United States Environmental Protection Agency
Office of Enforcement and Compliance Assurance
Office of Criminal Enforcement, Forensics and Training

National Enforcement Investigations Center

NEIC

**NEICVP1333E02**

# NEIC CIVIL INVESTIGATION REPORT
## Indorama Ventures Olefins
Westlake, Louisiana

**Investigation Dates:**
May 10-17, 2022


Matthew Schneider
Project Manager, NEIC

MATTHEW SCHNEIDER
Digitally signed by MATTHEW SCHNEIDER
Date: 2022.07.27 12:45:04 -06'00'

Richard Helmich
Analytical Project Manager, NEIC

Helmich, Richard
Digitally signed by Helmich, Richard
Date: 2022.07.27 15:40:22 -06'00'


**Authorized for Release by:**

REBECCA CONNELL
Digitally signed by REBECCA CONNELL
Date: 2022.07.28 09:23:26 -06'00'
Rebecca Connell, Field Branch Chief, NEIC

**Report Prepared for:**
EPA Region 6
1201 Elm Street
Dallas, Texas 75270


NATIONAL ENFORCEMENT INVESTIGATIONS CENTER
P.O. Box 25227
Building 25, Denver Federal Center
Denver, Colorado 80225

## CONTENTS



### TABLES



### FIGURE

**APPENDICES** (*NEIC-created document)

**Clean Air Act (CAA)**



**Resource Conservation and Recovery Act (RCRA)**



**This Contents page shows all the sections contained in this report and provides a clear indication of the end of this report.**

# INVESTIGATION OVERVIEW

## PROJECT OBJECTIVE

U.S. Environmental Protection Agency (EPA) Region 6 (Region) requested EPA's National Enforcement Investigations Center (NEIC) to conduct a multimedia compliance investigation of the Indorama Ventures Olefins (Indorama) facility located in Westlake, Louisiana. The scope of the investigation included a review of Indorama's compliance with the Clean Air Act (CAA) and the Resource Conservation and Recovery Act (RCRA).

**Table 1** lists the project team members.

| Table 1. PROJECT TEAM MEMBERS | | |
|---|---|---|
| **Team Member** | **Organization** | **Project Role** |
| Matthew Schneider | NEIC | Project manager (PM) |
| Hans Buenning | NEIC | Field team member (CAA) |
| Laura Kanopkin | NEIC | Field team member (RCRA) |
| Brian Kennedy | NEIC | Field team member (RCRA) |
| Zel Nabiyar | NEIC | Field team member (CAA) |
| Cindy Schafer | NEIC | Field team member (CAA) |
| Richard Helmich | NEIC | Analytical project manager (APM) |
| Justin Bordoff | NEIC | Laboratory team member |
| **REGIONAL AND OTHER CONTACTS:** | | |
| James Haynes | EPA Region 6 | Regional field team member |

## FACILITY CONTACT INFORMATION

**Table 2** lists the primary facility contacts.

| Table 2. FACILITY CONTACT INFORMATION | |
|---|---|
| **Name, Title** | **Email Address** |
| Damian Fryoux, Environmental Manager | damian.fryoux@us.indorama.net |
| David Hext, Plant Manager | david.hext@us.indorama.net |
| Adam Brown, Regional EHS Representative | adam.brown@us.indorama.net |
| Leslie Stuart, Integrated Oxides and Derivatives Corporate Environmental Manager | stuart.leslie@us.indorama.net |
| Todd McLane, Principal Environmental Specialist | todd.a.mclane@us.indorama.net |
| Alex Perticone, Environmental Specialist – Water and Waste | alex.perticone@us.indorama.net |

## FACILITY OVERVIEW

Indorama is a chemical manufacturer located in Westlake, Louisiana, whose primary product is ethylene. Previously owned and operated by Equistar Chemicals, the facility was shut down in 2001 and purchased by Indorama in 2015. Indorama invested in process reliability and safety improvements and attempted to restart the facility several times, beginning in December 2018; the most recent restart commenced in September 2021. The facility's primary raw material is ethane, which is processed in the cracking furnaces to produce the ethylene product. At the

time of the NEIC inspection, the facility was operating at approximately 81 percent (%) capacity, the highest since the plant commenced the restarted operations. Saleable byproducts of the ethylene manufacturing process include propylene, 1,3-butadiene, pyrolysis gasoline (pygas), and an aromatic-rich fuel oil. The facility has the capacity to produce 890 million pounds per year of ethylene. Indorama currently employs 135 full-time employees and 75 contract employees at the Westlake facility.

**FACILITY OPERATIONS SUMMARY**

Ethane is delivered to the Indorama facility by pipeline. The ethane is saturated with water and then introduced into the cracking furnaces (eight), where a reaction at approximately 2,000 degrees Fahrenheit thermally cracks the ethane into ethylene, propylene, and other organic compounds. The reaction products are quenched in the quench tower (T-1) by direct contact with water. The quench water, along with condensed steam and hydrocarbons, are collected in a quench drum (D-1), which separates the organic phase from the aqueous phase. The organic phase is called “raw gasoline” or “fuel oil” and is collected in an internal floating roof fuel oil tank (FA-712).

Water collected in D-1 is recirculated and primarily reused as quench. However, approximately 10% of the water stream is processed in a coalescer (V-300) to recover additional fuel oil into FA-712, with the remaining water collected in process water tanks (TK-636A and TK-636B). Eventually, a sludge layer builds up in D-1; Indorama considers the sludge a waste and plans to remove it manually during plant turnarounds. Sludge layer removal has not occurred since the 2021 restart because the facility has not been operating long enough for the sludge to fully accumulate.

TK-636A and TK-636B are fixed-roof tanks and are vented to a shared carbon absorber (two carbon canisters operated in series) as a control device. The tanks are also equipped with oil skimmers to recover any organic liquids, which are returned to the process in D-1. The process water is steam stripped in T-301 to remove entrained organics, which are returned to the process in D-1. Most of the stripped water is used to saturate the ethane feed gas prior to cracking in the furnaces, with the balance sent to the wastewater treatment system for treatment.

The overhead product gas stream from the quench tower (T-1) is passed through a series of heat exchangers and compressors, where additional water and hydrocarbon vapors are condensed into suction drums and collected in D-1. The compressed overhead gas is then treated with caustic in the caustic towers (T-202 and T-2) to neutralize any acid present in the gas. A red-colored oil (called red oil) is skimmed from T-2 into a de-oiling drum (D-78) and is then collected in FA-712. De-oiled spent caustic from D-78 and the spent caustic from the bottoms of T-2 are then treated in the wet air oxidation (WAO) system.

At the WAO area, the spent caustic is first collected in the spent caustic tank (D-31), which is divided in the middle by a baffle; each half of the tank has a 48-hour residence time for any entrained organics to phase-separate. D-31 has a fixed roof and is vented to a carbon absorber (two carbon drums operated in series) as a control device. Oil that is collected in the tank is skimmed to the D-626 drum and then pumped to FA-712. The aqueous spent caustic is treated in the WAO reactor, which uses steam and air to both convert sodium sulfide to sodium sulfate and strip out organics, which are vented to on-site boilers (each with greater than 150 million British thermal units per hour [Btu/hr]) for incineration. The oxidized caustic is discharged to the wastewater treatment system at the equalization basin.

After it is treated in the caustic towers, water is removed from the gas by first cooling the gas using a propylene heat exchanger (condensing liquids and collecting them in D-1) and then sending the gas through molecular sieve dryers. The dryers are regenerated on-site with the water that is removed from the regenerated dryers collected in D-6, and then sent back to the process through D-1.

The dried gas is then sent through a series of columns, heat exchangers, and compressors to separate the gas into various fractions. Some separated components are saleable products (ethylene, propylene, 1,3-butadiene, pygas); some are recycled as raw material feed (ethane, propane); and some are used to supplement the fuel gas in the cracking furnaces (methane and hydrogen).

The ethylene product is sent to downstream users (other Indorama facilities) by pipeline. Propylene is stored on-site in bullet tanks and spheres before it is sent to downstream users by pipeline. The 1,3-butadiene product is stored in a dedicated sphere and is loaded out onto railcars. Pygas is collected in an internal floating roof tank (TK-635) and is also loaded out by railcar. The fuel oil in FA-712 is pumped into tank trucks for sale.

Wastewaters from individual drains throughout the facility are collected in the process sewer and discharged into a sump (TK-9 sump). The individual drains throughout the facility are not equipped with water seals, and the entire individual drain system is considered uncontrolled for volatile organic compound (VOC) emissions. Water collected in the TK-9 sump either can be collected in a tank (TK-9) for temporary storage or pumped directly to a corrugated plate interceptor (CPI) to separate any oil. Any oil collected at the CPI is sent to FA-712. After passing through the CPI, the wastewater is pumped to the equalization basin at the wastewater treatment plant for treatment.

The equalization basin at the wastewater treatment plant receives wastewater from the CPI, the WAO system, and recycled water from the west aeration basin. The equalization basin has a separate inlet trough where influent wastewater streams are first mixed. Because the WAO influent is highly caustic, carbon dioxide gas is injected into the trough to reduce the pH of the mixed wastewater streams. The WAO influent may also contain small amounts of residual oil,

which is skimmed from the inlet trough approximately every 2 weeks and containerized for disposal off-site as a non-hazardous waste.

Wastewater from the equalization basin moves to the east aeration basin (EAB), where the aerobic digestion of organics is encouraged by two active surface aerators. The EAB is the only active biological treatment unit in the wastewater treatment plant. After aeration, wastewater from the EAB is injected with a coagulant before entering the east clarifier for sludge settling. The west clarifier is currently inactive. Bottom sludge and floating scum are removed from the east clarifier and transferred to a splitter box. The splitter box dewaters the sludge and scum and pumps it to the west aeration basin (WAB). The WAB is inactive and acts solely to collect wasted sludge from the clarifier. Over time, wasted sludge and water in the WAB separate and the water is recycled back to the equalization basin for repeat treatment. Accumulated sludge is removed from the WAB as needed. The last sludge removal and disposal event occurred in 2021. Removed WAB sludge has been characterized as a non-hazardous waste.

Clean effluent from the east clarifier moves to the filter feed sump. The filter feed sump controls the flow of wastewater into six sand filters. If necessary, after the sand filters, wastewater may be further filtered in two carbon filters. The sand filters are occasionally cleaned through backwashing. Backwash from filter cleaning is pumped to the WAB. Spent carbon filter media is sent off-site for regeneration, or it is characterized prior to disposal.

After filtration, wastewater moves to the discharge basin, where it is mixed with cooling tower blowdown. From the discharge basin, wastewater moves through a pump house, which monitors wastewater quality before discharge through outfall 001 to Bayou D'Inde.

Stormwater in the wastewater treatment plant is collected by a series of drains and flows to a concrete ditch that runs along the western edge of the plant. Accumulated stormwater flows from the ditch into the #1 pond sump, which is an in-ground concrete sump. Stormwater in the #1 pond sump is pumped to the equalization basin for treatment. The #1 pond sump may also be used to divert "off-specification" water that enters the equalization basin. Off-specification water includes wastewater with high chemical oxygen demand or pH, or residual oil that may get past the inlet trough and harm the microbial population in the EAB.

**Waste Generation and Management**

Typical hazardous wastes generated by Indorama include paint waste from maintenance operations, lead paint waste, sample waste, spent solvents and aqueous wastes from the quality control laboratory, discarded or unused chemicals from the quality control laboratory, aerosol cans, and solids containing benzene from process unit cleanouts and spill cleanups.

Most of these hazardous waste streams are initially accumulated in four dedicated satellite accumulation areas (SAAs) staged around the site before they are transferred to two less-than-

90-day hazardous waste central accumulation areas. The first central accumulation area is an outdoor storage yard in the southeast corner of the facility. The second central accumulation area is a dedicated trailer sometimes referred to as the "C-Can" or "Old E Yard."

Indorama contracts with OMI Environmental Solutions (OMI) to assist in the characterization, management, and disposal of hazardous wastes generated on-site.

## FIELD ACTIVITIES SUMMARY

### Clean Air Act

The NEIC CAA inspection team consisted of Hans Buenning, Zel Nabiyar, Cindy Schafer, and Matthew Schneider. The CAA compliance evaluation included:

- Conducting a detailed process review
- Interviewing plant personnel
- Conducting a process area walkthrough and inspection
- Reviewing reports and records
- Conducting leak detection and repair (LDAR) monitoring and data evaluation
- Identifying and recording VOC emissions using optical gas imaging (OGI)
- Sampling selected wastewater streams
- Evaluating compliance with the following applicable regulations:
    - 40 Code of Federal Regulations (CFR) Part 63 Subpart YY – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories: Generic Maximum Achievable Control Technology Standards (Ethylene Production)
        - 40 CFR Part 63 Subpart UU (as referenced by Subpart YY) – National Emission Standards for Equipment Leaks – Control Level 2 Standards
        - 40 CFR Part 63 Subpart WW (as referenced by Subpart YY) – National Emission Standards for Storage Vessels (Tanks) – Control Level 2
        - 40 CFR Part 63 Subpart SS (as referenced by Subpart YY) – National Emission Standards for Closed Vent Systems, Control Devices, Recovery Devices and Routing to a Fuel Gas System or a Process
    - 40 CFR Part 63 Subpart XX – National Emission Standards for Ethylene Manufacturing Process Units: Heat Exchange Systems and Waste Operations
    - 40 CFR Part 61 Subpart FF – National Emission Standard for Benzene Waste Operations (BWON)

#### Equipment Leaks

Indorama contracts with Darbonne Services, Inc. (Darbonne) to perform monitoring of equipment subject to LDAR requirements. Darbonne has been the LDAR contractor at the

Indorama facility since April 2018. At the time of the inspection, the facility was in the midst of a re-tagging effort. Components other than connectors are identified by tags; connectors are identified by their location relative to tagged components. Darbonne does not perform repairs on leaking equipment. According to Stan Broussard, an LDAR technician for Darbonne, when Darbonne identifies a leaking component, the LDAR technician places a leak tag on the component, documents the leak while in the field, and then uploads the monitoring data into LeakDAS, the software program Darbonne uses on behalf of Indorama to maintain LDAR records. After Darbonne identifies a leaking component, Indorama creates a work order that tells maintenance personnel which component is leaking. After Indorama performs a repair attempt, Darbonne is notified to monitor the component to determine whether the repair was successful. Darbonne provides information from the LDAR database to Trinity Consultants, Inc. (Trinity), and Trinity uses that information to generate semi-annual reports.

Indorama is subject to the LDAR requirements in 40 CFR Part 63, Subpart UU (MACT UU), and 40 CFR Part 60, Subpart VVa (NSPS VVa), depending on whether the process stream is in volatile hazardous air pollutant (VHAP) service (MACT UU) or VOC service (NSPS VVa). For simplicity, Indorama complies with the requirements of MACT UU, which are as stringent or more stringent than the LDAR requirements in NSPS VVa. A summary of the LDAR monitoring campaign is provided in **Appendix CAA A**. NEIC inspectors notified Indorama personnel of each leak identified, and Darbonne LDAR technicians attempted to verify the leaks with their instruments during the on-site inspection. The NEIC field team requested and received the LeakDAS database of monitoring data; however, NEIC inspectors were unable to analyze the data before this report was issued. NEIC provided the data to EPA Region 6 for its review.

### BWON

Indorama is a chemical plant subject to the BWON and has reported that its aqueous waste contains more than 10 megagrams (Mg) of benzene per year; therefore, it is required to implement a strategy to control benzene emissions from facility waste operations. Indorama has selected the compliance option as described in 40 CFR § 61.342(e), also known as the "6BQ" option. The 6BQ compliance option requires the control of all organic wastes; additionally, all aqueous (greater than 10% water) wastes must be controlled and treated, except the total amount of benzene in the treated aqueous waste plus any uncontrolled aqueous wastes must be less than or equal to 6Mg per year.

The NEIC field team evaluated the points of waste generation reported by Indorama and inspected the facility operations related to the waste generation, management, control, and treatment of benzene waste. The inspection also included a review of inspection and monitoring records and required reports. The NEIC field team collected wastewater samples at the "end of line" to verify compliance with the 6BQ control option. **Figure 1** shows the NEIC

sample locations on a block flow diagram of the wastewater management system. Based on the analytical results from samples collected at the time of the NEIC inspection (**Tables 5-8**) and the associated average flow rates provided by Indorama shown in **Figure 1**, Indorama's discharged wastewater is not expected to contain more than 6Mg of benzene per year.

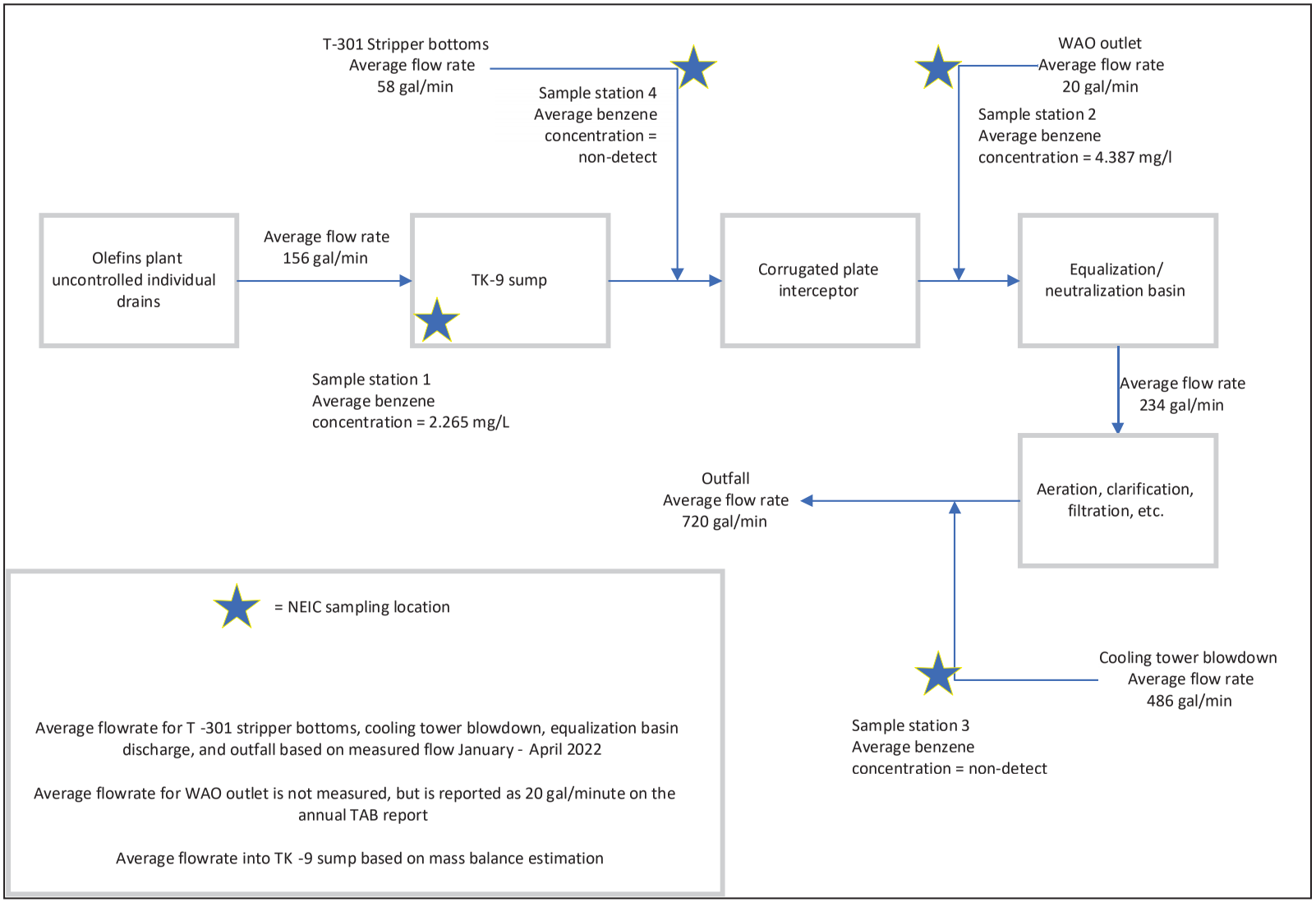
### Storage Tanks

Indorama operates five main atmospheric tanks for process streams and saleable product. As described above, these include two fixed-roof "process water" tanks (TK-636A and TK-636B), a fixed-roof spent caustic tank (D-31), a fuel oil internal floating roof tank (FA-712), and a pygas internal floating roof tank (TK-635). The NEIC field team inspected each of these five tanks using toxic vapor analyzers (TVAs) and infrared (IR) cameras from ground level and, when possible, from the platform at the tank tops. In addition, the NEIC field team requested inspection records of the internal floating roofs (TK-635 and FA-712) and documentation related to the design and performance of the carbon canisters controlling emissions from TK-636A, TK-636B, and D-31.

