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

SUBJECT:	CLEAN AIR ACT INSPECTION REPORT Union Carbide Corporation, Hahnville, Louisiana
FROM:	Victoria Nelson, Environmental Engineer AECAB (MI/WI)
THRU:	Sarah Marshall, Section Supervisor AECAB (MI/WI)
TO:	File

BASIC INFORMATION

Facility Name: Union Carbide Corporation (UCC)

Facility Location: 355 LA Highway 3142, Hahnville, Louisiana

Dates of Inspection: April 19 – 20, 2022

EPA Inspectors:

1. Victoria Nelson, EPA Region 5, Environmental Engineer
2. Karina Kuc, EPA Region 5, Environmental Engineer
3. Sarah Frey, EPA Region 6, Physical Scientist
4. James Haynes, EPA Region 6, Physical Scientist
5. Christopher Williams, EPA OECA, Chemical Engineer
6. Rich Helmich, EPA NEIC, Chemist
7. Ali Gitipour, EPA ORD, Federal Postdoctoral Research Fellow - Chemical Engineer
8. David Mahoney, EPA NEIC, Technical Coordinator

Other Attendees:

1. Charles Cuti, UCC, Leveraged Air Specialist
2. Brendan Chambon, UCC, Environmental Air Specialist
3. Brandon Saunier, Louisiana Department of Environmental Quality, Environmental Scientist
4. Irving Range, Think Environmental, Operations Manager
5. Dennis Fleming, Think Environmental, Site Supervisor
6. Jeff Lyons, Think Environmental, LDAR Technician

Contact Email Address: Charles Cuti – CRCuti@dow.com

Purpose of Inspection: To evaluate compliance with the Clean Air Act

Facility Type: Organic Chemical Manufacturing

Regulations Central to Inspection: National Emission Standards for Benzene Waste Operations, 40 C.F.R. Part 61, Subpart FF; National Emission Standards for Organic Hazardous Air Pollutants (NESHAP) from the Synthetic Organic Chemical Manufacturing Industry, 40 C.F.R. Part 63, Subparts F, G, and H (HON); NESHAP for Ethylene Manufacturing Process Units, 40 C.F.R. Part 63, Subpart XX; NESHAP for Miscellaneous Organic Chemical Manufacturing, 40 C.F.R. Part 63, Subpart FFFF (MON)

April 19, 2022
Arrival Time: 9:15 AM CT
Departure Time: 5:30 PM CT

April 20, 2022
Arrival Time: 8:45 AM CT
Departure Time: 5:40 PM CT

Inspection Type:
☒ Unannounced Inspection
☐ Announced Inspection

OPENING CONFERENCE

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

The following information was obtained verbally from Charles Cuti and Brendan Chambon unless otherwise noted.

Company Ownership: UCC is a subsidiary of the Dow Chemical Company. In December 2020, Vopak Industrial Infrastructure Americas St. Charles, LLC (Vopak) became the owner of the storage tanks that support raw material, product, and wastewater storage and associated transfer operations for the UCC facility. The storage tanks and associated equipment are co-located with the UCC facility.

Process Description:
UCC operates several chemical manufacturing process units at the Hahnville facility. A majority of the storage tanks used to store raw material, product, and wastewater are owned and operated

by Vopak. There are six ethylene oxide (EO) storage tanks (Tanks 2400 - 2405) that remain under the ownership and operation of UCC. The six EO tanks are referred to as the "EO Mound" and are underground. The EO Mound tanks are vented to a scrubber for EO recovery and then to a steam-assisted flare for control, denoted as Flare 507 in the corresponding Title V Permit. Tank loading operations are controlled by a vapor balance system.

The "Olefins Plant" contains two olefins process units that produce 1,3-butadiene, ethylene, acetylene and propylene from ethane and propane cracking. Naptha is stored at Vopak and is a raw material for the process, along with ethane and propane that UCC receives by pipeline. The raw materials are introduced to a furnace that is fueled with natural gas and methane. There are 11 furnaces in which cracking occurs. Following cracking, the process stream goes through a quench system and then through an acid gas system. Next, the process stream goes through a series of distillation columns to separate out 1,3-butadiene, ethylene, acetylene, and propylene. Most of the ethylene produced goes to other process units on-site. A portion is sent off-site to other Dow facilities. The olefins units produce benzene-containing wastewater that is subject to treatment under Subpart FF. Wastewater streams are transferred through the unit via open drain systems and then stored in Tanks 1301, 1311, 1321, and 1331 at the Vopak terminal. Wastewater is transferred back to UCC and is treated in three oil-water separators and three wastewater strippers in the olefins units for benzene removal. UCC uses a continuous analyzer to detect the concentration of organic material in the wastewater following treatment in the process unit. The wastewater stream will be retreated at the oil-water separators and wastewater strippers until it meets the minimum concentration to be transferred to the on-site wastewater treatment operation.

