, liquid toluene, and liquid MCS under hydrogen pressure in one of two autoclave reactors to create Vitride as a final product. After the autoclave, solids are filtered out by a filter and toluene is separated in a density-driven process. The solids and spent toluene are considered waste and disposed of offsite. There are two mineral-oil scrubbers and one dust collector associated with this process.

EMA: The EMA process, located in Building 31, reacts a mixture of liquid toluene, molten maleic anhydride, and liquid organic peroxide initiator under about 150 pounds of ethylene pressure in one of four reactors to create ethylene maleic anhydride (EMA). After the mixture is processed in the reactors it is fed to a slurry tank under ethylene pressure, then to a degassing tank, where ethylene degasses to an ethylene recovery system, then to one of four centrifuges, and then to one of two dryers and a blender where the final powdered EMA is packaged. Air emissions are vented to one of two cold traps and a wet scrubber. The vapors knocked out of the gas stream in the cold traps condense and go to toluene recovery where recovered toluene is then reused in this process. The ethylene gas recovery consists of two gas compressors and the

recovered gas is used for the initial ethylene gas charge to the autoclaves. A secondary ethylene gas charge brings the gas to high pressure.

CPC: The CPC process, located in Building 19, is one of the three buildings within a flexible group in the permit with emission units subject to Subpart VVVVVV. The CPC process reacts a mixture of acetyl chloride and pyridine in a reactor under elevated temperature and pressure. After the principal reactor, MEK is also added to the mixture. When the reaction is complete, the mixture goes through a crystallization tank and centrifuge. The liquor from the centrifuge is composed of MEK and pyridine, which goes to a still for recovery of material to be reused in the process. The wet cake is dried and then packaged as final product. Air emissions from the dryer are routed to a dust collector and pulled to a condenser to catch solvent. Air emissions from the reactor, crystallization tank and centrifuge are vented to cold traps for MEK and pyridine collection and the Building 07 mineral-oil scrubber. The Building 07 mineral-oil scrubber controls emissions for Buildings 05, 07, and 19.

WS5: The WS5 process is also located in Building 19 within a flexible group in the permit with emission units subject to Subpart VVVVVV. The WS5 process reacts liquid heptane, WS1, and phosphorous trichloride to generate WS1 and acid chloride as intermediate products and reacts the intermediate products with an aqueous glycine ethyl ester hydrochloride mixture and an aqueous sodium carbonate mixture. After the reactors, the mixture undergoes density-driven separation where the bottom aqueous layer is separated and collected as waste. The top layer, which is heptane mixed with the product, is washed with water to remove more waste material, then undergoes density-driven separation. It then goes to an azeo column, which is heated to drive off water. It then goes to a crystallization tank to form a slurry, which is sent to the centrifuge where any remaining heptane is sent to a still to be recovered. The wet cake is dried to generate the finished powdered WS5. Air emissions from the heptane still are vented to the Building 07 mineral-oil scrubber. Emissions from the dryer are routed to a dust collector and to a condenser to recover heptane.

Vertellus Zeeland also produces chromium picolinate, which is a vitamin. The process reacts sodium hydroxide, water, cyanopyridine, sulfuric acid, and chrome-alum as raw materials to ultimately produce chromium picolinate. Ammonia is generated as a byproduct from the initial reaction and is neutralized in-line in a sulfuric acid scrubber. The material is then cooled and centrifuged to produce the chromium picolinate. The chromium picolinate is then dried, ground, and packaged. Emissions from the dryer are controlled by the Building 02 scrubber. Emissions from the grinding operation are controlled by the Building 19 dust collector.

Staff Interview:

- Vertellus Zeeland monitors flow of mineral oil in the Vitride mineral oil scrubber;
- The PC-1036 process operates approximately two batches per month. Vertellus Zeeland told EPA that this emission unit may use methylene chloride;
- Vertellus Zeeland stated that nickel catalyst may be used at the facility;
- Reactor 5-R-9013 in Building 5 was the emission unit associated with a 2021 release reported. Vertellus Zeeland stated that they have not used xylene in this reactor since the

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emission release. Vertellus Zeeland believes this event was due to unexpected high vapor pressure due to inadequate venting.

- Reactor 5-R-9009 in Building 5 was the emission unit associated with a 2020 release reported. Vertellus Zeeland made an improvement to the 5-R-9009 reactor to prevent a disc from moving around and breaking prematurely;

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations:

EPA toured the facility. We used a FLIR camera to observe multiple parts of the facility but did not record any video.

EPA observed multiple processes in operation during the tour. However, neither the Vitride process nor the chromium picolinate process were running at the time of the tour.

Pursuant to Subpart VVVVVV, Vertellus Zeeland accepted throughput limits on material through, among other things, the emission units in the CPC process and chromium picolinate process. Vertellus Zeeland told EPA that the internal air emission calculations include this underlying data. EPA requested a copy of the internal air emissions calculations.

EPA requested information on if nickel catalysts have been used in the past five years for any processes and for Vertellus Zeeland to provide the emission units/processes in which the nickel catalysts were used, and the quantity of catalyst used.

Pursuant to Subpart VVVVVV, at 40 C.F.R. § 63.11494(a), chemical manufacturing operations that process, use, or produce the HAP shown in Table 1 of the NESHAP are subject to Subpart VVVVVV. Included in Table 1 is methylene chloride. Vertellus Zeeland uses methylene chloride in the PC-1036 process. EPA requested supporting documentation regarding the PC-1036 NESHAP VVVVVV exemption.

The permit requires Vertellus Zeeland to, among other things, limit ethylene emissions from the facility to 1.0 lb of ethylene per lb of product per batch from the permitted equipment classified as "FGCONSOLIDATED." Pursuant to this permit requirement EPA requested a copy of the 2021 TRI report and description of why the TRI reported data varies from the 2021 air emission calculations.

Photos and/or Videos: were not taken during the inspection.

Field Measurements: were not taken during this inspection.

CLOSING CONFERENCE

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

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Requested documents/information:

- Internal air emissions calculations for 2022;
- Documentation of the determination of the emission factors used in air emission calculations;
- Copy of air pollution control efficiency documents;
- Process block flows for the five main processes inspected (Vitride, EMA, CPC, WS5, Chromium);
- Flow diagrams of air emissions to air pollution control devices for the five main processes inspected (Vitride, EMA, CPC, WS5, Chromium);
- Copy of the 2021 TRI report and description if the TRI reported data varies from the 2021 air emission calculations requested above;
- A copy of the photo from the inspection tour of the wet scrubber duct, which was taken on Mr. Voorhies' phone due to ClassI DivII concerns;
- Nickel catalyst usage information; and
- Documents regarding NESHAP VVVVVV exemption for methylene chloride use at the facility.

Concerns: U.S. EPA noted that the facility's TRI reports indicated emissions of ethylene that exceed the company's permitted emission limit. When EPA spoke to Vertellus Zeeland about these reported emissions, Vertellus Zeeland did not know about the TRI emission report discrepancy.

DIGITAL SIGNATURES

Report Author: **KARYN DEFRANCO**
Digitally signed by KARYN DEFRANCO
Date: 2023.03.15 11:50:05 -05'00'

Section Supervisor: **DAVID SUTLIN**
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Date: 2023.03.15 12:53:14 -05'00' for Brian Dickens