### Rail Loading Rack

Indorama operates a railcar loading rack for loading pygas and 1,3-butadiene. Emissions from railcar loading are routed to flare F-6. At the time NEIC inspectors were in this part of the facility, Indorama was loading a railcar with 1,3-butadiene. The NEIC field team inspected the railcar hookups, closed-vent system, and F-6 using a TVA and an IR camera.

**Figure 1. NEIC sample locations**



### Flaring

Indorama operates one main plant flare for the facility (known as flare No. 1 or F-4) to dispose of waste gas streams. Other companies (Citgo and Westlake Chemicals) operate two other flares located directly next to flare No. 1 on Indorama's property. Flare No. 1 is designed as a steam-assisted elevated flare and controls emissions from most processes at the facility, except, most notably, the rail loading area, which is controlled by a much smaller flare, known as F-6.

Indorama representatives stated that instead of routinely venting process gases to flare No. 1 to be controlled, they are recovered and used as fuel for the facility's boilers and furnaces. As such, flare No. 1 would normally only burn sweep gas during periods other than plant startup/shutdowns and other emergency situations. Sweep gas for flare No. 1 mainly consists of pipeline-quality natural gas, but some methane produced from within the plant is sometimes also added. However, during NEIC's inspection, Indorama representatives also described the facility's closed-vent systems used for controlling various process vent streams, including flare No. 1, which Indorama representatives stated controls emissions from units D-78 (oil/caustic separator) and D-17 (spent caustic degassing drum), indicating that some routine process vent streams are routed to flare No. 1.

Currently, Indorama uses a calorimeter to measure the heat content of vent gas for flare No. 1, but also takes two daily grab samples of the vent gas for gas chromatography analysis. Flare No. 1 is equipped with ultrasonic flow monitors for vent gas and steam assist flow measurements. NEIC inspectors requested data collected by these monitors.

NEIC inspectors surveyed flare No. 1 using an IR camera to observe any potential uncombusted hydrocarbons on multiple days during the inspection. NEIC inspectors also visited the main plant flare control room and observed live flare operating parameter data (e.g., fuel gas flow rate, heating value of vent gases). While in the control room, NEIC inspectors interviewed control room operators to better understand the circumstances for making operating adjustments to the flare.

## Resource Conservation and Recovery Act

The NEIC RCRA inspection team consisted of Brian Kennedy and Laura Kanopkin. The scope of the RCRA inspection included an evaluation of the wastewater collection and treatment system, quality control laboratory, less-than-90-day hazardous waste storage areas, and hazardous waste SAAs. The RCRA inspection also included a review of hazardous waste manifests, waste characterization procedures and profiles, waste storage area inspection records, personnel training documents, and contingency plan.

## Measurement and Sampling Activities

The NEIC field team provided support to this investigation by conducting LDAR monitoring, performing optical gas imaging, and collecting samples of selected wastewater streams. **Table 3** summarizes field measurement and field sampling activities. All field measurements are contained in the project file. A copy of the chain of custody record is provided in **Appendix CAA B**.

All environmental measurement activities were performed in accordance with the NEIC quality system. All field sampling, field measurements/monitoring, and laboratory measurements described in this report are within the scope of NEIC's ISO/IEC 17025 accreditation issued by the ANSI National Accreditation Board (certificate No. FT-0303).

**Table 3. FIELD MEASUREMENT AND FIELD SAMPLING ACTIVITIES**

| Location Identifier | Date(s) and Time | Method, and/or Procedure,[1] and Equipment | Measurer Name (Instrument ID) |
|---|---|---|---|
| **MEASUREMENTS** | | | |
| Process areas and regulated LDAR equipment | May 12-16, 2022 | **Method:** EPA Method 21: Determination of Volatile Organic Compound Leaks<br>**NEIC procedure:** *Toxic Vapor Analyzer (TVA)*, NEICPROC/00-016<br>**Equipment:** TVA 2020 toxic vapor analyzer | Hans Buenning (B24309)<br>Zel Nabiyar (B24309)<br>Cindy Schafer (B24213)<br>Matthew Schneider (B24310, B24309) |
| Process areas and regulated LDAR equipment | May 12-16, 2022 | **NEIC procedure:** *FLIR ThermaCAM™ GasFindIR, GF320, and Similar Infrared Cameras*, NEICPROC/11-005<br>**Equipment:** FLIR camera GF320 | Hans Buenning (C12101, C12128)<br>Zel Nabiyar (C12128)<br>Cindy Schafer (C12128) |
| MSA Altair 5X used to screen location for safety; RadEye used additionally to screen samples for radiation | May 12-17, 2022 | **NEIC procedure:** *Safety and Sample Screening Instruments,* NEICPROC/17-002<br>**Instrument guides:**<br>• *RadEye – Radiation Detection Equipment*<br>• *MSA Altair 5X Multi-Gas Monitoring Equipment*<br>**Equipment:**<br>• MSA Altair 5x multiple-gas monitor, serial No. (S/N) SN2420<br>• RadEye survey meter, S/N S84634 | Richard Helmich (RadEye)<br>Hans Buenning (Altair)<br>Brian Kennedy (Altair) |

| Table 3. FIELD MEASUREMENT AND FIELD SAMPLING ACTIVITIES | | | | | |
|---|---|---|---|---|---|
| **SAMPLING** | | | | | |
| **Station No. (sample location)** | **Appendix CAA C Photo Nos.** | **Dates** | **Sampling Technique** | **Procedure and Equipment** | **Sampler Name** |
| 1 (TK-9 sump) | 1, 5, 9 | May 13, 2022 and May 16, 2022 | Dipper cup for station 1; direct fill for stations 2-4 | **NEIC Procedure:** *Benzene Waste and Other NESHAP Sampling,* NEICPROC/02-005 **Equipment:** Volatile organic analysis vials preserved with hydrochloric acid (HCl) | Matthew Schneider |
| 2 (WAO outlet) | 2, 6, 10 | | | | |
| 3 (Cooling tower blowdown) | 3, 7, 11 | | | | |
| 4 (T-301 stripper bottoms) | 4, 8, 12 | | | | |
| [1] The current version of each procedure, at the time of the investigation, was followed. | | | | | |

Site activities were documented in field records, and field photographs are attached as **Appendices CAA C and RCRA A**. Samples collected during the field activities were placed on ice in tamper-evident bags and shipped (via UPS) to the NEIC laboratory in Denver, Colorado, for analysis.

## LABORATORY ACTIVITIES SUMMARY

Samples were shipped via UPS with tracking No. 1Z A42 01T 84 9604 6335. APM Richard Helmich received the samples from Matthew Schneider on May 18, 2022. The samples were photographed upon receipt, and photographs are provided in **Appendix CAA D**.

The laboratory team analyzed the samples at the NEIC laboratory for purgeable volatile organic compounds following EPA Method 8260D. The samples were prepared following EPA Method 5030C. **Table 4** summarizes the analytical methods followed, as well as the analysts and dates of the analyses.

| Table 4. ANALYTICAL OBJECTIVE, TECHNIQUE, AND METHOD; ANALYST; AND DATE PERFORMED | | | |
|---|---|---|---|
| **Analytical Objective, Technique, and Method** | **NEIC Analyst** | **Samples Analyzed by Method (Sample Tag No.)** | **Dates Performed** |
| **Volatile organic compounds:**<br>• Gas chromatography/mass spectrometry (GC-MS) by EPA *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (SW-846) Test Method 8260D: Volatile Organic Compounds by Gas Chromatography/ Mass Spectrometry (GC/MS)<br>**Preparatory method:**<br>• EPA *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (SW-846) Test Method 5030C: Purge-and-Trap for Aqueous Samples, and<br>• *Volatile Organic Analysis by Gas Chromatography/Mass Spectrometry*, NEICPROC/00-002 | Justin Bordoff | Station 1 (NE43051)<br>Station 1 (NE43067)<br>Station 1 (NE43081)<br>Station 2 (NE43054)<br>Station 2 (NE43070, NE43071, and NE43072)<br>Station 2 (NE43084)<br>Station 3 (NE43058, NE43059, and NE43060)<br>Station 3 (NE43076)<br>Station 3 (NE43087)<br>Station 4 (NE43062)<br>Station 4 (NE43078)<br>Station 4 (NE43090)<br>Field blank 5-13-2022 (NE43065)<br>Field blank 5-16-2022 (NE43066) | May 24-26, 2022 |

## ANALYTICAL RESULTS

**Tables 5-9** summarize the analytical results. All samples were non-viscous, transparent, colorless liquids contained in amber vials with septa-lined caps. Samples from station 2 had pH greater than 12 even though HCl preservative had been added to the vial prior to sample collection; thus, these samples were not preserved. Analyses of samples from station 2 were not completed within the unpreserved-sample 7-day holding period; thus, these results should be considered a minimum value. All other vials analyzed had pH of less than 2 as indicated using pH paper. Samples from stations 1, 3, and 4 were analyzed within the preserved-sample 14-day holding period. Laboratory sample descriptions, observations, method modifications, and comments are documented in the project file. No samples were collected for hazardous waste determinations following the RCRA-specified methods.

| Table 5. GAS CHROMATOGRAPHY-MASS SPECTROMETRY ANALYSIS RESULTS FOR TK-9 SUMP | | | |
|---|---|---|---|
| **Station No.** | **1** | | |
| **Tag No.** | **NE43051** | **NE43067** | **NE43081** |
| **Collection Date, Time** | **May 13, 2022, 13:40** | **May 16, 2022, 9:48** | **May 16, 2022, 13:34** |
| **Laboratory Photograph Files** | DSC_0034.JPG<br>DSC_0035.JPG | DSC_0034.JPG<br>DSC_0035.JPG | DSC_0022.JPG<br>DSC_0023.JPG |
| | **(mg/L)[1]** | | |
| **Benzene** | 4.131[2] ≤ **6.288**$_{n=4}$[3] ≤ 9.570[4] | 0.214 ≤ **0.326** ≤ 0.496 | 0.118 ≤ **0.180** ≤ 0.274 |
| **1,3-Butadiene** | **ND** | **ND** | **ND** |
| **Toluene** | 1.061 ≤ **1.615**$_{n=4}$[3] **≤** 2.458 | 0.138 ≤ **0.210 ≤** 0.320 | < 0.1 |
| **Ethylbenzene** | 0.086≤ **0.130**$_{n=4}$[3] **≤** 0.197 | ND | ND |
| **m- &/or p-Xylene** | < 0.2 | < 0.2 | ND |
| **Styrene** | 0.569 ≤ **0.992**$_{n=4}$[3] **≤** 1.727 | 0.083 ≤ **0.145 ≤** 0.252 | < 0.1 |
| **Hexachlorobutadiene** | < 0.1 | ND | ND |
| **Napthalene** | < 0.1 | < 0.1 | < 0.1 |

Notes:
[1] mg/L: milligrams per liter.
[2] Uncertainty lower limit, 95% confidence expanded with 11 to 15 degrees of freedom depending on if analyte is present within the laboratory and/or field replicate analysis.
[3] n=4: Result is the average of four laboratory replicates.
[4] Uncertainty upper limit, 95% confidence expanded with 11 to 15 degrees of freedom depending on if analyte is present within the laboratory and/or field replicate analysis.
ND: Not detected.

| Table 6. GAS CHROMATOGRAPHY-MASS SPECTROMETRY ANALYSIS RESULTS FOR WAO OUTLET | | | |
|---|---|---|---|
| **Station No.** | **2** | | |
| **Tag No.** | **NE43054** | **NE43070, NE43071, and NE43072** | **NE43084** |
| **Collection Date, Time** | **May 13, 2022, 14:27** | **May 16, 2022, 10:14** | **May 16, 2022, 13:57** |
| **Laboratory Photograph Files** | DSC_0037.JPG<br>DSC_0039.JPG | DSC_0028.JPG<br>DSC_0029.JPG | DSC_0022.JPG<br>DSC_0023.JPG |
| | **(mg/L)[1]** | | |
| **Benzene** | 1.587[2] ≤ **3.742**$_{n=4}$[3] ≤ 8.824[4] | 2.532 ≤ **5.971**$_{n=3}$[5] ≤ 14.080 | 1.462 ≤ **3.449** ≤ 8.133 |
| **1,3-Butadiene** | ND | ND | ND |
| **Acetone** | 0.790 ≤ **2.218**$_{n=4}$[3] ≤ 6.239 | 1.431 ≤ **4.021**$_{n=3}$[5] ≤ 11.311 | 0.681 ≤ **1.913** ≤ 5.381 |
| **2-Butanone** | **0.138** ≤ **0.319**$_{n=4}$[3] ≤ 0.738 | **0.199** ≤**0.460**$_{n=3}$[5] ≤ 1.064 | **0.127** ≤ 0**.294** ≤0.680 |
| **Toluene** | 0.197 ≤ **0.491**$_{n=4}$[3] **≤** 1.221 | 0.318 ≤ **0.792**$_{n=3}$[5] **≤** 1.970 | 0.172 ≤ **0.428 ≤** 1.064 |
| **Ethylbenzene** | ND | < 0.1 | ND |
| **m- &/or p-Xylene** | ND | < 0.2 | ND |
| **o-Xylene** | ND | < 0.1 | ND |
| **Styrene** | 0.283 ≤ **0.772**$_{n=4}$[3] **≤** 2.112 | 0.531 ≤ **1.451**$_{n=3}$[5] **≤** 3.970 | 0.243 ≤ **0.665 ≤** 1.819 |
| **n-Propylbenzene** | ND | < 0.1 | ND |
| **Naphthalene** | 0.496 ≤ **1.442**$_{n=4}$[3] **≤** 4.193 | 1.482 ≤ **4.307**$_{n=3}$[5] **≤** 12.525 | 0.588 ≤ **1.710 ≤** 4.973 |

Notes:
[1] mg/L: milligrams per liter.
[2] Uncertainty lower limit, 95% confidence expanded with 11 to 15 degrees of freedom depending on if analyte is present within the laboratory and/or field replicate analysis.
[3] n=4: Result is the average of four laboratory replicates.
[4] Uncertainty upper limit, 95% confidence expanded with 11 to 15 degrees of freedom depending on if analyte is present within the laboratory and/or field replicate analysis
[5] n=3: Result is the average of three field replicates.
ND: Not detected.

| Table 7. GAS CHROMATOGRAPHY-MASS SPECTROMETRY ANALYSIS RESULTS FOR COOLING TOWER BLOWDOWN | | | |
|---|---|---|---|
| **Station No.** | **3** | | |
| **Tag No.** | **NE43058, NE43059, and NE43060** | **NE43076** | **NE43087** |
| **Collection Date, Time** | **May 13, 2022, 14:57** | **May 16, 2022, 10:33** | **May 16, 2022, 14:14** |
| **Laboratory Photograph Files** | DSC_0040.JPG | DSC_0020.JPG<br>DSC_0021.JPG | DSC_0032.JPG<br>DSC_0033.JPG |
| | **(mg/L)[1]** | | |
| **Benzene** | ND | ND | ND |
| **1,3-Butadiene** | ND | ND | ND |
| **Acetone** | QC | QC | QC |
| **Chloroform** | < 0.001 | ND2 | < 0.001 |
| **1,3,5-Trimethylbenzene** | < 0.001 | ND | ND |
| **1,2,4-Trimethylbenzene** | QC | QC | QC |
| **1,3-Dichlorobenzene** | < 0.001 | ND | ND |
| **1,4-Dichlorobenzene** | < 0.001 | ND | ND |
| **1,2,4-Trichlorobenzene** | < 0.001 | ND | ND |

Notes:
[1] mg/L: milligrams per liter.
QC: Analyte did not pass quality reporting requirements; no value reported.
ND: Not detected

| Table 8. GAS CHROMATOGRAPHY-MASS SPECTROMETRY ANALYSIS RESULTS[1] FOR T-301 WW STRIPPER BOTTOMS | | | |
|---|---|---|---|
| **Station No.** | **4** | | |
| **Tag No.** | **NE43062** | **NE43078** | **NE43090** |
| **Collection Date, Time** | **May 13, 2022, 15:22** | **May 16, 2022, 10:59** | **May 16, 2022, 14:36** |
| **Laboratory Photograph Files** | **DSC_0026.JPG<br>DSC_0027.JPG** | **DSC_0038.JPG<br>DSC_0039.JPG** | |
| | **(mg/L)[1]** | | |
| **1,3-Butadiene** | ND | ND | ND |
| **Benzene** | ND | ND | ND |
| **Styrene** | 0.18[2] ≤ **0.31** ≤ 0.54[3] | 0.101 ≤ **0.176** ≤ 0.306 | 0.088 ≤ **0.154** ≤ 0.268 |
| **Naphthalene** | 1.483 ≤ **2.015** ≤ 2.740 | 0.80 ≤ **1.08** ≤ 1.47 | 0.684 ≤ **0.929** ≤ 1.263 |

Notes:
[1] mg/L: milligrams per liter.
[2] Uncertainty lower limit, 95% confidence expanded with 11 to 15 degrees of freedom depending on if analyte is present within the laboratory and/or field replicate analysis.
[3] Uncertainty upper limit, 95% confidence expanded with 11 to 15 degrees of freedom depending on if analyte is present within the laboratory and/or field replicate analysis.
ND: not detected.

| Table 9. GAS CHROMATOGRAPHY-MASS SPECTROMETRY ANALYSIS RESULTS[1] FOR FIELD BLANKS | | |
|---|---|---|
| **Station No.** | **Field Blank 5-13-2022** | **Field Blank 5-16-2022** |
| **Collection Date, Time** | **May 13, 2022** | **May 16, 2022** |
| **Tag No.** | **NE43065** | **NE43066** |
| **Laboratory Photograph Files** | **DSC_0026.JPG<br>DSC_0027.JPG** | **DSC_0026.JPG<br>DSC_0027.JPG** |
| | **(mg/L)[1]** | |
| **1,3-Butadiene** | ND | ND |
| **Benzene** | ND | ND |

Notes:
[1] mg/L: milligrams per liter.
ND: Not detected

## INVESTIGATION OBSERVATIONS

NEIC made the following observations during the multimedia compliance inspection. NEIC field team members discussed all observations made at the time of the site inspection with facility representatives during the closeout meeting. These observations are not final compliance determinations. EPA Region 6 will make the final compliance determinations based on its review of this report and other technical, regulatory, and facility information.

