

FINAL

Semi-Annual Remediation Status Report August 2022 to February 2023

Former Philadelphia Energy Solutions Refinery
3144 West Passyunk Avenue, Philadelphia, PA

Prepared for

Philadelphia Energy Solutions Refining and Marketing LLC

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Contents

1	Introduction.....	1
2	Historical Releases.....	2
2.1	136 Naphtha Release.....	2
2.2	No. 3 Separator Release	3
2.3	UDEX Release.....	4
2.4	Release Near Tank PB 253 (a.k.a. Penrose Avenue Remediation System Area)	4
3	Releases During Decommissioning and Demolition.....	5
3.1	860 Unit Cooling Tower and Hartranft Street Release.....	5
3.2	PB 881 Dike Roadway Release.....	6
3.3	No. 4 Separator Release	6
4	Releases Identified during AST Closure.....	7
5	Closing	7

Figures

- 1 Post-2012 Release Areas Pursuing Act 2 Closure
- 2 Tank Groups

Attachments

- A Table 1 - 3 Separator LNAPL Gauging Data



1 Introduction

On behalf of Philadelphia Energy Solutions Refining and Marketing LLC (PESRM), Terraphase Engineering Inc. (Terraphase) has prepared this *Semi-Annual Remediation Status Report* (Status Report) to document the progress of activities being completed by PESRM to characterize and remediate certain areas of the Former Philadelphia Energy Solutions Refinery (former PES; the Facility). The Facility, which is undergoing demolition in preparation for redevelopment, is located at 3144 West Passyunk Avenue, Philadelphia, Pennsylvania.

The releases discussed in this *Status Report* do not include those which are associated with “Pre-Existing Contamination” as defined in the 2012 Consent Order and Agreement (CO&A)¹ among the Pennsylvania Department of Environmental Protection (PADEP), Evergreen², and PESRM, which are being addressed by Evergreen. In accordance with the CO&A, PESRM has assumed responsibility for releases of hazardous or regulated substances from the Facility which have been identified to have occurred after September 8, 2012. The releases discussed herein are:

1. Historical releases that PESRM plans to close under the Act 2 Program;
 - a) A 2019 release of light naphtha from an aboveground line near 136 process unit at the former refinery (136 Naphtha Release);
 - b) A 2013 release from a process sewer near the No. 3 separator at the former refinery (No. 3 Separator Release);
 - c) A 2018 release from the UDEX feed line at the former refinery (UDEX Feed Release);
 - d) A 2017 release identified near Tank PB 253 (Release Near Tank PB 253);
2. Recent releases, which occurred decommissioning and demolition of the former refinery;
 - a) A 2021 release from overhead piping near the 860 Unit Cooling Tower and Hartranft Street (860 Unit and Hartranft Street Release);
 - b) A 2021 release from piping along the Dike Roadway near PB 881 (PB 881 Dike Roadway Release);
 - c) A recent (October 2022) release from the No. 4 Separator at the former refinery (No. 4 Separator Release); and
3. Potential releases identified during the decommissioning and closure of aboveground storage tanks (ASTs) which are being completed in accordance with the *Storage Tank and Spill Prevention Act* (Act 32) and 25 PA Code §245 (Subchapter D).

¹ August 14, 2012 CO&A as amended June 26, 2020 and referred to as the “Buyer-Seller Agreement”.

² Evergreen Resources Management Operations, a series of Evergreen Resources Group, LLC, is managing the legacy remedial work for Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC (“Evergreen”) and Sunoco (R&M), LLC. For clarity, Sunoco, Inc. n/k/a ETC Sunoco Holdings LLC, Sunoco, Inc. (R&M) n/k/a Sunoco (R&M), LLC and Evergreen shall be referred to collectively as “Evergreen” in this Report.



PESRM plans to remediate the releases identified above in accordance with applicable portions of the *Land Recycling and Environmental Remediation Standards Act (Act 2)*, 25 PA Code §250, Act 32, and Subchapter D. The location of these release areas is shown on Figure 1. The status of the characterization and remediation of each release area is discussed and summarized below.

This is the third *Status Report*. It discusses remedial activities completed during the period from August 1, 2022, through February 1, 2023. The next semi-annual *Status Report* will cover activities completed from February 1 through August 1, 2023.

2 Historical Releases

This section summarizes the status of historical releases that PESRM plans to close under the Act 2 Program.

2.1 136 Naphtha Release

On February 22, 2019, approximately 53,000 gallons of petroleum-product, identified as light naphtha, was released to the ground surface from defects in above-ground piping associated with former Process Unit 137, near the location of the former Unit 136. The petroleum-product was observed by Stantec Consulting Services, Inc. (Stantec) while on-site performing routine monitoring. The response actions included the removal of water and product from a nearby storm sewer and culvert and from test pits installed along the compromised product line via a vacuum truck. The removed water/product mixture was stored in a waste oil tank and then treated via the on-site wastewater treatment system. The defective section of product line was replaced with new above-ground piping.

