

**ENVIRONMENTAL PROTECTION AGENCY**

**REGION 1 – NEW ENGLAND**

5 POST OFFICE SQUARE, SUITE 100  
BOSTON, MASSACHUSETTS 02109-3912

**RCRA Compliance Inspection of:**

**Hampford Research, Inc.**

**54 Veterans Boulevard**

**Stratford, CT 06615**

July 25-27, 2022

Dates of Inspection

Linda Brolin, Environmental Engineer

Waste and Chemical Compliance Section

November 3, 2022

Date Inspection Report Approved

Mary Jane O'Donnell, Manager

Waste and Chemical Compliance Section

November 3, 2022

Date Inspection Report Finalized

November 4, 2022

Date Inspection Report Transmitted to Facility

***Disclaimer: Unless otherwise noted, this report describes conditions at the facility/property as observed by EPA inspector(s), and/or through records provided to and/or information reported to EPA inspector(s) by facility representatives and as understood by the inspector(s). This report may not capture all operations or activities ongoing at the time of the inspection. This report does not make final determinations on potential areas of concern. Nothing in this report affects EPA's authorities under federal statutes and regulations to pursue further investigation or action.***

# RCRA HAZARDOUS WASTE INSPECTION REPORT

## I. GENERAL INFORMATION

- a. **Facility Name:**           Hampford Research, Inc. (“HRI” or the “facility”)
- b. **Inspection Dates:**       Monday, July 25, 2022 – Wednesday, July 27, 2022
- c. **Inspection Type:**       RCRA Compliance Evaluation Inspection (CEI)
- d. **EPA Inspectors:**       Cheryl Wilkinson, Life Scientist, EPA Region 1  
Linda Brolin, Environmental Engineer, EPA Region 1  
Kimberly Chavez, Envir. Protection Specialist, EPA HQ  
Brook McKeown, Chemical Engineer, Contractor  
George Wieber, Chemical Engineer, Contractor
- e. **EPA ID Number:**       CTD075133835
- f. **NAICS:**                   325199 – All Other Basic Organic Chemical  
  
  Manufacturing
- g. **Street Address:**       54 Veterans Blvd, Stratford, CT, 06615
- h. **Mailing Address:**       54 Veterans Blvd, Stratford, CT, 06615
- i. **Facility Contacts:**     Kate Hampford Donahue  
  President & CEO  
  Phone: 203-375-1137  
  Email: kdonahue@hampfordresearch.com  
  
  Timothy Hampford  
  Senior EHS&S Engineer  
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  Lloyd Lirio  
  Director of Operations  
  Phone: 203-375-1137  
  Email: llirio@hampfordresearch.com
- j. **Generator Status (per RCRAInfo):**   Large Quantity Generator (LQG)
- k. **Date first notified as a generator (per RCRAInfo):**   09/10/1984

- l. **Date of most recent notification in RCRAInfo:** 02/28/2022
- m. **Current Property Owner:** Hampford Research, Inc.
- n. **Current Operator:** Hampford Research, Inc.
- o. **Wastes generated (per most recent RCRAInfo notification):** D001, D002, D003, D007, D011, F002, F003, F005, U188

Report Attachments:

ATTACHMENT 1 – Digital Photo Log of Photos Taken by EPA Inspectors

ATTACHMENT 2 – NSR Permit

ATTACHMENT 3 – 2020-2022 Nonhazardous Water Analytical Testing

ATTACHMENT 4 – Waste Stream list

ATTACHMENT 5 – T-6 Feed Waste Profiles

ATTACHMENT 6 – 2021-2022 Waste Area Inspection Forms

ATTACHMENT 7 – Contingency Plan

ATTACHMENT 8 – Training Logs and Certificates

ATTACHMENT 9 – pH Testing of T-6 Feed

ATTACHMENT 10 – Product List

ATTACHMENT 11 – 2019 and 2020 Selected Process Emissions

ATTACHMENT 12 – 2021 Oil Manifest

ATTACHMENT 13 – Document Request Response

## **II. FACILITY DESCRIPTION**

Hampford Research, Inc. began operations in early 1980s and currently employs approximately 34 people. The facility operates two shifts, 5 days/week. HRI manufactures small-batch specialty chemicals for its customers, with product applications in the electronics, adhesives, coating, imaging, dental and personal care industries. The facility's product list contains over sixty materials, however, only a subset of that is manufactured on an annual basis. HRI also operates three laboratories: a quality control lab, research and development lab, and a clean room production lab. The facility occupies a production building with an area of approximately 29,000 ft<sup>2</sup> and a maintenance and warehouse building of unknown square footage. HRI notified as a Large Quantity Generator (LQG) of hazardous waste. HRI also operates under a Connecticut Department of Energy and Environmental Protection (CT DEEP) new source review (NSR) air permit (Attachment 2).

## **III. INSPECTION IN-BRIEF**

EPA inspectors arrived at the facility at 54 Veterans Boulevard in Stratford, CT at approximately 11:00 AM on the 25<sup>th</sup> of July, 2022. The EPA inspection team (“inspection team”) consisted of Cheryl Wilkinson (EPA Region 1), Linda Brolin (EPA Region 1), Kimberly Chavez (EPA Headquarters), Brook McKeown (Contractor, Eastern Research Group, Inc. [ERG]), and George Wieber (Contractor, ERG). The inspection team met Lloyd Lirio, Director of Operations, at the entrance to the building at 11:02 AM. The inspection team signed in and followed Mr. Lirio to a conference room for the opening conference and presented EPA credentials. Also present during the opening conference was Timothy Hampford and Kate Hampford Donahue. Inspector Chavez discussed inspection procedures at this time, including the right to claim confidential business information (CBI). The following personnel were present at the opening conference and in-brief:

EPA:	Cheryl Wilkinson, Life Scientist, EPA Region 1 Linda Brolin, Environmental Engineer, EPA Region 1 Kimberly Chavez, Environmental Protection Specialist, EPA HQ Brook McKeown, Chemical Engineer, Contractor George Wieber, Chemical Engineer, Contractor
HRI:	Timothy Hampford, Senior EHS&S Engineer Lloyd Lirio, Director of Operations Kate Hampford Donahue, President and CEO

HRI employees and EPA inspectors discussed the following information about the facility processes and operations during the in-brief and inspection walkthrough:

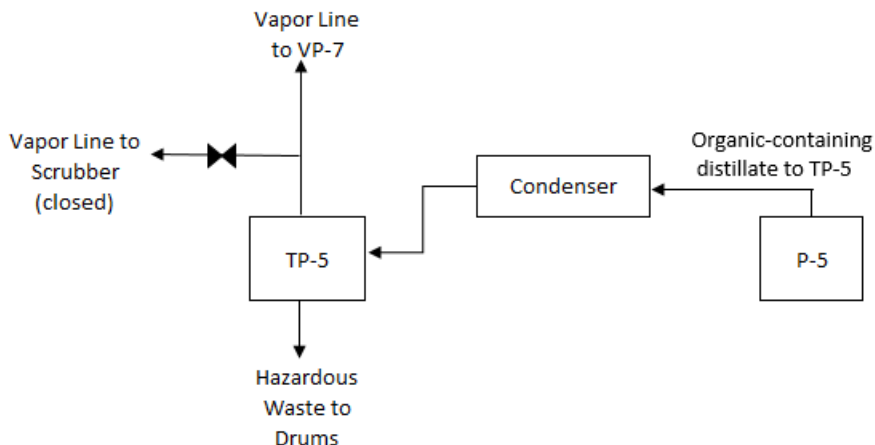
The inspection team first asked the facility representatives for an overview of HRI’s operations. HRI produces specialty chemicals through batch manufacturing operations. HRI maintains several reactor systems, each of which generally consist of a combination of reactor vessels, agitators, receivers, condensers, and temperature control equipment. Most reactors systems are utilized to manufacture multiple products and are not dedicated to a single product stream. The site has approximately 30 reactors, ranging in size from 10 to 2,000 gallons and approximately 70 condensers. Raw materials are received in totes, drums, or smaller containers. HRI utilizes solvents as part of the manufacturing process, as well as to clean equipment. Solvents utilized in reactions can be distilled and may be reused for production or cleaning purposes. Common solvents used at the facility include methylene chloride, acetone, hexane, heptane, acetonitrile, n-propyl acetate (nPA), isopropyl alcohol (IPA), toluene, xylene and tetrahydrofuran (THF). Acetone and heptane are the most common cleaning solvents utilized. Spent solvents managed as hazardous wastes are transferred to totes or drums from reactor or receiving tanks.