Louisiana has adopted the provisions of the RCRA Subtitle C Code of Federal Regulations in Part V of Louisiana Administrative Code (LAC) Title 33. RCRA observations in this report cite the current Louisiana regulations along with the corresponding CFRs.

| **CAA Observation 1** |
| --- |
| **Observation Summary:** Indorama did not identify and report all points of benzene waste generation and did not identify and report points of benzene waste generation in the correct locations. |
| **Citation:**<br>**40 CFR Part 63 Subpart YY – National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards**<br><br>**40 CFR § 63.1103 – Source category-specific applicability, definitions, and requirements.**<br><br>**(e) Ethylene production applicability, definitions, and requirements**<br><br>**(2) Definitions.**<br><br>**Ethylene production or production unit** *means a chemical manufacturing process unit in which ethylene and/or propylene are produced by separation from petroleum refining process streams or by subjecting hydrocarbons to high temperatures in the presence of steam. The ethylene production unit includes the separation of ethylene and/or propylene from associated streams such as a C4 product, pyrolysis gasoline, and pyrolysis fuel oil. Ethylene production does not include the manufacture of SOCMI chemicals such as the production of butadiene from the C4 stream and aromatics from pyrolysis gasoline.*<br><br>**40 CFR Part 63 Subpart XX – National Emission Standards for Ethylene Manufacturing Process Units: Heat Exchange Systems and Waste Operations**<br><br>**40 CFR § 63.1091 What do the waste requirements do?** *This subpart requires you to comply with 40 CFR part 61, subpart FF, National Emission Standards for Benzene Waste Operations...*<br><br>**40 CFR Part 61 Subpart FF – National Emission Standard for Benzene Waste Operations**<br><br>**40 CFR § 61.342 – Standards: General.** |

**CAA Observation 1**

**(a)** *An owner or operator of a facility at which the total annual benzene quantity from facility waste is less than 10 megagrams per year (Mg/yr) (11 ton/yr) shall be exempt from the requirements of paragraphs (b) and (c) of this section. The total annual benzene quantity from facility waste is the sum of the annual benzene quantity for each waste stream at the facility that has a flow-weighted annual average water content greater than 10 percent or that is mixed with water, or other wastes, at any time and the mixture has an annual average water content greater than 10 percent. The benzene quantity in a waste stream is to be counted only once without multiple counting if other waste streams are mixed with or generated from the original waste stream. Other specific requirements for calculating the total annual benzene waste quantity are as follows:*

**(4)** *The total annual benzene quantity is determined based upon the quantity of benzene in the waste before any waste treatment occurs to remove the benzene except as specified in § 61.355(c)(1)(i) (A) through (C).*

**40 CFR § 61.357 Reporting requirements.**

**(a)** *Each owner or operator of a chemical plant, petroleum refinery, coke by-product recovery plant, and any facility managing wastes from these industries shall submit to the Administrator within 90 days after January 7, 1993, or by the initial startup for a new source with an initial startup after the effective date, a report that summarizes the regulatory status of each waste stream subject to § 61.342 and is determined by the procedures specified in § 61.355(c) to contain benzene. Each owner or operator subject to this subpart who has no benzene onsite in wastes, products, by-products, or intermediates shall submit an initial report that is a statement to this effect. For all other owners or operators subject to this subpart, the report shall include the following information:*

**(1)** *Total annual benzene quantity from facility waste determined in accordance with § 61.355(a) of this subpart.*

**(2)** *A table identifying each waste stream and whether or not the waste stream will be controlled for benzene emissions in accordance with the requirements of this subpart.*

**(3)** *For each waste stream identified as not being controlled for benzene emissions in accordance with the requirements of this subpart the following information shall be added to the table:*

**(i)** *Whether or not the water content of the waste stream is greater than 10 percent;*

**(ii)** *Whether or not the waste stream is a process wastewater stream, product tank drawdown, or landfill leachate;*

**(iii)** *Annual waste quantity for the waste stream;*

**CAA Observation 1**

**(iv)** *Range of benzene concentrations for the waste stream;*

**(v)** *Annual average flow-weighted benzene concentration for the waste stream; and*

**(vi)** *Annual benzene quantity for the waste stream.*

**(4)** *The information required in paragraphs (a) (1), (2), and (3) of this section should represent the waste stream characteristics based on current configuration and operating conditions. An owner or operator only needs to list in the report those waste streams that contact materials containing benzene. The report does not need to include a description of the controls to be installed to comply with the standard or other information required in § 61.10(a).*

**(d)** *If the total annual benzene quantity from facility waste is equal to or greater than 10 Mg/yr (11 ton/yr), then the owner or operator shall submit to the Administrator the following reports:*

**(2)** *Beginning on the date that the equipment necessary to comply with these standards has been certified in accordance with paragraph (d)(1) of this section, the owner or operator shall submit annually to the Administrator a report that updates the information listed in paragraphs (a)(1) through (a)(3) of this section. If the information in the annual report required by paragraphs (a)(1) through (a)(3) of this section is not changed in the following year, the owner or operator may submit a statement to that effect.*

**(5)** *If an owner or operator elects to comply with the alternative requirements of § 61.342(e), then the report required by paragraph (d)(2) of this section shall include a table presenting the following information for each waste stream:*

**(i)** *For each waste stream identified as not being controlled for benzene emissions in accordance with the requirements of this subpart; the table shall report the following information for the waste stream as determined at the point of waste generation: annual waste quantity, range of benzene concentrations, annual average flow-weighted benzene concentration, and annual benzene quantity;*

**(ii)** *For each waste stream identified as being controlled for benzene emissions in accordance with the requirements of this subpart; the table shall report the following information for the waste stream as determined at the applicable location described in § 61.355(k)(2): Annual waste quantity, range of benzene concentrations, annual average flow-weighted benzene concentration, and annual benzene quantity.*

**CAA Observation 1**

**40 CFR § 61.341 Definitions.**

**Point of waste generation** *means the location where the waste stream exits the process unit component or storage tank prior to handling or treatment in an operation that is not an integral part of the production process, or in the case of waste management units that generate new wastes after treatment, the location where the waste stream exits the waste management unit component.*

**Waste stream** *means the waste generated by a particular process unit, product tank, or waste management unit. The characteristics of the waste stream (e.g., flow rate, benzene concentration, water content) are determined at the point of waste generation. Examples of a waste stream include process wastewater, product tank drawdown, sludge and slop oil removed from waste management units, and landfill leachate.*

**Waste** *means any material resulting from industrial, commercial, mining or agricultural operations, or from community activities that is discarded or is being accumulated, stored, or physically, chemically, thermally, or biologically treated prior to being discarded, recycled, or discharged.*

**40 CFR § 63.1082 What definitions do I need to know?**

**Dilution steam blowdown waste stream** *means any continuously flowing process wastewater stream resulting from the quench and compression of cracked gas (the cracking furnace effluent) at an ethylene production unit and is discharged from the unit. This stream typically includes the aqueous or oily-water stream that results from condensation of dilution steam (in the cracking furnace quench system), blowdown from dilution steam generation systems, and aqueous streams separated from the process between the cracking furnace and the cracked gas dehydrators. The dilution steam blowdown waste stream does not include blowdown that has not contacted HAP-containing process materials...*

**Evidence:**
**Appendix CAA E –** 2021 BWON TAB Report
**Field Notes**

**Description of Observation**: Based on an in-depth review of the production processes and inspection of the site operations, Indorama did not identify all points of waste generation in its total annual benzene (TAB) report (**Appendix CAA E**), and several of the listed BWON waste streams were not identified at the correct points of waste generation.

As described in "Facility Operations Summary," ethylene gas and reaction byproducts from the cracking furnaces are quenched with water in the quench tower (T-1), and the condensed materials are collected in D-1. The material collected in D-1 meets the definition of dilution steam blowdown waste because it is the continuously flowing wastewater stream from the cracking furnace quench system; therefore, the point of waste generation of the waste stream is the material being discharged from T-1.

The overhead gas stream from T-1 is compressed in a series of compressors, and for several stages of compression, vapors are condensed into suction drums and discharged into D-1. The material condensed into each of the suction drums also meets the definition of dilution

steam blowdown waste because they are continuously flowing wastewater streams generated from the compression of cracked gas and, therefore, should each be individual points of waste generation. Four suction drums collect the condensed aqueous material from compression; drums D-2 and D-3 discharge directly into D-1, while drums D-4 and D-5 discharge into D-3.

Although many of the individual waste streams entering D-1 meet the definition of waste in the BWON, and specifically meet the definition of dilution steam blowdown waste in Subpart XX, because D-1 collects materials that are recovered back to the process, Indorama considers D-1 to be integral to the production process. Indorama therefore considers the points of waste generation to be downstream of D-1 and subsequent oil-water separators, tanks, and treatment processes. However, a *Federal Register* (FR) publication associated with the preamble to the BWON addresses the determination of whether a piece of equipment is considered integral to the production process and where the points of waste generation should be considered.

> **58 FR 3076** – *"…The point of generation of a stream is after it has left a process and prior to handling or management in a unit that is not integral to the process, including prior to processes that promote resource recovery. In general, and as discussed in the proposal preamble, the distinction between what is a waste management unit and what is a process unit is based on the material managed in the unit (see 57 FR 8020). If the material meets the definition of waste in the rule, then the unit is a waste management unit and the point of generation would be at a location prior to where the waste enters this unit."*

In addition to the T-1 and suction drum waste streams discharged into D-1, other waste streams expected to contain benzene identified by the NEIC CAA inspection team that were not included on Indorama's TAB report include:

- Flare knockout tank liquid drained to D-1.
- Primary dryers (R-1 A/B/C) into knockout drum (D-6) that collects water from dryer regeneration, drained into D-1.
- Pump blowdowns from throughout the facility (TAB report lists only 5 pumps, but facility has 62 pumps). Specifically, the NEIC identified a pump (P-626) near D-31 (spent caustic storage tank) used to pump recovered hydrocarbons. The pump is equipped with a drain to the process sewer from which VOC emissions at 3,500 parts per million (ppm) were measured using a TVA.
- Coke periodically chiseled out of the secondary "TLE" (heat exchanger).
- Sample station purges to the process sewer.
- T-10 and T-11 ethane feed saturator oil skim to D-1.
- Red oil skimmed from T-2 (mid/weak caustic tower) into red oil skim drum.
- T-202 (strong caustic tower) oil skimmed twice a week into D-31.

**CAA Observation 1**

- TK-636A and TK-636B overflow. A pipe from the bottom of the tank rises to the tank height and back to ground level, terminating at a dip tube submerged in water; the NEIC CAA inspection team observed water around the concrete at the base of the tank, indicating a potential recent overflow.
- Oil skimmed from WAO inlet trough.
- Propylene heat exchanger condensate drained into D1 after caustic towers.

**CAA Observation 2**

**Observation Summary**: Indorama operated benzene waste management units and closed-vent systems with detectable emissions.

**Citation:**
**40 CFR Part 61 Subpart FF – National Emission Standard for Benzene Waste Operations**

**40 CFR § 61.347 Standards: Oil-water separators.**

**(a)** *Except as provided in § 61.352 of this subpart, the owner or operator shall meet the following standards for each oil-water separator in which waste is placed in accordance with § 61.342(c)(1)(ii) of this subpart:*

> **(1)** *The owner or operator shall install, operate, and maintain a fixed-roof and closed-vent system that routes all organic vapors vented from the oil-water separator to a control device.*
>
> > **(i)** *The fixed-roof shall meet the following requirements:*
> >
> > **(A)** *The cover and all openings (e.g., access hatches, sampling ports, and gauge wells) shall be designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined initially and thereafter at least once per year by the methods specified in § 61.355(h) of this subpart.*
> >
> > **(B)** *Each opening shall be maintained in a closed, sealed position (e.g., covered by a lid that is gasketed and latched) at all times that waste is in the oil-water separator except when it is necessary to use the opening for waste sampling or removal, or for equipment inspection, maintenance, or repair.*
>
> **(ii)** *The closed-vent system and control device shall be designed and operated in accordance with the requirements of § 61.349 of this subpart.*

**40 CFR § 61.349 Standards: Closed-vent systems and control devices.**

**(a)** *For each closed-vent system and control device used to comply with standards in accordance with §§ 61.343 through 61.348 of this subpart, the owner or operator shall*

**CAA Observation 2**

*properly design, install, operate, and maintain the closed-vent system and control device in accordance with the following requirements:*

**(1)** *The closed-vent system shall:*

**(i)** *Be designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined initially and thereafter at least once per year by the methods specified in § 61.355(h) of this subpart.*

**(iii)** *All gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place.*

**(iv)** *For each closed-vent system complying with paragraph (a) of this section, one or more devices which vent directly to the atmosphere may be used on the closed-vent system provided each device remains in a closed, sealed position during normal operations except when the device needs to open to prevent physical damage or permanent deformation of the closed-vent system resulting from malfunction of the unit in accordance with good engineering and safety practices for handling flammable, explosive, or other hazardous materials.*

**(b)** *Each closed-vent system and control device used to comply with this subpart shall be operated at all times when waste is placed in the waste management unit vented to the control device except when maintenance or repair of the waste management unit cannot be completed without a shutdown of the control device.*

**Evidence:**
**Appendix CAA F** – OGI Survey Images and Videos
**Appendix CAA G** – Carbon Canister Monitoring Records
**Appendix CAA H** – Carbon Canister Monitoring Summary
**Field logbooks**

**Description of Observation**: Indorama operates a spent caustic tank (D-31), which, after providing a 48-hour residence time, separates oil from the aqueous spent caustic before it is treated in the WAO reactor. D-31 is, therefore, an oil-water separator. Using optical gas imaging, the NEIC CAA inspection team observed that a bolted flange on the level indicator at the top of D-31 was leaking (**Appendix CAA F**, video 263). A TVA that the NEIC CAA inspection team used to verify the leak measured emissions of greater than 20,000 ppm before the instrument flamed out. For oil-water separators, all organic vapors must be collected and routed through a closed-vent system to a control device. Additionally, the cover and all openings are required to be operated with no detectable emissions.

Process (waste) water tanks TK-636A and TK-636B also are equipped with skimmers that separate and collect oil from the surface of the water within the tank; therefore, the tanks are oil-water separators. TK-636A and TK-636B are equipped with a closed-vent system routed to two carbon canisters operated in series, used as a control device. Upon inspection of the closed-vent system, the NEIC CAA inspection team observed an opening where a temperature gauge and instrument sampling valve are usually installed. The opening to the atmosphere at the gauging and sampling device was emitting VOCs, and the TVA flamed out.

**CAA Observation 2**

NEIC also collected an IR video (**Appendix CAA F**, video 264). The carbon canister inspection and monitoring logs (**Appendix CAA G**, summarized in **Appendix CAA H**) for 2021 and 2022 indicate 21 additional instances when Indorama found the sampling valve open or the temperature gauge missing from the closed-vent system during daily inspections.

The day after video 264 was collected, approximately 2 hours after the NEIC CAA inspection team observed carbon canisters being replaced with new canisters, a valve within the closed-vent system upstream of the carbon canisters was in the closed position, indicating that no vapors from the tanks were being routed to the carbon canisters at that time. The NEIC CAA inspection team observed a pressure release from TK-636A, as indicated by a hissing sound, and vapors, which could be seen with the naked eye from about 40 feet away at the platform of TK-636B. For at least those 2 hours, Indorama did not properly operate the closed-vent system, failed to operate the control device while waste was in the tanks, and failed to route all organic vapors to the control device. Devices that vent directly to the atmosphere may only be used during a malfunction of the unit; failure to open the vent to the control device does not constitute a malfunction of the unit.

**CAA Observation 3**

**Observation Summary**: Indorama did not conduct required inspections and monitoring of benzene waste management units and treatment processes.

