



pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION

SOUTHEAST REGIONAL OFFICE

MEMO

TO Sachin Shankar, P.E. *SS*
Assistant Regional Director

FROM C. David Brown, P.G. *CDB*
Licensed Professional Geologist

THROUGH *WP*
Walter Payne, P.G.
Professional Geologist Manager

DATE November 8, 2016

RE ECB: Land Recycling Program
Act 2 Technical Memo Summary
Philadelphia Refinery AOI 10
Risk Assessment Report
eFACTS PF No. 720775
3144 Passyunk Avenue
City of Philadelphia
Philadelphia County

Property Owner Name and Site Address:

Owner	Remediator	Site
Philadelphia Energy Solutions 3144 W. Passyunk Ave. Philadelphia, PA 19145	Evergreen Resources Management Operations 2 Righter Parkway, Suite 200 Wilmington, DE 19803	3144 Passyunk Ave. Philadelphia, PA 19145

Coordinates: 39.9165°N, 75.2063°W

Act 2 Standard(s) Sought:
Soil and groundwater—nonresidential site-specific standard

Property Size: 80 acres

Project Site History:

Petroleum refining began at the site circa 1870. The facility consisted of two refineries, Point Breeze operated by Atlantic Petroleum Corporation (formerly ARCO) and Girard Point by Chevron (formerly Gulf). Sunoco purchased these two refineries in 1988 and 1994 and consolidated them into a single facility. In 2012 Sunoco sold the refinery to the Carlyle Group and entered a joint venture to operate it as Philadelphia Energy Solutions (PES). Sunoco, Inc. is now a subsidiary of Energy Transfer Partners, L.P. Evergreen Resources Management Operations is a Sunoco subsidiary responsible for its legacy environmental liabilities.

The refinery can process up to 330,000 barrels a day of crude oil. It produces gasoline, diesel, jet fuel, kerosene, home heating oil, and other petroleum liquids. The facility includes multiple process units, above-ground storage tanks, pipelines, as well as truck, railcar, and barge transfer equipment.

Area of Interest 10 of the Philadelphia Refinery complex (AOI 1) is known as the Point Breeze West Yard. Most of the area is now open space, but historical operations have included petroleum storage in above-ground tanks, pump stations, fuel docks, and waste disposal. Presently a pipeline crosses AOI 10 and there is a manifold area. Waste disposed in four areas in the 1950s and 1960s consisted of leaded tank bottom and separator sludges, spent catalyst, acid and caustic wastes, and paraffin, in addition to miscellaneous debris and rubble. Clay caps were installed over these areas in the 1980s. In March 2010 about 63,000 gal of vacuum gas oil was released to the surface from a manifold.

AOI 10 is bordered by Passyunk Avenue to the north, nonresidential properties to the west and south, and the Schuylkill River to the east. A small surface water body, Lands Creek, is present in the south of the West Yard. DEP approved the remedial investigation report for AOI 10 in January 2012. This memo concerns an ecological risk assessment for sediment in Lands Creek.

Site Findings:

Unconsolidated materials at AOI 10, from surface to bedrock, consist of fill, alluvium (sand, silt, and clay), and the Trenton Gravel (sand and gravel). The depth to Wissahickon Formation bedrock is ~30–80'. Shallow groundwater depths range from ~1' to 13', generally within the fill and alluvium.

In 2011 Sunoco collected shallow (0–2') soil samples at 55 locations (including 10 from the caps over the waste areas). An additional 12 waste samples were obtained and 11 soil samples were collected from beneath the waste. The samples were analyzed for DEP's combined petroleum short list; samples collected at and near the waste disposal areas were analyzed for an extended list of VOCs, SVOCs, and metals.

There were some exceedences of soil-to-groundwater MSCs, including minor exceedences of benzene and PCE in surface soil. Certain SVOCs and metals exceeded nonresidential direct contact MSCs in shallow soil. Benzo(a)pyrene exceeded in three locations (maximum 120 mg/kg). Lead exceeded in three locations (maximum 4550 mg/kg). Vanadium exceeded the current standard in two locations (maximum 259 mg/kg). Dibenzo(a,h)pyrene exceeded at one point (73 mg/kg). There were multiple exceedences of samples from the waste, which is not an environmental medium governed by Act 2.

(I reviewed the shallow soil data for ethylbenzene, naphthalene, and chrysene exceedences. These substances have significantly lower direct contact MSCs in the August 27, 2016 Ch. 250 revisions. There were no new exceedences for these three substances.)