Hazardous waste at the facility is stored in over twelve satellite accumulation areas (SAAs) and one central accumulation area (CAA). Hazardous waste containers are managed off site by Clean Harbors or Veolia. Chlorinated solvent waste is managed under hazardous waste code F002. Waste peroxides are managed under hazardous waste code D001. THF-containing wastes are managed under hazardous waste codes D001 and F002. Other solvent containing wastes are managed under hazardous waste codes D001, F003, and F005. Additionally certain corrosive waste streams are managed under D001, D002 and D003.

Due to the large number of products manufactured at the facility, the inspection team asked the facility representatives to go through each reactor system or other equipment and identify any areas where hazardous waste contacts the process, which is outlined below. Although there may be multiple uses for the equipment described below, only processes relevant to hazardous waste handling are discussed.

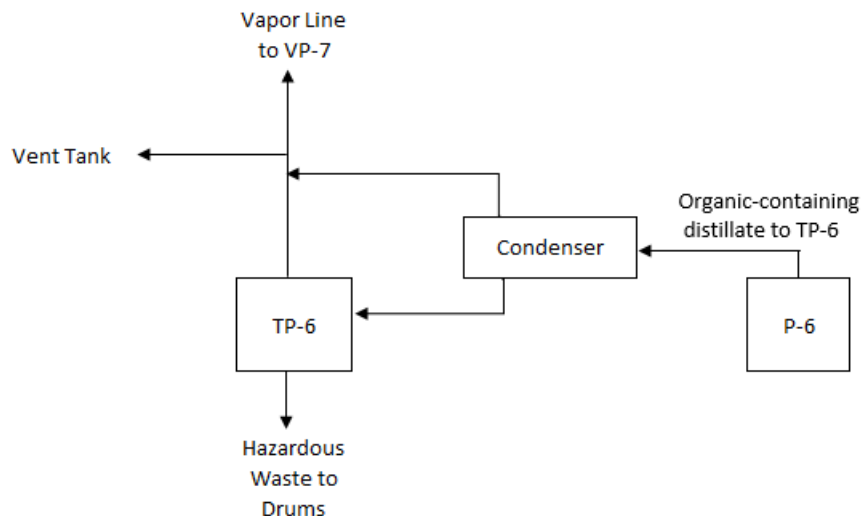
*Pilot Plant*

- P-5 System – From the distillation process that occurs in vessel P-5, a mixture containing toluene is distilled into vessel TP-5 after passing through a condenser. The mixture in TP-5 is transferred to drums from a line at the bottom of the vessel, where it is managed as hazardous waste. Hazardous waste drums are labeled and stored in a SAA in the pilot plant and/or moved to the CAA. Any vapor phase material transferred to or generated in TP-5 is controlled by vacuum pump 7 (VP-7). The site also has the capability to transfer volatile emissions to a scrubber instead of VP-7, however the scrubber is not in use.



*Process flow diagram of P-5 system based on facility description and field observation.*

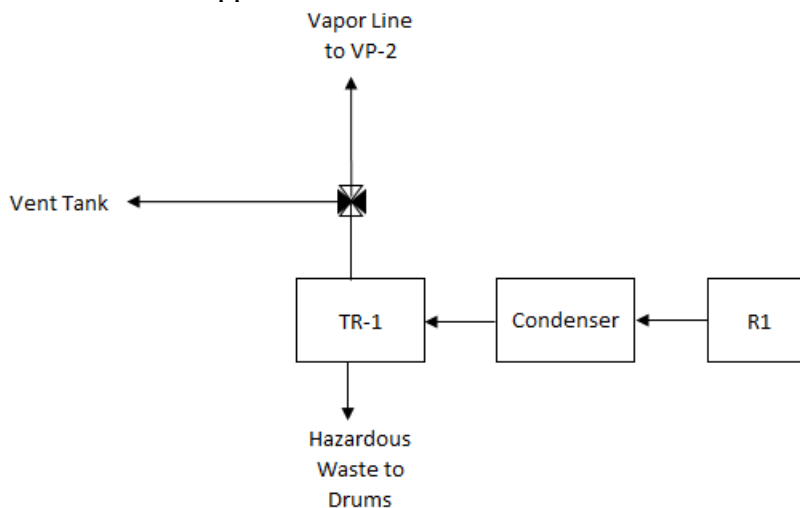
- P-6 System – From the distillation process that occurs in vessel P-6 for a certain dimer-based product, a mixture containing methylene chloride and IPA is distilled into vessel TP-6 after passing through a condenser. The mixture in TP-6 is transferred to drums from a line at the bottom of the vessel, where it is managed as hazardous waste. Hazardous waste drums are labeled and stored in a SAA in the pilot plant and/or moved to the CAA. Any vapor phase material transferred to or generated in TP-6 is controlled by VP-7 or discharged to the vent tank. When the vacuum is removed from the system, any air emissions generated are routed to the vent tank as opposed to VP-7.



*Process flow diagram of P-6 system based on facility description and field observation.*

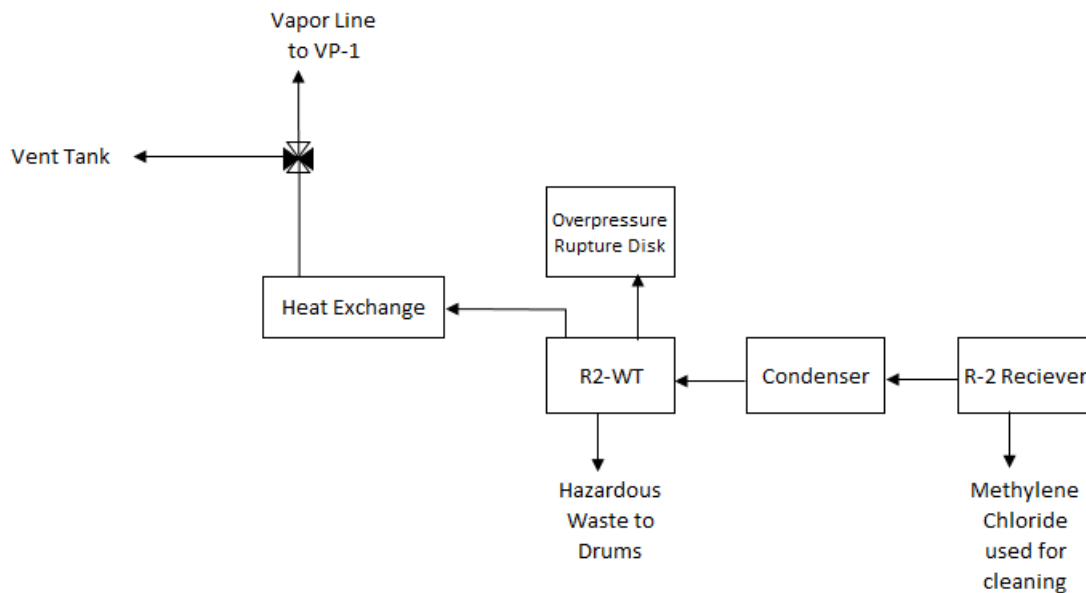
*Main Plant Room / Main Reactor Hallway*

- R-1 System – During certain processes in the R-1 system, a methylene chloride stream is stripped into TR-1, where it is drummed to be reused for cleaning between batches. Additionally, a mixture containing methanol and methylene chloride is distilled from reactor R-1 and condensed into TR-1. Approximately 100 pounds per batch of the methanol and methylene chloride mixture is transferred from the bottom of TR-1 into drums that are labeled and managed as hazardous waste. Hazardous waste drums may be stored in one of the main reactor hallway SAAs and/or transferred to the CAA for storage. Nonhazardous aqueous wastes are also generated during this process, which may be distilled in R-5 or transferred directly to Tank T-6 for aqueous waste. Any vapor phase material transferred to or generated in TR-1 is controlled by VP-2 or discharged to the vent tank. When the vacuum is removed from the system, any air emissions generated are routed to the vent tank as opposed to VP-2.



