

Screening Level Ecological Risk Assessment

UDEX Feed Underground Line Release

Former PES Refinery
3144 West Passyunk Avenue
Philadelphia, Pennsylvania
PADEP Facility ID No. 780190

February 11, 2026

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1 Introduction

On behalf of Bellwether District Holdings, LLC (BDH), Stantec Consulting Services Inc. (Stantec) has prepared this Screening Level Ecological Risk Assessment (SLERA) to evaluate potential ecological exposures to chemical contaminants in environmental media resulting from an underground petroleum release that occurred from an UDEX feed line (UDEX release) at the former Philadelphia Energy Solutions (PES) Refinery (hereafter referred to as the Site) located at 3144 West Passyunk Avenue, Philadelphia, Pennsylvania. The purpose of this SLERA is to determine if Site-related chemical constituents in environmental media (subsurface soil, groundwater, and subsequent transport to surface water) at the Site may pose unacceptable risks to ecological receptors at the Site or the adjacent Schuylkill River.

This SLERA evaluates the likelihood that adverse ecological effects are occurring, or may occur, as a result of the UDEX release. The property locations are shown on **Figure 1-1**. This report is being submitted to the Pennsylvania Department of Environmental Protection (PADEP) and in accordance with Act 2 and the corresponding regulations in 25 PA Code 250.402(c).

This SLERA is primarily an evaluation to satisfy the requirements of Act 2 that focus on ecological receptors as identified in PA Code 250.402(a) and 25 PA Code 250.311(a): threatened species, endangered species, exceptional value wetlands, habitats of concern and species of concern.

The SLERA for the Site focuses on the Schuylkill River adjacent to the Site. The UDEX release occurred underground, and no Site-related contamination has been identified at the ground surface. The upland areas of the facility are currently undergoing significant alteration due to demolition and redevelopment activities being performed by BDH.

1.1 Facility Description

The former PES Refinery facility is an approximately 1,300-acre property located in south Philadelphia (**Figure 1-1**). The portion of the facility on the east side of the Schuylkill River is currently being redeveloped as a multimodal industrial park with ancillary rail infrastructure, energy infrastructure, marine capabilities, and commercial uses (e-commerce, life sciences, and logistics). The UDEX release is located within the redevelopment area in the south yard of the (now former) Point Breeze Refinery Impoundment Area. The portion of the former facility where the UDEX release is located is owned by BDH (formerly Philadelphia Energy Solutions Refining & Marketing LLC [PESRM]). The UDEX release is also within the



bounds of the Evergreen Resources Group, LLC (Evergreen)¹ Area of Interest (AOI) 3. Historical operations and investigations that occurred in this area unrelated to the UDEX release were previously described in Evergreen's *Area of Interest 3 Remedial Investigation Report* (Langan, 2017) which was approved by the Pennsylvania Department of Environmental Protection (PADEP) on June 14, 2017.

1.2 Facility Operational and Regulatory History

The former PES Refinery ceased operations in 2019. Up until that point, the facility and its predecessor, the former Philadelphia Refinery, operated nearly continuously for over 100 years as a crude oil refinery. A brief timeline for the ownership and regulatory history relevant to the UDEX release is as follows:

- 2012: The former Philadelphia Refinery was transferred from Sunoco to PESRM and became known as the PES Refining Complex during the time that it was operated by PESRM.
- 2019: PESRM announced the closure of the former PES Refinery. All refinery operations ceased at this time.
- 2020: PESRM (now known as BDH) was purchased through a bankruptcy sale by HRP Philadelphia Holdings, LLC in June 2020.

Remediation activities are being conducted at the facility by both BDH, formerly PESRM, and Evergreen in accordance with the 2012 Consent Order & Agreement (CO&A) and the 2020 CO&A Amendment. In accordance with the CO&A, Sunoco/Evergreen is responsible for addressing Pre-Existing Contamination, and BDH is responsible for addressing Post-September 2012 Contamination.

1.3 Relevant Guidance and Policies

The SLERA was conducted in accordance with the guidelines set forth in the *Ecological Risk Assessment Guidelines for Superfund (ERAGS): Process for Designing and Conducting Ecological Risk Assessments* (USEPA, 1997) and will fulfill the requirements of the *Site-Specific Ecological Risk Assessment Guidelines* presented in Pennsylvania regulations promulgated in Act 2 and in accordance with the corresponding regulations in 25 PA Code 250.402(c). The SLERA incorporates steps 1 and 2 of the 8-step ecological risk assessment process as described by USEPA (1997) and will result in a Scientific Management Decision Point (SMDP) which will conclude one of the following:

¹ 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) f/k/a Sunoco (R&M), LLC n/k/a Energy Transfer (R&M), LLC effective 4/19/2021 and Evergreen shall be referred to collectively as "Evergreen" in this Report.



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1. There is adequate information to conclude that ecological risks are negligible and therefore there is no need for remediation based on ecological risk;
2. The information available is not adequate to make a decision and the ecological risk assessment process should continue; or
3. The available information indicates a potential for adverse ecological effects and a more thorough ecological assessment is warranted.

The methods and structure of the SLERA are consistent with PA Act 2 and USEPA ERAGS and associated technical documents and reports. The receptors and pathways of exposure evaluated are based on site-specific conditions and characteristics of the UDEX release and supports receptor-specific assessment of risk.



2 Environmental Setting

The UDEX release is located within the redevelopment area in the south yard of the (now former) Point Breeze Refinery Impoundment Area (**Figure 1-1**). There are no expected surface soil impacts from the UDEX release because the release occurred from a subsurface pipe located approximately 4 to 5 feet below grade. Future redevelopment plans for the area include asphalt parking, roadways, and a slab on grade warehouse structure. There are currently no buildings above the UDEX release impacts. Based on these findings, the UDEX release has the potential to impact subsurface soil and groundwater, with subsequent transport to the Schuylkill River.

2.1 Schuylkill River

The Schuylkill River is an urban waterway with a largely hardened shoreline in the vicinity of the former Philadelphia Refinery. It flows into the Delaware River near the western side of South Philadelphia and is tidally influenced south of the Fairmount Dam which is located about 5 miles upstream of the former Philadelphia Refinery. The river collects watershed runoff and has many industrial inputs, both current and past via both permitted and unpermitted discharges. South of the Fairmount Dam, the river receives flow from the Philadelphia Water Department (PWD) sewers during combined sewer overflow (CSO) events when the city's combined sanitary/stormwater system exceeds its capacity during high-flow periods.

While the site operated as a refinery, runoff from the former refinery was controlled with berms, bulkheads, storm sewers and stormwater basins and was conveyed to the Point Breeze Refinery Wastewater Treatment Plant (WWTP) and the Girard Point WWTP. The former Philadelphia Refinery maintained National Pollutant Discharge Elimination System (NPDES) permits for WWTP discharge, stormwater, non-contact cooling water, and emergency overflows but BDH has recently taken the refinery WWTPs offline and currently treats stormwater through a temporary water treatment system during construction. New stormwater management infrastructure and discharge mechanisms are being established by BHD as part of the completed development. Previously there were some areas of water bodies and wetlands throughout the facility which were primarily associated with manmade ponds and drainage features. These small water bodies are in the process of being decommissioned/filled during development activities. New stormwater detention areas at the site will be constructed as lined basins.

2.2 Wetlands

An online search of the National Wetlands Inventory (NWI; <https://www.fes.gov/program/national-wetlands-inventory/wetlands-mapper>) determined that the Schuylkill River located west of the UDEX



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release area is the only habitat identified as wetland or open water in the vicinity of the UDEX release with the potential to be impacted by the release.

The Schuylkill River is classified as R1UBV: riverine, tidal, unconsolidated bottom, permanently flooded. These classifications are defined below.

System Riverine (R): The Riverine System includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts of 0.5 ppt or greater. A channel is an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water.

Subsystem Tidal (1): This Subsystem extends from the upstream limit of tidal fluctuations down to the upper boundary of the Estuarine System, where the concentration of ocean-derived salts reaches 0.5 ppt during the period of average annual low flow. The gradient is low, and water velocity fluctuates under tidal influence. The stream bottom is mainly mud with occasional patches of sand. Oxygen deficits may sometimes occur, and the fauna is similar to that in the Lower Perennial Subsystem. The floodplain is typically well developed.

Class Unconsolidated Bottom (UB): Includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 6-7 cm), and a vegetative cover less than 30%.

Water Regime Permanently Flooded-Tidal (V): Tidal fresh water covers the substrate throughout the year in all years. This Modifier is used for Riverine, Lacustrine, and Palustrine habitats.



3 Environmental Data Used in the SLERA

In the summer of 2018, Stantec performed a routine annual, sitewide well gauging event for the facility on behalf of Evergreen. During review and analysis of the gauging data, Stantec noted a first occurrence of apparent LNAPL in monitoring well S-414 and increased apparent LNAPL thicknesses (ANT) in wells S-283 and S-382 (**Figure 3-1**), where LNAPL was first observed in 2017 and 2016, respectively. Stantec's field technician confirmed the gauging observations, and the findings were reported to Evergreen.

Evergreen notified PESRM of the findings and on July 19, 2018, Stantec collected LNAPL samples from wells S-283, S-382, and S-414 in the presence of PES and Evergreen personnel. Stantec shipped the LNAPL samples to a contract laboratory for characterization on behalf of Evergreen, and duplicate LNAPL samples were provided to the onsite PES laboratory for analysis and fingerprinting to known products and refinery intermediates.

The PES laboratory indicated that the LNAPL was a refinery intermediate called reformat (Safety Data Sheet included as **Appendix A**). Stantec's contracted laboratory provided a basic interpretation which indicated that the LNAPL collected from wells S-382 and S-414 was a light petroleum distillate of unknown weathering degree, and the LNAPL collected from well S-283 was chemically similar to the samples collected from wells S-382 and S-414 but also contained a relatively smaller amount of extremely weathered middle petroleum distillate. During late July 2018, PES identified the underground portion of a product line that conveyed reformat through the release area (a feed from an UDEX unit) and emptied, isolated, and bypassed that section of underground pipe. PES retained Stantec to assist on the project through characterization and initiation of remediation of the LNAPL present in the subsurface near the UDEX feed underground line release area.

In August 2018, Stantec began conducting remediation activities on behalf of PESRM in the UDEX release area. Stantec commenced passive LNAPL recovery in late August 2018. Active LNAPL recovery efforts were initiated in early November 2018. From the start of remediation in 2018 through November 2021 recovery efforts included the continued operation and maintenance (O&M) of pneumatic LNAPL skimming systems in three wells, and manual bailing/pumping of LNAPL from additional wells in the vicinity of the skimming wells. Approximately 96,228 gallons of LNAPL were recovered by these systems. Soil vapor extraction (2021) and later air sparge (2024) were initiated and operated through 2025. The soil vapor extraction/air sparge remediation period accounted for the vapor recovery equivalent of approximately 196,053 gallons of LNAPL bringing the total recovery for the remediation program to approximately 292,662 gallons through June 13, 2025.