Non-benzene containing wastewater from the other process units is routed to the on-site wastewater treatment operation. The wastewater treatment plant includes a large, open aeration pond. UCC does not monitor these wastewater streams for concentrations of organic hazardous air pollutants (HAP). Periodically, UCC collects samples from the wastewater sumps (the point prior to transfer to the wastewater treatment plant) at each process unit and has them analyzed for concentrations of organic compounds.

The "Oxides Plant" produces EO with ethylene and oxygen in the presence of a silver catalyst. Following the formation of EO, an analyzer is used to measure the product stream. The sample line for the analyzer, denoted as 46R and EQT 120 in the corresponding UCC Title V Permit, vents to atmosphere. A steam-assisted flare controls emissions from the Oxides Plant. The EO is used on-site in other process units and also sent off site by rail.

The "Polyethers Plant" is a batch process unit that operates with EO as a raw material.

The "Amines Plant" contains three process units that produce ethylene amines, ethanol amines, and other various amines. EO and ammonia are raw materials for some of the units.

The "Acrylics Plant" consists of multiple process units that produces acrylic acid, acrolein, heavy esters, 2-ethylhexyl acrylate, and methyl acrylate. A steam-assisted flare controls emissions from the Acrylics Plant.

Staff Interview: UCC has approximately 900 employees and operates the Hahnville facility 24 hours a day for seven days a week.

The scrubber used for EO recovery at the storage tanks header prior to flaring was brought online in March 2021. A design evaluation was done for the scrubber and no testing has been performed.

Recently, one of the Acrylics Plant process units was converted from ethyl acrylate production to produce methyl acrylate.

Interview of Dennis Fleming, Site Supervisor and Irving Range, Operations Manager with Think Environmental: Think Environmental staff perform LDAR monitoring for the UCC facility, as well as for the co-located terminal operated by Vopak. Think Environmental LDAR Technicians use ThermoFisher Toxic Vapor Analyzer 1000 flame ionization detectors (TVA 1000) to conduct EPA Method 21 monitoring. Prior to use, each TVA 1000 is calibrated using methane span gases of 500, 1,000, 5,000, and 10,000 parts per million (ppm). EPA reviewed calibration records that showed past usage of isobutylene calibration gases. In April 2021, Think Environmental technicians switched from using Phoenix 21 photo ionization detectors to the TVA 1000 FID.

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations:
EPA inspectors observed organic emissions at storage tanks operated by Vopak using the FLIR GFx-320 and a flame ionization detector (FID). Think Environmental LDAR Technician, Jeff Lyons, confirmed EPA's FID readings with the FID regularly used for LDAR monitoring conducted on-site.

Photos and/or Videos: were taken during the inspection.
EPA inspectors recorded videos using the FLIR GFx-320. *See* Appendix A.

Field Measurements: were taken during this inspection.
EPA inspectors collected organic emissions data using a FID. *See* Appendix B.

EPA also toured the facility with a mobile air monitoring unit, or geospatial measurement of air pollution (GMAP), and collected air canister samples for lab analysis. The results from the GMAP and air samples will be detailed in a separate report. With the GMAP, EPA detected elevated EO concentrations that appeared to be from an open sample line associated with an analyzer in the Oxides Plant. EPA also observed with the GMAP elevated benzene concentrations at the base of Tanks 1301, 1311, 1321, and 1331. Additional GMAP results were noted during the inspection and will be included in the comprehensive report.

RECORDS REVIEW

1. Sample LDAR Calibration Records from 2018 - 2022
2. Notifications of Compliance Status for process units subject to the HON and MON

CLOSING CONFERENCE

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

Requested documents:

- Current permits for each process unit
- LDAR Database for the previous five years
- Notifications of Compliance Status for the HON, MON, Subpart FF, and Subpart XX
- Semi-annual and quarterly compliance reports for MON, HON, and Subpart FF, 2020 - 2021
- Wastewater sumps sampling results, 2018 - 2022
- Monthly benzene stripper samples, Jan. 2022 - March 2022
- Process flow diagrams for each process unit and wastewater streams
- Wastewater emission calculations
- Site-wide annual emissions calculations for 2020 and 2021
- Benzene wastewater analyzer data, 2020 - 2022
- Total Annual Benzene reports, 2020 and 2021
- Completed work orders for leaks identified during the inspection
- Flare 507 - "EO Flare" Emission Calculations

Compliance Assistance: EPA recommended repair of the leaks identified during the inspection, see Appendix B.