*Process flow diagram of R-1 system based on facility description and field observation.*

- R-2 System – During the reaction process conducted in the R-2 system, the receiver tank for R-2 receives a solvent mixture containing heptane and methylene chloride. The heptane mixture is distilled from the receiver tank for R-2 into R2-WT. The methylene chloride that remains in the receiver tank for R-2 following distillation is recycled as a cleaning solvent. The heptane mixture in R2-WT is transferred into drums, where it is labeled and managed as hazardous waste. Hazardous waste drums may be stored in one of the main reactor hallway SAAs and/or transferred to the CAA for storage. Any vapor phase material transferred to or generated in R2-WT is controlled by a heat exchanger, and subsequently sent to VP-1 or discharged to the vent tank. Additionally, R2-WT has an overpressure rupture disk as a safety mechanism. When the vacuum is removed from the system, any air emissions generated are routed to the vent tank as opposed to VP-1.

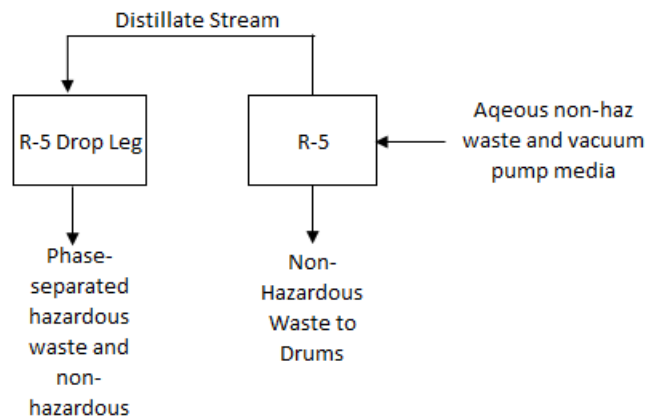


*Process flow diagram of R-2 system based on facility description and field observation.*

- R-4 System – The R-4 tank system is used to process coatings and generates nonhazardous waste or methylene chloride solvent mixtures that are reused. TR-4 recovers methylene chloride from the process that is reused. Vapor control on TR-4 is sent to VP-4, where methylene chloride can enter the vacuum pump system. At regular intervals, the vacuum pump media is purged and sent to R-5 for distillation. Facility personnel estimated that this waste stream could contain 15 gallons of methylene chloride and 25 gallons of water, which could indicate that the R-5 unit treats hazardous waste [AOC 15]. The Inspection Team requested a hazardous waste determination for the vacuum pump stream sent to R-5. Facility personnel did not provide a waste determination for this stream, and instead submitted the following: “Vacuum pumps 4, 7, and 1, and their associated condensers and receiving tanks, are an inherent part of the manufacturing processes with which they are associated. As such, they are excluded from coverage under RCRA by the manufacturing process unit exclusion. We do not form a conclusion on RCRA status of materials that are moved from receiving tanks until the time that those materials are removed. In some cases, those materials are reintroduced

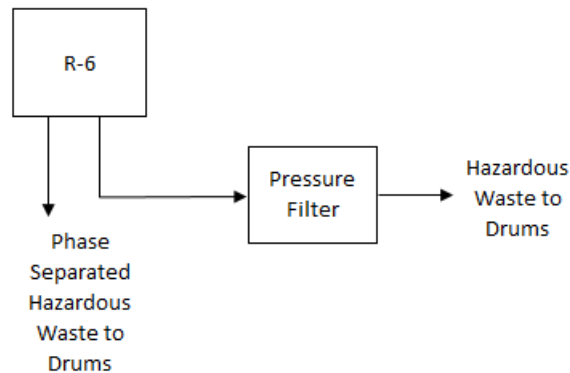
into that process, used in other processes, subjected to filtration to recover product, etc. and so are not solid waste when they are removed. In cases where the material being removed from a receiving tank is determined to be a solid waste, and to be hazardous waste, it is managed according to RCRA requirements”.

- R-5 System – Tank R-5 is a waste processing tank. Tank R-5 receives various nonhazardous aqueous wastes, as well as vacuum pump mixtures, where the pump media is solvent and aqueous mixtures. HRI believes that all material sent to Tank R-5 is nonhazardous. The waste mixture is then distilled, with nonhazardous waste remaining in Tank R-5 and hazardous waste as well as aqueous nonhazardous waste distilled to the Tank R-5 drop leg. The hazardous waste phase separates from the aqueous nonhazardous waste, and each phase is transferred to their respective drums. Hazardous waste drums may be stored in one of the main reactor hallway SAAs and/or transferred to the CAA for storage.



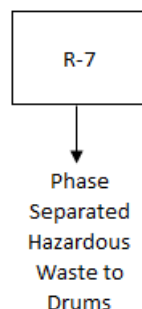
*Process flow diagram of R-5 system based on facility description and field observation.*

- R-6 Reactor System – Based on the products run through the R-6 system, a heptane bottoms mixture is phase separated in reactor R-6 and transferred from the bottom of the reactor into drums, where it is managed as hazardous waste. Alternatively, in a different product run in the system, a mixture transferred from the bottom of R-6 is subsequently processed in a portable pressure filter, where the filtrate is drummed and managed as solvent-containing hazardous waste. Hazardous waste drums may be stored in one of the main reactor hallway SAAs and/or transferred to the CAA for storage.



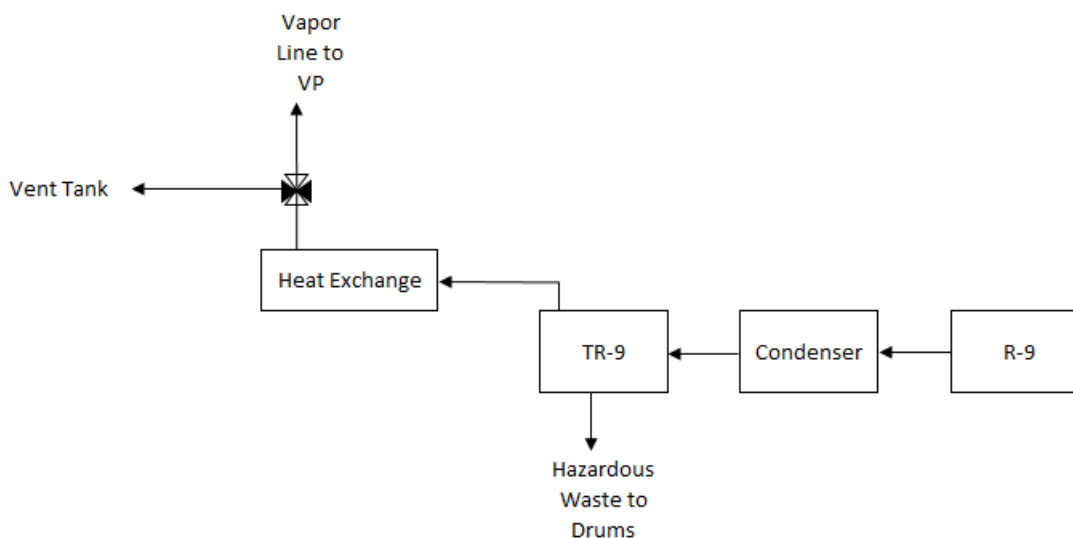
*Process flow diagram of R-6 system based on facility description and field observation.*

- R-7 System – One dedicated process is run in the R-7 system, where a toluene mixture is phase separated in reactor R-7 and transferred from the bottom of the reactor into drums, where it is managed as hazardous waste. Hazardous waste drums may be stored in one of the main reactor hallway SAAs and/or transferred to the CAA for storage.