The environmental media that form the basis of this SLERA consist of groundwater samples collected from monitoring wells located within the UDEX release area. Stantec put forth a concerted effort to include as many sample points/wells as possible to establish the conservative initial conditions for the UDEX release fate and transport assessment. This included a combination of data from all BDH



monitoring wells plus a selection of Evergreen wells either impacted by the UDEX release, or adjacent to the release with non-detect results for benzene and toluene, thereby informing its delineation. Based on the estimated timing of the UDEX release and on the available groundwater sampling dataset, it was decided that the initial concentrations of benzene and toluene were the maximum concentrations from groundwater samples collected between February 2019 and January 2025 with the following exception: any well with post-2024 analytical data availability would have the maximum COPEC concentrations selected from the period between January 2024 and January 2025. The resulting maximum contaminant concentration datasets formed the basis for the initial concentration data for the unconfined and lower aquifers, summarized in **Table 9-3** of the Remedial Investigation Report (RIR) (Stantec, 2025a). The locations of the groundwater monitoring wells used to characterize groundwater in the area of the UDEX release are presented in **Figure 3-1**.

3.1 Identification of COPECs

Through chemical fingerprinting and operational knowledge, the product released from the underground UDEX conveyance line is understood to be reformat, a highly volatile gasoline feedstock enriched in benzene and toluene. As presented in the UDEX release RIR, (Stantec, 2025a), the constituents of potential ecological concern (COPECs) for ecological risk assessment in groundwater are therefore limited to benzene and toluene as these two compounds are known constituents of reformat (see additionally PESRM safety data sheet [SDS] in **Appendix A**) and have been detected at elevated concentrations in the release area. Elevated detections of other volatile organic compounds (VOCs), semi-volatile compounds (SVOCs), or metals that have been confirmed to exist in soil and/or groundwater in proximity to the release generally predate the UDEX release and cannot be attributed to it; such legacy impacts have been characterized and are being addressed in Act 2 reporting completed by the former PES Refinery's previous owner/operator (prior to 2012), Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC (Evergreen; formerly Sunoco) (see **Appendix D**).

Based on this information, benzene and toluene are the sole COPECs for the Site and are the chemicals that are quantitatively assessed in the SLERA.



4 Screening Level Problem Formulation

The Screening Level Problem Formulation for the SLERA includes the following:

- Potential Release Mechanisms
- Potential Ecological Receptors
- Complete Exposure Pathways
- Screening Level Assessment and Measurement Endpoints.

These components of the SLERA are discussed in the following sections.

4.1 Release Mechanisms

In the summer of 2018, Stantec noted a first occurrence of apparent LNAPL in several monitoring wells and increased apparent LNAPL thicknesses in wells where LNAPL was first observed in 2017 and 2016. Stantec collected LNAPL samples from several wells and shipped the LNAPL samples to a contract laboratory for characterization on behalf of Evergreen, and duplicate LNAPL samples were provided to the onsite PES laboratory for analysis and fingerprinting to known products and refinery intermediates. The PES laboratory indicated that the LNAPL was a refinery intermediate called reformate. During late July 2018, PES identified the underground portion of a product line that conveyed reformate through the release area (a feed from an UDEX unit) and emptied, isolated, and bypassed that section of underground pipe.

The UDEX release was a subsurface release and as such, contamination at the ground surface has not been identified. Currently, the main potential migration pathway between the source area and available ecological habitat is diffuse groundwater discharge to the Schuylkill River. An in-depth evaluation of the connection between groundwater at the Site and surface water in the Schuylkill River was recently completed and presented in Evergreen's Sitewide Fate and Transport Remedial Investigation Report (F&T RIR) (Stantec, 2025b). The report presents results of numerical groundwater modeling, contaminant transport modeling, and surface water modeling.

4.2 Exposure Point Concentrations

The exposure point concentration (EPC) is the concentration of a COPEC that could be contacted by a receptor over the exposure period (USEPA, 1989). The EPCs for surface water in the Schuylkill River are



derived from fate and transport modeling of COPECs in groundwater with subsequent seepage and mixing in the Schuylkill River as described in the following sections.

4.2.1 Groundwater Fate and Transport

A complex groundwater flow pattern exists in the UDEX release area and is discussed in detail in the UDEX release RIR (Stantec, 2025a). The conditions warranted use of numerical modeling to complete the UDEX release groundwater fate and transport assessment which included the application of an existing numerical groundwater flow model (GWF Model) developed by Stantec (2025b) for the facility on behalf of Evergreen. Prior to using the GWF Model as a tool to simulate the fate and transport of UDEX release COPECs (i.e., benzene and toluene) in groundwater, the numerical model performance was validated against site-specific UDEX release data. After making small adjustments to the GWF Model in support of the calibration, it was coupled with a transport model to perform predictive simulations for benzene and toluene over a 30-year period (2025-2055) based on a conservative set of plume conditions where maximum initial concentrations from groundwater sampling and continuous, decaying sources were applied.

The benzene transport simulation predicted that the dissolved benzene plume is present beyond the Schuylkill River bank to the northwest and forms a comparatively small seepage face where diffuse discharges to surface water may be occurring. In this area, the benzene mass discharge is predicted to peak in simulation year 28. The benzene plume then gradually decreases over time through natural attenuation and Natural Source Zone Depletion (NSZD) processes. The model results are interpreted to represent current conditions regarding plume extent that may be over-represented based on model construction and conservative input conditions. The toluene transport simulation indicated that the toluene plume gradually decreases in size and magnitude over time and does not reach the Schuylkill River at concentrations above the groundwater MSC.

The groundwater transport model was used to estimate mass discharges to surface water which were applied in the PADEP Toxics Management Spreadsheet (TMS) surface water model to evaluate attainment of applicable surface water standards or other selected screening criteria (Stantec, 2025a). Surface water modeling supports the conclusion that the predicted levels of COPECs in the Schuylkill River are likely to be far below the published standards or screening criteria. Using the predictive simulation results, the maximum benzene and toluene groundwater concentrations resulting from the UDEX release numerical modeling are simulated to reach the river in year 28 at 3,288 micrograms per liter ($\mu\text{g/L}$) and 0.1 ($\mu\text{g/L}$), respectively.

4.2.2 Dilution Modeling

In order to estimate the concentrations of COPECs in Schuylkill River surface water, a groundwater-to-surface water dilution factor was estimated. The groundwater flux at the seepage face from the



groundwater flow model is 22.4 gallons per day, which equates to 0.000035 cubic feet per second (cfs). The lowest 7-day average flow that occurs (on average) once every ten years (7Q10) for the Schuylkill River at Philadelphia is 125 cfs (Baird, 2024). The dilution of groundwater discharging to the Schuylkill River is calculated as follows:

$$DF = (Q_R + Q_{GW}) \div Q_{GW}$$

Where:

DF	=	Dilution factor
Q_R	=	Schuylkill River flow rate (cfs)
Q_{GW}	=	Groundwater flow rate (cfs)

For the UDEX feed line underground release, this equation yields a dilution factor of 3.57E+06. The maximum benzene concentration at the riverbed simulated seep is 3,288 µg/L and the maximum toluene concentration at the riverbed simulated seep is 0.1 µg/L. Applying the dilution factor calculated above, the maximum estimated concentrations of benzene and toluene in the Schuylkill River resulting from the UDEX release are 9.2E-04 µg/L and 2.8E-08 µg/L, respectively.

4.2.3 Schuylkill River Surface Water Sampling

Surface water sampling in the Schuylkill River was conducted in June/July 2024 for the purpose of characterizing surface water conditions adjacent to the former Philadelphia refinery in support of an Evergreen SLERA (Stantec, 2025c). Twenty-nine surface water samples were collected from locations adjacent to and in the near vicinity of the former refinery from approximately mid-depth of the water column. Surface water sampling at locations adjacent to the Site were conducted within a four-hour period around low tide to bias sampling toward the time periods when modeling (Stantec, 2025b) has shown groundwater seeps are most likely to be active.

Surface water samples were analyzed for the following:

- Evergreen Petroleum Short List compounds: VOCs, SVOCs, lead (total and dissolved)
- Target Compound List (TCL) Polycyclic Aromatic Hydrocarbons (PAHs)
- Hardness
- Salinity

The analytical results of the Schuylkill River surface water samples showed that benzene was detected in 1 out of 29 samples at a concentration of 1.6 µg/L. Benzene was not detected in the other 28 surface



water samples collected from the Schuylkill River both upstream and downstream of the UDEX release. Toluene was not detected in any of the surface water samples collected from the Schuylkill River.

4.3 Potential Ecological Receptors

At the screening level stage of assessment, ecological receptors are generic in nature. For this SLERA it was not necessary or feasible to individually assess each receptor that may potentially inhabit, breed, or forage at or in the vicinity of the Site. Instead, the potential for adverse effects was evaluated for the receptors representing the various aquatic communities that may be exposed to COPECs in the Schuylkill River. The ecological receptors assessed in this SLERA were chosen by focusing on receptors that are:

- indigenous to the area and could potentially be exposed to COPECs
- representative of species classified as rare, threatened, or endangered (i.e., species of conservation concern).

As described in Section 4.1, the UDEX feed line release was an underground release, and the main potential migration pathway between the source area and available ecological habitat is diffuse groundwater discharge to the Schuylkill River. As a result, this SLERA focuses on aquatic receptors that utilize the habitat available in the Schuylkill River adjacent to the Site. The ecological receptor group that is quantitatively assessed in the SLERA is freshwater aquatic life. Because the UDEX feed line release was an underground release and future redevelopment plans for the area include asphalt parking areas, roadways, and a slab-on-grade warehouse structure, habitat for terrestrial ecological receptors will be limited or non-existent. Therefore, terrestrial ecological receptors are not quantitatively assessed in this SLERA.

4.3.1 Species of Conservation Concern

In accordance with 25 PA Code 250.402(c), potential ecological receptors were identified as per 25 PA Code 250.402(a) and 25 PA Code 250.311(a). The Pennsylvania Natural Diversity Inventory (PNDI) program was used to determine whether threatened, endangered or other species or habitats of concern may be present in the area of the Site. The PNDI Environmental Review Report for the area of the UDEX release dated April 18, 2025, is included in **Appendix B**. The PNDI searches the databases of the PA Game Commission (PGC), PA Department of Conservation and Natural Resources (PA DCNR), PA Fish and Boat Commission (PA FBC), and the U.S Fish and Wildlife Service (USFWS) to determine if the presence of any threatened or endangered and/or special concern species have been documented on or in the near vicinity of the Site.

The PNDI search found that the PGC and PA DCNR determined that “No impact is anticipated to threatened and endangered species and/or special concern species and resources” and “no further



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review is required". The USFWS found that "No impacts to federally listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq. is required." PA FBC determined that further review was required for three sensitive species at the Site.

Further communication with the PA FBC (**Appendix B**) identified the following 3 rare or protected species as being known in the vicinity of the UDEX release:

- Atlantic sturgeon (*Acipenser oxyrinchus*)
- Shortnose sturgeon (*Acipenser brevirostrum*)
- Northern redbelly cooter (*Pseudemys rubriventris*)

As a result of previous ecological investigations conducted by Evergreen in the Schuylkill River in the vicinity of the Site, an *Eastern Redbelly Turtle (Pseudemys rubriventris) Habitat Evaluation* (DuBois Environmental Consultants, 2018) was conducted in August 2018 and a *Phase II Eastern Redbelly Turtle (Pseudemys rubriventris) Presence/Absence Survey* (DuBois Environmental Consultants, 2019) was conducted in June and July 2019.