Sunoco installed 30 shallow and six intermediate-depth monitoring wells in AOI 10. These wells were gauged and sampled in 2011. Shallow groundwater was inferred to flow towards the Schuylkill River (east) and south, with a downward vertical gradient. Groundwater in the Trenton Gravel aquifer was inferred to flow toward the southwest. Three shallow wells, all near the waste disposal areas, contained LNAPL. The LNAPL was characterized as residual oil and middle distillate petroleum, with a maximum in-well thickness of 0.6'.

Groundwater samples were analyzed for DEP's combined petroleum short list. Exceedences of benzene (maximum 250 µg/L) and chrysene (maximum 20 µg/L) were found in multiple shallow wells. Naphthalene exceeded in one well (330 µg/L), and a slight exceedence of lead occurred in a single well. There were no exceedences in samples from the intermediate wells.

A fate-and-transport model indicated that benzene could migrate to Lands Creek, but at a concentration less than the Ch. 93 standard. There are no occupied buildings within AOI 10; therefore, vapor intrusion is not a concern.

In 2011 Sunoco collected surface water samples from five locations in Lands Creek. They were analyzed for DEP's combined petroleum short list and an extended suite of metals. There were no exceedences of Ch. 93 fish and aquatic life criteria. There is no human exposure to water in the creek, and it does not flow at the surface into the river.

Sunoco also obtained sediment samples at five locations in Lands Creek in 2011 and 2015. These samples were analyzed for VOCs on DEP's petroleum short list, an extended suite of SVOCs and metals, acid volatile sulfides and simultaneously extracted metals (AVS/SEM), as well as total organic carbon. Ecological screening indicated exceedences of several SVOCs and metals. A PNDI review identified the threatened eastern redbelly turtle and two threatened plant species as potential concerns.

GHD biologists surveyed the site. They concluded that the eastern redbelly turtle is likely present at Lands Creek. The threatened plant species of concern were not observed, and the area does not provide suitable habitat for them.

GHD re-screened total polycyclic aromatic hydrocarbons (SVOCs) using carbon-normalized screening levels. TOC in the sediments is relatively high, ~10%. On this basis, PAHs screened out and were not evaluated further.

GHD utilized the AVS/SEM analyses to determine the net molar balance of divalent metals bound to sulfides. The excess, unbound metal molar concentrations were normalized to organic carbon. This quantity was screened against a value of 130 µmol per gram organic carbon, which is a threshold below which the metals are not considered toxic to benthic invertebrates. There were no exceedences of this threshold. Hexavalent chromium was nondetect in the sediments.

Arsenic exceeded screening, but was viewed as naturally occurring and was found not to exceed the surface water criterion.

Site Cleanup History:

NIR Received Date November 17, 2014

RIR Approved Date January 6, 2012

RAR Received Date August 19, 2016

An initial NIR was submitted October 16, 2006; it was revised with updated information on November 17, 2014. The facility entered into a consent order and agreement with DEP's Clean Water Program in December 1993; the agreement was succeeded by another in December 2003 which terminated in December 2013. The facility is currently subject to a DEP buyer-seller agreement which became effective September 8, 2012. A remedial investigation report was submitted for AOI 10 on August 10, 2011 with an addendum dated November 8, 2011; the RIR was approved by DEP. The refinery site entered into the One Cleanup Program with DEP and EPA on November 8, 2011.

On May 6, 2015 DEP approved a nonresidential site-specific numerical standard of 2240 mg/kg for lead in soil at the Philadelphia Refinery. This standard was developed in a risk assessment report received February 26, 2015.

Discussion of Cleanup Involved and Demonstration of Attainment:

The VGO released in 2010 was recovered by vacuum trucks. An unknown amount of soil was removed from the area. In 2011 ten soil samples were collected from the margins of the excavation. There were no exceedences of substances in DEP's combined petroleum short list.

The ecological risk assessment concluded that PAHs and metals in sediment do not pose an excess risk to the one species of concern present in Lands Creek, the eastern redbelly turtle. Contaminants have limited biological availability because of the relatively high organic carbon content of the sediment. Divalent metals were determined not to bio-accumulate in the food chain.

LNAPL occurs in a relatively small, delineated area. Sunoco concluded that the LNAPL is stable and does not pose a risk of migration to surface water.

Evergreen will prepare a cleanup plan to address the direct contact exceedences of benzo(a)pyrene and lead in soil. Additional remediation and/or a human health risk assessment may be required. Soil-to-groundwater exceedences will be addressed through groundwater attainment with a site-specific standard. Evergreen intends to attain a site-specific standard for groundwater by means of pathway elimination. An environmental covenant will be required.

DEP Final Action Approval/Disapproval Letter:

I recommend approving the ecological risk assessment report for AOI 10. Evergreen properly evaluated the habitat for species of concern and screened contaminants of concern. Ecological risks appear to be acceptable, and no further evaluation of ecological receptors is needed.

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