*Process flow diagram of R-7 system based on facility description and field observation.*

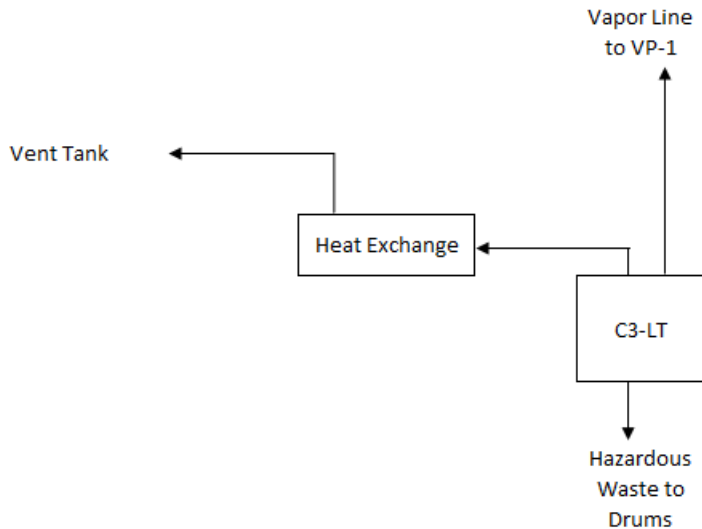
- R-9 System - During the reaction process conducted in the R-9 system, a methyl tert-butyl ether (MTBE) mixture is distilled from the R-9 reactor into TR-9. The MTBE mixture in TR-9 is transferred from the tank bottom into drums, where it is labeled and managed as hazardous waste. Hazardous waste drums are stored in the R-9 room SAA and/or transferred to the CAA for storage. Any vapor phase material transferred to or generated in TR-9 is controlled by a heat exchanger, and subsequently sent to a vacuum pump or discharged to the vent tank. When the vacuum is removed from the system, any air emissions generated are routed to the vent tank as opposed to the vacuum pump.



*Process flow diagram of R-9 system based on facility description and field observation.*

- Tank C3-LT – A mixture containing THF is run through a filter dryer and subsequently sent to Tank C3-LT, where it may be stored for up to a day before being transferred to

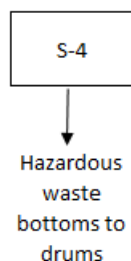
drums, where the material is labeled and managed as hazardous waste. The hazardous waste drum is stored in a dedicated SAA and/or transferred to the CAA. When pulling a vacuum, any vapor phase material present in Tank C3-LT is pulled to VP-1. When not on a vacuum, any vapor phase material is run through a heat exchanger and then subsequently transferred to the vent tank.



*Process flow diagram of Tank C3-LT based on facility description and field observation.*

#### *Building 301*

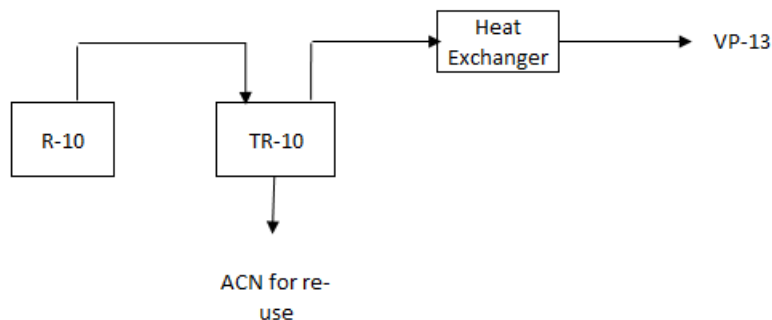
- S-4 System – Tank S-4 receives a heptane mixture from T-3, where a dirty heptane-containing mixture phase-separates to the bottom of the tank. This heptane mixture is pulled from the bottom of the tank to drums, where it is labeled and managed as hazardous waste. A “clean” phase of heptane that is reusable is the top layer in S-4, which is transferred to S4-WT for recycle back in the process. Hazardous waste drums may be stored in one of the Building 301 SAAs and/or transferred to the CAA for storage.



*Process flow diagram of Tank S-4 based on facility description and field observation.*

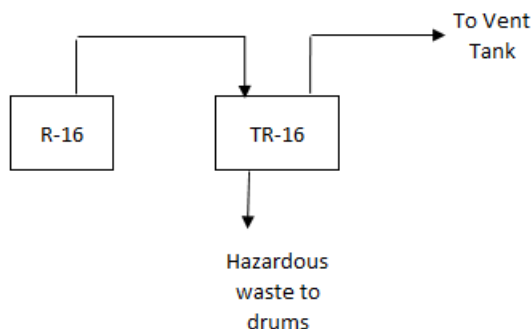
- R-10 System - During the reaction process conducted in reactor R-11, reactor R-10 receives a mixed heptane and acetonitrile (ACN) stream. The mixture is distilled, with ACN separating and flashing into TR-10, where it is ultimately recycled back through the

process. Any organic vapors generated in the tank are controlled by a heat exchanger and pulled through to the VP-13 system.



*Process flow diagram of R-10 system based on facility description and field observation.*

- R-16 System – During the process in Building 301, reactor R-16 receives a mixture from R-11. Reactor R-16 performs a flash distillation, where the distillates consist of a methylene chloride and heptane mixture that is transferred to Tank TR-16. The mixture is transferred from the bottom of the tank into drums, where it is managed and labeled as hazardous waste. Any vapor phase material generated in Tank TR-16 is vented directly to the vent tank. Hazardous waste drums may be stored in one of the Building 301 SAAs and/or transferred to the CAA for storage.



*Process flow diagram of R-16 system based on facility description and field observation.*

#### *Dryer Room*

- VP-3 – This vacuum pump system is associated with a product dryer. The vacuum pump media is IPA and the system has a small (<20 gallon) collector tank where the media is stored when not in use. The vacuum pump system has a condenser, where vapor phase IPA is condensed to the liquid phase. Any remaining vapor phase IPA after the condenser is sent to the vent tank. The IPA is reused in the vacuum pump until the volume in the collector tank is too high, where a portion of the material can either be removed for re-use as a cleaning agent or drummed and managed as hazardous waste. This determination is made based on process need.
- VP-6 – This vacuum pump system is associated with a product dryer. The vacuum pump media is methanol, and the system has a small (<20 gallon) collector tank where the

media is stored when not in use. The vacuum pump system has two condensers in parallel, an initial spiral condenser, followed by an exhaust condenser. Any vapor phase material that is not condensed and returned to the vacuum pump by the condensers is vented from the exhaust condenser to the vent tank.

#### *Nonhazardous Waste Tanks*

- Tank T-6 and Scrubber – Nonhazardous aqueous waste from various sources at the facility is collected and sent to the caustic scrubber located in Building 301. A large portion of the nonhazardous aqueous waste received by the scrubber comes directly from the R-5 distillation system. The scrubber is used to control pH of the nonhazardous waste stream. The scrubbing liquor is reportedly changed every 6 months to a year and is sent off site as nonhazardous waste. The treated material from the caustic scrubber is stored in Tank T-6 and sent off site in bulk as aqueous nonhazardous waste.
- Tank S-34 Vent Tank – As discussed above, vent lines from various operations that contains caustic, water, and some small amounts of solvents are mixed in Tank S-34, located on the exterior of the facility. The tank is controlled with a flame arrestor, for which the specifications were not available. The material is managed as nonhazardous waste.