The Eastern Redbelly Turtle (*Pseudemys rubriventris*) Habitat Evaluation report (DuBois Environmental Consultants, 2018) determined that suitable habitat for Eastern redbelly cooters exists along the Schuylkill River shoreline adjacent to the Site. The referenced Eastern Redbelly Turtle reports were included as attachments to Evergreen's 2025 SLERA (Stantec, 2025c).

As a result of previous ecological investigations conducted by Evergreen in the Schuylkill River in the vicinity of the Site, an *Ecological Risk Assessment for Hickory Shad, Shortnose Sturgeon and Atlantic Sturgeon in the Schuylkill River Adjacent to the PES Philadelphia Refining Complex, Areas Of Interest 1 through 9* (ERC, 2019) was completed and included as an attachment to Evergreen's 2025 SLERA (Stantec, 2025c). The *Ecological Risk Assessment for Hickory Shad, Shortnose Sturgeon and Atlantic Sturgeon in the Schuylkill River Adjacent to the PES Philadelphia Refining Complex, Areas Of Interest 1 through 9* (ERC, 2019) found that no juvenile Atlantic sturgeon were detected in the Schuylkill River despite there being a substantial number with active acoustic tags in the Delaware River. This suggests that the Schuylkill River is not used by juvenile Atlantic sturgeons. Additionally, only one acoustically-tagged adult Atlantic sturgeon was detected very briefly (2 detections) by the downriver Schuylkill River receiver in May 2019. This was clearly a transient occurrence, perhaps by a fish staging for spawning, or moving to or from a spawning area. Adult Atlantic sturgeon are not expected to utilize the Schuylkill River.

Acoustic monitoring of shortnose sturgeon reported in the *Ecological Risk Assessment for Hickory Shad, Shortnose Sturgeon and Atlantic Sturgeon in the Schuylkill River Adjacent to the PES Philadelphia Refining Complex, Areas Of Interest 1 through 9* (ERC, 2019) suggest that a small percentage (~3 percent) of the adult shortnose sturgeon in the Delaware River seasonally utilize the lower Schuylkill



River. The absence of detection of juvenile shortnose sturgeon during the Site-specific survey suggests that the Schuylkill River is not utilized as habitat by these life stages. Based on these survey results, a very small percentage of shortnose sturgeon utilize the Schuylkill River as habitat.

The assessments referenced in this section were included as attachments to Evergreen's SLERA (Stantec, 2025c).

4.4 Screening Level Assessment and Measurement Endpoints

Assessment and measurement endpoints define the focus of the SLERA. As defined in USEPA's Guidelines for Ecological Risk Assessment (USEPA, 1998), an assessment endpoint is an explicit expression of the environmental value that is to be protected (e.g., growth, survival, and reproduction of a specific ecological community). Thus, assessment endpoints focus the SLERA on the guilds or communities that might be affected by exposure to COPECs. Per USEPA Ecological Risk Assessment Guidance for Superfund (USEPA, 1997), "For the screening-level ecological risk assessment, assessment endpoints are any adverse effects on ecological receptors, where receptors are plant and animal populations and communities, habitats, and sensitive environments." This concept is further defined by USEPA in their Ecological Risk Assessment and Risk Management Principles for Superfund Sites (1999) memo where it is stated "Superfund's goal is to reduce ecological risks to levels that will result in the recovery and maintenance of healthy local populations and communities of biota."

Assessment endpoints are evaluated with measurement endpoints, which are defined as the quantitative expression of an observed or measured effect of a stressor (USEPA, 1998). At the SLERA stage, assessment and measurement endpoints are generic and generally do not focus on specific feeding guilds or communities. The screening level assessment endpoint for this SLERA is the following:

- Protection of the aquatic ecological receptor communities and populations that may be present or utilize the reach of the Schuylkill River adjacent to the Site from adverse effects attributable to Site-related COPECs in surface water.

The screening level measurement endpoint for this SLERA is the following:

- Comparison of concentrations of COPECs detected in groundwater and subsequently dispersed in the Schuylkill River to ecological screening values (ESVs) protective of sensitive aquatic ecological receptors and consideration of additional relevant lines of evidence.

The assessment endpoints are population scale adverse effects to various receptors. The measurement endpoints used to evaluate these assessment endpoints are organismal-scale effects that include, but are not limited to, mortality, growth, and reproductive impairment. Measurement endpoints were not assessed



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by direct measure of the ecological population. Instead, they were evaluated through exposure modelling associated with applicable media for each receptor during the exposure assessment, effects assessment and risk characterization steps of the SLERA. Ecological hazards based on organismal scale measurement endpoints are indicative of individual effects, while the population scale effect may remain uncertain.



5 Screening Level Ecological Effects Assessment

The ecological effects assessment quantifies the relationship between exposure to a stressor and the potential effects on an organism or ecological community resulting from that exposure. The screening level effects evaluation consists of the identification of appropriate ecological standards or screening values (ESV) for constituents detected in environmental media at the Site. Since the focus of this SLERA is the Schuylkill River adjacent to the Site, the ecological standards and ESVs were selected from various literature sources applicable to surface water.

Community level receptors are typically assessed by comparing constituent concentrations in abiotic media (e.g., surface water) to screening values (or benchmarks) that have been determined to be protective of sensitive aquatic (surface water) receptors. The majority of available screening values are presented as a single calculated value (e.g., no observed adverse effect level [NOAEL] or maximum acceptable toxicant concentration [MATC]) as provided in appropriate peer-reviewed literature or technical publications. The surface water quality standards and ecological screening values (ESVs) used to assess aquatic receptors are described below.

5.1 Surface Water Quality Standards and Screening Values

The PADEP surface water quality criteria are maintained by the PADEP and list the aquatic life criteria for toxic substances which the PADEP uses in development of effluent limitations in NPDES permits and for other purposes. The Criterion Continuous Concentrations (CCC) and Criterion Maximum Concentrations (CMC) listed by PADEP are used in this SLERA. Surface water quality standards applicable to the Schuylkill River based on the protection of ecological receptors are summarized in **Table 5-1** below. Additionally, ESVs for aquatic communities whose major route of exposure is through surface water are referenced from USEPA Region 3 Biological Technical Assistance Group (BTAG) Surface Water Screening Benchmarks (USEPA, 2006a).

Table 5-1. Applicable Surface Water Quality Standards and Screening Values

Constituent	PA Code Chapter 93 Criteria Continuous Conc. (µg/L)	PA Code Chapter 93 Criteria Maximum Conc. (µg/L)	USEPA Region 3 BTAG Screening Benchmark (µg/L)
Benzene	130	640	370
Toluene	330	1700	2

NA – Not Available



Screening Level Ecological Risk Assessment
5 Screening Level Ecological Effects Assessment

The PA Code Chapter 93 Criteria Continuous Concentration (CCC) and Criteria Maximum Concentration (CMC) for benzene and toluene represent chronic and acute surface water concentrations, respectively, that the PA Department of Environmental Protection considers protective of aquatic ecological receptors. The USEPA Region 3 Biological Technical Assistance Group (BTAG) Screening Benchmarks represent surface water screening levels considered by USEPA Region 3 to be protective of aquatic ecological receptors.

USEPA Region 3 BTAG freshwater screening benchmarks for benzene and toluene are referenced from the Canadian Council of Ministers of the Environment (CCME) (2003) Canadian Environmental Quality Guidelines: Summary Table, December 2003. These guidelines are intended to protect all forms of aquatic life and all aspects of aquatic life cycles, including the most sensitive life stage of the most sensitive species over the long term from anthropogenic stressors such as chemical inputs or changes to physical components. They provide the science-based benchmark for a nationally consistent level of protection for aquatic life in Canada.

Surface water screening values specific to reptilian populations and the constituents identified as COPECs are not available in the scientific literature, as such these receptor groups were not quantitatively assessed. The lack of standards and/or screening values based on reptilian toxicity is discussed in **Appendix C**. However, due to the conservative nature of the Chapter 93 surface water criteria and Region 3 BTAG screening values for water column communities, these standards and screening values are likely protective of aquatic reptile populations as well.



6 Screening Level Exposure Assessment

For exposures to occur, a complete exposure pathway must exist between the contaminant and the receptor. A complete exposure pathway requires the following four components:

- A source mechanism for contaminant release
- A transport mechanism
- A point of environmental contact
- A route of uptake at the exposure point

If any of these four components are absent, then a pathway is generally considered incomplete.

As presented previously, the release of reformate from underground piping is the mechanism by which contaminants were released to the subsurface environment. Subsequent groundwater transport to the Schuylkill River is the transport mechanism by which contaminants are transported to the point of environmental contact, the Schuylkill River. Benzene and toluene are not expected to strongly bind to sediment, bioconcentrate in aquatic organisms, or hydrolyze and will primarily remain in the water column or evaporate into the air (ATSDR, 2017 & 2024). Ecological receptors in the Schuylkill River may be exposed to constituents in surface water via direct contact or through ingestion of surface water. Based on this screening level assessment, ecological exposures to the UDEX release-related COPECs are considered complete.

6.1 Exposure Point Concentrations for Aquatic Receptors

As described previously in Section 4.2, a groundwater transport model was used to estimate mass discharges of benzene and toluene to the Schuylkill River. The groundwater flux at the seepage face from the groundwater flow model was calculated to be 22.4 gallons per day, which equates to 0.000035 cfs. The 7Q10 flow rate for the Schuylkill River at Philadelphia is 125 cfs (Baird, 2024). Using these flow rates, the dilution of groundwater discharging to the Schuylkill River was calculated to be 3.57E+06. Applying this dilution factor to the maximum predicted concentrations of benzene and toluene at the seepage face, the maximum estimated concentrations of benzene and toluene in the Schuylkill River resulting from the UDEX release were calculated to be 9.2E-04 µg/L and 2.8E-08 µg/L, respectively. These are the calculated EPCs for benzene and toluene for aquatic receptors in the Schuylkill River.



7 Screening Level Risk Characterization

Risk characterization consists of two major components: risk estimation and risk description. Risk estimation combines results of the exposure assessment and effects assessment to derive a quantitative evaluation of potential risks to ecological receptors. For the risk estimation component, calculated exposure concentrations for each preliminary COPEC were used to estimate COPEC-specific risks by calculating hazard quotients (HQs). The risk description component provides additional information that is important for interpreting the calculated risk estimates.

7.1 Hazard Quotients

HQs for aquatic receptors were derived as the ratio of the EPC for each COPEC to the respective standard or ESV using the following generic equation:

$$HQ = \frac{EPC}{ESV}$$

Where:

HQ	= hazard quotient (unitless)
EPC	= exposure point concentration (µg/L)
ESV	= ecological screening value (µg/L)

7.2 Schuylkill River Risk Characterization

Potential risks were assessed for the aquatic receptors potentially present in the Schuylkill River adjacent to the Site.