In March 2019, Stantec collected 20 soil samples in the vicinity of the release to determine the extent of the impacted area. Samples from the area outside and surrounding the release were collected based on visual observation of the extent of the impacts. The samples were analyzed for the unleaded gasoline parameters (“unleaded gasoline short list”) listed in Table III-5 Short List of Petroleum Products from the PADEP’s (2021) *Land Recycling Program Technical Guidance Manual*.

Between November 25 and December 12, 2019, PESRM conducted an excavation of the soil impacted by the release. The excavation of surface soils was completed beneath approximately 130 feet of product piping that runs north to south, and then toward the storm sewer catch basin located approximately 50 feet to the east. The excavation was guided by visual observations of soil impacts and excavation depths ranged from approximately 2 to 6 feet below ground surface. Approximately 377 tons of soil were excavated and transported offsite for disposal at Clean Earth of New Castle, Delaware.

Post-excavation soil sampling³ conducted by Stantec involved the collection of twelve samples from the excavation base and sidewalls. Samples were analyzed for unleaded gasoline short list parameters. The

³ Sample locations were chosen using a systematic random approach.



post-excavation soil sample results identified no chemicals at concentrations greater than the applicable PADEP Statewide Health Standards (SHS) Medium Specific Concentrations.

A Notice of Intent to Remediate (NIR) was submitted in June 2021 to address the soil-related impacts associated with the release under the non-residential SHS. Langan Engineering and Environmental Services, Inc. subsequently submitted a *Combined Remedial Investigation Report/Final Report* to PADEP on June 29, 2021, to document the remediation of the release area. PADEP identified technical deficiencies in the report in a letter dated August 26, 2021.

PESRM plans to address the technical deficiencies identified by PADEP and provide an updated Remedial Investigation Report/Final Report to PADEP once the deficiencies have been addressed.

2.2 No. 3 Separator Release

The No. 3 Separator Remediation System was a 10-well total fluids recovery system installed by Evergreen in 2012 to address light non-aqueous phase liquid (LNAPL) from a prior release in the area of the property along the Schuylkill River near the No. 3 oil-water separator. In 2013, PESRM assumed primary responsibility for the No. 3 Separator Remediation System due to petroleum releases from a process sewer system, which connected the 137 Unit to the No. 4 Separator.

PESRM continued to operate and monitor the recovery system until October 2021 when it was shut down due to the termination of the compressed air supply from the facility as part of decommissioning. The compressed air had been used to power the pneumatic pumps for the system. Increases in LNAPL thicknesses were periodically observed in the monitoring and recovery wells associated with the system between 2013 and October 2021. These occasions of increased thickness are likely associated with leaks from the adjacent process sewer. Increased LNAPL thickness/product recovery also coincided with the decommissioning of the 137 process unit during the spring and summer of 2021. Since the completion of decommissioning activities on August 16, 2021, the process sewer has been cleaned to remove residual oil.

After the shutdown of the plant air in October 2021, skimmer pumps have been used to remove measurable LNAPL from the monitoring and recovery wells associated with the No. 3 Separator Remediation System. Stantec (on behalf of PESRM) conducts bi-weekly LNAPL gauging of the monitoring and recovery wells. LNAPL gauging data is presented in Table 1. LNAPL levels have been generally stable in the monitoring and recovery wells in this area since December 2021 with the exception of monitoring well C-169. The LNAPL level in C-169 increased in March and April 2022, and fluctuated in May and June 2022. When the measurable LNAPL thickness reaches 1 foot, a skimmer pump is used to remove the LNAPL from C-169. The LNAPL level in C-169 last exceeded 1 foot in September 2022; this increase in LNAPL coincided with the end of demolition of the 137 Process Unit. LNAPL levels have not exceeded 1 foot in C-169 since September 2022; however, the skimmer pump was utilized to remove free product in January 2023 when the LNAPL level reached 0.7 feet. Stantec's gauging data is included in Table 1. Stantec continues to conduct bi-weekly gauging of the wells to monitor LNAPL/water-level conditions.



A NIR was submitted in March 2022 to address the soil and groundwater-related impacts associated with the release under the non-residential SHS. PESRM is continuing to conduct active monitoring associated with this release.