#### *Laboratory*

The facility operates a quality control lab, which primarily conducts product testing, in-process testing, and some experimental testing. The laboratory focuses primarily on analytical or compositional testing. Generally, hazardous waste is not tested in the lab for waste determination purposes, although samples may be sent there for pH. The aqueous or alkaline bulk waste is tested for pH in the lab and a cyanide waste test is run on one specific waste stream approximately three to four times per year.

The laboratory generates its own hazardous waste from HPLC machines, where it has collection containers for receiving solvent and water mixtures. Additionally, chlorinated solvents are generated and collected in containers located within lab hoods. Any solid waste generated are collected in the stock room, where they are sent out as lab packs. Lab packs are sent off approximately once per quarter.

#### *Universal Wastes*

The facility manages universal wastes in Building 375. Ballasts, light bulbs, mercury-containing equipment, metal halide and other universal materials are stored in cardboard boxes in a designated area. Additionally, waste oil is stored in 55-gallon drums in the maintenance area of Building 375.

## **IV. FACILITY TOUR**

This section consists of observations by EPA Inspectors during the physical tour of the Facility. Please see Attachment 1 for a digital photo log of photos taken throughout the inspection. A site

map was provided, however, it was outdated and included tanks that were not in service and did not include other tanks that were currently in service

The tour of the Facility took place on Monday July 25<sup>th</sup> through Wednesday, July 27<sup>th</sup>, 2022. The following personnel were present for all or part of the tour:

EPA:	Cheryl Wilkinson Linda Brolin Kimberly Chavez Brook McKeown George Wieber
HRI:	Tim Hampford Lloyd Lirio Tim Jenkin, Engineering Manager Monica Hilgarth, Quality Control Lab Manager Elirose Edwards, Lab Tech

As part of the facility tour, the inspection team conducted Method 21 monitoring with a Toxic Vapor Analyzer (TVA) operating with flame ionization detectors on July 26<sup>th</sup> and 27<sup>th</sup>, 2022. Calibrations were performed using zero air and span gases consisting of 500 parts per million (ppm) and 10,000 ppm of methane at 2:10 pm on 7/26/22 and 7:50 am on 7/27/22. A forward-looking infrared (FLIR) was also utilized to screen for potential organic vapor emissions. The inspection team conducted Method 21 monitoring using the TVA 2020 devices as well as screening using the FLIR camera, with information on specific equipment monitored and results detailed in the sections below.

The Facility does not currently have an emissions monitoring program under RCRA Subpart AA/BB/CC. The Inspection Team conservatively monitored equipment and components to evaluate whether containment was achieved and in the case that certain components were determined to be subject to the RCRA air emissions standards.

### **Flammable Warehouse And CAA**

The inspection team started the walkthrough at 2:10 PM on Monday July 25<sup>th</sup>, 2022 in the Flammable Warehouse area of the main building. This area serves as receiving and storage for raw materials, as well as the designated CAA for hazardous waste. Fire extinguishers and spill protection were observed in the vicinity of the CAA. An emergency posting with the required information (such as name and telephone number of emergency coordinator; location of fire extinguishers and spill control equipment, fire alarm; and phone number to fire department, unless there is a direct alarm to them) was not observed in the vicinity of the CAA [AOC 1]. Hazardous waste containers stored in the CAA are shown in Photographs 1-4 of Attachment 1.

The storage racks were colored yellow to indicate hazardous waste storage, however, there was no CAA signage designating the hazardous waste storage area [AOC 2]. The inspection team identified sixteen, 55-gallon drums containing hazardous waste in the drum storage area.

Additionally, two 55-gallon drums of solid nonhazardous waste were also stored in this area. Hazardous waste drums were not stored with labels facing out, so it was difficult to read the labels on every drum. The earliest accumulation date on the hazardous waste drums was 7/11/2022. Additionally, adequate aisle space between the hazardous waste drums was not given to provide ease of access for routine inspections [AOC 3] (see Photograph 4, Attachment 1).

Although the labels could not be read for every drum in the CAA, the types of hazardous waste observed were as follows:

- Toluene-containing waste: Profile number CH148040
- THF: Profile number CH148039
- Chlorinated Solvent Waste: Profile number CH362119
- Distilled Solvents: Profile number CH183207
- Magnesium Sulfate: Profile number CH116246
- Acetone and Solvent Waste: Profile number CH2252883

Hazardous waste codes were not listed on these containers and generally not included on hazardous waste containers throughout the Facility, which is why the information is not provided above.

The inspection team returned to the Flammable Warehouse and the CAA on 7/26/22 at approximately 3:05 pm to observe changes HRI had made. In addition to hazardous waste drums originally observed on 7/25/22, there are now seven hazardous waste plastic totes present of Acetone and Solvent Mixture (CH2252883) with accumulation dates of 7/25/22 (see Photograph 37, Attachment 1). Mr. Wieber used the TVA 2020 to monitor the hazardous waste totes. The concentrations observed using the TVA 2020 were less than 500 ppm above background for all locations monitored. Further, the Inspection Team observed signs labeling the presence of hazardous waste at the CAA now in place (see Photograph 38, Attachment 1).

## **Dryer Room**

The Inspection Team entered the dryer room at approximately 2:30 pm on 7/25/22. The operations and equipment configuration were observed for potential Method 21 monitoring locations and as well as general RCRA compliance. Materials in these areas are processed in one of two dryers, where any organic material that volatilizes in the oven is captured and controlled by the vacuum pump systems, which use solvents at their media.

The Inspection Team returned to the dryer room at 2:30 pm on 7/26/22. Mr. Wieber used the TVA 2020 to monitor the following components:

- VP-6 Collection System: seven valves, three flanges and one pump monitored. 104 ppm was the highest concentration observed in this area, on a valve (see Photograph 33, Attachment 1).
- VP-3 Collection System: four valves, two flanges and one pump monitored. None of the concentrations observed were above background from this equipment (see Photograph 34, Attachment 1).

## **Pilot Plant**

The Inspection Team entered the pilot plant at approximately 2:45 pm on 7/25/22. The area consists of the P-5, P-6 and P-7 reactor systems, each with some combination of reactor, receiver and weigh tanks. The P-7 system was determined not to generate any hazardous wastes based on the process descriptions provided by facility personnel. The tanks predominantly sit on the second floor, with the access to the tank bottoms on the first floor for discharge into product, intermediate or waste storage containers (see Photograph 8).

Open buckets were observed beneath the reflux line for the condensers at P-5 and P-6 to catch any materials that drip from the equipment due to cleaning (see Photograph 6). The material collected in the bucket is an acetone and water mix that is dumped into a mixed solvent waste drum in the pilot plant SAA approximately 4-5 times per month [AOC 4] [AOC 5].

The following drums were located in the SAA in the pilot plant:

- Four drums (Hazardous)
  - Labeled as “Acetone and Solvent Mixture”
  - Waste profile number CH2252883
  - Accumulation start date of 7/25/22
  - Three full drums awaiting transport, one actively being filled
- One Drum (Hazardous)
  - Used by the dye lab
  - Waste profile number CH2252883
  - Actively being filled
- One drum (Nonhazardous)
  - Labeled as “H<sub>2</sub>O Sink Waste”
- One drum (Nonhazardous)
  - Labeled as “H<sub>2</sub>O and Caustic from P5 cleaning”

Facility personnel stated that the two nonhazardous waste drums observed in the pilot plant SAA could either be taken to R-5 for distillation or sent directly to the aqueous nonhazardous waste tank, Tank T-6. The Inspection Team requested that HRI conduct a pH test on the drum labeled “H<sub>2</sub>O and Caustic from P5 cleaning”. Facility personnel conducted a pH test with test strips at approximately 3:15 pm. Using the visual color scale provided with the test, the Inspection Team determined the results to be between 11 and 12 for pH (see Photograph 7, Attachment 1). The Inspection Team requested waste determination documentation at each point of waste generation, including the “H<sub>2</sub>O and Caustic from P5 cleaning”. Facility personnel stated in their response to the document request that they “rely on process knowledge in concluding that the pH of material contained in P5 falls below the regulatory threshold. That process knowledge is based on years of experience with P5 and predates the 2016 requirement to maintain documentation of process knowledge conclusions.” HRI is responsible for documenting waste determinations and meeting recordkeeping requirements for all waste streams, including those determinations made from process knowledge per 40 CFR §262.11(f). Modifications to this regulation specifying these

recordkeeping requirements were published November 28, 2016 and any wastes generated after these changes went into effect would require appropriate documentation and records [AOC 6].