**Citation:**
**40 CFR Part 61 Subpart FF – National Emission Standard for Benzene Waste Operations**

**40 CFR § 61.341 Definitions.**

**Sewer line** *means a lateral, trunk line, branch line, or other enclosed conduit used to convey waste to a downstream waste management unit.*

**Treatment process** *means a stream stripping unit, thin-film evaporation unit, waste incinerator, or any other process used to comply with § 61.348 of this subpart.*

**Waste management unit** *means a piece of equipment, structure, or transport mechanism used in handling, storage, treatment, or disposal of waste. Examples of a waste management unit include a tank, surface impoundment, container, oil-water separator, individual drain system, steam stripping unit, thin-film evaporation unit, waste incinerator, and landfill.*

**Waste** *means any material resulting from industrial, commercial, mining or agricultural operations, or from community activities that is discarded or is being accumulated, stored, or physically, chemically, thermally, or biologically treated prior to being discarded, recycled, or discharged.*

**Waste stream** *means the waste generated by a particular process unit, product tank, or waste management unit. The characteristics of the waste stream (e.g., flow rate, benzene concentration, water content) are determined at the point of waste generation. Examples of a waste stream include process wastewater, product tank drawdown, sludge and slop oil removed from waste management units, and landfill leachate.*

**CAA Observation 3**

**40 CFR § 61.343 Standards: Tanks.**

**(a)(1)** *The owner or operator shall install, operate, and maintain a fixed-roof and closed-vent system that routes all organic vapors vented from the tank to a control device.*

**(i)** *The fixed-roof shall meet the following requirements:*

**(A)** *The cover and all openings (e.g., access hatches, sampling ports, and gauge wells) shall be designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined initially and thereafter at least once per year by the methods specified in § 61.355(h) of this subpart.*

**40 CFR § 61.346 – Standards: Individual drain systems.**

**(a)** *Except as provided in paragraph (b) of this section, the owner or operator shall meet the following standards for each individual drain system in which waste is placed in accordance with § 61.342(c)(1)(ii) of this subpart:*

**(1)** *The owner or operator shall install, operate, and maintain on each drain system opening a cover and closed-vent system that routes all organic vapors vented from the drain system to a control device.*

**(b)** *As an alternative to complying with paragraph (a) of this section, an owner or operator may elect to comply with the following requirements:*

**(3)** *Each sewer line shall not be open to the atmosphere and shall be covered or enclosed in a manner so as to have no visual gaps or cracks in joints, seals, or other emission interfaces.*

**(4)** *Equipment installed in accordance with paragraphs (b)(1), (b)(2), or (b)(3) of this section shall be inspected as follows:*

**(iv)** *The unburied portion of each sewer line shall be visually inspected initially and thereafter quarterly for indication of cracks, gaps, or other problems that could result in benzene emissions.*

**40 CFR § 61.347 Standards: Oil-water separators.**

**(a)(1)** *The owner or operator shall install, operate, and maintain a fixed-roof and closed-vent system that routes all organic vapors vented from the oil-water separator to a control device.*

**(i)** *The fixed-roof shall meet the following requirements:*

**(A)** *The cover and all openings (e.g., access hatches, sampling ports, and gauge wells) shall be designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined*

**CAA Observation 3**

*initially and thereafter at least once per year by the methods specified in § 61.355(h) of this subpart.*

**(b)** *Each cover seal, access hatch, and all other openings shall be checked by visual inspection initially and quarterly thereafter to ensure that no cracks or gaps occur between the cover and oil-water separator wall and that access hatches and other openings are closed and gasketed properly.*

**40 CFR § 61.348 – Standards: Treatment processes.**

**(e)** *Except as specified in paragraph (e)(3) of this section, if the treatment process or wastewater treatment system unit has any openings (e.g., access doors, hatches, etc.), all such openings shall be sealed (e.g., gasketed, latched, etc.) and kept closed at all times when waste is being treated, except during inspection and maintenance.*

**(1)** *Each seal, access door, and all other openings shall be checked by visual inspections initially and quarterly thereafter to ensure that no cracks or gaps occur and that openings are closed and gasketed properly.*

**Evidence:**
**Appendix CAA I –** BWON Monitoring 2021
**Appendix CAA J –** BWON Quarterly Inspections

**Description of Observation**: Waste management units have inspection and monitoring requirements, which depend on the type of unit managing benzene waste. Indorama has implemented a BWON monitoring and inspection program and provided NEIC records of the inspections conducted to satisfy the requirements (**Appendices CAA I** and **CAA J**).

However, because Indorama did not identify the points of benzene waste generation in the correct locations, the facility did not consider the units receiving the waste from those points of generation to be waste management units. For example, D-1 is an oil-water separator, but, because Indorama did not consider it to be managing waste, it has not performed the required quarterly inspections and annual Method 21 monitoring.

Oil-water separators managing waste that the NEIC CAA inspection team identified, but that Indorama did not inspect (annual Method 21 and quarterly visual inspections), include:

- D-1 quench drum
- DOx system oil-water separator (V-300)
- TK-636A and TK-636B process (waste) water tanks
- Raw gasoline knockout drum (D-49)
- Caustic de-oiling drum (D-78); annual Method 21 inspection performed, but not included in quarterly visual inspections

The following tanks managing benzene waste were not included in the annual Method 21 monitoring required by the BWON:

**CAA Observation 3**

- D-2, D-3, D-4, and D-5 compressor suction drums
- D-303 (wastewater stripper T-301 overhead receiver)
- Water collection tank from primary dryers (D-6)

The unburied portions of the following sewer lines were not included in the quarterly visual inspections required by the BWON:

- Line from D-2 to D-1
- Line from D-3 to D-1
- Line from D-4 to D-3
- Line from D-5 to D-3
- Line from D-1 to V-300
- Line from D-300 to TK-636A and TK-636B
- Line from D-1 to D-49
- Line from V-300 to D-49
- Line from D-49 to D-1
- Line from D-49 to FA-712
- Line from D-6 to D-1
- Water draw line from pygas tank (TK-635)

**CAA Observation 4**

**Observation Summary**: Indorama failed to replace carbon canisters when breakthrough was observed.

**Citation:**
**40 CFR Part 61 Subpart FF – National Emission Standard for Benzene Waste Operations**

**40 CFR § 61.354 Monitoring of operations.**

**(d)** *For a carbon adsorption system that does not regenerate the carbon bed directly on site in the control device (e.g., a carbon canister), either the concentration level of the organic compounds or the concentration level of benzene in the exhaust vent stream from the carbon adsorption system shall be monitored on a regular schedule, and the existing carbon shall be replaced with fresh carbon immediately when carbon breakthrough is indicated. The device shall be monitored on a daily basis or at intervals no greater than 20 percent of the design carbon replacement interval, whichever is greater. As an alternative to conducting this monitoring, an owner or operator may replace the carbon in the carbon adsorption system with fresh carbon at a regular predetermined time interval that is less than the carbon replacement interval that is determined by the maximum design flow rate and either the organic concentration or the benzene concentration in the gas stream vented to the carbon adsorption system.*

**CAA Observation 4**

**Evidence:**
**Appendix CAA G –** Carbon Canister Monitoring Records
**Appendix CAA H –** Carbon Canister Monitoring Summary

**Description of Observation:** Indorama performs daily monitoring for VOCs and benzene on carbon canisters that are connected to D-31, TK-636A, and TK-636B to test for breakthrough, which is an instrument reading of 500 ppm VOC or 10 ppm benzene. Indorama provided the NEIC CAA inspection team with documentation of these daily tests for December 31, 2020-May 15, 2022 **(Appendix CAA G)**. NEIC observed several daily tests that resulted in breakthrough of the final carbon canister, and the canisters were not changed, as indicated by the carbon canister identification number in the monitoring records.

NEIC conducted an analysis of Indorama's daily monitoring records and created a summary table **(Appendix CAA H)**. For TK-636A and TK-636B, NEIC noted 107 instances when the secondary canister experienced VOC breakthrough and 26 instances when benzene breakthrough was measured. On eight occasions, the canisters were not replaced immediately. Additionally, in two instances, Indorama failed to immediately replace the carbon canisters for D-31 after detecting breakthrough of the secondary canister.

**CAA Observation 5**

**Observation Summary**: The carbon canisters controlling emissions from TK-636A and TK-636B were not designed to achieve the required control efficiency, and Indorama's design evaluation does not contain all required information.

**Citation:**
**40 CFR Part 61 Subpart FF – National Emission Standard for Benzene Waste Operations**

**40 CFR § 61.349 Standards: Closed-vent systems and control devices.**

**(a)** *For each closed-vent system and control device used to comply with standards in accordance with §§ 61.343 through 61.348 of this subpart, the owner or operator shall properly design, install, operate, and maintain the closed-vent system and control device in accordance with the following requirements:*

> **(2)** *The control device shall be designed and operated in accordance with the following conditions:*
>
> > **(ii)** *A vapor recovery system (e.g., a carbon adsorption system or a condenser) shall recover or control the organic emissions vented to it with an efficiency of 95 weight percent or greater, or shall recover or control the benzene emissions vented to it with an efficiency of 98 weight percent or greater.*

**(c)** *An owner and operator shall demonstrate that each control device, except for a flare, achieves the appropriate conditions specified in paragraph (a)(2) of this section by using one of the following methods:*

**CAA Observation 5**

**(1)** *Engineering calculations in accordance with requirements specified in § 61.356(f) of this subpart…*

**40 CFR § 61.356 Recordkeeping requirements.**

**(f)** *An owner or operator using a closed-vent system and control device in accordance with § 61.349 of this subpart shall maintain the following records. The documentation shall be retained for the life of the control device.*

**(2)** *If engineering calculations are used to determine control device performance in accordance with § 61.349(c), then a design analysis for the control device that includes for example:*

**(i)** *Specifications, drawings, schematics, and piping and instrumentation diagrams prepared by the owner or operator, or the control device manufacturer or vendor that describe the control device design based on acceptable engineering texts. The design analysis shall address the following vent stream characteristics and control device operating parameters:*

**(G)** *For a carbon adsorption system that does not regenerate the carbon bed directly on-site in the control device, such as a carbon canister, the design analysis shall consider the vent stream composition, constituent concentration, flow rate, relative humidity, and temperature. The design analysis shall also establish the design exhaust vent stream organic compound concentration level or the design exhaust vent stream benzene concentration level, capacity of carbon bed, type and working capacity of activated carbon used for carbon bed, and design carbon replacement interval based on the total carbon working capacity of the control device and source operating schedule.*

**Evidence:**
**Appendix CAA K –** Tank 636 Carbon Canister Design Details
**Field logbooks**

**Description of Observation:**
The NEIC CAA inspection team inspected the carbon canisters used as a control device for TK-636A and TK-636B and discovered VOC breakthrough at the outlet of the second canister (flaming out the TVA). A representative from Darbonne, an Indorama contractor that conducts the daily monitoring of the carbon canisters, stated that the carbon canisters must be changed virtually every day because breakthrough is observed nearly every time a daily inspection is performed. As described in CAA Observation 4, NEIC noted 107 instances when the secondary canister experienced VOC breakthrough and 26 instances when benzene breakthrough was measured; the observed breakthrough events occurred from October 13, 2021-May 15, 2022. Based on the monitoring records, breakthrough of the second canister was observed more than 50% of the time the carbon canisters were monitored.

To demonstrate compliance with the requirement to control benzene emissions by 98% or VOC emissions by 95%, Indorama was required to conduct a design analysis that includes the information listed in 40 CFR § 61.356(f)(2)(i).

**CAA Observation 5**

NEIC reviewed the design evaluation submitted by Indorama (**Appendix CAA K**). The design evaluation included the vent stream composition and constituent concentration; however, based on knowledge of the process and the chemical constituents expected to be present in the vapor from TK-636A and TK-636B, the list of expected vent stream chemical concentrations in the design analysis is not accurate. For example, the design evaluation lists water vapor and nitrogen together making up 99.9% of the vent stream composition, with the total of all organic compounds combined being less than 1 ppm of the vent stream. If this were accurate, VOC breakthrough would not be expected to occur on a regular basis.

The design analysis also did not establish the design exhaust vent stream organic compound concentration level or the design exhaust vent stream benzene concentration level, nor did it include the design carbon replacement interval based on the total carbon working capacity of the control device and source operating schedule.

**CAA Observation 6**

**Observation Summary**: Indorama exceeded the 6BQ compliance option based on the required calculation method in 40 CFR § 61.355(k)

**Citation:**
**40 CFR Part 61 Subpart FF – National Emission Standard for Benzene Waste Operations**

**40 CFR § 61.342 Standards: General.**

**(e)** *As an alternative to the requirements specified in paragraphs (c) and (d) of this section, an owner or operator of a facility at which the total annual benzene quantity from facility waste is equal to or greater than 10 Mg/yr (11 ton/yr) as determined in paragraph (a) of this section may elect to manage and treat the facility waste as follows:*

> **(1)** *The owner or operator shall manage and treat facility waste with a flow-weighted annual average water content of less than 10 percent in accordance with the requirements of paragraph (c)(1) of this section; and*
>
> **(2)** *The owner or operator shall manage and treat facility waste (including remediation and process unit turnaround waste) with a flow-weighted annual average water content of 10 percent or greater, on a volume basis as total water, and each waste stream that is mixed with water or wastes at any time such that the resulting mixture has an annual water content greater than 10 percent, in accordance with the following:*
>
> > **(i)** *The benzene quantity for the wastes described in paragraph (e)(2) of this section must be equal to or less than 6.0 Mg/yr (6.6 ton/yr), as determined in § 61.355(k)…*

**40 CFR § 61.355 Test methods, procedures, and compliance provisions.**

**(k)** *An owner or operator shall determine the benzene quantity for the purposes of the calculation required by § 61.342(e)(2) by the following procedure:*

**CAA Observation 6**

> **(1)** *For each waste stream that is not controlled for air emissions in accordance with § 61.343. 61.344, 61.345, 61.346, 61.347, or 61.348(a), as applicable to the waste management unit that manages the waste, the benzene quantity shall be determined as specified in paragraph (a) of this section, except that paragraph (b)(4) of this section shall not apply, i.e., the waste quantity for process unit turnaround waste is not annualized but shall be included in the determination of benzene quantity for the year in which the waste is generated for the purposes of the calculation required by § 61.342(e)(2).*
>
> **(2)** *For each waste stream that is controlled for air emissions in accordance with § 61.343. 61.344, 61.345, 61.346, 61.347, or 61.348(a), as applicable to the waste management unit that manages the waste, the determination of annual waste quantity and flow-weighted annual average benzene concentration shall be made at the first applicable location as described in paragraphs (k)(2)(i), (k)(2)(ii), and (k)(2)(iii) of this section and prior to any reduction of benzene concentration through volatilization of the benzene, using the methods given in (k)(2)(iv) and (k)(2)(v) of this section.*
>
> > **(i)** *Where the waste stream enters the first waste management unit not complying with §§ 61.343, 61.344, 61.345, 61.346, 61.347, and 61.348(a) that are applicable to the waste management unit.*

**40 CFR § 61.355 (a)** *An owner or operator shall determine the total annual benzene quantity from facility waste by the following procedure:*

> **(2)** *Total annual benzene quantity from facility waste is calculated by adding together the annual benzene quantity for each waste stream generated during the year and the annual benzene quantity for each process unit turnaround waste annualized according to paragraph (b)(4) of this section.*

**(b)** *For purposes of the calculation required by paragraph (a) of this section, an owner or operator shall determine the annual waste quantity at the point of waste generation…*

**Evidence:** See observations above.

**Description of Observation:** Indorama has chosen the compliance option in 40 CFR § 61.342(e), which requires the management and treatment of aqueous benzene waste such that the resulting waste streams contain less than 6 Mg/yr benzene (the 6BQ compliance option). To demonstrate compliance with the 6BQ compliance option, Indorama is required to determine the benzene quantity based on the calculation specified in 40 CFR § 61.355(k); specifically, the benzene quantity is determined at each location where the waste stream enters the first waste management unit not complying with the requirements for that type of unit.

Because Indorama has operated several waste management units in non-compliance with the BWON (see observations above), the facility has failed to comply with the 6BQ compliance option. For example, because D-1 has not been inspected quarterly as required, the benzene quantity for the 6BQ compliance option must be determined from each of the

| CAA Observation 6 |
|---|
| aqueous waste streams entering the unit. Based on knowledge of the process, more than 6 Mg per year of benzene is expected to be managed in D-1. |

| CAA Observation 7 |
|---|
| **Observation Summary**: Indorama operated storage vessels TK-635 (pygas storage tank) and T-712 (oil storage tank) with unmaintained floating roofs and did not conduct the required initial fill and subsequent annual inspections of the internal floating roofs. As a result of these missed inspections, TK-635 and T-712 have been operating for an unknown period of time with rim seals in disrepair and product on the floating roof deck, resulting in elevated VOC emissions. |

**Citation:**
**40 CFR Part 63, Subpart YY – National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards**

**40 CFR § 63.1101 Definitions.**

"**Storage vessel or tank**," *for the purposes of regulation under the storage vessel provisions of this subpart, means a stationary unit that is constructed primarily of nonearthen materials (such as wood, concrete, steel, fiberglass, or plastic) that provides structural support and is designed to hold an accumulation of liquids or other materials. Storage vessel includes surge control vessels and bottoms receiver vessels. For the purposes of regulation under the storage vessel provisions of this subpart, storage vessel does not include vessels permanently attached to motor vehicles such as trucks, railcars, barges, or ships; pressure vessels designed to operate in excess of 204.9 kilopascals and without emissions to the atmosphere; or wastewater storage vessels. Wastewater storage vessels are covered under the wastewater provisions of § 63.1106.*

**40 CFR § 63.1103 Source category-specific applicability, definitions, and requirements.**

**(e)** Ethylene production applicability, definitions, and requirements

**Applicability**

**(i) Affected source**. *For the ethylene production (as defined in paragraph (e)(2) of this section) source category, the affected source comprises all emission points listed in paragraphs (e)(1)(i)(A) through (G) of this section that are associated with an ethylene production unit that is located at a major source, as defined in section 112(a) of the Act.*

**(A)** *All storage vessels (as defined in § 63.1101) that store liquids containing organic HAP.*

**(3) Requirements**. *The owner or operator must control organic HAP emissions from each affected source emission point by meeting the applicable requirements specified in Table 7 to this section…*

**CAA Observation 7**

**Table 7 to § 63.1103(e) – What Are My Requirements If I Own or Operate an Ethylene Production Existing or New Affected Source?**

| *If you own or operate . . .* | *And if . . .* | *Then you must . . .* |
|---|---|---|
| *(a) A storage vessel (as defined in § 63.1101) that stores liquid containing organic HAP* | *(1) The maximum true vapor pressure of total organic HAP is ≥3.4 kilopascals but <76.6 kilopascals; and the capacity of the vessel is ≥4 cubic meters but <95 cubic meters* | *(i) Fill the vessel through a submerged pipe; or*<br>*(ii) Comply with the requirements for storage vessels with capacities ≥95 cubic meters.* |
| *(b) A storage vessel (as defined in § 63.1101) that stores liquid containing organic HAP* | *(1) The maximum true vapor pressure of total organic HAP is ≥3.4 kilopascals but <76.6 kilopascals; and the capacity of the vessel is ≥95 cubic meters* | *(i) Except as specified in paragraph (b)(1)(iii) of this table, comply with the requirements of subpart WW of this part; or*<br>*(ii) Except as specified in paragraph (b)(1)(iii) of this table, reduce emissions of total organic HAP by 98 weight-percent by venting emissions through a closed vent system to any combination of control devices and meet the requirements of § 63.982(a)(1). [paragraph (b)(1)(iii) of this table does not apply until July 6, 2023]* |

**40 CFR Part 63, Subpart WW – National Emission Standards for Storage Vessels (Tanks) – Control Level 2**

**40 CFR § 63.1062 Storage vessel control requirements**.

**(a)** *For each storage vessel to which this subpart applies, the owner or operator shall comply with one of the requirements listed in paragraphs (a)(1) through (a)(3) of this section.*

**(1)** *Operate and maintain an IFR.*

**40 CFR § 63.1063 Floating roof requirements.**

**(c) Inspection frequency requirements –**

**(1) Internal floating roofs**. *Internal floating roofs shall be inspected as specified in paragraph (d)(1) of this section before the initial filling of the storage vessel. Subsequent inspections shall be performed as specified in paragraph (c)(1)(i) or (c)(1)(ii) of this section.*

**CAA Observation 7**

**(i)** *Internal floating roofs shall be inspected as specified in paragraphs (c)(1)(i)(A) and (c)(1)(i)(B) of this section*.