2.3 UDEX Release

In the summer of 2018, Stantec (on behalf of Evergreen) performed a routine annual well gauging event across the Facility. During their review and analysis of the data, Stantec identified LNAPL in two monitoring wells where LNAPL had not been previously identified (S-414 and S-283) and an increased LNAPL thickness in an additional well (S-382). In July 2018, Stantec (on behalf of Evergreen) collected samples of the LNAPL from the wells for analysis and fingerprint comparison to known products and refinery intermediates. The laboratory indicated that the LNAPL was a refinery intermediate called reformat. The laboratory also provided a basic interpretation indicating that the LNAPL collected from the two wells (that previously did not contain LNAPL) was a light petroleum distillate of unknown weathering degree. The LNAPL collected from the well with increased LNAPL thickness was chemically similar to the other samples, but also contained smaller amount of extremely weathered middle petroleum distillate. Based upon the results, it is believed that comingled LNAPL plumes are present in this area.

In late July 2018, PESRM identified a leak from an underground portion of a product line that conveys reformat (a feed for the UDEX unit). The line was emptied, isolated, bypassed and replaced with a new aboveground line constructed in the same location as the underground line. PESRM has retained Stantec to characterize and remediate the release area. Multiple rounds of subsurface investigation have been conducted to characterize the nature and extent of the release. Additionally, over 96,000 gallons of free product was recovered from the subsurface by skimmer pumps operated at three recovery wells between September 2018 and November 2021, and over 24,000 gallons of free product was converted to vapor, extracted, and combusted during a pilot test of soil vapor extraction (SVE) technology between April 2021 and January 2022. A Full-Scale SVE Design Technical Memo was prepared by Stantec in February 2022 and was included in the August 2022 Status Report. The full-scale SVE system began operation in May 2022. The full scale SVE system initially used two internal combustion engine units, the Model V4 supplied by Remediation Services International, which consists of two 460 cubic inch V8 engines each. A third unit consisting of two single-engine Model V3 units plumbed together began operation on August 17, 2022. As of January 20, 2023, a total of 181,957.5 gallons of LNAPL were recovered/destroyed since UDEX release remediation activities began in 2018. A NIR was submitted in March 2022 to address the soil and groundwater-related impacts associated with the release under the non-residential SHS.

2.4 Release Near Tank PB 253 (a.k.a. Penrose Avenue Remediation System Area)

In 2016, a release was identified by PESRM personnel who observed surficial staining outside of tank containment berms in the vicinity of tank PB 253. Subsequently, an increase in NAPL in nearby wells and increased recovery by Evergreen's former Penrose Avenue Remediation System were recorded. The



former system collected NAPL from a series of recovery wells located in the vicinity of Tank PB 253. PESRM is developing a plan to characterize the release area in accordance with its obligations under the CO&A. Once characterization is complete, a NIR will be submitted to enter the release into the Act 2 program.

3 Releases During Decommissioning and Demolition

Below is a summary of the status of releases that have occurred during the decommissioning and demolition of the former refinery.

3.1 860 Unit Cooling Tower and Hartranft Street Release

On October 11, 2021, a petroleum release occurred during the removal of overhead pipelines within the pipe rack located near the 860 Unit Cooling Tower and Hartranft Street. The pipeline that caused the release was an out-of-service line used to remove water from two ASTs (PB-840 and PB-843) in the area. Both ASTs were formerly used to store crude oil. The total area of the release was approximately 1,600 square feet, and 1,200 square feet of this area is an asphalt roadway. NorthStar Contracting Group, Inc. (NorthStar) conducted immediate cleanup actions relating to the residual liquids remaining on the low-permeability asphalt. Soil located beneath this asphalt is not expected to have been impacted by the release. The remaining 400 square feet of the release occurred on soil adjacent to the asphalt.

NorthStar proceeded to conduct a limited soil excavation in the unpaved areas impacted by the release. Surficial soil up to 1 foot in depth was removed using an excavator and screened for signs of impact. Impacted soil was identified using a photoionization detector, olfactory evidence, and visual staining as indicators. Approximately 12 to 14 cubic yards of soil were removed and deposited in a roll-off container. On January 6, 2022, the excavated soil was transported to the Pure Soil Technologies facility in Jackson, New Jersey for disposal.

Following soil excavation, post-excavation soil sampling activities were conducted by NorthStar. Concentrations of the targeted constituents were either not detected above laboratory reporting limits or were detected at concentrations below the non-residential Statewide Health Standard medium-specific concentrations.

A NIR was submitted in March 2022 to address the soil-related impacts associated with the release under the non-residential SHS. Shortly thereafter, PESRM submitted a Final Report for the site in March 2022. On May 20, 2022, PADEP issued a *Letter of Technical Deficiency* for the report that identified five technical deficiencies. On July 19, 2022, PESRM addressed these deficiencies and submitted a *Response to Letter of Technical Deficiency* to the PADEP, along with a revised version of the Final Report. PADEP issued a disapproval letter for the Final Report on September 15, 2022.

PESRM plans to address the deficiencies identified by the PADEP and submit an updated Final Report.