The Inspection Team returned to the pilot plant at 3:15 pm on 7/26/22. Mr. Wieber used the TVA 2020 to monitor the following components:

- P-5: four valves, one flange (see Photograph 39, Attachment 1)
- TP-5: five valves, 9 flanges (see Photograph 40, Attachment 1 for components on the first floor of the pilot plant and Photograph 44 for the top of the tank)
- P-6: five valves, two flanges (see Photograph 41, Attachment 1)
- TP-6: three valves, thirteen flanges (see Photograph 42, Attachment 1 for the components on the bottom of the tank and Photograph 45 for components on the top of the tank)
- VP-7: pump, 5 valves (Tank VP-7 containment tank), 3 flanges (Tank VP-7 containment tank). VP-7 pump had a maximum concentration of 1,038 ppm was observed on one of the pump seals [AOC 7] (see Photograph 43, Attachment 1).

Additionally, a visual leak was observed on the Tank VP-7 pump [AOC 7].

### **Main Reactor Hallway**

The Inspection Team entered the main reactor hallway at approximately 4:25 pm on 7/25/22. Facility personnel provided a description of the process associated with the R-1 reactor system. Additionally, two drums of methylene chloride solvent collected from the R-1 reactor system were observed in the main reactor hallway (see Photographs 11 and 12, Attachment 1). This material is stored for reuse as a cleaning solvent.

The Inspection Team returned to the main reactor hallway at 9:30 am on 7/26/22. The “Magnesium Sulfate” SAA was observed and contained the following (see Photograph 18, Attachment 1):

- One Drum (Hazardous Waste)
  - Labeled as “Magnesium Sulfate Solids”
  - Waste profile number CH116246
  - Receives wastes from TR-7 filter, that removes residual water from methylene chloride.

The “R-7” SAA was observed and contained the following (see Photograph 19, Attachment 1):

- One Drum (Hazardous)
  - Labeled as “Toluene [redacted product name]”
  - Waste profile number CH148040
- One Drum (Nonhazardous)
  - Labeled as “Aqueous Non-Haz”
  - Generated from cleanout at R-7; sent to aqueous waste Tank T-6

The Main Reactor Hallway #3 SAA was observed and contained the following:

- One Drum (Hazardous)
  - Labeled as “Filter Cake and Bags”

- Waste profile number CH218557
- Not labeled as “Hazardous Waste” [AOC 8]
- One Drum (Nonhazardous)
  - Labeled as “Contaminated Absorbent Pads”
  - Waste profile number CH272223
  - Generated from floor cleaning

The Inspection Team returned to the main reactor hallway at approximately 10:00 am on 7/27/22. Mr. Wieber used the TVA 2020 to monitor the following components:

- TR-1: four valves, seven flanges (see Photograph 55, Attachment 1)
- R-5: three valves, one flange, flexible hose attachments. Maximum concentration of 22.1 ppm was observed at the flexible hose attachment (see Photograph 56, Attachment 1)
- R-5 Drop Leg: two valves, two flanges, pipe connection. Maximum concentration of 176 ppm was observed at the bottom flange of the drop leg. A visible leak was observed at the bottom flange of the drop leg [AOC 9.] (see Photograph 58, Attachment 1).
- R-6 bottom: three flanges, three valves (See Photograph 57, Attachment 1).
- R-7 bottom: two valves, two flanges, one connection/cap (see Photograph 59, Attachment 1).
- TR-4: two valves, five flanges, one flow controller, one tank lid. Maximum concentration of 142 ppm was observed on the sight glass flange (see Photograph 61, Attachment 1).
- VP-4: one pump, six valves, four flanges, one tank lid (see Photograph 60, Attachment 1).

## **Main Plant Room**

The Inspection Team entered the main plant room at approximately 4:40 pm on 7/25/22. One SAA was observed near the CL-3T vessel which contained the following (see Photograph 14, Attachment 1):

- One Drum (Hazardous)
  - Labeled as “THF [redacted product name]”
  - Waste profile number CH148039

Adjacent to the main plant room is the “P206 Alcove”, where an additional SAA was observed with the following materials (see Photograph 13, Attachment 1):

- One Drum (Hazardous)
  - Labeled as “Acetone and Solvent Mixture”
  - Waste profile number CH2252883
  - Not labeled as “Hazardous Waste” [AOC 8]
- One Drum (Hazardous)
  - Labeled as “[redacted product name]”
  - Waste profile number CH393575
  - Drum label did not identify hazards, a blank NFPA hazard diamond was shown [AOC 10]
- One Drum (Nonhazardous)
  - Labeled as “[redacted product name] Residual Nonhaz Product”

- Waste profile number CH1059870

With the two hazardous waste drums stored together, HRI had more than 55 gallons of hazardous waste stored at a single SAA [AOC 11].

The Inspection Team returned to the P206 Alcove SAA at approximately 9:05 am on 7/26/22 to observe changes HRI made. EPA observed that HRI had created two SAAs, separating the two hazardous waste drums between them to bring the total volume of hazardous waste per SAA at or below 55 gallons (see Photograph 15, Attachment 1).

The Inspection Team returned to the main reactor room at 9:05 am on 7/27/22. Mr. Wieber used the TVA 2020 to monitor the following components:

- VP-1 System: various components monitored for containment (see Photograph 47, Attachment 1)
- C3-LT: five valves, five flanges, one manway cover (see Photograph 48, Attachment 1)
- R2-WT: four valves, 6 flanges, one manway cover, and flexible hose attachments. Maximum concentration of 194 ppm was observed on the TVA 2020 at the manway cover (see Photograph 50, Attachment 1).

## **R-9 Room**

The Inspection Team entered the R-9 room at approximately 9:15 am on 7/26/22. One SAA was observed in the room, that contained the following (see Photograph 16, Attachment 1):

- One Drum (Hazardous)
  - Labeled as “Chlorinated Solvents”
  - Based on log at the SAA, some material collected in this drum are generated in the lower lab, which is not located in the vicinity of the R-9 room [AOC 5]. Additionally, this drum receives materials from the R-5 drop leg, which is visible from and adjacent to the R-9 room.
  - Waste profile number CH362119
  - Not labeled as “Hazardous Waste” [AOC 8]
  - Full Drum
- One Drum (Hazardous)
  - No label, but top has hand-written note “R-1 Cleaning, Use as Misc. Chlorinated” [AOC 8][AOC 10]

With the two hazardous waste drums stored together, HRI had more than 55 gallons of hazardous waste stored at a single SAA [AOC 11]. Additionally, there was no signage present to designate this area an SAA [AOC 12].

The Inspection Team returned to the R-9 room at approximately 9:45 am on 7/27/22. Mr. Wieber used the TVA 2020 to monitor the following components:

- TR-9: one valve, one flange

## **Building 301**

The Inspection Team was walking from the main reactor hallway to Building 301 at approximately 9:30 am on 7/26/22. Two hazardous waste drums were observed on an interior loading dock that were reportedly just moved from the “Building 301 SAA #1” next to Tank T-6 in Building 301 and were in transit to the CAA (see Photograph 21). Information on the drums is as follows:

- Two Drums (Hazardous)
  - Labeled as “Bis-heptane Bottoms”
  - Waste profile number CH156618-1
  - Accumulation date labeled as 7/21/2022 for both drums. Based on the date of observation, the drums exceeded the 72-hour limit for full drums to be moved to the CAA [AOC 13].