Fish (including shortnose sturgeon and Atlantic sturgeon) and other aquatic communities in the Schuylkill River were assessed by comparing maximum modeled concentrations of the COPECs in the Schuylkill River to PADEP chronic (CCC) and acute (CMC) surface water quality standards and USEPA Region 3 BTAG surface water benchmarks. These water quality standards and screening benchmark values have been designed to be protective of sensitive aquatic organisms. Hazard quotients (HQ) greater than 1 indicate the potential for impacts to sensitive aquatic organisms, including sensitive fish species. The calculated HQs for the COPECs in the Schuylkill River are presented in **Table 7-1** below.



Table 7-1. Schuylkill River Surface Water Hazard Quotients

COPEC	Calculated Surface Water Conc. (µg/L)	Region 3 BTAG Screening Benchmark (µg/L)	Chapter 93 CCC (µg/L)	Chapter 93 CMC (µg/L)	Region 3 BTAG HQ	Chapter 93 CCC HQ	Chapter 93 CMC HQ
Benzene	9.2E-04	370	130	640	2.5E-06	7.1E-06	1.4E-06
Toluene	2.8E-08	2	330	1700	1.4E-08	8.5E-11	1.6E-11

As presented in **Table 7-1**, maximum HQs for the COPECs were less than 1. The calculated HQs indicate the potential for adverse impacts to fish (including shortnose sturgeon and Atlantic sturgeon) and other aquatic communities in the Schuylkill River from exposure to COPECs in surface water are insignificant.

7.3 Schuylkill River Reptile Communities

As discussed previously, there are no available screening levels based on reptilian toxicity (see Reptile Toxicity Assessment included in **Appendix B**, also included in Evergreen’s 2025 SLERA) for the COPECs. As such, quantitative assessment of potential risks to aquatic reptiles could not be completed. However, the surface water quality standards and ESVs are designed to be protective of sensitive aquatic receptors and as such, are likely protective of aquatic reptiles, including redbelly cooters.

7.4 Additional Lines of Evidence

Additional lines of evidence considered in the characterization of risks to aquatic receptors in the Schuylkill River are described below.

Surface Water Sampling. As presented previously in Chapter 3, surface water sampling in the Schuylkill River was conducted by Evergreen in June/July 2024 for the purpose of characterizing surface water conditions adjacent to the former Philadelphia refinery in support of a site-wide SLERA for historical site



impacts (Stantec, 2025c). Twenty-nine surface water samples were collected from locations adjacent to the former refinery from approximately mid-depth of the water column. Surface water sampling at locations adjacent to the Site were conducted within a four-hour period around low tide to bias sampling toward the time periods when modeling (Stantec, 2025b) has shown groundwater seeps are most likely to be active.

The analytical results of the Schuylkill River surface water samples showed that benzene was detected in 1 out of 29 samples (sample location SW-24-13, approximately 970 meters upstream of the UDEX release area) at a concentration of 1.6 µg/L. Benzene was not detected in the other 28 surface water samples collected upstream and downstream of the UDEX release from the Schuylkill River. Toluene was not detected in any of the surface water samples collected from the Schuylkill River. These analytical results provide additional lines of evidence that concentrations of benzene and toluene in the Schuylkill River adjacent to the Site are significantly less than surface water screening levels protective of sensitive aquatic ecological receptors.

Sturgeon Monitoring. Monitoring for the presence of shortnose sturgeon and Atlantic sturgeon in the Schuylkill River was reported in *Ecological Risk Assessment for Hickory Shad, Shortnose Sturgeon and Atlantic Sturgeon in the Schuylkill River Adjacent to the PES Philadelphia Refining Complex, Areas Of Interest 1 through 9* (ERC, 2019) contained in Evergreen's SLERA (Stantec, 2025c). No juvenile Atlantic sturgeon were detected in the Schuylkill River despite there being a substantial number with active acoustic tags in the Delaware River. Adult Atlantic sturgeon are not expected to utilize the Schuylkill River.

Acoustic monitoring of shortnose sturgeon reported in the *Ecological Risk Assessment for Hickory Shad, Shortnose Sturgeon and Atlantic Sturgeon in the Schuylkill River Adjacent to the PES Philadelphia Refining Complex, Areas Of Interest 1 through 9* (ERC, 2019) suggest that a small percentage (~3 percent) of the adult shortnose sturgeon in the Delaware River seasonally utilize the lower Schuylkill River as habitat. The Schuylkill River is not utilized as habitat by juvenile shortnose sturgeon.

These monitoring results indicate that no juvenile Atlantic sturgeon or shortnose sturgeon utilize the lower Schuylkill River as habitat. Additionally, adult Atlantic sturgeon do not utilize the lower Schuylkill River as habitat, and a small number of adult shortnose sturgeon may utilize the lower Schuylkill River as habitat. These monitoring results indicate that potential exposure of Atlantic and shortnose sturgeon to Site-related COPECs is likely minimal.



8 Summary and Conclusions

A SLERA was conducted to evaluate potential ecological exposures to chemical contaminants in environmental media resulting from the UDEX release as described in this report. The SLERA evaluated the likelihood that adverse ecological effects are occurring, or may occur, as a result of the UDEX release, and is primarily an evaluation to satisfy the requirements of Act 2 that focus on ecological receptors as identified in PA Code 250.402(a) and 25 PA Code 250.311(a): threatened species, endangered species, exceptional value wetlands, habitats of concern and species of concern.

Because the UDEX release was subsurface and did not result in any surface contamination, the SLERA for the Site focuses on the Schuylkill River adjacent to the Site. Future redevelopment plans for the area include asphalt parking, roadways, and a slab on grade warehouse structure. There are currently no buildings above the UDEX release impacts. Based on these findings, terrestrial ecological receptors are unlikely to be exposed to COPECs associated with the UDEX release; however, the UDEX release has the potential to impact subsurface soil and groundwater, with subsequent transport to the Schuylkill River.

The environmental media that form the basis of this SLERA consist of groundwater samples collected from monitoring wells located within the UDEX release area. Through chemical fingerprinting and operational knowledge, the product released from the underground UDEX conveyance line is understood to be reformate, a highly volatile gasoline feedstock enriched in benzene and toluene. Based on this information, benzene and toluene are the sole COPECs for the Site and are the chemicals that were quantitatively assessed in the SLERA.

Currently, the main potential migration pathway is diffuse groundwater discharge to the Schuylkill River. Benzene and toluene are not expected to strongly bind to sediment, bioconcentrate in aquatic organisms, or hydrolyze and will primarily remain in the water column or evaporate into the air (ATSDR, 2017 & 2024). The groundwater transport model was used to estimate mass discharges to surface water. In order to estimate the concentrations of COPECs in Schuylkill River surface water a groundwater-to-surface water dilution factor was estimated to be 3.57E+06. Applying this dilution factor to the COPEC flux resulted in maximum estimated concentrations of benzene and toluene in the Schuylkill River resulting from the UDEX release of 9.2E-04 µg/L and 2.8E-08 µg/L, respectively. These are the EPCs of benzene and toluene that aquatic ecological receptors would be exposed to.

This SLERA focuses on aquatic receptors that utilize the habitat available in the Schuylkill River adjacent to the Site. The ecological receptor group that is quantitatively assessed in the SLERA is freshwater aquatic life. A PNDI database search for the UDEX Site identified the following 3 rare or protected species as being known in the vicinity of the UDEX release:

- Atlantic sturgeon (*Acipenser oxyrinchus*)



Screening Level Ecological Risk Assessment
8 Summary and Conclusions

- Shortnose sturgeon (*Acipenser brevirostrum*)
- Northern redbelly cooter (*Pseudemys rubriventris*)

The screening levels used to characterize ecological risk in the SLERA were the PADEP surface water quality criteria (CCC and CMC) applicable to the Schuylkill River based on the protection of ecological receptors and ESVs for aquatic communities whose major route of exposure is through surface water referenced from USEPA Region 3 BTAG Surface Water Screening Benchmarks (USEPA, 2006a).

Maximum HQs for the COPECs were less than 1. The calculated HQs indicate the potential for adverse impacts to fish (including shortnose sturgeon and Atlantic sturgeon) and other aquatic communities in the Schuylkill River from exposure to COPECs in surface water are insignificant.

There are no available screening levels based on reptilian toxicity (see Reptile Toxicity Assessment included in **Appendix B**) for the COPECs. As such, quantitative assessment of potential risks to aquatic reptiles could not be completed. However, the surface water quality standards and ESVs are designed to be protective of sensitive aquatic receptors and as such, are likely protective of aquatic reptiles, including redbelly cooters.

Based on the results of this SLERA, further ecological evaluation of COPECs resulting from the UDEX release is not warranted.



9 References

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DuBois Environmental Consultants, 2018. Eastern Redbelly Turtle (*Pseudemys rubriventris*) Habitat Evaluation

Environmental Research and Consulting, Inc. (ERC), 2019. Ecological Risk Assessment for Hickory Shad, Shortnose Sturgeon and Atlantic Sturgeon in the Schuylkill River Adjacent to the PES Philadelphia Refining Complex, Areas of Interest 1 through 9.

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Screening Level Ecological Risk Assessment
9 References

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USEPA, 1989. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Part A. Office of Solid Waste and Emergency Response, Washington, DC.