3.2 PB 881 Dike Roadway Release

On November 16, 2021, a release occurred to soil during the removal of overhead pipelines within the pipe rack located along the dike roadway west of the PB 881 tank dike. The pipeline that caused the release was associated with ASTs that were formerly used to store crude oil. The releases occurred in three distinct areas that are approximately 640, 300, and 160 square feet, respectively. A prompt interim response, including a limited soil excavation, was conducted by NorthStar immediately following discovery of the release. Approximately 14 tons of soil were transported off-site for disposal.

Initial post-excitation sampling completed in November 2021 identified concentrations of benzene and lead greater than the non-residential Statewide Health Standard medium-specific concentrations in two of the three release areas. Soil characterization activities were completed in February 2022 in advance of additional excavation. Based on the soil characterization results, additional soil excavation was conducted in May 2022 and November 2022 and post-excitation soil samples were collected from locations identified using PADEP's Systematic Random Sampling tool in an attempt to attain the non-residential SHS. The results of this additional random sampling indicated the presence of benzene concentrations in soil above applicable Medium Specific Concentrations in the southern portion of one of the three release areas. A combined 110 tons of soil excavated during the May and November 2022 remedial activities were transported offsite for disposal.

PESRM plans to submit an updated NIR to address the soil and groundwater-related impacts associated with the release under the site-specific standard. Following the 30-day public comment period, a combined Remedial Investigation Report/Risk Assessment/Final Report will be submitted to the PADEP.

3.3 No. 4 Separator Release

On October 8, 2022, a release was identified in the vicinity of the No. 4 Separator. The oil/water level rose over a portion of the northern separator wall and then followed the overland grade of the adjacent roadway toward the bulkhead along the Schuylkill River. The oil/water migrated through gaps in the sheet pile bulkhead and entered the Schuylkill River. The oil/water also entered the onsite sewer system and overflowed at several sewer box and sewer inlet locations along the bulkhead. The release impacted approximately 1.3 acres of surface soil in the area.

A prompt interim response, including deploying river booms, removal of impacted debris, decontamination of the riverside bulkhead wall, and a limited soil excavation were conducted by NorthStar immediately following discovery of the release. Approximately 63 cubic yards of soil were excavated and have been stored in in roll-off containers at a staging area near tank GP 273 awaiting future offsite disposal.

PESRM is developing a plan to characterize the extent of residual contamination at the site. Once characterization is complete, a NIR will be submitted to enter the release into the Act 2 program.



4 Releases Identified during AST Closure

Removal of the ASTs and associated infrastructure began in December 2020. In accordance with Terraphase's (2021) *Aboveground Storage Tank Closure Work Plan*, which was approved by the PADEP on April 23, 2021, site assessment sampling was initiated in May 2021 for tanks that had been adequately decommissioned and demolished to facilitate sampling. Bi-weekly status summary reports and teleconference calls have occurred since early May 2021 to document for PADEP the work performed as part of the AST closure effort.

As detailed in the *Aboveground Storage Tank Closure Work Plan*, the work is progressing in a phased approach and instead of submitting individual site assessment results, closure reports, and closure forms for individual tanks, the site assessment and site characterization results for tank groupings will be documented in Tank Group Closure reports. The property has been divided into nine Tank Groups⁴ (Figure 2). To date, demolition and site assessment/site characterization work has been performed in Tank Groups 01 through 05 and 07. Site assessment soil sampling is ongoing in Tank Group 06 and following a review of the sampling results, site characterization sampling will be performed. Site assessment soil sampling in Tank Groups 07A and 08 is expected to be conducted in 2Q 2023. Additional details relating to AST closure progress are available in Terraphase's *Bi-Weekly Status Summary Reports*, and updates to the AST closure program will be included in the next semi-annual Status Report. To date, releases have been identified in each Tank Group sampled. Site Characterization Reports have been submitted for Tank Groups 01, 02, 03, 04, 05, and 07. PESRM has received feedback from PADEP on the Site Characterization Reports for Tank Groups 01, 02, and 03 and will address these comments in future submissions. Based on the findings of the site characterizations, releases in each tank group will be addressed through Corrective Action under Act 2 or Act 32.

5 Closing

Should you have any questions, please contact Joe Jeray (jjeray@hilcoglobal.com) and Julianna Connolly (jconnolly@hilcoglobal.com) at Hilco Redevelopment Partners.

⁴ As of December 2022, aboveground storage tanks GP R 250 and GP R 251 have been re-assigned to Tank Group 07A due to inaccessibility for Site Assessment sampling and will be evaluated separately from Tank Group 07.



Figures

- 1 Post-2012 Release Areas Pursuing Act 2 Closure
- 2 Tank Groups



Attachment A

Table 1 - 3 Separator LNAPL Gauging Data