Concerns: EPA noted that open drain hubs throughout the olefins units, which UCC staff believed were part of the process unit's wastewater transfer system, were observed with detectable emissions.

DIGITAL SIGNATURES

Report Author: VICTORIA NELSON Digitally signed by VICTORIA NELSON Date: 2022.05.16 11:42:03 -05'00'

Section Supervisor: SARAH MARSHALL Digitally signed by SARAH MARSHALL Date: 2022.05.16 12:10:28 -05'00'

APPENDICES AND ATTACHMENTS

1. Appendix A: Digital Video and Image Log
2. Appendix B: EPA Monitoring Results and Calibration Information

Facility Name: Union Carbide Corporation
Facility Location: 355 LA Highway 3142, Hahnville, Louisiana
Date of Inspection: April 19-20, 2022

APPENDIX A: DIGITAL VIDEO AND IMAGE LOG

1. **Inspector Name:** Karina Kuc, Victoria Nelson	2. **Archival Record Location:** Region 5 Electronic Records Center

Image Number	File Name	Date and Time (Central time)*	Description of Image
1	MOV_0218.mp4	4/19/2022 15:35	Olefins 1 Flare
2	MOV_0219.mp4	4/19/2022 15:39	Sewer grate in Olefins 1
3	MOV_0220.mp4	4/19/2022 15:41	Sewer grate in Olefins 1
4	MOV_0221.mp4	4/19/2022 15:52	Boiler feed water pump
5	MOV_0222.mp4	4/19/2022 15:54	Stack for Furnace 11
6	MOV_0223.mp4	4/19/2022 16:35	Lummus furnace stack
7	MOV_0224.mp4	4/20/2022 15:47	Leak on equipment LDAR ID: 36963
8	MOV_0225.mp4	4/20/2022 15:49	Leak on methane column reformer pump - tag frozen therefore ID couldn't be read
9	MOV_0226.mp4	4/20/2022 15:59	Leak on equipment LDAR ID: R4655.1
10	IR_0228.jpg	4/20/2022 16:17	Leak on equipment LDAR ID: R4655.1
11	MOV_0229.mp4	4/20/2022 16:30	Leak on control valve at the base of FA-3208
12	MOV_0230.mp4	4/20/2022 16:37	Leak on equipment LDAR ID: 1036
13	MOV_0231.mp4	4/20/2022 17:16	Leak on methane line
14	MOV_0232.mp4	4/20/2022 17:18	Leak on flare sweep line (methane) no LDAR ID
15	IR_0233.jpg	4/20/2022 17:33	Wastewater drain hub open to atmosphere
16	IR_0234.jpg	4/20/2022 17:35	Wastewater drain hub open to atmosphere
17	IR_0235.jpg	4/20/2022 17:35	Wastewater drain hub open to atmosphere, plugged with a pad
18	MOV_0236.mp4	4/20/2022 17:46	Process line overflowing into stormwater sewer
19	MOV_0239.mp4	4/21/2022 12:25	Union Carbide Oxides Flare and Thermal Oxidizer stack
20	MOV_0240.mp4	4/21/2022 12:26	Union Carbide Acrylics Flare – EPA observed smoke from the Acrylics flare at the flame.
21	MOV_0244.mp4	4/21/2022 13:08	Union Carbide Oxides Flare and Thermal Oxidizer stack

*The time reflected on the timestamp is an hour later than the video was recorded.

APPENDIX B: EPA MONITORING RESULTS AND CALIBRATION INSTRUMENTATION

Monitoring Results from Inspection 4/19/2022 – 4/20/2022 and Calibration and Instrument Information

Table 1. Monitoring of Process Equipment and Wastewater Transfer Points

Equipment	Location	Notes	EPA Inspector	Date	EPA Reading (ppm)	Think Environmental Reading (ppm)
Open drain hub	North Quench Area of the Olefins 1 Unit		Victoria N.	4/19/2022	650	248
Valve R50667	Olefins 2 Unit C2 Column		Victoria N.	4/20/2022	894	1028
Stormwater drain	Beneath Deethanizer Reflux Pump in Olefins 2 Unit		Victoria N.	4/20/2022	25	81
Valve R41618	Methane Column Reflux Drum (FA-3311)		Victoria N.	4/20/2022	1,700	1,020
Connector R36963	Methane Column in Olefins 2 Unit		Victoria N.	4/20/2022	1,229	2,505
Pump	Methane Column Reformer	Tag number was frozen over and could not be observed. Significant emissions were observed from equipment at the Methane Column in the Olefins 2 Unit.	Victoria N.	4/20/2022	1,200	2,876
Connector R4655.1	At the base of the Methane Column #3 Feed Separator	Leak at the drain line to the flare	Victoria N.	4/20/2022	> 80,000	9,092
Connector	At the base of Methane Feed Stripper (DA-3302) in Olefins 2 Unit	No LDAR tag. Potential leak from the insulation in this area.	Victoria N.	4/20/2022	>20,000	9,999
Pressure Regulator	Next to Instrument 4234 at Gypsy Line Knock-Out Pot	No LDAR tag.	Victoria N.	4/20/2022	4,000	--