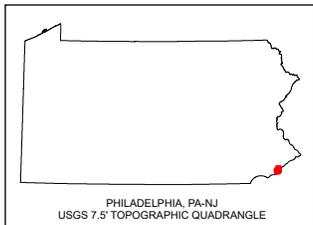
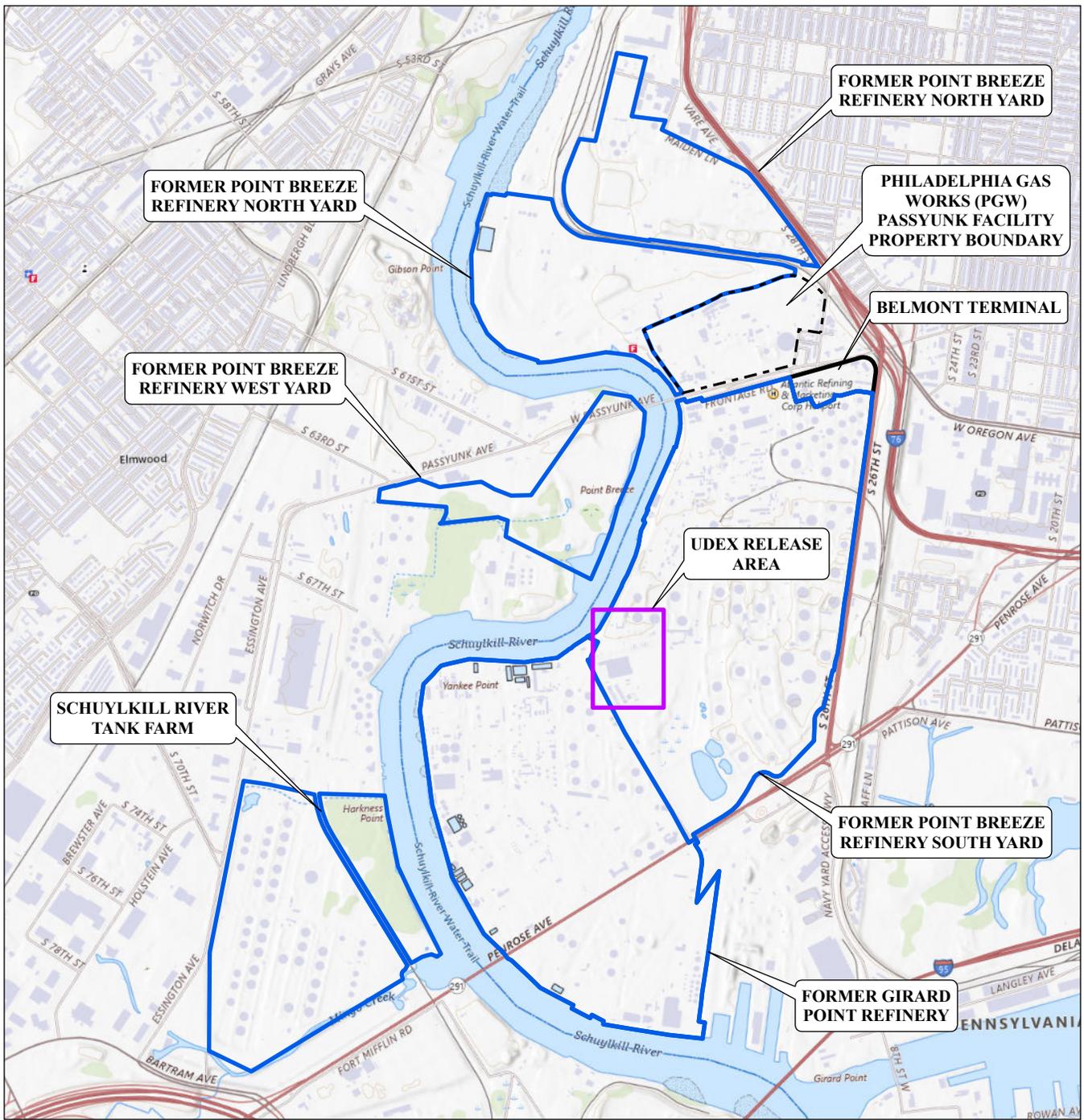
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Project Number:

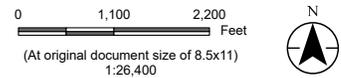
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Figure 1-1 Site Location Map





- Legend**
- UDEX Release Area
 - Former PES Refinery
 - Belmont Terminal
 - Philadelphia Gas Works (PGW)
 - Passyunk Facility Property Boundary



Project Location
 City of Philadelphia, Philadelphia County, PA

Client/Project
 BELLWETHER DISTRICT HOLDINGS, LLC
 FORMER PES REFINERY
 3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Prepared by GWC on 2025-05-29
 TR Review by ADK on 2025-07-15
 IR Review by JKK on 2025-07-21

195603450

Figure No.
 1-1

Title
 Site Location Map

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
2. Data Sources: Stantec, USGS
3. Background: USGS Topo Layers (TMN); USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road data; Natural Earth Data; U.S. Department of State HIU; NOAA National Centers for Environmental Information. Data refreshed July, 2025.

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Figure 3-1 UDEX Investigation Site Plan



Appendix A Reformat Safety Data Sheet



SAFETY DATA SHEET

1. Identification

Product identifier REFORMATE LIGHT MTR
Other means of identification None.
Recommended use Motor Fuel
Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name Philadelphia Energy Solutions
Address 3144 W. Passyunk Ave
 Philadelphia, Pennsylvania, 19145
E-mail msds@PES-Companies.com
Emergency phone number
24 Hours Information (215) 339-5400
Product Safety Information (215) 339-2000

2. Hazard(s) identification

Physical hazards Flammable liquids Category 2
Health hazards Germ cell mutagenicity Category 1B
 Carcinogenicity Category 1B
 Aspiration hazard Category 1
Environmental hazards Hazardous to the aquatic environment, acute hazard Category 2
OSHA defined hazards Not classified.
Label elements



Signal word Danger

Hazard statement Highly flammable liquid and vapor. May be fatal if swallowed and enters airways. Causes skin irritation. May cause drowsiness or dizziness. May cause genetic defects. May cause cancer. Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Precautionary statement

Prevention Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Avoid breathing mist or vapor. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.

Response If swallowed: Immediately call a poison center/doctor. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs: Get medical advice/attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. If exposed or concerned: Get medical advice/attention. Call a poison center/doctor if you feel unwell. Do NOT induce vomiting. Take off contaminated clothing and wash before reuse. In case of fire: Use appropriate media to extinguish. Collect spillage.

Storage Store in a well-ventilated place. Keep container tightly closed. Store in a well-ventilated place. Keep cool. Store locked up.

Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC)

Static accumulating flammable liquid can become electrostatically charged even in bonded and grounded equipment. Sparks may ignite liquid and vapor. May cause flash fire or explosion.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Catalytic Reformed Light Naphtha	64741-63-5	100

Constituents

Chemical name	CAS number	%
Benzene	71-43-2	0 - 20
Toluene	108-88-3	0 - 20
Naphtha (petroleum), light straight-run	64741-46-4	10
Xylene	1330-20-7	0 - 10

Composition comments

Occupational Exposure Limits for constituents are listed in Section 8.

4. First-aid measures

Inhalation

If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician if symptoms develop or persist.

Skin contact

Take off immediately all contaminated clothing. Rinse skin with water/shower. Get medical attention if irritation develops and persists.

Eye contact

Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Get medical attention if irritation develops and persists.

Ingestion

Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Most important symptoms/effects, acute and delayed

Aspiration may cause pulmonary edema and pneumonitis. Direct contact with eyes may cause temporary irritation.

Indication of immediate medical attention and special treatment needed

Provide general supportive measures and treat symptomatically. Thermal burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim under observation. Symptoms may be delayed.

General information

Take off all contaminated clothing immediately. IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media

Water fog. Foam. Carbon dioxide (CO₂). Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

Unsuitable extinguishing media

Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical

Vapors may form explosive mixtures with air. Vapors may travel considerable distance to a source of ignition and flash back. This product is a poor conductor of electricity and can become electrostatically charged. If sufficient charge is accumulated, ignition of flammable mixtures can occur. To reduce potential for static discharge, use proper bonding and grounding procedures. This liquid may accumulate static electricity when filling properly grounded containers. Static electricity accumulation may be significantly increased by the presence of small quantities of water or other contaminants. Material will float and may ignite on surface of water. During fire, gases hazardous to health may be formed.

Special protective equipment and precautions for firefighters

Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions

In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk.

Specific methods

Use standard firefighting procedures and consider the hazards of other involved materials.

General fire hazards

Highly flammable liquid and vapor.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Wear appropriate protective equipment and clothing during clean-up. Avoid breathing mist or vapor. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Use appropriate containment to avoid environmental contamination. Transfer by mechanical means such as vacuum truck to a salvage tank or other suitable container for recovery or safe disposal. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up

Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Take precautionary measures against static discharge. Use only non-sparking tools. Keep combustibles (wood, paper, oil, etc.) away from spilled material. This product is miscible in water.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Prevent product from entering drains. Following product recovery, flush area with water.

Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Environmental precautions

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

Avoid release to the environment. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground. Inform appropriate managerial or supervisory personnel of all environmental releases. Use appropriate containment to avoid environmental contamination.

7. Handling and storage

Precautions for safe handling

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. When using do not smoke. Explosion-proof general and local exhaust ventilation. Minimize fire risks from flammable and combustible materials (including combustible dust and static accumulating liquids) or dangerous reactions with incompatible materials. Handling operations that can promote accumulation of static charges include but are not limited to: mixing, filtering, pumping at high flow rates, splash filling, creating mists or sprays, tank and container filling, tank cleaning, sampling, gauging, switch loading, vacuum truck operations. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. Should be handled in closed systems, if possible. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Observe good industrial hygiene practices.

For additional information on equipment bonding and grounding, refer to the Canadian Electrical Code in Canada, (CSA C22.1), or the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents" or National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity" or National Fire Protection Association (NFPA) 70, "National Electrical Code".

Conditions for safe storage, including any incompatibilities

Store locked up. Keep away from heat, sparks and open flame. Prevent electrostatic charge build-up by using common bonding and grounding techniques. Eliminate sources of ignition. Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity. Store in a cool, dry place out of direct sunlight. Store in original tightly closed container. Store in a well-ventilated place. Keep in an area equipped with sprinklers. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Constituents	Type	Value
Benzene (CAS 71-43-2)	STEL	5 ppm
	TWA	1 ppm

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Constituents	Type	Value
Xylene (CAS 1330-20-7)	PEL	435 mg/m ³
		100 ppm

US. OSHA Table Z-2 (29 CFR 1910.1000)

Constituents	Type	Value
Benzene (CAS 71-43-2)	Ceiling	25 ppm
	TWA	10 ppm
Toluene (CAS 108-88-3)	Ceiling	300 ppm
	TWA	200 ppm

US. ACGIH Threshold Limit Values

Constituents	Type	Value
Xylene (CAS 1330-20-7)	STEL	150 ppm
	TWA	100 ppm
Benzene (CAS 71-43-2)	STEL	2.5 ppm
	TWA	0.5 ppm
Toluene (CAS 108-88-3)	TWA	20 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Constituents	Type	Value
Xylene (CAS 1330-20-7)	STEL	655 mg/m ³
		150 ppm
	TWA	435 mg/m ³
Benzene (CAS 71-43-2)		100 ppm
	STEL	1 ppm
Toluene (CAS 108-88-3)	TWA	0.1 ppm
	STEL	560 mg/m ³
		150 ppm
	TWA	375 mg/m ³
		100 ppm

Biological limit values

ACGIH Biological Exposure Indices

Constituents	Value	Determinant	Specimen	Sampling Time
Xylene (CAS 1330-20-7)	1.5 g/g	Methylhippuric acids	Creatinine in urine	*
Benzene (CAS 71-43-2)	25 µg/g	S-Phenylmercapturic acid	Creatinine in urine	*
Toluene (CAS 108-88-3)	0.3 mg/g	o-Cresol, with hydrolysis	Creatinine in urine	*
	0.03 mg/l	Toluene	Urine	*
	0.02 mg/l	Toluene	Blood	*

* - For sampling details, please see the source document.

Exposure guidelines

US - California OELs: Skin designation

Benzene (CAS 71-43-2)

Can be absorbed through the skin.

Toluene (CAS 108-88-3)

Can be absorbed through the skin.

US - Minnesota Haz Subs: Skin designation applies

Toluene (CAS 108-88-3)

Skin designation applies.

US ACGIH Threshold Limit Values: Skin designation

Benzene (CAS 71-43-2)

Can be absorbed through the skin.

Appropriate engineering controls

Explosion-proof general and local exhaust ventilation. Eye wash fountain and emergency showers are recommended.