When the Inspection Team entered Building 301 and observed the Building 301 SAA #1, the area was labeled but there was no waste storage, due to the two drums that had just been removed. Adjacent to this SAA was Tank T-6, which collects nonhazardous waste streams and was labeled as “Alkaline Aqueous Wastewater”.

The Building 301 SAA #2, located under a stairwell, contained the following (see Photograph 23, Attachment 1):

- One Drum (Hazardous)
  - Labeled as “Chlorinated Solvents”
  - Waste profile number CH362119
  - Per Facility personnel, wastes contained within this drum could be generated from several tanks in Building 301 and also from the quality control laboratory, which was not visible from the SAA and through multiple doorways [AOC 5].

The Building 301 SAA #3, located near R-10, contained the following (see Photograph 24, Attachment 1):

- One Drum
  - Empty, unlabeled
  - Intended for non-chlorinated solvent hazardous waste

The Inspection Team also observed the caustic scrubber, located in Building 301 (see Photograph 28, Attachment 1). The scrubber treats aqueous nonhazardous waste to adjust pH prior to storage in Tank T-6. The pH read-out for the scrubbing liquor was observed to 14.2 (see Photograph 27, Attachment 1). Additionally, the log for the scrubber showed a pH of 14.2 from 7/21/22 through 7/26/22 (see Photographs 25 and 26, Attachment 1).

The Inspection Team returned to Building 301 at approximately 11:00 am on 7/27/22. Mr. Wieber used the TVA 2020 to monitor the following components:

- S-4 bottom: two valves, one flange, one end cap (see Photograph 67, Attachment 1).
- S4-WT: one valve, nine flanges, one end cap, and one manway cover

- T-3: five valves, thirteen flanges, one manway cover. Maximum concentration of 191 ppm observed on the TVA 2020 at the manway cover (see Photograph 63, Attachment 1).
- TR-16: six valves, eight flanges (see Photograph 66, Attachment 1).
- TR-10: seven flanges, 2 valves, one flexible hose connector (see Photograph 64, Attachment 1).
- VP-13: various components monitored for containment (see Photograph 65, Attachment 1)

## **Quality Control Laboratory**

The Inspection Team entered the quality control laboratory at approximately 10:15 am on 7/26/22. The quality control laboratory manager, Ms. Hilgarth and Lab Tech, Ms. Edwards provided a tour and description of the laboratory operations. The Inspection Team observed HPLC machines with small (~1 gallon) containers to collect solvent containing wastes. Three one-gallon containers were observed throughout the laboratory collecting hazardous wastes (see Photograph 29, Attachment 1). Additionally, hazardous chlorinated solvent wastes were collected in small containers within laboratory hoods. The chlorinated solvent waste and HPLC solvent waste collection areas are not labeled as SAAs [AOC 12].

Laboratory personnel stated that the materials stored in the hazardous waste containers in the labs were then transferred to drums in the SAAs in Building 301 [AOC 5].

## **Tank S-34 (Vent Tank)**

The Inspection Team observed the S-34 vent tank at approximately 2:50 pm on 7/26/22. The vent lines from various reactor systems feed into S-34 (see Photograph 31, Attachment 1). The tank contains a slight caustic solution. The tank is equipped with a flame arrestor on the vent line (see Photograph 32, Attachment 1). The vent line was inaccessible for Method 21 monitoring with the TVA 2020 device. The FLIR camera was used by Inspector Chavez to observe the discharge from the flame arrestor. No visual emissions were observed.

## **Building 375**

The Inspection Team observed universal waste storage in Building 375 at approximately 11:55 am on 7/27/22. A universal waste storage container was observed and labeled with an accumulation start date of 1/1/2022. Five small cardboard drums containing ballasts, light bulbs, mercury-containing equipment, metal halide, and unlabeled material is present in the universal waste area. Two boxes of used fluorescent bulbs were also present. One of the boxes of fluorescent bulbs was not closed [AOC 14] (see Photograph 68, Attachment 1).

Additionally, in Building 375 a waste oil SAA was observed. One 55-gallon drum was present and labeled as hazardous waste and waste oil (profile number CH484882) (see Photograph 69 and 70, Attachment 1). Facility personnel reported that the drum was labeled as hazardous due to a contamination issue, but that used oil is typically not managed as a hazardous waste stream.

## **V. RECORDS REVIEW**

The inspection team reviewed a subset of documents either on site during the inspection or remotely following the electronic submission made by HRI.

### Manifests

The inspection team reviewed hazardous waste manifests on site from shipments made by HRI during calendar years 2021 and 2022, up to the inspection date. Manifests were signed by Tim Hampford, Paul Sheets and Tim Jenkin. No deviations from the regulatory requirements were noted by the inspection team based on a review of the manifests reviewed on site.

HRI also provided an example manifest that included used oil shipment. The material was managed as nonhazardous waste under profile number CH484882 and shipped to Safety-Kleen in Smithfield, KY (EPA ID KYD053348108) (see Attachment 12, Attachment 1).

### Inspection Logs

Representative daily inspection logs of the CAA were reviewed by the inspection team for the year 2021 and up through July 2022 (see Attachment 6, Attachment 1). No deviations from the regulatory requirements were noted by the inspection team.

### Waste Determinations

The inspection team reviewed several documents related to hazardous waste determinations. Monthly pH testing data from the aqueous nonhazardous waste in T-6 from January 2021 through June 2022 were reviewed (see Attachment 5). pH results ranged from 3.4 to 10.1. As the criteria for corrosive hazardous waste is pH less than 2.0 or greater than 12.5, these results for the aqueous waste stream in Tank T-6 do not exhibit hazardous waste characteristics for corrosivity.

Additionally, fingerprint analytical results for shipments of the bulk aqueous nonhazardous waste in Tank T-6 from July 2020 through July 2022 were reviewed (see Attachment 3). The document contains pH, flashpoint and TCLP metals testing results. pH results ranged from 3.44 to 11.40. Based on the data reviewed, the results do not indicate that the stream exhibits hazardous waste characteristics for corrosivity, ignitability or toxicity.

### Contingency Plan

HRI's contingency plan (see Attachment 7) was reviewed by the inspection team. The contingency plan was last revised in 2022. The contingency plan does identify the title of the emergency coordinator in different emergency situations but does not include the names and emergency phone numbers of persons qualified to act as the emergency coordinator [AOC 16].

## Training

Training certificates from 2020 and 2022 for Paul Sheets, Tim Hampton and Tim Jenkins were reviewed by the inspection team (see Attachment 8). These individuals received DOT HAZMAT and Dangerous Goods Shipping training in October 2020 and HAZMAT Refresher training in May 2022. These individuals are currently up to date on their training, although annual training records for 2021 were not provided [AOC 17].

## Permits

The inspection team reviewed HRI's Connecticut Department of Energy and Environmental Protection (CT DEEP) New Source Review (NSR) air permit (see Attachment 2). Part I. (B) of the NSR permit includes a list of permitted equipment and air emission control devices. The permit lists specific operating and inspection requirements related to the caustic scrubber. Although the scrubber has the capability of controlling process emissions, based on the current configuration, the scrubber is only being used to treat the aqueous nonhazardous waste. Primary control devices listed are condenser systems. The permit limits volatile organic compound (VOC) emissions to 8.0 pounds per hour from each piece of equipment.