Valve	At Methane Line from C2 Dryer in Olefins 2 Unit	Not part of the LDAR program.	Victoria N.	4/20/2022	8,000	10,000
Control Valve	Leak from Process Line at Base of FA-3208	Not part of the LDAR program. Visible leak – equipment covered in yellow material. Could not find the highest leak point due to significant, overwhelming odors.	Victoria N.	4/20/2022	>1,000	--
OEL	At base of line to the Propylene Accumulator. Below Valve 1036.		Victoria N.	4/20/2022	>10,000	9,000
Control Valve	Fuel gas line from another process unit feeding to the fuel drum	No LDAR tag.	Victoria N.	4/20/2022	>10,000, Flame out	7,888
Valve	Flare Sweep line next to Ethane Feed Preheater	No LDAR tag and not in the LDAR program.	Victoria N.	4/20/2022	802	--
Valve	Flare Sweep line next to Ethane Feed Preheater	No LDAR tag and not in the LDAR program.	Victoria N.	4/20/2022	>10,000	9,821
Connector	Flare Sweep line next to Ethane Feed Preheater	No LDAR tag and not in the LDAR program.	Victoria N.	4/20/2022	>10,000	--
Open drain hub	Next to Valve 9708	J. Lyons observed the reading on EPA's instrument	Victoria N.	4/20/2022	810	210
Open drain hub	Next to Flux Oil Tank Containment area		Victoria N.	4/20/2022	880	Charles Cuti confirmed the reading on EPA's instrument. J. Lyons left the tour at the end

						of his shift at 4:30 PM.
Open drain hub	Near Flux Oil Tank Containment area		Victoria N.	4/20/2022	275	C. Cuti confirmed the reading on EPA's instrument.
Open drain hub	Near Flux Oil Tank Containment area		Victoria N.	4/20/2022	112	C. Cuti confirmed the reading on EPA's instrument.
Open drain hub	Near Flux Oil Tank Containment area		Victoria N.	4/20/2022	111	C. Cuti confirmed the reading on EPA's instrument.
Open drain hub	Near Flux Oil Tank Containment area		Victoria N.	4/20/2022	350	C. Cuti confirmed the reading on EPA's instrument.
Open drain hub	Near Flux Oil Tank Containment area		Victoria N.	4/20/2022	120	C. Cuti confirmed the reading on EPA's instrument.
Background reading	At base of furnace	A process sewer hub was overflowing to a nearby stormwater drain that drains to an open oil skimmer prior to wastewater treatment on-site.	Victoria N.	4/20/2022	15	

Legend:
"--" Used to denote that J. Lyon's confirmation reading was not given to EPA or that J. Lyons was not available to confirm the reading.
OEL – Open-ended valve or line

Calibration and Instrument Information

EPA used one ThermoFisher Toxic Vapor Analyzers 2020 (TVA2020). The EPA TVA2020 response times are in the 4 to 5 second range. During the inspection, Jeff Lyons, Think Environmental LDAR Technician, used a flame ionization detector (FID), model ThermoFisher Toxic Vapor Analyzer 1000, to confirm EPA's readings. All readings were collected on April 19-20, 2022.

Victoria Nelson used TVA2020 ID: SL1555 for the duration of the survey.

Table 2. Instrument Calibration

April 19, 2022	SL1555 Reading (ppm)
1:45pm Calibration Reading, 500 ppm	496
1:45pm Calibration Reading, 10,000 ppm	10,300

April 20, 2022	SL1555 Reading (ppm)
2:17pm Calibration Reading, 500 ppm	499
2:17pm Calibration Reading, 10,000 ppm	10,300
5:10pm Drift Check, 500 ppm	520
5:10pm Drift Check, 10,000 ppm	10,600

Table 3. Calibration Gases

Manufacturer	Composition	Lot #	Expiration
TG Technical Services	Zero air	TDBJ-1-22	3/27/2023
TG Technical Services	Methane, 500 ppm	TDBJ-150A-500-11	3/27/2023
TG Technical Services	Methane, 1%	TIBJ-135A-1-1	8/21/2023