Individual protection measures, such as personal protective equipment

Eye/face protection	Chemical respirator with organic vapor cartridge and full facepiece.
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves.
Other	Wear suitable protective clothing. Use of an impervious apron is recommended.
Respiratory protection	Chemical respirator with organic vapor cartridge and full facepiece.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	When using do not smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties**Appearance**

Physical state	Liquid.
Form	Liquid.
Color	Colorless.
Odor	Gasoline.
Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	Not available.
Initial boiling point and boiling range	100 - 435 °F (37.78 - 223.89 °C)
Flash point	-40.0 °F (-40.0 °C) Closed Cup
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	1.5 %
Flammability limit - upper (%)	7.6 %
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	525 mm Hg at 20°C
Vapor density	Not available.
Relative density	0.75
Solubility(ies)	
Solubility (water)	Nil
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	750 °F (398.89 °C)
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Percent volatile	100

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Avoid heat, sparks, open flames and other ignition sources. Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents.

Hazardous decomposition products No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation May cause drowsiness and dizziness. Headache. Nausea, vomiting.
Skin contact Causes skin irritation.
Eye contact Direct contact with eyes may cause temporary irritation.
Ingestion Droplets of the product aspirated into the lungs through ingestion or vomiting may cause a serious chemical pneumonia.

Symptoms related to the physical, chemical and toxicological characteristics May cause drowsiness and dizziness. Headache. Nausea, vomiting. Aspiration may cause pulmonary edema and pneumonitis. Skin irritation. May cause redness and pain.

Information on toxicological effects

Acute toxicity May be fatal if swallowed and enters airways. Narcotic effects.

Toxicological data

Constituents	Species	Test Results
Xylene (CAS 1330-20-7)		
Acute		
<i>Dermal</i>		
LD50	Rabbit	12126 mg/kg, 24 Hours
<i>Inhalation</i>		
LC50	Rat	6350 ppm, 4 Hours
<i>Oral</i>		
LD50	Rat	3523 mg/kg
Benzene (CAS 71-43-2)		
Acute		
<i>Oral</i>		
LD50	Rat	930 mg/kg
Toluene (CAS 108-88-3)		
Acute		
<i>Dermal</i>		
LD50	Rabbit	14.1 ml/kg
<i>Inhalation</i>		
LC50	Rat	49000 mg/m ³ , 4 Hours
<i>Oral</i>		
LD50	Rat	636 mg/kg

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Direct contact with eyes may cause temporary irritation.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity May cause genetic defects.

Carcinogenicity May cause cancer.

IARC Monographs. Overall Evaluation of Carcinogenicity

Benzene (CAS 71-43-2) 1 Carcinogenic to humans.
Toluene (CAS 108-88-3) 3 Not classifiable as to carcinogenicity to humans.
Xylene (CAS 1330-20-7) 3 Not classifiable as to carcinogenicity to humans.

NTP Report on Carcinogens

Benzene (CAS 71-43-2) Known To Be Human Carcinogen.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Benzene (CAS 71-43-2) Cancer

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	May cause drowsiness and dizziness.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	May be fatal if swallowed and enters airways.

12. Ecological information

Ecotoxicity Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Constituents	Species	Test Results
Toluene (CAS 108-88-3)		
Aquatic		
Crustacea	EC50 Water flea (Daphnia magna)	5.46 - 9.83 mg/l, 48 hours
Fish	LC50 Pink salmon (Oncorhynchus gorbuscha)	6.86 - 8.48 mg/l, 96 hours

Persistence and degradability	No data is available on the degradability of this product.
Bioaccumulative potential	Not available.
Mobility in soil	Expected to be slightly to moderately mobile in soil.
Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

US RCRA Hazardous Waste U List: Reference

Benzene (CAS 71-43-2)	U019
Toluene (CAS 108-88-3)	U220
Xylene (CAS 1330-20-7)	U239

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN number	UN1268
UN proper shipping name	Petroleum products, n.o.s. (naphtha, benzene)
Transport hazard class(es)	
Class	3
Subsidiary risk	-
Label(s)	3
Packing group	II
Environmental hazards	
Marine pollutant	Yes
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	144, IB2, T7, TP1, TP8, TP28
Packaging exceptions	150
Packaging non bulk	202
Packaging bulk	242

IATA

UN number	UN1268
UN proper shipping name	Petroleum products, n.o.s. (naphtha, benzene)

Transport hazard class(es)

Class 3

Subsidiary risk -

Label(s) 3

Packing group II

Environmental hazards Yes

ERG Code 3H

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number UN1268

UN proper shipping name PETROLEUM PRODUCTS, N.O.S. (naphtha, benzene)

Transport hazard class(es)

Class 3

Subsidiary risk -

Label(s) 3

Packing group II

Environmental hazards

Marine pollutant Yes

EmS F-E, S-E

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not established.

General information IMDG Regulated Marine Pollutant.

15. Regulatory information**US federal regulations**

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Benzene (CAS 71-43-2)

Cancer
Central nervous system
Blood
Aspiration
Skin
Eye
respiratory tract irritation
Flammability**CERCLA Hazardous Substance List (40 CFR 302.4)**

Benzene (CAS 71-43-2)

LISTED

Toluene (CAS 108-88-3)

LISTED

Xylene (CAS 1330-20-7)

LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)**Hazard categories**Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - Yes
Pressure Hazard - No
Reactivity Hazard - No**SARA 302 Extremely hazardous substance**

Not listed.

SARA 311/312 Hazardous chemical

Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Benzene	71-43-2	0 - 20
Xylene	1330-20-7	0 - 10

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Toluene	108-88-3	0 - 20

Other federal regulations**Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List**

Benzene (CAS 71-43-2)
Toluene (CAS 108-88-3)
Xylene (CAS 1330-20-7)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.**Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number**

Toluene (CAS 108-88-3) 6594

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))

Toluene (CAS 108-88-3) 35 %WV

DEA Exempt Chemical Mixtures Code Number

Toluene (CAS 108-88-3) 594

US state regulations**US. Massachusetts RTK - Substance List**

Benzene (CAS 71-43-2)
Toluene (CAS 108-88-3)
Xylene (CAS 1330-20-7)

US. New Jersey Worker and Community Right-to-Know Act

Benzene (CAS 71-43-2)
Toluene (CAS 108-88-3)
Xylene (CAS 1330-20-7)

US. Pennsylvania Worker and Community Right-to-Know Law

Benzene (CAS 71-43-2)
Toluene (CAS 108-88-3)
Xylene (CAS 1330-20-7)

US. Rhode Island RTK

Benzene (CAS 71-43-2)
Toluene (CAS 108-88-3)
Xylene (CAS 1330-20-7)

US. California Proposition 65

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Benzene (CAS 71-43-2)
Toluene (CAS 108-88-3)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	No

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date	09-June-2015
Revision date	-
Version #	01
HMIS® ratings	Health: 2* Flammability: 3 Physical hazard: 0

NFPA ratings



Disclaimer

Philadelphia Energy Solutions cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

Appendix B PNDI Search Results



1. PROJECT INFORMATION

Project Name: **Former Philadelphia Refinery UDEX**

Date of Review: **4/18/2025 05:56:18 PM**

Project Category: **Hazardous Waste Clean-up, Site Remediation, and Reclamation, Spill (e.g., oil, chemical)**

Project Area: **25.92 acres**

County(s): **Philadelphia**

Township/Municipality(s): **Philadelphia City**

ZIP Code:

Quadrangle Name(s): **PHILADELPHIA**

Watersheds HUC 8: **Schuylkill**

Watersheds HUC 12: **City of Philadelphia-Schuylkill River**

Decimal Degrees: **39.910127, -75.204374**

Degrees Minutes Seconds: **39° 54' 36.4584" N, 75° 12' 15.7461" W**

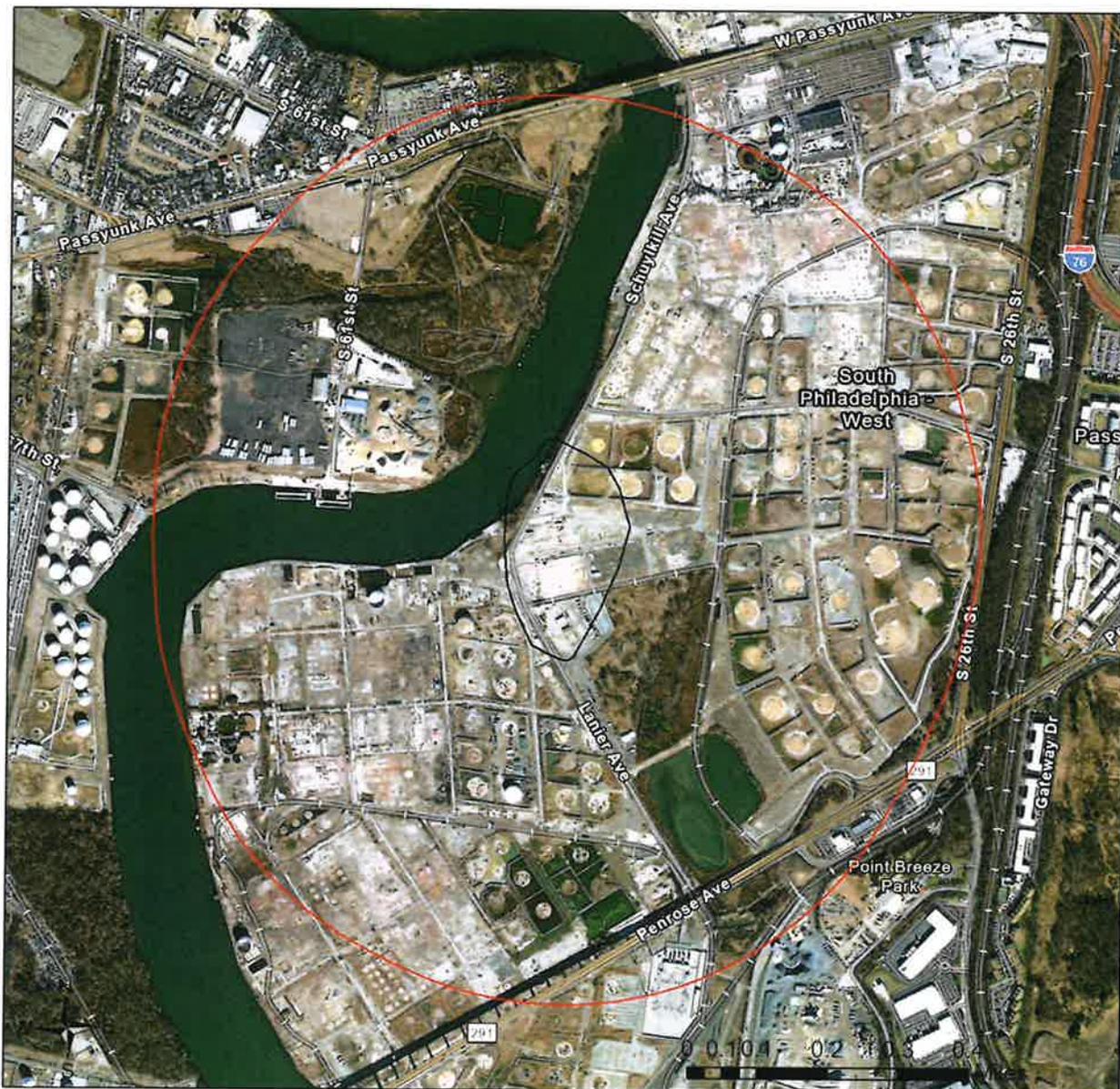
This is a draft receipt for information only. It has not been submitted to jurisdictional agencies for review.