**(A)** *At least once per year the IFR shall be inspected as specified in paragraph (d)(2) of this section.*

**(B)** *Each time the storage vessel is completely emptied and degassed, or every 10 years, whichever occurs first, the IFR shall be inspected as specified in paragraph (d)(1) of this section.*

**(ii)** *Instead of the inspection frequency specified in paragraph (c)(1)(i) of this section, internal floating roofs with two rim seals may be inspected as specified in paragraph (d)(1) of this section each time the storage vessel is completely emptied and degassed, or every 5 years, whichever occurs first.*

**(d) Inspection procedure requirements.** *Floating roof inspections shall be conducted as specified in paragraphs (d)(1) through (d)(3) of this section, as applicable. If a floating roof fails an inspection, the owner or operator shall comply with the repair requirements of paragraph (e) of this section.*

**(1)** *Floating roof (IFR and EFR) inspections shall be conducted by visually inspecting the floating roof deck, deck fittings, and rim seals from within the storage vessel. The inspection may be performed entirely from the top side of the floating roof, as long as there is visual access to all deck components specified in paragraph (a) of this section. Any of the conditions described in paragraphs (d)(1)(i) through (d)(1)(v) of this section constitutes inspection failure.*

**(i)** *Stored liquid on the floating roof*.

**(ii)** *Holes or tears in the primary or secondary seal (if one is present).*

**(iii)** *Floating roof deck, deck fittings, or rim seals that are not functioning as designed (as specified in paragraph (a) of this section).*

**(iv)** *Failure to comply with the operational requirements of paragraph (b) of this section.*

**(v)** *Gaps of more than 0.32 centimeters (1⁄8 inch) between any deck fitting gasket, seal, or wiper (required by paragraph (a) of this section) and any surface that it is intended to seal.*

**(2)** *Tank-top inspections of IFR's shall be conducted by visually inspecting the floating roof deck, deck fittings, and rim seal through openings in the fixed roof. Any of the conditions described in paragraphs (d)(1)(i) through (d)(1)(iv) of this section constitutes inspection failure. Identification of holes or tears in the rim seal is required only for the seal that is visible from the top of the storage vessel.*

**CAA Observation 7**

**(e) Repair requirements**. *Conditions causing inspection failures under paragraph (d) of this section shall be repaired as specified in paragraph (e)(1) or (e)(2) of this section.*

> **(1)** *If the inspection is performed while the storage vessel is not storing liquid, repairs shall be completed before the refilling of the storage vessel with liquid.*
>
> **(2)** *If the inspection is performed while the storage vessel is storing liquid, repairs shall be completed or the vessel removed from service within 45 days. If a repair cannot be completed and the vessel cannot be emptied within 45 days, the owner or operator may use up to 2 extensions of up to 30 additional days each. Documentation of a decision to use an extension shall include a description of the failure, shall document that alternate storage capacity is unavailable, and shall specify a schedule of actions that will ensure that the control equipment will be repaired or the vessel will be completely emptied as soon as practical.*

**Evidence:**
**Appendix CAA F –** OGI Survey Images and Videos
**Appendix CAA L –** EPA Information Request Response, May 31, 2022 (Email Attachment)
**Appendix CAA M –** HMT Seal Report
**Appendix CAA N –** June 7, 2022, Email from Damian Fryoux Re: Pygas Tank Follow-up
**Field logbooks**

**Description of Observation:** TK-635 (pygas storage tank) is an aboveground storage tank equipped with a steel deck internal floating roof and mechanical shoe rim seal. TK-635 is designed to vent excess vapor space pressure (and hydrocarbon emissions) above the internal floating roof through a conservation vent or, in emergency situations, through a pressure relief valve. Using an IR camera, the NEIC CAA inspection team observed hydrocarbon emissions venting from the two fire-fighting foam discharge devices and associated flanges located on the northeast and southwest sides of the tank. These emissions were observed on two separate days (May 13 and 16, 2022) from both foam discharge devices while the IR camera was set to auto mode (**Appendix CAA F**, videos 269, 270, 271, 278, and 279). In addition, the NEIC CAA inspection team detected strong hydrocarbon odors from ground level, on the tank's staircase on the southwest side of the tank, and on the tank platform on both days.

These foam discharge devices are not designed to release tank vapor space vapors. As noted above, normally any excess pressure built up in the vapor space above the internal floating roof would first vent through the conservation vent, followed by the pressure relief valve, if necessary. On both days the tank was inspected, the NEIC CAA inspection team did not observe any emissions with the IR camera from either the conservation vent or the emergency pressure relief valve. While it is clear that the fire-fighting foam discharge devices are not operating properly because they are venting the tank's vapor space, of greater concern from an emission standpoint was the apparent degree of hydrocarbon emissions being vented through these foam discharge devices based on the IR camera surveys and odors observed. The degree of emissions observed from the foam discharge devices on TK-635 can be indicative of poor control of organic vapors by the tank's internal floating roof, when compared with other similarly controlled tanks observed at other facilities (normally vented through perimeter roof vents or conservation vents). For TK-635, the hydrocarbon

emissions contain significant benzene, as the pygas being stored in the tank is approximately 50% benzene by weight.

T-712 (fuel oil tank) is also an aboveground internal floating roof storage tank but is designed to vent excess vapor space pressure (and hydrocarbon emissions) above the internal floating roof through perimeter vents open to the atmosphere near the fixed roof of the tank. With an IR camera, the NEIC CAA inspection team observed hydrocarbon emissions venting from perimeter roof vents on the south and southeast sides of the tank (**Appendix CAA F**, videos 267 and 268), albeit considerably less than observed venting from TK-635.

During the inspection, the NEIC CAA inspection team requested records of any periodic inspections of the internal floating roofs on TK-635 (pygas tank) and T-712 (fuel oil tank). Damian Fryoux, Indorama environmental manager, stated that Indorama has elected to conduct the 5-year through the hatch "tank-top" inspection option outlined in 40 CFR Part 63, Subpart WW (which is cross-referenced by 40 CFR Part 63, Subpart YY). The NEIC CAA inspection team explained that the 5-year option in 40 CFR Part 63, Subpart WW, requires an inspection from within the tank itself, on the "top-side" of the internal floating roof, and could not just be conducted by looking through a hatch on top of the "tank-top." NEIC further clarified that the "tank-top" inspection option described by Mr. Fryoux was required annually (not every 5 years), with an out-of-service inspection from within the tank required every 10 years, or each time the tank is emptied, whichever is earlier. Mr. Fryoux indicated that Indorama has not been conducting "tank-top" inspections annually. He doubted the company would elect the 5-year "top-side" compliance option from within the tank, due to safety concerns about sending personnel inside a tank and onto the floating roof deck while the tank is in service.

As a follow-up to the inspection, NEIC requested that Indorama provide the initial fill dates for TK-635 and T-712, as well a copy of the initial fill inspection reports. On May 31, 2022, Indorama provided an email with an attachment responding to several NEIC information requests, including those related to the initial fill dates and inspection reports (**Appendix CAA L**). In its response, Indorama stated that the tanks' initial fill dates were in December 2018 and that "[i]nitial fill inspections were never done."

Furthermore, as a follow-up to NEIC's regulatory clarifications and concerns of elevated tank emissions explained during the closeout meeting, a visual "tank-top" inspection was conducted on both tanks by an Indorama contractor (HMT) shortly after NEIC's inspection, on May 20, 2022 (**Appendix CAA M**). HMT's visual inspection indicated that TK-635's internal floating roof rim seal was flipped upside down and that there was approximately 1 foot of product on the surface of the floating roof. For T-712, the inspection findings were a worn and torn rim seal (no mention of whether it was a single or double seal) and a little bit of product on the aluminum floating roof. These findings all trigger repair requirements, as outlined in 40 CFR § 63.1062(e)(2), within 45 days of an inspection identifying these problems with the floating roofs. An email from Indorama on June 7, 2022, states, "TK-635 is out-of-service and is being degassed for full seal replacement. FA-712 is still in-service, with no liquid currently present on the roof." (**Appendix CAA N**) Hence, it appears Indorama has taken some steps to address the findings of HMT's inspection. However, it remains unclear whether Indorama is addressing the rim seal findings for T-712. Furthermore, as noted

| CAA Observation 7 |
| --- |
| above, the inspections conducted by HMT that identified the condition of the floating roofs on the two tanks were not conducted timely. Therefore, the state of disrepair and condition of both internal floating roofs may have been ongoing since the initial fill. |

| CAA Observation 8 |
| --- |
| **Observation Summary**: Continuous parameter monitoring data and IR camera observations during NEIC's inspection indicate Indorama has been over-steaming the main plant flare. As a result, the combustion gas mixture (vent gas, sweep gas, steam assist) has had insufficient heat content (less than 300 Btu/SCF) to ensure adequate combustion. Indorama thus has not operated and maintained the main plant flare in conformance with its design and applicable performance standards. |
| **Citation:**<br>**40 CFR Part 63 Subpart YY – National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards**<br><br>**40 CFR § 63.1103 Source category-specific applicability, definitions, and requirements.**<br><br>**(e) Ethylene production applicability, definitions, and requirements –**<br><br>**(1) Applicability –**<br><br>**(i)** *Affected source. For the ethylene production (as defined in paragraph (e)(2) of this section) source category, the affected source comprises all emission points listed in paragraphs (e)(1)(i)(A) through (G) of this section that are associated with an ethylene production unit that is located at a major source, as defined in section 112(a) of the Act.*<br><br>**(3) Requirements.** *The owner or operator must control organic HAP emissions from each affected source emission point by meeting the applicable requirements specified in Table 7 to this section.* |

**Table 7 to § 63.1103(e) – What Are My Requirements If I Own or Operate an Ethylene Production Existing or New Affected Source?**

| If you own or operate . . . | And if . . . | Then you must . . . |
|---|---|---|
| *(d) An ethylene process vent (as defined in paragraph (e)(2) of this section)* | *(1) The process vent is at an existing source and the vent stream has a flow rate ≥0.011 scmm and a total organic HAP concentration ≥50 parts per million by volume on a dry basis; or the process vent is at a new source and the vent stream has a flow rate ≥0.008 scmm and a total organic HAP concentration ≥30 parts per million by volume on a dry basis* | *(i) Except as specified in paragraph (d)(1)(ii) of this table, reduce emissions of organic HAP by 98 weight-percent; or reduce organic HAP or TOC to a concentration of 20 parts per million by volume on a dry basis corrected to 3% oxygen; whichever is less stringent, by venting emissions through a closed vent system to any combination of control devices and meet the requirements specified in § 63.982(b) and (c)(2).* |

**40 CFR Part 63, Subpart SS – National Emission Standards for Closed Vent Systems, Control Devices, Recovery Devices and Routing to a Fuel Gas System or a Process**

**40 CFR § 63.982 Requirements.**

**(b)** ***Closed vent system and flare.*** *Owners or operators that vent emissions through a closed vent system to a flare shall meet the requirements in § 63.983 for closed vent systems; § 63.987 for flares; § 63.997 (a), (b) and (c) for provisions regarding flare compliance assessments; the monitoring, recordkeeping, and reporting requirements referenced therein; and the applicable recordkeeping and reporting requirements of §§ 63.998 and 63.999. No other provisions of this subpart apply to emissions vented through a closed vent system to a flare.*

**40 CFR § 63.987 Flare requirements.**

**(a) Flare equipment and operating requirements.** *Flares subject to this subpart shall meet the performance requirements in 40 CFR 63.11(b) (General Provisions).*

**40 CFR Part 63, Subpart A – General Provisions**

**40 CFR § 63.11(b) Control device and work practice requirements.**

**(b) Flares.**

**CAA Observation 8**

> **(1)** *Owners or operators using flares to comply with the provisions of this part shall monitor these control devices to assure that they are operated and maintained in conformance with their designs. Applicable subparts will provide provisions stating how owners or operators using flares shall monitor these control devices.*
>
> **(2)** *Flares shall be steam-assisted, air-assisted, or non-assisted.*
>
> **(3)** *Flares shall be operated at all times when emissions may be vented to them.*
>
> **(4)** *Flares shall be designed for and operated with no visible emissions, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours. Test Method 22 in appendix A of part 60 of this chapter shall be used to determine the compliance of flares with the visible emission provisions of this part. The observation period is 2 hours and shall be used according to Method 22.*
>
> **(5)** *Flares shall be operated with a flame present at all times. The presence of a flare pilot flame shall be monitored using a thermocouple or any other equivalent device to detect the presence of a flame.*
>
> **(6)** *An owner/operator has the choice of adhering to the heat content specifications in paragraph (b)(6)(ii) of this section, and the maximum tip velocity specifications in paragraph (b)(7) or (b)(8) of this section, or adhering to the requirements in paragraph (b)(6)(i) of this section.*
>
> > **(i) (A)** *Flares shall be used that have a diameter of 3 inches or greater, are nonassisted, have a hydrogen content of 8.0 percent (by volume) or greater, and are designed for and operated with an exit velocity less than 37.2 m/sec (122 ft/sec) and less than the velocity Vmax….*
> >
> > **(ii)** *Flares shall be used only with the net heating value of the gas being combusted at 11.2 MJ/scm (300 Btu/scf) or greater if the flare is steam-assisted or air-assisted; or with the net heating value of the gas being combusted at 7.45 M/scm (200 Btu/scf) or greater if the flares is non-assisted*.

**Evidence:**
**Appendix CAA L –** EPA Information Request Response, May 31, 2022 (Email Attachment)
**Appendix CAA O –** Title V Permit Issued November 15, 2018
**Appendix CAA P –** Title V Permit Renewal and Major Modification Application (September 24, 2020)
**Appendix CAA Q –** Title V Permit Issued April 29, 2022
**Appendix CAA F –** OGI Survey Images and Videos
**Appendix CAA R –** Flare Data for EPA
**Appendix CAA S –** Flare No. 1 Compliance Test Report (April 1, 2022)
**Appendix CAA T –** NEIC Calculation of Indorama NHVcz Based on Flare Data Adjusted for H2

**Description of Observation:** According to a May 31, 2022, email from Indorama (**Appendix CAA L**), in December 2018, the plant "commenced operational startup and shakedown activities of the refurbished plant." Also, in September 2021, the same email states that

**CAA Observation 8**

Indorama "[b]egan efforts to restart plant after long shutdown due to lightening [sic] strike and subsequent storms."

Section X of Indorama's November 15, 2018, Title V permit indicates that the main plant flare (flare No. 1) and the railcar/truck loading rack flare (flare F-6) are subject to the closed-vent system and flaring requirements of 40 CFR Part 63, Subparts SS and YY. However, the "Specific Requirements" section of the permit does not cite the 40 CFR Part 63, Subpart YY, requirements for either flare and only cites certain requirements of 40 CFR Part 63, Subpart SS, for flare F-6 (**Appendix CAA O**).

Indorama submitted a Title V permit renewal and major modification application to the Louisiana Department of Environmental Quality (LDEQ) on September 24, 2020. Section 1.3, "Title V Permit Renewal and Reconciliation Updates," includes the following: "Updates have been made to Tables 1 through 4 for Applicable Louisiana and Federal Air Quality Requirements as summarized below: ….[a]dded 40 CFR 61 Subpart FF, 40 CFR 63 Subpart SS, and 40 CFR 63 Subpart YY applicability for the Flare No. 1 (EQT0008) in Table 2……..[a]dded 40 CFR 63 Subpart YY applicability for the Railcar/Truck Loading Area Flare (EQT0009) in Table 2." (**Appendix CAA P**) The permit application has no discussion as to why these updates were being requested, if anything had changed since the previous permit necessitating these changes, or if these additions were simply correcting an oversight in the previous version of the permit.

LDEQ issued the modified renewal Title V permit on April 27, 2022. Section III of the modified permit includes a list of changes made to the permit, including "[a]dd 40 CFR Part 61 Subpart FF, 40 CFR Part 63 Subpart SS, and 40 CFR Part 63 Subpart YY applicability for Flare No. 1 (EQT00008)." Furthermore, the "Specific Requirements" section includes a new Condition 218, which requires Indorama to "[c]omply with the requirements of 63.982(b) and (c)(2). Subpart YY. [63.1103(e)(3)]." (**Appendix CAA Q**) This is the compliance requirement for process vents shown in Table 7 of Subpart YY in 40 CFR § 63.1103(e). No future applicability date is listed in Condition 218, unlike other Subpart YY requirements that do not apply until July 6, 2023, and are denoted as such in the permit conditions.

Indorama representatives stated during NEIC's inspection that instead of venting emissions from process gases to flare No. 1, they are recovered and used as fuel for the facility's boilers and furnaces. However, during NEIC's inspection, Indorama representatives also described the facility's closed-vent systems for controlling emissions, including flare No. 1, which Indorama representatives stated controls emissions from units D-78 (oil/caustic separator) and D-17 (spent caustic degassing drum). Furthermore, the most recent permit renewal/major modification permit application and associated permit issued on April 27, 2022, indicate that there are process vents subject to those control requirements under 40 CFR § 63.1103(e)(3) and cross-referenced 40 CFR Part 63, Subpart SS, requirements. It is not entirely clear why these process vents were not included in the November 15, 2018, Title V permit and were just recently added.

On multiple occasions during NEIC's inspection, the NEIC CAA inspection team observed with the IR camera uncombusted hydrocarbon emissions trailing from the release point of the main plant flare (flare No. 1) (**Appendix CAA F**, videos 272, 282, 560, 561, and 570). Also,

**CAA Observation 8**

inspectors did not observe a visible flame from the flare tip from the ground level. As a result of these observations, NEIC inspectors asked Indorama representatives how they manage flare No. 1 operations and if any flare continuous monitoring equipment was installed. Indorama representatives stated that flare No. 1 is equipped with a calorimeter to measure the heat content of the combination of sweep gas and vent gas after the flare header. Flow of the combined vent and sweep gas is measured with an ultrasonic flowmeter, as is the amount of assist steam added at the flare tip. NEIC requested and received available monitoring data for the period when the plant restarted in late 2021 through the time of NEIC's inspection (**Appendix CAA R**).

NEIC used this data; vent/sweep gas compositional data collected on April 1, 2022, from the flare No. 1 flare compliance assessment report (**Appendix CAA S**); and equations from 40 CFR § 63.670(l) and (m) to calculate the net heating value (adjusted for hydrogen content) of combined vent gas, sweep gas, and steam assist for each hour during this period (**Appendix CAA T**). Based on these calculations, the net heating value of the combined gases being combusted at flare No. 1 was less than the currently applicable 300 Btu/SCF specified in 40 CFR § 63.11(b)(6) over 70% of the operating hours during the period for which NEIC received data (October 1, 2021-May 16, 2022).