## Process Emissions Data

The inspection team reviewed select process emissions data from 2019 and 2020 (see Attachment 11). FP5440 is processed through R-7, TR-7, R-4, FD-02 and C3-LT. The emission tracking documents how much methylene chloride is controlled through vacuum pumps (VP-4) off of the methylene chloride distillation process in R-4. In 2020, 78,059 pounds of methylene chloride were fed into this reactor system and 17,472 pounds of methylene chloride were controlled through VP-4. Approximately 22 percent of the methylene chloride run through the process is estimated to be controlled by VP-4, which ultimately is transferred and distilled further in R-5. In 2019, an estimated 15,989 pounds of methylene chloride were controlled by VP-4, approximately 20 percent of the total methylene chloride initially added.

## **VI. INSPECTION OUTBRIEF**

Daily initial outbriefs were provided on July 25<sup>th</sup> and 26<sup>th</sup> prior to leaving the facility for the day. A final outbrief conference was conducted on Wednesday July 27<sup>th</sup>, 2022, prior to leaving the facility. The following personnel were present for the outbrief:

EPA:	Cheryl Wilkinson
	Linda Brolin
	Kimberly Chavez
	Brook McKeown
	George Wieber

CAF: Kate Hampford Donahue  
Tim Hampford  
Lloyd Lirio  
Tim Jenkin

The inspection team then relayed the following areas of concern (AOCs) that arose from observations throughout the inspection:

1. An emergency posting with the required information (such as name and telephone number of emergency coordinator; location of fire extinguishers and spill control equipment, fire alarm; and phone number to fire department, unless there is a direct alarm to them) was not present in the vicinity of the CAA.
2. No hazardous waste signage was present in the general areas around the hazardous waste tanks or near the drum storage area. The item was resolved during the inspection.
3. There was not adequate aisle space between the hazardous waste drums managed in the CAA for ease of access for routine inspections or emergency response.
4. Hazardous waste was managed in open containers beneath the reflux line for the condensers at P-5 and P-6 in the pilot plant to collect acetone and water mix.
5. Hazardous wastes were transferred between SAAs at the following locations:
  - a. Open buckets were observed beneath the reflux line for the condensers at P-5 and P-6 in the pilot plant to collect acetone and water mix that is dumped into a mixed solvent waste drum in the pilot plant SAA.
  - b. Materials stored in the hazardous waste SAA containers in the quality control lab are transferred to drums in the SAAs in Building 301.
  - c. Chlorinated solvent waste generated in the lower lab are transferred to the drum in the R-9 room SAA.
6. The Inspection Team observed HRI conduct a pH test on the drum labeled “H<sub>2</sub>O and Caustic from P5 cleaning” at 3:15 pm on 7/25/22. Using the visual color scale provided with the test, the Inspection Team determined the results to be between 11 and 12 for pH. The Inspection Team requested testing data on this waste stream to document that the waste is not hazardous for corrosivity prior to any additional treatment or mixing with other aqueous waste streams. HRI stated that they use process knowledge as the basis for the determination that the waste stream is nonhazardous. This waste stream and other nonhazardous streams are either sent directly to the nonhazardous Tank T-6 or treated through distillation and phase separation in the R-5 and R-5 drop leg, respectively. Fingerprint analytical results for shipments of the bulk aqueous nonhazardous waste in Tank T-6 from July 2020 through July 2022 documented a range (3.44 to 11.40) and variability in pH results (Attachment 3). Based on the field pH result for the “H<sub>2</sub>O and Caustic from P5 cleaning” being near the hazardous waste threshold for corrosivity and the potential for additional treatment outside of elementary neutralization of this and other wastes streams treated as non-hazardous, the Inspection Team requested documentation of waste determinations at the point of generation for all process wastes. HRI did not provide records to support their process knowledge waste determinations for the “H<sub>2</sub>O and Caustic from P5 cleaning” waste stream and other nonhazardous wastes, as required per 40 CFR §262.11(f).

7. A visual leak was observed at the VP-7 pump on 7/25/22. Additionally, although not in exceedance of regulatory thresholds, an elevated concentration of 1,038 ppm was observed on the TVA 2020 monitoring device.
8. The following drums were observed to be managing hazardous waste but were not labeled as “hazardous waste”:
  - a. Main Reactor Hallway SAA #3, a drum managing “Filter Cake and Bags” was not labeled as hazardous waste.
  - b. P206 Alcove SAA, a drum managing “Acetone and Solvent Mixture” was not labeled as hazardous waste.
  - c. R-9 Room SAA, a drum managing “Chlorinated Solvents” was not labeled as hazardous waste.
  - d. R-9 Room SAA, a drum managing “R-1 Cleaning, Use as Misc. Chlorinated” was not labeled as hazardous waste.
9. A visible leak was observed at the bottom flange of the R-5 drop leg.
10. The following hazardous waste drums were not labeled with an indication of the nature of the hazard:
  - a. A drum labeled as “[redacted product name]” with waste profile number CH393575 located in the P206 Alcove SAA was not labeled with an indication of the nature of the hazard, and a blank NFPA diamond was shown on the label.
  - b. R-9 Room SAA, a drum managing “R-1 Cleaning, use as Misc. Chlorinated” was not labeled with an indication of the nature of the hazard.
11. HRI exceeded more than 55 gallons of hazardous waste stored at a single SAA at the following locations:
  - a. P206 Alcove SAA - This item was resolved during the inspection (see Photograph 15, Attachment 1).
  - b. R-9 Room SAA
12. No signage present to designate SAAs in the following areas:
  - a. R-9 Room SAA. This item was resolved during the inspection.
  - b. Chlorinated solvent waste and HPLC solvent waste collection areas in the quality control laboratory.
13. Hazardous waste drums containing bis-heptane bottoms observed on 7/26/22 in transit near the Building 301 SAA #1 were dated with a 7/21/22 accumulation date. The drums exceeded the 72-hour limit for full drums to be moved to the CAA.
14. Universal waste bulbs were not in a closed container.
15. Based on the reported compositions of waste material removed from VP-4 which is subsequently treated in the R-5 system (e.g. distillation in R-5 and phase separation in the R-5 drop leg), these vessels in this reactor system may be hazardous waste treatment units and subject to additional requirements. Additional waste streams treated in the R-5 besides the VP-4 waste motive fluid may also meet the definition of hazardous waste. A full determination was not possible, as the facility did not provide waste determination records for any of the streams processed in the R-5 treatment system.
16. The facility utilizes several tanks on-site to receive materials that are ultimately managed as hazardous waste. The following tanks receive condensed distillate that are managed as hazardous waste from some product but have multi-use and also receive non-hazardous waste or product streams: TP-5, TP-6, R2-WT, TR-9, TR-1, TR-10, and TR-16.

Tank C3-LT receives waste after processing in a filter dryer, and this tank serves solely as storage and not as an inherent manufacturing process unit. Tank C3-LT is a hazardous waste tank subject to RCRA Subpart J and Subpart CC, as the tank is a stationary source where hazardous waste can accumulate and the tank is dedicated to the storage of THF-containing hazardous waste. The facility is not currently managing this unit as a hazardous waste tank and is not meeting labeling, inspection and recordkeeping requirements.

Following this discussion, the inspection team left the premises at approximately 5:00 PM on 7/27/22 and concluded the on-site portion of the inspection. Following the inspection, the following additional AOCs were noted during records review:

17. The contingency plan does not include the names and emergency phone numbers of persons qualified to act as the emergency coordinator.
18. Annual personnel training records for 2021 were not provided.

HRI's comments during the out-briefing inspection response document noted the following:

- HRI believes that all receiving tanks, reactors and other process vessels are not considered hazardous waste tanks and qualify under the manufactured process units (MPU) exemption. HRI does not form a conclusion regarding the RCRA status of materials that are removed from the receiving tanks until the time that those materials are removed.
- HRI believes that vacuum pumps 4,7, and 1 and their associated condensers and receiving tanks are an inherent part of the manufacturing process and are excluded from coverage under RCRA by the MPU exclusion.