2. SEARCH RESULTS

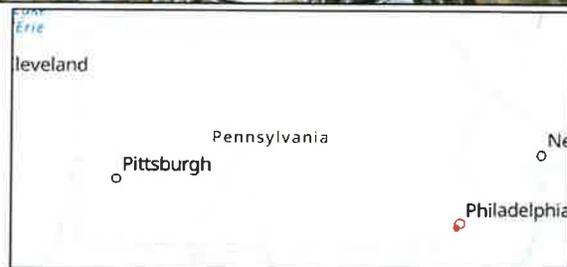
Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	No Known Impact	No Further Review Required
PA Fish and Boat Commission	Potential Impact	FURTHER REVIEW IS REQUIRED, See Agency Response
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

Former Philadelphia Refinery UDEX

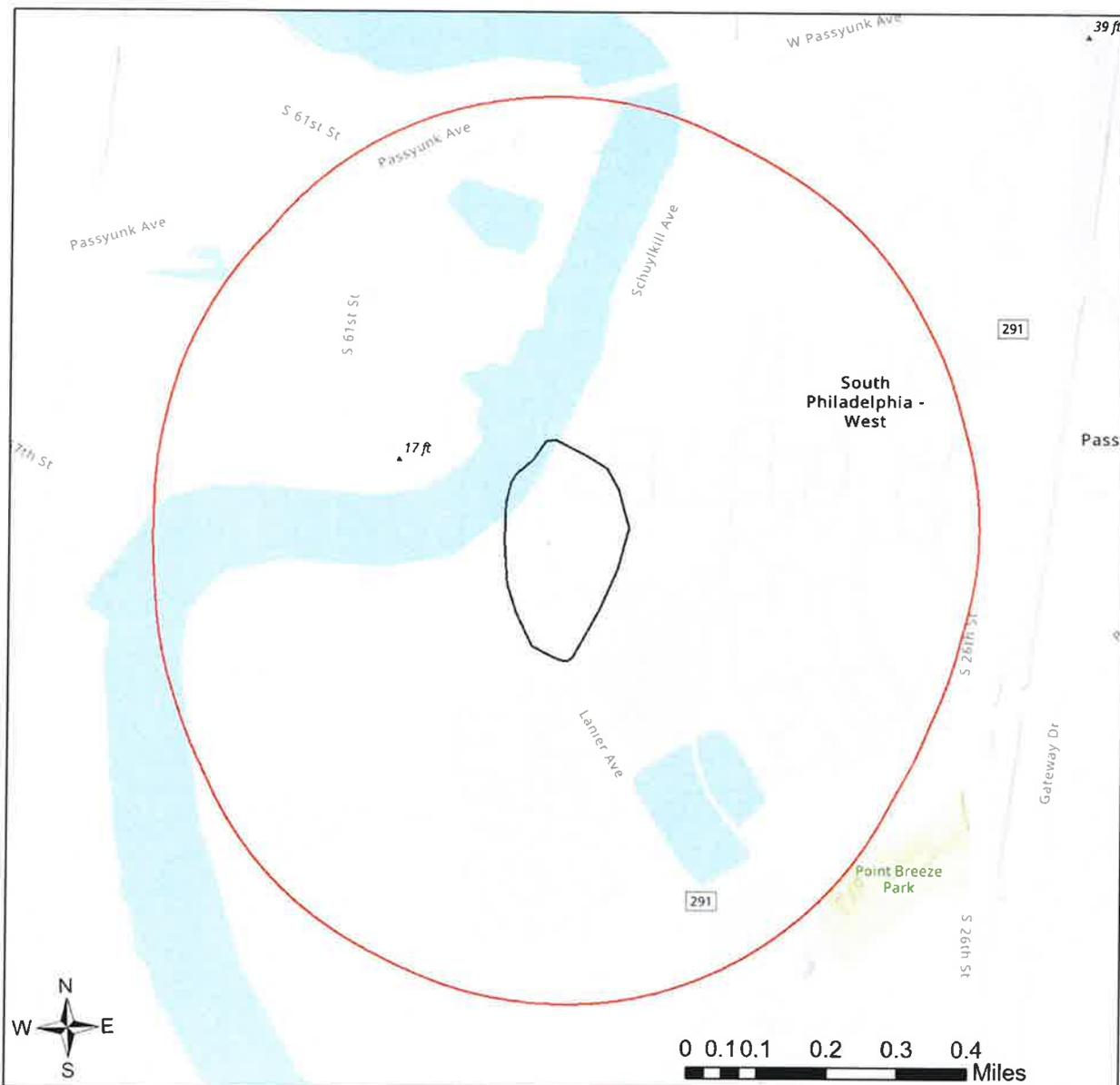


-  Buffered Project Boundary
-  Project Boundary

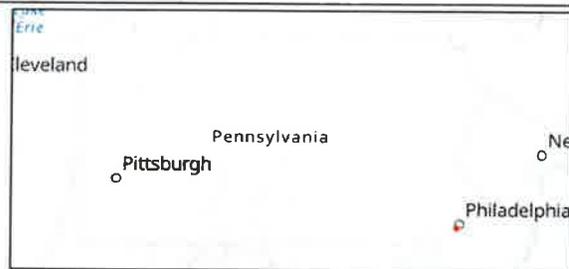


Source: Esri, Maxar, Earthstar Geographics and the GIS User Community
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors and the GIS User Community

Former Philadelphia Refinery UDEX



- Buffered Project Boundary
- Project Boundary



Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community
Sources: Esri, Maxar, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA,

RESPONSE TO QUESTION(S) ASKED

Q1: Aquatic habitat (stream, river, lake, pond, etc.) is located on or adjacent to the subject property and project activities (including discharge) may occur within 300 feet of these habitats?

Your answer is: Yes

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jurisdictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission

RESPONSE:

No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Department of Conservation and Natural Resources

RESPONSE:

No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Fish and Boat Commission

RESPONSE:

Further review of this project is necessary to resolve the potential impact(s). Please send project information to this agency for review (see WHAT TO SEND).

PFBC Species: (Note: The Pennsylvania Conservation Explorer tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)

Scientific Name	Common Name	Current Status
Sensitive Species**		Endangered
Sensitive Species**		Endangered
Sensitive Species**		Threatened

U.S. Fish and Wildlife Service

RESPONSE:

No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq. is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.

** Sensitive Species - Species identified by the jurisdictional agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, upload* or email the following information to the agency(s) (see AGENCY CONTACT INFORMATION). Instructions for uploading project materials can be found [here](#). This option provides the applicant with the convenience of sending project materials to a single location accessible to all three state agencies (but not USFWS).

*If information was requested by USFWS, applicants must email, or mail, project information to IR1_ESPenn@fws.gov to initiate a review. USFWS will not accept uploaded project materials.

Check-list of Minimum Materials to be submitted:

___ Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.

___ A map with the project boundary and/or a basic site plan (particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)

In addition to the materials listed above, USFWS REQUIRES the following

___ **SIGNED** copy of a Final Project Environmental Review Receipt

The inclusion of the following information may expedite the review process.

___ Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)

___ Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams.

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. Two review options are available to permit applicants for handling PNDI coordination in conjunction with DEP's permit review process involving either T&E Species or species of special concern. Under sequential review, the permit applicant performs a PNDI screening and completes all coordination with the appropriate jurisdictional agencies prior to submitting the permit application. The applicant will include with its application, both a PNDI receipt and/or a clearance letter from the jurisdictional agency if the PNDI Receipt shows a Potential Impact to a species or the applicant chooses to obtain letters directly from the jurisdictional agencies. Under concurrent review, DEP, where feasible, will allow technical review of the permit to occur concurrently with the T&E species consultation with the jurisdictional agency. The applicant must still supply a copy of the PNDI Receipt with its permit application. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. The applicant and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at <https://conservationexplorer.dcnr.pa.gov/content/resources>.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a preliminary screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

DRAFT
NOT FOR ACTUAL USE



pennsylvania
FISH AND BOAT COMMISSION

June 27, 2025

IN REPLY REFER TO

SIR# 61661

Stantec
Shravani Kalita
1060 Andrew Drive
West Chester, Pennsylvania 19380

**RE: Species Impact Review (SIR) – Rare, Candidate, Threatened and Endangered Species
PNDI Search No. 839173_1
Former Philadelphia Refinery UDEX
Philadelphia City: PHILADELPHIA County**

Dear Shravani Kalita:

This responds to your inquiry about a Pennsylvania Natural Diversity Inventory (PNDI) Internet Database search “potential conflict” or a threatened and endangered species impact review. These projects are screened for potential conflicts with rare, candidate, threatened or endangered species under Pennsylvania Fish and Boat Commission jurisdiction (fish, reptiles, amphibians, aquatic invertebrates only) using the Pennsylvania Natural Diversity Inventory (PNDI) database and our own files. These species of special concern are listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, and the Pennsylvania Fish and Boat Code (Chapter 75), or the Wildlife Code.

Based on records maintained in the Pennsylvania Natural Diversity Inventory (PNDI) database and our own files, the following rare or protected species are known from the vicinity of the project site:

Common Name (Scientific Name, PA Status)

Atlantic Sturgeon (*Acipenser oxyrinchus*, Endangered)

Shortnose Sturgeon (*Acipenser brevirostrum*, Endangered)

Northern Red-bellied Cooter (*Pseudemys rubriventris*, Threatened)

This response represents the most up-to-date summary of the PNDI data and our files and is valid for two (2) years from the date of this letter. An absence of recorded species information does not necessarily imply species absence. Our data files and the PNDI system are continuously being updated with species occurrence information. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered, and consultation shall be re-initiated.

SIR # 61661
June 27, 2025
Page 2

If you have any questions regarding this review, please contact Kathy Gipe at 814-359-5186 or c-kgipe@pa.gov and refer to the SIR # 61661. Thank you for your cooperation and attention to this important matter of species conservation and habitat protection.

Sincerely,

A handwritten signature in black ink that reads "Christopher A. Urban". The signature is written in a cursive style with a large, prominent initial "C".

Christopher A. Urban, Chief
Natural Diversity Section

CAU/KDG/dn

Appendix C Reptile Toxicity Assessment



Reptile Toxicity Assessment

Establishing an understanding of the relationship between exposure to a constituent and the nature and degree of possible adverse effects is the major tenet of toxicology. The dose received by an organism determines the magnitude of any adverse effects and is related to the constituent's inherent toxicity (i.e., "the dose makes the poison"). Although there are reports of adverse effects on reptiles after exposure to contamination, there are currently insufficient data linking exposure levels to adverse effects. A review of the available scientific literature related to reptile toxicity determined that "...established toxicity reference values do not exist for reptiles. The independent development of such values is hindered by the paucity of relevant data currently available. Ecological risks cannot be predicted in a screening assessment without toxicity reference values" (Meyers-Schöne, L., 2000).