While flare No. 1 is not currently subject to the 270 Btu/SCF net heat value of combustion zone gas (15-minute average) until July 6, 2023, this value was originally set in the National Emission Standards for Hazardous Air Pollutants From Petroleum Refineries (40 CFR Part 63, Subpart CC), and later incorporated in the Generic Maximum Achievable Control Technology Standards for ethylene plants (40 CFR Part 63, Subpart YY), as an indicator of whether a flare is using excessive assist steam, which would indicate the flare is not being operating properly to achieve the required 98% control. Based on NEIC's calculations, the net heating value of the combined gases being combusted at flare No. 1 was less than the 270 Btu/SCF value specified in 40 CFR § 63.1103(e)(4) over 67% of the operating hours during the period for which NEIC received data (October 1, 2021-May 16, 2022). This data, as well NEIC's IR camera observations during the inspection, indicate that flare No. 1 has been operated with excessive amounts of assist steam and has not maintained adequate heat content for the gases being combusted, resulting in reduced combustion efficiency and destruction efficiency.

**CAA Observation 9**

**Observation Summary**: Indorama did not conduct required initial performance testing on two flares within 180 days of the startup of the refurbished facility.

**Citation:**

**40 CFR Part 63 Subpart YY – National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards**

**40 CFR § 63.1103 Source category-specific applicability, definitions, and requirements.**

**(e) Ethylene production applicability, definitions, and requirements –**

**CAA Observation 9**

**(1)** ***Applicability –***

*(i) Affected source. For the ethylene production (as defined in paragraph (e)(2) of this section) source category, the affected source comprises all emission points listed in paragraphs (e)(1)(i)(A) through (G) of this section that are associated with an ethylene production unit that is located at a major source, as defined in section 112(a) of the Act.*

**(3) Requirements.** *The owner or operator must control organic HAP emissions from each affected source emission point by meeting the applicable requirements specified in Table 7 to this section.*

**Table 7 to § 63.1103(e) – What Are My Requirements If I Own or Operate an Ethylene Production Existing or New Affected Source?**

| If you own or operate . . . | And if . . . | Then you must . . . |
|---|---|---|
| *(d) An ethylene process vent (as defined in paragraph (e)(2) of this section)* | *(1) The process vent is at an existing source and the vent stream has a flow rate ≥0.011 scmm and a total organic HAP concentration ≥50 parts per million by volume on a dry basis; or the process vent is at a new source and the vent stream has a flow rate ≥0.008 scmm and a total organic HAP concentration ≥30 parts per million by volume on a dry basis* | *(i) Except as specified in paragraph (d)(1)(ii) of this table, reduce emissions of organic HAP by 98 weight-percent; or reduce organic HAP or TOC to a concentration of 20 parts per million by volume on a dry basis corrected to 3% oxygen; whichever is less stringent, by venting emissions through a closed vent system to any combination of control devices and meet the requirements specified in § 63.982(b) and (c)(2).* |
| *(e) A transfer rack (as defined in paragraph (e)(2) of this section)* | *(1) Materials loaded have a true vapor pressure of total organic HAP ≥3.4 kilopascals and ≥76 cubic meters per day (averaged over any consecutive 30-day period) of HAP-containing material is loaded* | *(i) Reduce emissions of organic HAP by 98 weight-percent; or reduce organic HAP or TOC to a concentration of 20 parts per million by volume on a dry basis corrected to 3-percent oxygen; whichever is less stringent, by venting emissions through a closed vent system to any combination of control devices as specified in § 63.1105 and meet the requirements specified in paragraph (e)(9) of this section.; or* |

| | |
|---|---|
| | *(ii) Install process piping designed to collect the HAP-containing vapors displaced from tank trucks or railcars during loading and to route it to a process, a fuel gas system, or a vapor balance system, as specified in § 63.1105 and meet the requirements specified in paragraph (e)(9) of this section.*[(a)] |

**40 CFR Part 63, Subpart SS – National Emission Standards for Closed Vent Systems, Control Devices, Recovery Devices and Routing to a Fuel Gas System or a Process**

**40 CFR § 63.982 Requirements.**

**(b) Closed vent system and flare.** *Owners or operators that vent emissions through a closed vent system to a flare shall meet the requirements in § 63.983 for closed vent systems; § 63.987 for flares; § 63.997 (a), (b) and (c) for provisions regarding flare compliance assessments; the monitoring, recordkeeping, and reporting requirements referenced therein; and the applicable recordkeeping and reporting requirements of §§ 63.998 and 63.999. No other provisions of this subpart apply to emissions vented through a closed vent system to a flare.*

**40 CFR § 63.987 Flare requirements.**

**(a) Flare equipment and operating requirements.** *Flares subject to this subpart shall meet the performance requirements in 40 CFR 63.11(b) (General Provisions).*

**(b) Flare compliance assessment.**

**(1)** *The owner or operator shall conduct an initial flare compliance assessment of any flare used to comply with the provisions of this subpart. Flare compliance assessment records shall be kept as specified in § 63.998(a)(1) and a flare compliance assessment report shall be submitted as specified in § 63.999(a)(2). An owner or operator is not required to conduct a performance test to determine percent emission reduction or outlet regulated material or total organic compound concentration when a flare is used.*

**(2) [Reserved]**

**(3)** *Flare compliance assessments shall meet the requirements specified in paragraphs (b)(3)(i) through (iv) of this section.*

**CAA Observation 9**

> **(i)** *Method 22 of appendix A of part 60 shall be used to determine the compliance of flares with the visible emission provisions of this subpart. The observation period is 2 hours, except for transfer racks as provided in (b)(3)(i)(A) or (B) of this section.*
>
> > **(A)** *For transfer racks, if the loading cycle is less than 2 hours, then the observation period for that run shall be for the entire loading cycle.*
> > **(B)** *For transfer racks, if additional loading cycles are initiated within the 2-hour period, then visible emissions observations shall be conducted for the additional cycles.*
>
> **(ii)** *The net heating value of the gas being combusted in a flare shall be calculated using Equation 1:…….*
> **(iii)** *The actual exit velocity of a flare shall be determined by dividing the volumetric flow rate (in unit of standard temperature and pressure), as determined by Method 2, 2A, 2C, 2D, 2F, or 2G of 40 CFR part 60, appendix A, as appropriate, by the unobstructed (free) cross sectional area of the flare tip.*
> *(iv) Flare flame or pilot monitors, as applicable, shall be operated during any flare compliance assessment.*

**40 CFR § 63.997 Performance test and compliance assessment requirements for control devices.**

**(c) Performance tests and flare compliance assessments schedule.**

> **(1)** *Unless a waiver of performance testing or flare compliance assessment is obtained under this section or the conditions of a referencing subpart, the owner or operator shall perform such tests as specified in paragraphs (c)(1)(i) through (vii) of this section.*
>
> > **(iii)** *Within 180 days after the compliance date specified in a referencing subpart for an existing source, or within 180 days after start-up of an existing source if the source begins operation after the effective date of the relevant emission standard; or*

**Evidence:**
**Appendix CAA U** – February 1, 2019, Notification of NESHAP Subpart YY Applicability
**Appendix CAA L** – EPA Information Request Response, May 31, 2022 (Email Attachment)
**Appendix CAA P** – Title V Permit Renewal and Major Modification Application (September 24, 2020)
**Appendix CAA Q** – Title V Permit (April 29, 2022)
**Appendix CAA S** – Flare No. 1 Compliance Test Report (April 1, 2022)

**Description of Observation:** According to a February 1, 2019, submittal to LDEQ, Indorama was not subject to the 40 CFR Part 63, Subpart YY, requirement as of December 31, 2018 (including reporting requirements), as the plant was "still under a continual path of construction" and not operational (**Appendix CAA U**). However, according to a May 31, 2022, email from Indorama, in December 2018, the plant, "commenced operational startup and shakedown activities of the refurbished plant." Also in September 2021, the same email states that the Indorama "[b]egan efforts to restart plant after long shutdown due to lightening [sic] strike and subsequent storms." (**Appendix CAA L**)

**CAA Observation 9**

Indorama submitted a Title V permit renewal and major modification application to LDEQ on September 24, 2020. Section 1.3, "Title V Permit Renewal and Reconciliation Updates," includes the following: "Updates have been made to Tables 1 through 4 for Applicable Louisiana and Federal Air Quality Requirements as summarized below: ….[a]dded 40 CFR 61 Subpart FF, 40 CFR 63 Subpart SS, and 40 CFR 63 Subpart YY applicability for the Flare No. 1 (EQT0008) in Table 2……..[a]dded 40 CFR 63 Subpart YY applicability for the Railcar/Truck Loading Area Flare (EQT0009) in Table 2." (**Appendix CAA P**) The permit application has no discussion as to why these updates were being requested, if anything had changed since the previous permit necessitating these changes, or if these additions were simply an oversight in the previous version of the permit. LDEQ issued the revised Title V permit on April 27, 2022, and the "Specific Requirements" section includes a new Condition 218, which requires Indorama to "[c]omply with the requirements of 63.982(b) and (c)(2). Subpart YY. [63.1103(e)(3)]." (**Appendix CAA Q**) This is the compliance requirement for process vents shown in Table 7 of Subpart YY in 40 CFR § 63.1103(e), which cross-references 40 CFR Part 63, Subpart SS, the flare compliance assessment requirements for each flare. No future applicability date is listed in Condition 218, unlike other Subpart YY requirements that do not apply until July 6, 2023, and are denoted as such in the permit conditions.

Based on the operational history of the facility (which was shut down in 2001), the 40 CFR Part 63, Subpart YY (and Subpart SS by cross-reference), flare compliance assessment requirements would not have been triggered originally, because the plant was not operating at the time Subpart YY became effective (July 12, 2005). When the plant restarted in December 2018, it would have been considered an existing source for purposes of 40 CFR Part 63, Subpart YY. As such, that would have triggered the 180-day compliance date for an existing source that begins operation after the effective date of the relevant emission standard. Conservatively, that would mean the flare compliance assessments would have been due by June 29, 2019. The plant "ceased operations of the ethylene production equipment" in June 2019 (**Appendix CAA L**). During NEIC's inspection on May 16, 2022, Mr. Fryoux stated that Indorama had just recently conducted the compliance assessment for flare No. 1 and had not yet conducted the assessment for flare F-6. Per the final report for flare No. 1, the flare compliance assessment was conducted on April 1, 2022 (**Appendix CAA S**), well past the 180-day compliance date of June 29, 2019.

Even if the December 2018 startup would not constitute the final restart of the plant, the plant was again restarted in September 2021. Conservatively, this would mean the 180-day compliance date for conducting the flare compliance assessment would have been March 29, 2022. At this point, no compliance assessment had been conducted for either flare No.1 or flare F-6.

**CAA Observation 10**

**Observation Summary**: Indorama did not submit a notification of compliance status within 240 days of startup of the refurbished plant.

**Citation:**

**40 CFR Part 63 Subpart YY – National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards**

**CAA Observation 10**

**40 CFR § 63.1110 Reporting requirements.**

**(a) Required reports**. *Each owner or operator of an affected source subject to this subpart shall submit the reports listed in paragraphs (a)(1) through (8) of this section, as applicable….*

**(4)** *A Notification of Compliance Status report described in paragraph (d) of this section.*

**(d) Notification of Compliance Status –**

**(1) Contents.** *The owner or operator shall submit a Notification of Compliance Status for each affected source subject to this subpart containing the information specified in paragraphs (d)(1)(i) and (ii) of this section….*

**(i)** *Except as specified in paragraphs (d)(1)(iv) and (v) of this section, the Notification of Compliance Status shall include the information specified in this subpart and the subparts referenced by this subpart. Alternatively, this information can be submitted as part of a title V permit application or amendment.*

**(ii)** *The Notification of Compliance Status shall include a statement from the owner or operator identifying which subpart he or she has elected to comply with, where given a choice, as provided for in § 63.1100(g).*

**(2) Due date.** *The owner or operator shall submit the Notification of Compliance Status for each affected source 240 days after the compliance date specified for the affected source under this subpart, or 60 days after completion of the initial performance test or initial compliance assessment/subsequent required performance test or subsequent compliance assessment, whichever is earlier. Notification of Compliance Status reports may be combined for multiple affected sources as long as the due date requirements for all sources covered in the combined report are met.*

**Evidence:**
**Appendix CAA L** – EPA Information Request Response, May 31, 2022 (Email Attachment)

**Description of Observation:** As previously described, Indorama did not conduct all required compliance assessments triggered by the restart of the refurbished facility in December 2018. Normally, a facility submits a notification of compliance status (NOCS) once all performance testing and compliance assessments have been completed, as these tests/assessments directly inform whether a facility is in compliance with applicable regulatory requirements. When NEIC requested the NOCS during the inspection, Mr. Fryoux stated that the NOCS had not been submitted because Indorama had not completed all required performance testing and compliance assessments. In addition, a May 31, 2022, email from Indorama stated, "[c]ompliance testing had to be completed in order to file initial NOCS report, so that subsequent semi-annual reports could be submitted. The NOCS will be completed once initial compliance testing is completed." (**Appendix CAA L**)

Much like the requirements to conduct performance testing and compliance assessments, when Indorama restarted the refurbished facility, it triggered deadlines for submitting a NOCS for those affected sources (the earlier of 240 days after the compliance date, or 60 days after the performance test was completed). As described in CAA Observation 9, when

**CAA Observation 10**

the plant restarted in December 2018, it would have been considered an existing source for the purposes of 40 CFR Part 63, Subpart YY. As such, that would have triggered a deadline of 240 days after the compliance date for an existing source that begins operation after the effective date of the relevant emission standard. Conservatively, assuming that Indorama restarted the refurbished facility on December 31, 2018, the NOCS would have been due no later than August 28, 2019.

Even if the December 2018 restart did not constitute the final restart of the plant, the plant was again restarted in September 2021. Conservatively, this would mean the 240-day compliance date for conducting the flare compliance assessment would have been May 29, 2022. As noted in the May 31, 2022, email from Indorama, Indorama had not yet submitted a NOCS at that time.

**CAA Observation 11**

**Observation Summary:** NEIC observed equipment that is missing from the LDAR program.

**Citation:**
**40 CFR Part 63 Subpart YY National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards**

**Table 7 to § 63.1103(e) - What Are My Requirements If I Own or Operate an Ethylene Production Existing or New Affected Source?**

| If you own or operate . . . | And if . . . | Then you must . . . |
|---|---|---|
| (f) *Equipment (as defined in § 63.1101) that contains or contacts organic HAP* | (1) *The equipment contains or contacts ≥5 weight-percent organic HAP; and the equipment is not in vacuum service* | (i) *Except as specified in paragraph (f)(1)(ii) of this table, comply with the requirements of subpart UU of this part.*<br>*(ii) Beginning no later than the compliance dates specified in § 63.1102(c), comply with the requirements of paragraph (e)(9) of this section and subpart UU of this part, except instead of complying with the pressure relief device requirements of § 63.1030 of subpart UU, meet the requirements of § 63.1107(h), and in lieu of the flare requirement of § 63.1034(b)(2)(iii), comply with the requirements specified* |

| | | |
|---|---|---|
| | | *in paragraph (e)(4) of this section.*[(a)] |

[(a)] *Beginning no later than the compliance dates specified in § 63.1102(c), any flare using fuel gas from a fuel gas system, of which 50 percent or more of the fuel gas is derived from an ethylene production unit as determined on an annual average basis, must be in compliance with paragraph (e)(4) of this section.*

**40 CFR Part 63 Subpart UU National Emission Standards for Equipment Leaks – Control Level 2 Standards**

**40 CFR § 63.1019 Applicability**

**(b) Equipment subject to this subpart.** *The provisions of this subpart and the referencing subpart apply to equipment that contains or contacts regulated material. This subpart applies to pumps, compressors, agitators, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, connectors, instrumentation systems, and closed vent systems and control devices used to meet the requirements of this subpart.*

**Evidence:**
**Appendix CAA F** – OGI Survey Images and Videos
**Appendix CAA A** – LDAR Monitoring Summary
**Field logbooks**

**Description of Observation:** Indorama uses physical tags to identify equipment, other than connectors, that are subject to LDAR regulations in 40 CFR Part 63, Subpart UU. While inspecting the facility, the NEIC inspection team observed leaks from equipment that was not tagged in the DOx area (**Appendix F**, videos 253 and 254). One leak was from a check valve between the DOx filters and measured greater than 20,000 ppm with the TVA before flaming out the instrument. Another was the open end of the DOx outlet sampling station that was actively dripping. No equipment associated with the DOx area was observed to be part of the facility LDAR program.

The NEIC CAA inspection team identified other areas of the facility that contained equipment that also were not tagged or otherwise identified as equipment being monitored under the Indorama LDAR program (**Appendix CAA A**), including:

- D-31
- TK-636A and TK-636B
- D-626
- FA-712
- D-303

**CAA Observation 12**

**Observation Summary:** NEIC observed leaking open-ended valves or lines.

**Citation:**
**40 CFR Part 63 Subpart UU National Emission Standards for Equipment Leaks – Control Level 2 Standards**

**40 CFR § 63.1033** *Open-ended valves or lines standards.*

**(b)(1)** *Each open-ended valve or line shall be equipped with a cap, blind flange, plug, or a second valve, except as provided in §§ 63.1021(b), 63.1036, 63.1037, and paragraphs (c) and (d) of § 63.1033. The cap, blind flange, plug, or second valve shall seal the open end at all times except during operations requiring process fluid flow through the open-ended valve or line, or during maintenance. The operational provisions of paragraphs (b)(2) and (b)(3) of § 63.1033 apply.*

**Evidence:**
**Appendix CAA A –** LDAR Monitoring Summary
**Field logbooks**

**Description of Observation:** During the inspection, the NEIC CAA inspection team identified six open-ended valves or lines that were leaking greater than 500 ppm (**Appendix CAA A**). The open-ended lines were not sealed with a cap, blind flange, plug, or second valve. At the time of the inspection, facility representatives did not indicate that operations requiring process fluid flow through the open-ended valves or lines or maintenance was taking place.

**CAA Observation 13**

**Observation Summary**: Indorama did not record a reason for placing components on delay of repair (DOR).

**Citation:**
**40 CFR Part 63 Subpart UU National Emission Standards for Equipment Leaks – Control Level 2 Standards**

**40 CFR § 63.1024 Leak repair.**

**(d) Delay of repair**. *Delay of repair is allowed for any of the conditions specified in paragraphs (d)(1) through (d)(5) of §63.1024. The owner or operator shall maintain a record of the facts that explain any delay of repairs and, where appropriate, why the repair was technically infeasible without a process unit shutdown.*

**Evidence:**
**Appendix CAA V** – LDAR Database DOR Info Summary

**Description of Observation:** A review of the Indorama LDAR database (**Appendix CAA V**) identified 63 pieces of equipment that were placed on DOR; for six pieces of this equipment, no reason for placing the equipment on DOR was recorded in the LDAR database.

**CAA Observation 14**

**Observation Summary:** Leak tags were not placed on leaking components.

**Citation:**
**40 CFR Part 63 Subpart UU National Emission Standards for Equipment Leaks – Control Level 2 Standards**

**40 CFR § 63.1023** *Instrument and sensory monitoring for leaks.*

**(e)** *Leaking equipment identification and records.*

**(1)** *When each leak is detected pursuant to the monitoring specified in 63.1023(a), a weatherproof and readily visible identification, shall be attached to the leaking equipment.*

**Evidence:**
**Field logbooks**

**Description of Observation:** The NEIC CAA inspection team identified 30 leaking pieces of equipment during the LDAR monitoring campaign. The NEIC CAA inspection team did not observe Indorama or Darbonne staff place leak tags on any of the equipment that NEIC identified and, Darbonne staff confirmed, as leaking.

**RCRA Observation 1**

**Observation Summary**: Indorama did not properly label hazardous waste containers in the following SAAs:

- SAA #1: A 55-gallon steel drum accumulating hazardous waste paint in the painting area was not marked with an indication of the hazards of its contents.
- SAA #2: A 55-gallon steel drum accumulating hazardous waste aerosol cans in the maintenance shop was not marked with an indication of the hazards of its contents.
- SAA #3: Seven plastic containers accumulating organic and aqueous hazardous waste in the quality control laboratory were not marked with the words "Hazardous Waste" or an indication of the hazards of their contents.
- SAA #4: A 55-gallon steel drum accumulating hazardous waste aerosol cans in the warehouse area was not marked with an indication of the hazards of its contents. The label also appeared to be dated from a prior waste removal event.

Additionally, Indorama did not keep closed hazardous waste containers in the following SAAs:

- SAA #3: Four plastic containers accumulating organic and aqueous hazardous waste in the quality control laboratory were not closed when waste was not being added or removed.

**Citation:**
**Satellite Accumulation Area Regulations for Small Quantity Generators and Large Quantity Generators, LAC 33:V.1011.A.4-6 [40 CFR §§ 262.15(a)(4)-(6)]**

**(A)** *A generator may accumulate as much as 55 gallons of nonacute hazardous waste and/or either one quart of liquid acute hazardous waste listed in LAC 33:V.4901.B or E, or 1 kg (2.2 lbs.) of solid acute hazardous waste listed in LAC 33:V.4901.B or E in containers at or near any point of generation where waste initially accumulate which is under the control of the operator of the process generating the waste, without a permit or interim status and without complying with the requirements of LAC 33:V.Subpart 1, provided that all of the conditions for exemption in this Section are*

*met. A generator may comply with the conditions for exemption in this Section instead of complying with the conditions for exemption in LAC 33:V.1013.C. or 1015.B, except as required in Paragraphs A.7 and 8 of this Section. The conditions for exemption for satellite accumulation are included in Paragraphs 1-8 below.*

**(4)** *A container holding hazardous waste shall be closed at all times during accumulation, except:*

*a. when adding, removing, or consolidating waste; or*

*b. when temporary venting of a container is necessary:*

*i. for the proper operation of equipment; or*

*ii. to prevent dangerous situations, such as build-up of extreme pressure.*

**(5)** *A generator shall mark or label its container with:*

*a. the words "Hazardous Waste"; and*

*b. an indication of the hazards of the contents (examples include, but are not limited to, the applicable hazardous waste characteristic(s) (i.e., ignitable, corrosive, reactive, toxic); hazard communication consistent with the U.S. Department of Transportation requirements at 49 CFR part 172 subpart E (labeling) or subpart F (placarding); a hazard statement or pictogram consistent with the U.S. Occupational Safety and Health Administration Hazard Communication Standard at 29 CFR 1910.1200; or a chemical hazard label consistent with the National Fire Protection Association Code 704).*

**(6)** *A generator who accumulates either acute hazardous waste listed in LAC 33:V.4901.B or E or nonacute hazardous waste in excess of the amounts listed in Subsection A of this Section at or near any point of generation shall do the following:*

*a. comply within three consecutive calendar days with the applicable central accumulation area regulations in LAC 33:V.1013.C or 1015.B, or*

*b. remove the excess from the satellite accumulation area within three consecutive calendar days to either:*

*i. a central accumulation area operated in accordance with the applicable regulations in LAC 33:V.1013.C or 1015.B;*

*ii. an on-site interim status or permitted treatment, storage, or disposal facility, or*

*iii. an off-site designated facility; and*

*c. during the three consecutive calendar day period the generator shall continue to comply with Paragraphs A.1-5 of this Section. (The generator shall mark or label the container(s) holding the excess accumulation of hazardous waste with the date the excess amount began accumulating.)*

**Evidence:**
**Appendix RCRA A –** RCRA Photographs
**Appendix RCRA B –** 81 Federal Register 85757 – 85759
**Appendix RCRA C –** May 27, 2022, Photographs of Laboratory Satellite Accumulation Areas
**Field logbooks**

**RCRA Observation 1**

**Description of Observation**: On May 12, 2022, the NEIC RCRA inspection team inspected Indorama's hazardous waste SAAs and made the following observations:

- **SAA #1**: Indorama conducts paint maintenance operations in a trailer west of the olefins unit. Hazardous waste paint, paint-related debris, and residues are accumulated in a 55-gallon satellite accumulation drum outside of the trailer (**Appendix RCRA A**, photo 8). At the time of the inspection, the drum was marked as "Hazardous Waste," "D001," and "Waste Paint." The drum was also marked with the four-digit United Nations (UN)/U.S. Department of Transportation (DOT) hazardous material identification number, UN1263, which corresponds to hazard Class 3 (flammable) paint. No other markings or labels were on the drum.

  LAC 33:V.1011.A.5, which is identical to the requirements at 40 CFR § 262.15(a)(5), requires generators to mark their hazardous waste satellite accumulation containers with an indication of the hazards of its contents. Several marking options are allowed, including, but not limited to, marking the container with its waste characteristic (e.g., "ignitable") or following the DOT labeling or placarding requirements at 40 CFR Part 172. The DOT requirements specify the use of diamond pictogram labels, which visually indicate the hazard of the contents of the container. For UN1263, for example, the DOT would require a red diamond pictogram with a flame and the words "flammable liquid." In issuing the final Hazardous Waste Generator Improvements Rule on November 28, 2016, EPA stated the following at 81 *Federal Register* 85758 (**Appendix RCRA B**):

  *It is important to note that if generators choose to identify the hazards of the contents of their containers using the DOT, OSHA or NFPA labeling methods, those methods must be used appropriately*.

  Placing the DOT hazardous material number alone on the drum is not the appropriate use of the DOT labeling methods. As a result, Indorama failed to properly mark this hazardous waste satellite accumulation container with an indication of the hazards of its contents.

- **SAA #2**: Indorama maintains a general maintenance shop on the southeast corner of the olefins unit. Hazardous waste aerosol cans are accumulated in a 55-gallon satellite accumulation drum within the shop (**Appendix RCRA A**, photos 11 and 12). At the time of the inspection, the drum was marked as "Hazardous Waste," "Waste Aerosols," and "Spray Paint." The drum was also marked with the four-digit DOT hazardous material identification number, UN1950, which corresponds to hazard Class 2.1 (flammable) aerosols. No other markings or labels were on the drum.

  For UN1950, the DOT would require a red diamond pictogram with a flame and the words "flammable gas." As described for SAA #1, placing the DOT hazardous material number alone on the drum is not the appropriate use of the DOT labeling methods. As a result, Indorama failed to properly mark this hazardous waste satellite accumulation container with an indication of the hazards of its contents.

- **SAA #3**: Indorama maintains a quality control laboratory where products and byproducts of the ethylene process are regularly analyzed for consistency. Additional analysis is conducted for facility maintenance purposes, e.g., boiler water quality. The

laboratory is divided into a wet chemistry lab, a petroleum lab, and a gas chromatography lab. In the hoods of these labs, Indorama generates separate organic and aqueous hazardous waste streams and places the waste in small plastic satellite accumulation containers. Organic hazardous waste is also generated in a container leading from a density measurement instrument in the petroleum lab. Matt Hebert, an Indorama analyst, stated the organic waste stream consisted of waste petroleum samples (i.e., pygas, fuel oil, lube oil) as well as spent acetone and toluene used for glassware cleaning. He stated the aqueous waste stream primarily consisted of corrosive boiler water waste. When the plastic containers are full, they are consolidated in separate organic and aqueous 55-gallon hazardous waste satellite accumulation drums staged outside the laboratory entrance (**Appendix RCRA A**, photos 13, 14, and 15).

At the time of the inspection, three plastic satellite containers were accumulating organic hazardous waste and three plastic satellite containers were accumulating aqueous hazardous waste in the laboratory hoods (**Appendix RCRA A**, photos 16, 17, 18, and 20). Organic hazardous waste was also accumulating in a plastic satellite container from the petroleum lab's density measurement instrument (**Appendix RCRA A**, photo 19). None of the containers were marked with the words "Hazardous Waste" or an indication of the hazards of their contents. Additionally, three containers of aqueous hazardous waste and one container of organic hazardous waste were open while waste was not being added or removed (**Appendix RCRA A**, photos 17, 18, and 20). By not marking these satellite containers with the words "Hazardous Waste" and an indication of their hazards, and not keeping them closed when waste was not being added or removed, Indorama failed to meet the satellite accumulation area requirements.

On May 27, 2022, Alex Perticone, Indorama's water and waste environmental specialist, provided by email three photographs of the containers in the laboratory hoods (**Appendix RCRA C**). The aqueous waste containers were labeled as hazardous waste and marked as "corrosive, toxic," and the organic waste containers were labeled as hazardous waste and marked as "flammable liquids, toxic." All containers appeared to be closed. However, an updated photograph of the satellite container that accumulated organic hazardous waste from the petroleum lab's density measurement instrument was not provided.

- **SAA #4**: Indorama maintains a storage warehouse at the southern end of its facility. A satellite accumulation area with a 55-gallon drum is staged in this area to collect hazardous waste aerosol cans. The drum was marked as "Hazardous Waste," "Waste Aerosols," and "Spray Paint" (**Appendix RCRA A**, photo 21). The drum was also marked with the four-digit DOT hazardous material identification number, UN1950, which corresponds to hazard Class 2.1 (flammable) aerosols. No other markings or labels were on the drum. As described for SAA #1, placing the DOT hazardous material number alone on the drum is not the appropriate use of the DOT labeling methods. As a result, Indorama failed to properly mark this hazardous waste satellite accumulation container with an indication of the hazards of its contents.

  Additionally, the satellite drum was not full and was dated February 23, 2022. LAC 33:V.1011.A.6 requires that satellite containers only be marked with the date when

**RCRA Observation 1**

the excess accumulation of hazardous waste begins, i.e., when more than 55 gallons of hazardous waste has accumulated in the satellite area. The date on the drum likely represented the last instance when the satellite container became full and was emptied. Because the container was not currently accumulating more than 55 gallons of hazardous waste and was marked with a date that was no longer applicable, Indorama was not complying with the satellite accumulation container requirements.

**RCRA Observation 2**

**Observation Summary:** Indorama failed to make an accurate waste determination for the following hazardous waste streams:

- Spent solvent waste generated in the quality control laboratory
- Corrosive aqueous waste generated in the quality control laboratory

**Citation:**
**Hazardous Waste Determination and Recordkeeping, LAC 33:V.1005.A-E and H [40 CFR §§ 262.11(a)-(d), (g)]**

**(A)** *A person who generates a solid waste, as defined in LAC 33:V.109, shall determine if that waste is a hazardous waste in order to ensure the wastes are properly managed according to applicable RCRA regulations. A hazardous waste determination is made using the steps in Subsections B-G of this Section.*

**(B)** *The hazardous waste determination for each solid waste shall be made at the point of waste generation, before any dilution, mixing, or other alteration of the waste occurs, and at any time in the course of its management that it has, or may have, changed its properties as a result of exposure to the environment or other factors that may change the properties of the waste such that the RCRA classification of the waste may change.*

**(C)** *The generator shall determine if the waste is exempted or excluded from regulation under LAC 33:V.105.D.*

**(D)** *If the waste is not exempted or excluded under LAC 33:V.105.D, the person shall then use knowledge of the waste to determine whether the waste meets any of the listing descriptions under LAC 33:V.Chapter 49. Acceptable knowledge that may be used in making an accurate determination as to whether the waste is listed may include waste origin, composition, process producing the waste, feedstock, and other reliable and relevant information. If the waste is listed, the person may file a delisting petition under LAC 33:V.105.M to demonstrate to the Office of Environmental Services that the waste from this particular site or operation is not a hazardous waste.*

**(E)** *The person then shall also determine whether the waste exhibits one or more hazardous characteristics as identified in LAC 33:V.4903 by following the procedures in Paragraph E.1 or 2 of this Section, or a combination of both.*

**RCRA Observation 2**

**(H)** *Identifying Hazardous Waste Numbers for Small Quantity Generators and Large Quantity Generators. If the waste is determined to be hazardous, small quantity generators and large quantity generators shall identify all applicable EPA hazardous waste numbers (EPA hazardous waste codes) in LAC 33:V.4901 and 4903. Prior to shipping the waste off-site, the generator shall mark its containers with all applicable EPA hazardous waste numbers (EPA hazardous waste codes) according to LAC 33:V.1063.C.*

**Lists of Hazardous Wastes, LAC 33:V.Chapter 49 [40 CFR 261, Subpart D]**
**Category I Hazardous Wastes, LAC 33:V.4901.B [40 CFR § 261.31(a)]**

*(1) The following solid wastes are listed hazardous wastes from nonspecific sources unless they are excluded in accordance with LAC 33:V.105.H.*

| Table 1. Hazardous Wastes from Nonspecific Sources | | |
|---|---|---|
| **Industry and EPA Hazardous Waste Number** | **Hazard Code** | **Hazardous Waste** |
| | | **Generic** |
| F003 | (I)* | The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of 10 percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. |
| F005 | (I,T) | The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of 10 percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. |

**RCRA Observation 2**

**Evidence:**
**Appendix RCRA A** – RCRA Photographs
**Appendix RCRA D** – March 17, 2021, Lab Waste Profile
**Appendix RCRA E –** June 3, 2022, Email from Alex Perticone
**Appendix RCRA F** – June 20, 2022, Aqueous Lab Waste Profile
**Appendix RCRA G** – May 19, 2022, Organic Lab Waste Profile
**Field logbooks**

**Description of Observation:** Indorama maintains a quality control laboratory where products and byproducts of the ethylene process are analyzed for consistency. Additional analyses are conducted for facility maintenance purposes, e.g., testing of boiler water quality. In conducting these analyses, Indorama generates two separate hazardous waste streams. The first is an organic waste stream consisting of waste petroleum samples (i.e., pygas, fuel oil, lube oil) as well as spent acetone and toluene used for glassware cleaning. The second is an aqueous waste stream consisting of, primarily, corrosive boiler water sample waste.

Both hazardous waste streams are accumulated in separate 55-gallon satellite accumulation drums outside of the laboratory entrance (**Appendix RCRA A**, photos 13, 14, and 15). At the time of the inspection, both satellite drums were marked as D018 and D022 hazardous waste, toxic organic liquids, and with DOT hazardous material No. UN2810, which corresponds to Class 6.1 toxic organic liquids.

While reviewing Indorama's hazardous waste profiles, NEIC inspectors located one U.S. Ecology profile for "Lab Waste" (**Appendix RCRA D**). Dated March 17, 2021, the profile describes the waste stream as "left over poured lab waste" and characterizes the material as D018 and D022 hazardous waste. The profile, which is based on "lab analysis," also describes the waste stream as consisting of 99% water with ppm concentrations of chloroform and benzene. The profile does not indicate the pH of the waste.

Indorama personnel described the organic hazardous waste stream generated in the laboratory as pygas, fuel oil, and lube oil samples as well as acetone and toluene used for cleaning glassware. Spent acetone and toluene solvent generated in this manner meets the definition of the EPA hazardous waste Nos. F003 and F005, respectively. Additionally, a waste stream consisting of pygas, fuel oil, lube oil, and spent solvents is highly unlikely to consist of 99% water, as the waste profile indicates. It does not appear that the March 17, 2021, waste profile for "lab waste" applied to the organic hazardous waste stream generated in the laboratory at the time of the inspection.

Communication with Alex Perticone after the inspection indicated that the March 17, 2021, waste profile observed during the inspection applied to the laboratory's aqueous hazardous waste stream, and not to the organic waste stream (**Appendix RCRA E**). Mr. Perticone stated that Indorama was creating a new waste profile for the organic hazardous waste stream (although an existing or "old" profile for the organic hazardous waste was not available). He also stated the aqueous waste profile was being updated to include EPA hazardous waste No. D002 for corrosivity.

On June 24, 2022, Mr. Perticone provided by email an updated waste profile for the aqueous hazardous waste (**Appendix RCRA F**) and a newly created waste profile for the organic

**RCRA Observation 2**

hazardous waste streams (**Appendix RCRA G**). The aqueous waste was assigned the hazardous waste Nos. D002, D018, and D022. The organic waste was assigned the hazardous waste Nos. D018, D022, F003, and F005.

Indorama failed to make accurate hazardous waste determinations by failing to assign the F003 and F005 hazardous waste numbers to the laboratory's organic hazardous waste stream, and the D002 hazardous waste number to the laboratory's aqueous hazardous waste stream.

**RCRA Observation 3**

**Observation Summary:** Indorama failed to maintain records supporting its hazardous waste determinations.

**Citation:**
**Hazardous Waste Determination and Recordkeeping, LAC 33:V.1005.G [40 CFR § 262.11(f)]**

**(G)** *Recordkeeping for Small Quantity Generators and Large Quantity Generators. A small or large quantity generator shall maintain records supporting its hazardous waste determinations, including records that identify whether a solid waste is a hazardous waste, as defined by LAC 33:V.109. Records shall be maintained for at least three years from the date that the waste was last sent to on-site or off-site treatment, storage, or disposal. These records shall comprise the generator's knowledge of the waste and support the generator's determination, as described in Subsections D and E of this Section. The records shall include, but are not limited to the following types of information: the results of any tests, sampling, waste analyses, or other determinations made in accordance with this section; records documenting the tests, sampling, and analytical methods used to demonstrate the validity and relevance of such tests; records consulted in order to determine the process by which the waste was generated, the composition of the waste, and the properties of the waste; and records which explain the knowledge basis for the generator's determination, as described in Paragraph E.1 of this Section. The periods of record retention referred to in this Section are extended automatically during the course of any unresolved enforcement action regarding the regulated activity or as requested by the administrative authority.*

**Evidence:**
**Appendix RCRA H –** Follow-Up Hazardous Waste Profiles
**Appendix RCRA I** – May 27, 2022, Email from Alex Perticone
**Field logbooks**

**Description of Observation:** From May 11-May 13, 2022, the NEIC RCRA inspection team reviewed a binder on-site that contained Indorama's hazardous and non-hazardous waste profiles and characterization records. The hazardous waste profiles that NEIC inspectors observed in the binder were for solids from the cleanup of benzene spills (D018); sodium hydroxide solution (D002); laboratory waste (D018 and D022); sulfuric and phosphoric acids (D002); lead-containing debris (D008); and digestive solution from chemical oxygen demand (COD) vials from laboratory analyses (D002, D007, D009, D011). All hazardous waste profiles in the binder were prepared by U.S. Ecology. No other hazardous waste profiles were

available, including for the hazardous waste paint observed in SAA #1, and hazardous waste aerosol cans observed in SAAs #2 and #4 (see RCRA Observation 1).