More recent research conducted by Camacho, et al., 2014 ; Camacho, et al., 2012; Casini, et al., 2018; and Ozdilek and Ozdilek, 2007; Zychowski and Godard-Codding, 2017, among others, indicates the recognition of the need for further research regarding the toxicity of various chemicals to reptiles, but does not provide the necessary data to conduct quantitative risk assessment of reptiles.

Very few studies have been conducted on the responses of reptiles to PAH exposure, which is confirmed by several review articles (Meador, J.P., 2008). A representative sampling of the literature related to reptilian toxicity is provided below.

The Reptile and Amphibian Toxicology Literature (RATL) database (Pauli, et al., 2000), established by the Canadian Wildlife Service, provides an extensive list of references for research carried out related to reptilian toxicity; however, the database presented in this report does not present any dose-response information linking quantitative reptile exposures/doses to measured adverse effects.

Van Meter, et al. (2006) determined that crude oil was found to penetrate snapping turtle egg shells, and exposure to crude oil, benzo(a)pyrene and DMBA had a detrimental effect on survival and development of snapping turtle embryos; however, there was considerable variation in the response of embryos among clean sites and between clean and contaminated sites (Van Meter, et al., 2006), which confounded the results. Crude oil is a complex mixture of chemicals and individual chemical composition of the crude oil was not determined in this study. As such, no chemical-specific dose-response relationships were established.

Reproductive deficits were observed in a study by Kitana, et al. (2007) in Cape Cod, Massachusetts which corroborates previous observations at the same site that suggest low-level exposure to a xenobiotic mixture from an impacted site or other source in the area may disrupt the reproductive health of the turtle population. However, the chemical environment of the impacted site is unknown since chemical characterization of the pond was not performed. Several reports suggest the presence of low-level mixtures of organic and inorganic xenobiotics at the site (Kitana, et al., 2007) based on observed contamination at an adjacent site and likely transport pathways. However, the identification and levels of contaminants, if any, in the pond are unknown. Therefore, the causative agent(s) related to the observed reproductive deficits could not be identified and, as such, no dose-response relationship could be determined.

In a study by Bell, et al. (2006) at the John Heinz National Wildlife Refuge (JHNWR), mean annual deformity rate of pooled painted turtle clutches over four years ranged from 45 to 71%, while that of snapping turtle clutches ranged from 13 to 19%. Lethal deformities were more common than minor or moderate deformities in embryos of both species. Adult painted turtles had a higher deformity rate than

Reptile Toxicity Assessment

adult snapping turtles. Snapping turtles at JHNWR had high levels of PAH contamination in their fat, but PAH concentrations in painted turtle fat were not reported. According to the authors, the high level of PAHs detected in snapping turtle fat suggests that PAHs are involved in the high level of deformities. However, the authors also suggest that other contaminants may also play a role (Bell, et al., 2006). Since PAH concentrations in painted turtle fat were not reported, the data reported in this study do not support a correlation between PAH concentrations in fat and frequency of deformities. The author's suggestion that the high level of PAHs detected in snapping turtle fat are involved in the high level of deformities is not supported by the data. Although certain chemicals have been shown to bioaccumulate in reptilian tissues, bioaccumulation does not necessarily equate to toxicity. Multiple contaminants from multiple sources are present in surface water and sediment at the JHNWR. No correlation was drawn between environmental media concentration of any specific contaminant and observed deformities.

These studies illustrate the type of studies that have been conducted with reptiles and a variety of contaminants including petroleum-related contaminants, and the data that have been collected to date. They illustrate that exposure to contaminants at unknown concentrations have the potential to bioaccumulate in reptilian tissues and that exposures to complex mixtures of chemicals at unknown concentrations may pose adverse effects. However, the data do not support any dose-response relationship with respect to exposure levels or doses and concomitant effects. As such, surface water or sediment screening values protective of reptiles have not been developed and toxicity reference values (TRV) for reptiles are not available. In order to quantitatively assess risks to reptiles, media screening values protective of reptiles and/or TRVs based on reptilian toxicity are necessary.

In studies where adverse effects in reptiles have been observed, the causative agents have not been identified or quantified. The inherent uncertainty in any quantitative assessment of reptiles (e.g., turtles) using the limited reptilian toxicity data that may be available is so great that it would render any decisions based on those assessments completely unreliable.

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Reptile Toxicity Assessment

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Appendix D Pre-Existing Conditions Acknowledgement – UDEX Release Area





Evergreen Resources Management
2 Righter Parkway, Suite 120
Wilmington, DE 19803

January 30, 2026

Matthew Sabetta, PG
Pennsylvania Department of Environmental Protection
Southeast Regional Office
2 East Main Street
Norristown, PA 19401

**Subject: Pre-Existing conditions acknowledgment - UDEX Release Area
Point Breeze South Yard – Former PES Refinery
3144 West Passyunk Avenue
City of Philadelphia, Philadelphia County**

Dear Matt:

This letter is to acknowledge that Evergreen Resources Management Operations (Evergreen) has reviewed Stantec Consulting Services Inc.'s (Stantec) Remedial Investigation (RI), Human Health Risk Assessment (HHRA), and Screening Level Ecological Risk Assessment (SLERA) reports for the UDEX Release, completed on behalf of Bellwether District Holdings, LLC (BDH). In accordance with the 2012 Consent Order & Agreement (CO&A) and the 2020 CO&A Amendment, Evergreen is responsible for addressing Pre-Existing Contamination at the facility, and BDH is responsible for addressing Post-September 2012 Contamination. Pre-Existing Contamination is the result of historic petroleum releases that occurred at the facility during the period of Evergreen responsibility and were previously characterized by Evergreen through approved Act 2 reporting.

Evergreen acknowledges Pre-Existing Contamination was identified and characterized in the area of the UDEX release as reported in Evergreen's past Act 2 Area of Interest 3 (AOI 3) and Sitewide Fate & Transport Remedial Investigation Reports (RIRs). The Pre-Existing Contamination is managed via pathway elimination as documented in the Human Health Risk Assessments and Cleanup Plan. Evergreen will continue to manage sitewide Pre-Existing Contamination through the One Cleanup Program under Facility ID No. 780190. Please contact me if you have any questions or concerns regarding this letter.

Regards,

Evergreen Resources Management Operations

Tiffani L. Doerr, PG

cc: Julianna Connolly (HRP Group)
Joe Jeray (HRP Group)

Appendix E Report Notices



The Philadelphia Inquirer

100 S. INDEPENDENCE MALL W, STE 600, PHILADELPHIA, PA 19106

Affidavit of Publication

On Behalf of:
STANTEC
1060 Andrew Drive
WEST CHESTER, PA 19380

STATE OF PENNSYLVANIA COUNTY OF PHILADELPHIA:

Before the undersigned authority personally appeared the undersigned who, on oath represented a and say: that I am an employee of The Philadelphia Inquirer, LLC, and am authorized to make this affidavit of publication, and being duly sworn, I depose and say:

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3. The printed notice or publication attached hereto set forth on attached hereto was published in all regular print editions of the Philadelphia Daily News on

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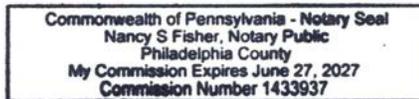
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Bellwether District – UDEX Release Risk Assessment Reports

Pursuant to the Land Recycling and Environmental Remediation Standards Act, the act of May 19, 1995, P.L. 4, No. 1995-2., notice is hereby given that Bellwether District Holdings, LLC (BDH) is submitting Human Health Risk Assessment and Screening Level Ecological Risk Assessment Reports to the Pennsylvania Department of Environmental Protection (PADEP) Southeast Regional Office for the UDEX release site at the former Philadelphia Energy Solutions Refinery located at 3144 West Passyunk Avenue, Philadelphia, Philadelphia County, Pennsylvania on February 11, 2026. The reports are being submitted in accordance with site-specific remediation standards.



Stantec Consulting Services Inc.
1060 Andrew Drive, Suite 140
West Chester PA 19380-5602

February 9, 2026

Leigh Anne Rainford, MPH
Philadelphia Department of Public Health
Environmental Health Services
321 University Avenue - 2nd Floor
Philadelphia, PA 19104

Dear Ms. Rainford,

**Reference: Submission of Risk Assessment Reports
UDEX Release Area – Point Breeze South Yard
Former PES Refinery
3144 West Passyunk Avenue
Philadelphia, PA 19153**

This letter is to provide notice to the City of Philadelphia that Bellwether District Holdings, LLC (BDH) is submitting Human Health Risk Assessment (HHRA) and Screening Level Ecological Risk Assessment (SLERA) reports to the Pennsylvania Department of Environmental Protection (PADEP) Southeast Regional Office on February 11, 2026, for the UDEX Release located in the Point Breeze South Yard area of the former Philadelphia Energy Solutions Refinery at 3144 West Passyunk Avenue in Philadelphia, Pennsylvania (Site). The HHRA and SLERA provide information for the Site under Pennsylvania's Land Recycling and Environmental Remediation Standards Act, the Act of May 19, 1995, P.L. #4, No. 2 (Act 2) in accordance with the site-specific remediation standards.

Please call me at (610) 850-1420 if you have any questions concerning the report submissions.

Sincerely,

Stantec Consulting Services Inc.

Andrew Klingbeil PG
Associate Geologist
Phone: (610) 840-2525
Mobile: (610) 850-1420
andrew.klingbeil@stantec.com

cc: C. David Brown, PADEP (via email)
Joseph Jeray, HRP Group (via email)

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MS. Leigh Ane Rainford, Dept. of Public Health
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June 4, 2025

Leigh Anne Rainford, MPH
Philadelphia Department of Public Health
Environmental Health Services
321 University Avenue - 2nd Floor
Philadelphia, PA 19104

Dear Ms. Rainford,

**Reference: Revised Notice of Intent to Remediate
UDEX Release Area – Point Breeze South Yard
Former PES Refinery
3144 West Passyunk Avenue
Philadelphia, PA 19153**

The Land Recycling and Environmental Remediation Standards Act (Act 2) requires that a Notice of Intent to Remediate (NIR) a site be provided to the municipality in which the site is located. On behalf of Bellwether District Holdings, LLC (BDH), this notification is to inform the City of Philadelphia of the submission of a revision to the previously submitted NIR for this project. The purpose of the revised NIR is to change the selected remediation standard from the Statewide Health Standard to the Site-Specific Standard for the UDEX Release area. A copy of the revised NIR (enclosed) will be sent to the Pennsylvania Department of Environmental Protection (PADEP) and published in the Pennsylvania Bulletin.

Please call me at (610) 850-1420 if you have any questions concerning the proposed remediation.

Sincerely,

Stantec Consulting Services Inc.

Andrew Klingbeil PG
Associate Geologist
Phone: (610) 840-2525
Mobile: (610) 850-1420
andrew.klingbeil@stantec.com

cc: C. David Brown, PADEP
Joseph Jeray, HRP Group

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