While reviewing the previous 3 years of hazardous waste shipments from Indorama, NEIC inspectors observed additional hazardous wastes on manifests that did not have corresponding waste determination records or profiles available for review. The hazardous waste shipments were to Clean Harbors facilities in La Porte, Texas; El Dorado, Arkansas; and Smithfield, Kentucky. NEIC inspectors observed no hazardous waste profiles prepared by Clean Harbors, or records referencing the hazardous wastes in the Clean Harbors shipments, in Indorama's records at the time of the inspection.

At the time of the inspection, waste determination records or profiles were not available for the following hazardous waste streams, as observed on 2019 and 2020 manifests:

| Hazardous Waste Description | Hazardous Waste No(s). | Clean Harbors Profile No. |
|---|---|---|
| Benzene-impacted carbon | D018 | CH1841084B |
| Benzene-impacted process water | D018 | CH1841085 |
| Benzene-contaminated soil and debris | D018 | 1883015 |
| Spent Lifeguard 1600/3000 | D018 | CH1930812 |
| Discarded/unused pygas | D001, D018 | CH1907092 |
| Paint sludge/solids | D001, F005 | CH1896952 |
| DOX wastewater | D018 | CH1931394 |
| Lead abatement waste | D008 | CH1841076 |
| Used antifreeze | D006, D007, D008, D018, D039, D040 | CH1838690 |
| Crushed fluorescent bulbs | D009 | CH1838676 |
| Non-punctured aerosol cans | D001, D005, D006, D007, D008, D035, D039, D040 | CH1838671 |
| Unknown – unspecified lab pack (sulfuric acid, mercuric sulfate) | D002, D007, D009 (as seen on manifest 013850719FLE, dated 10/13/19) | LCHG4 |
| Unknown – unspecified lab pack (benzene, butadiene) | D001, D018, U019 (as seen on manifest 013850348FLE, dated 9/30/19) | LCCRD |

Following the inspection, Alex Perticone provided electronic copies of all the above Clean Harbors waste profiles, except profile Nos. LCHG4 and LCCRD (**Appendix RCRA H**). In a May 27, 2022, email related to profiles LCHG4 and LCCRD, Mr. Perticone provided a response from Clean Harbors stating the waste streams were "lab packs." The DOT description of the lab packs from box 9.b. of the manifests referenced in the above table were also provided.

**RCRA Observation 3**

However, no actual documentation or Clean Harbors profiles related to the characterization of the lab pack wastes were provided (**Appendix RCRA I**).

Additionally, and as described in RCRA Observation 2, two hazardous waste streams (organic and aqueous) are generated in Indorama's quality control laboratory. However, only the aqueous waste stream's hazardous waste profile was available for review. No waste profile or determination record was available for the organic hazardous waste stream at the time of the inspection. On June 24, 2022, Mr. Perticone provided by email a newly created waste profile for the organic hazardous waste stream. The organic waste was assigned the hazardous waste Nos. D018, D022, F003, and F005.

**RCRA Observation 4**

**Observation Summary:** Indorama failed to maintain on-site records of land disposal restriction (LDR) notification forms for hazardous wastes that were shipped off site.

**Citation:**

**Conditions for Exemption for Large Quantity Generators, LAC 33:V.1015.A and B.9 [40 CFR 262.17(a)(9)]**

**(A)** *A large quantity generator may accumulate hazardous waste on-site without a permit or interim status, and without complying with the requirements of LAC 33:V.Subpart 1, provided that all of the following conditions for exemption are met.*

**(B)** *Accumulation. A large quantity generator accumulates hazardous waste on-site for no more than 90 days, unless in compliance with the accumulation time limit extension or F006 waste accumulation conditions for exemption in Subsections C-F of this Section. The following accumulation conditions also apply.*

*9. Land Disposal Restrictions. The large quantity generator complies with all applicable requirements under LAC 33:V.Chapter 22.*

**Generators' Waste Analysis, Recordkeeping, and Notice Requirements, LAC 33:V.2245.H [40 CFR § 268.7(a)(8)]**

**(H)** *Generators must retain on-site a copy of all notices, certifications, demonstrations, waste analysis data, and other documentation produced in accordance with this Section for at least three years from the date that the waste that is the subject of such documentation was last sent to on-site or off-site treatment, storage, or disposal. The three-year record retention period is automatically extended during the course of any unresolved enforcement action regarding the regulated activity or as requested by the administrative authority. The requirements of this Paragraph apply to solid wastes even when the hazardous characteristic is removed prior to disposal, or when the waste is excluded from the definition of hazardous or solid waste under LAC 33:V.Chapter 1 or 41, or exempted from regulation under LAC 33:V.Subpart 1, subsequent to the point of generation.*

**Evidence:**

**Appendix RCRA J** – Follow-up Land Disposal Restriction Notification Forms

**RCRA Observation 4**

**Field logbooks**

**Description of Observation:** From May 11-May 13, 2022, the NEIC RCRA inspection team reviewed Indorama's hazardous waste profile binder. The hazardous waste profiles that NEIC inspectors observed in the binder were for solids from the cleanup of benzene spills (D018), laboratory waste (D018, D022); sulfuric and phosphoric acids (D002); sodium hydroxide solution (D002); lead-containing debris (D008); and digestive solution from COD vials from laboratory analyses (D002, D007, D009, D011).

At the time of the review, no LDR notification forms associated with off-site shipments of the hazardous waste sodium hydroxide solution and COD digestive solution were available.

While reviewing the previous 3 years of hazardous waste shipments from Indorama, NEIC inspectors observed additional hazardous wastes on manifests that did not have corresponding LDR notification forms available for review. At the time of the inspection, LDR notification forms were not available on-site for the following hazardous waste streams, as observed on 2019 and 2020 manifests:

| Hazardous Waste Description | Hazardous Waste No(s). | Clean Harbors Profile No. |
|---|---|---|
| Benzene-impacted process water | D018 | CH1841085 |
| Spent Lifeguard 1600/3000 | D018 | CH1930812 |
| Discarded/unused pygas | D001, D018 | CH1907092 |
| Paint sludge/solids | D001, F005 | CH1896952 |
| DOX wastewater | D018 | CH1931394 |
| Used antifreeze | D006, D007, D008, D018, D039, D040 | CH1838690 |

On May 27, 2022, Alex Perticone provided by email electronic copies of LDR notification forms for all the above hazardous waste streams, excluding the used antifreeze waste stream (**Appendix RCRA J**).

Indorama did not meet this LDR recordkeeping requirement because it did not maintain on-site LDR notification forms related to the shipment of its sodium hydroxide solution, COD digestive solution, and used antifreeze hazardous waste streams.

**RCRA Observation 5**

**Observation Summary:** Indorama did not maintain a hazardous waste contingency plan or any related plan that contained the necessary content of a hazardous waste contingency plan.

**Citation:**

**Conditions for Exemption for Large Quantity Generators, LAC 33:V.1015.A and B.6 [40 CFR § 262.17(a)(6)]**

**(A)** *A large quantity generator may accumulate hazardous waste on-site without a permit or interim status, and without complying with the requirements of LAC 33:V.Subpart 1, provided that all of the following conditions for exemption are met.*

**RCRA Observation 5**

**(B)** *Accumulation. A large quantity generator accumulates hazardous waste on-site for no more than 90 days, unless in compliance with the accumulation time limit extension or F006 waste accumulation conditions for exemption in Subsections C-F of this Section. The following accumulation conditions also apply.*

**(6)** *Emergency Procedures. The large quantity generator complies with the standards in Subchapter D of this Chapter, Preparedness, Prevention, and Emergency Procedures for Large Quantity Generators.*

**Preparedness, Prevention and Emergency Procedures for Large Quantity Generators, LAC 33:V.Chapter 10, Subchapter D [40 CFR 262, Subpart M]**

**Purpose and Implementation of Contingency Plan, LAC 33:V.1051.A [40 CFR § 262.260(a)]**

**(A)** *A large quantity generator shall have a contingency plan for the facility. The contingency plan shall be designed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or nonsudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water.*

**Content of Contingency Plan, LAC 33:V.1053.C-E [40 CFR §§ 262.261(c)-(e)]**

**(C)** *The plan shall describe arrangements agreed to with the local police department, fire department, other emergency response teams, emergency response contractors, equipment suppliers, local hospitals or, if applicable, the local emergency planning committee, in accordance with Section 1049 of this Subchapter.*

**(D)** *The plan shall list names and telephone numbers of all persons qualified to act as emergency coordinator (see Section 1059 of this Subchapter), and this list shall be kept up to date. Where more than one person is listed, one shall be named as primary emergency coordinator and others shall be listed in the order in which they assume responsibility as alternates. In situations where the generator facility has an emergency coordinator continuously on duty because it operates 24 hours per day, every day of the year, the plan may list the staff position (e.g., operations manager, shift coordinator, shift operations supervisor) as well as an emergency telephone number that can be guaranteed to be answered at all times.*

**(E)** *The plan shall include a list of all emergency equipment at the facility (e.g., fire extinguishing systems, spill control equipment, communications and alarm systems (internal and external), and decontamination equipment), where this equipment is required. This list shall be kept up to date. In addition, the plan shall include the location and physical description of each item on the list, and a brief outline of its capabilities.*

**Arrangements with Local Authorities, LAC 33:V.1049.B [40 CFR § 262.256(b)]**

**RCRA Observation 5**

**(B)** *The large quantity generator shall maintain records documenting the arrangements with the local fire department as well as any other organization necessary to respond to an emergency. This documentation shall include documentation in the operating record that either confirms such arrangements actively exist or in cases where no arrangements exist, confirms that attempts to make such arrangements were made.*

**Evidence:**
**Appendix RCRA K –** Indorama Hazardous Waste Contingency Plan
**Field logbooks**

**Description of Observation:** During a review of the facility's RCRA records, NEIC inspectors requested to see Indorama's contingency plan. At the time of the inspection, Indorama did not provide a document specifically identified as a contingency plan. Instead, Indorama provided three documents: an emergency response plan (ERP), an emergency action plan (EAP), and an "Emergency Operations Center" book.

In a follow-up email sent after the inspection on May 27, 2022, Indorama provided a newly created document titled "Appendix 1 RCRA Contingency Plan" (**Appendix RCRA K**) that consolidates required contingency plan information as an appendix to the facility's ERP. Indorama's initial emergency response documentation at the time of the inspection, as well as the follow-up document, were reviewed for the contents of an "LQG Contingency Plan," as required by LAC 33:V.1053 [40 CFR §§ 262.261]. NEIC inspectors observed the following:

- None of the three documents originally provided contained any description of arrangements agreed to with the local police department, fire department, or other emergency response teams. As evidence that these arrangements do exist, Indorama provided a membership certificate for the Mutual Aid Association, which is an emergency assistance organization involving local authorities and other industrial facilities in the area. The certificate was current, with an expiration date of December 31, 2022. The follow-up contingency plan contains a short section titled "Agreements with Local Authorities," which simply states that, "Indorama Ventures Olefins staff work closely with local response organizations" and that "Response information and information regarding the materials handled on site is also shared...." This description does not adequately confirm that arrangements have been made with local authorities, as is required to be documented in the operating record by LAC 33:V.1049.B [40 CFR § 262.256(b)].
- The ERP and EAP provided by Indorama do not list names and emergency telephone numbers of all persons qualified to act as emergency coordinator. OMI is listed as the designated emergency response contractor, and a 24-hour emergency response phone number is included in the ERP and EAP, but no specific names are given nor is any specific individual identified as the responsible emergency coordinator. Indorama's "Emergency Operations Center" book does contain a list of emergency contacts for the facility with phone numbers, but no specific individual is identified as the emergency coordinator for the facility. The follow-up contingency plan created after the inspection corrects this deficiency and identifies a list of Indorama personnel qualified to act as the emergency coordinator, along with their respective phone numbers.

**RCRA Observation 5**

- None of the three documents initially provided contained a list or description of emergency equipment maintained at the facility. The follow-up contingency plan describes emergency response vehicles and equipment maintained on-site, but it does not specify the location of most equipment.

At the time of the inspection, Indorama failed to have assembled an adequate contingency plan as required by the regulations. The follow-up contingency plan that was created after the fact contains most of the required information; however, it lacks confirmation of arrangements with local authorities, as well as the location of emergency equipment.

**RCRA Observation 6**

**Observation Summary:** Indorama did not maintain the necessary fire suppression equipment at the "C-Can" less-than-90-day hazardous waste central accumulation area.

**Citation:**

**Conditions for Exemption for Large Quantity Generators, LAC 33:V.1015.A and B.6 [40 CFR § 262.17(a)(6)]**

**(A)** *A large quantity generator may accumulate hazardous waste on-site without a permit or interim status, and without complying with the requirements of LAC 33:V.Subpart 1, provided that all of the following conditions for exemption are met.*

**(B)** *Accumulation. A large quantity generator accumulates hazardous waste on-site for no more than 90 days, unless in compliance with the accumulation time limit extension or F006 waste accumulation conditions for exemption in Subsections C-F of this Section. The following accumulation conditions also apply.*

*(6) Emergency Procedures. The large quantity generator complies with the standards in Subchapter D of this Chapter, Preparedness, Prevention, and Emergency Procedures for Large Quantity Generators.*

**Preparedness, Prevention and Emergency Procedures for Large Quantity Generators, LAC 33:V.Chapter 10, Subchapter D [40 CFR 262, Subpart M]**

**Required Equipment, LAC 33:V.1041.A.3-4 [40 CFR §§ 262.252(c)-(d)]**

**(A)** *All areas deemed applicable by Section 1037 of this Subchapter shall be equipped with the items in Paragraphs A.1-4 of this Section, unless none of the hazards posed by waste handled at the facility could require a particular kind of equipment specified below or the actual hazardous waste generation or accumulation area does not lend itself for safety reasons to have a particular kind of equipment specified below. A large quantity generator may determine the most appropriate locations within its facility to locate the following equipment necessary to prepare for and respond to emergencies including:*

**RCRA Observation 6**

**(3)** *portable fire extinguishers, fire control equipment (including special extinguishing equipment, such as that using foam, inert gas, or dry chemicals), spill control equipment, and decontamination equipment; and*

**(4)** *water at adequate volume and pressure to supply water hose streams, or foam producing equipment, or automatic sprinklers, or water spray systems.*

**Evidence:**
**Appendix RCRA A** – RCRA Photographs
**Appendix RCRA L** – Ignitable Aerosols Waste Profile
**Field logbooks**

**Description of Observation:** On May 12, 2022, the NEIC RCRA inspection team inspected Indorama's less-than-90-day hazardous waste central accumulation area, referred to as the C-Can (**Appendix RCRA A**, photographs 32 and 33). NEIC inspectors observed that the area was not equipped with any type of fire suppression equipment.

Indorama did not demonstrate to inspectors that fire suppression equipment is not needed for the types of wastes that will be accumulated in this area. Indorama generates several wastes which have been characterized as D001 (ignitable) hazardous waste, including waste aerosol cans, paint sludge, and unused pygas (see RCRA Observation 3). As an example, ignitable aerosols (**Appendix RCRA L**) are accumulated in SAAs #2 and #4, and D001 paint waste was observed at SAA #1. Therefore, it is likely that D001 waste will be centrally accumulated in the less-than-90-day hazardous waste accumulation area at some point, requiring fire suppression to be available.

**RCRA Observation 7**

**Observation Summary:** Indorama failed to maintain personnel training records related to hazardous waste management.

**Citation:**
**Conditions for Exemption for Large Quantity Generators, LAC 33:V.1015.A and B.7.d-e [40 CFR §§ 262.17(a)(7)(iv-v)]**

**(A)** *A large quantity generator may accumulate hazardous waste on-site without a permit or interim status, and without complying with the requirements of LAC 33:V.Subpart 1, provided that all of the following conditions for exemption are met.*

**(B)** *Accumulation. A large quantity generator accumulates hazardous waste on-site for no more than 90 days, unless in compliance with the accumulation time limit extension or F006 waste accumulation conditions for exemption in Subsections C-F of this Section. The following accumulation conditions also apply.*

**(7)** *Personnel Training*

**d.** *The large quantity generator shall maintain documents and records at the facility including:*

**i.** *the job title of each position at the facility related to hazardous waste management, and the name of the employee filling each job;*

**ii.** *a written job description of each position listed under Clause B.7.d.i of this Section (This description may be consistent in its degree of specificity with*

| RCRA Observation 7 |
|---|
| *descriptions for other similar positions in the same company location or bargaining unit, but shall include the requisite skill, education, or other qualifications, and duties of facility personnel assigned to each position);*<br>**iii.** *a written description of the type and amount of both introductory and continuing training that will be given to each person filling a position listed under Clause B.7.d.i of this Section; and*<br>**iv.** *records that document that the training or job experience, required under Subparagraphs B.7.a-c of this Section, has been given to, and completed by, facility personnel.*<br>**e.** *Training records on current personnel shall be kept until closure of the facility. Training records on former employees shall be kept for at least three years from the date the employee last worked at the facility. Personnel training records may accompany personnel transferred within the same company.* |
| **Evidence:**<br>**Appendix RCRA M –** OMI Duties<br>**Appendix RCRA I –** May 27, 2022, Email from Alex Perticone<br>**Field Logbooks** |
| **Description of Observation:** NEIC inspectors reviewed Indorama's training records for facility personnel involved in hazardous waste handling procedures and found that the 2020 training records for Mark Trahan and Edward McGowan were missing. The certificate for Mr. Trahan was located following the inspection and provided by email from Indorama on May 27, 2022.<br><br>According to a document provided by Indorama titled "OMI Duties" (**Appendix RCRA M**), Mr. McGowan is a waste disposal technician responsible for handling and transporting hazardous and non-hazardous waste to and from the less-than-90-day hazardous waste storage area, tracking and inventorying all waste generated on-site, and ensuring that all waste is shipped in DOT-compliant containers. In a follow-up email sent by Indorama on May 27, 2022 (**Appendix RCRA I**), it was stated that "OMI was able to locate one file 'M. Trahan-RCRA-01.03.20'. The other records were lost during Hurricane Laura." Indorama did not maintain complete personnel training records as required by the regulations. |