



pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION

SOUTHEAST REGIONAL OFFICE

MEMO

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

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

THROUGH Susan M. Kennedy, P.G.
Professional Geologist Manager *SMK*

DATE June 9, 2017

RE ECB: Land Recycling Program
Act 2 Technical Memo Summary
Philadelphia Refinery AOI 3
Remedial Investigation Report
eFACTS PF No. 778377
3144 West Passyunk Avenue
City of Philadelphia
Philadelphia County

Property Owner Name and Site Address:

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

Coordinates: 39.9078°N, 75.2020°W

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

Property Size: 107 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. Adjacent to the refinery is the Belmont Terminal which is owned and operated by Sunoco Logistics Partners L.P.

Area of Interest 3 of the Philadelphia Refinery complex (AOI 3) is also known as the Point Breeze Impoundment Area. It includes the No. 5 Tank Farm and storm water retention basins. It is located in the southwest section of the Point Breeze South Yard. It is bordered by AOI 2 to the north, AOI 4 to the east, Penrose Avenue (Route 291) to the south, AOI 6 to the southwest, AOI 7 to the west, and the Schuylkill River to the northwest. No sheet pile wall is present along this section of the river bank. Historically there were six aboveground storage tanks in the No. 5 Tank Farm.

Petroleum contamination exists in AOI 3 from historical operations, including releases from above ground storage tanks and pipelines. Evergreen (Sunoco) is participating in the Act 2 program to address contamination predating the transfer of the property to PES on September 8, 2012. Corrective action responsibilities under the Storage Tank and Spill Prevention Act are being addressed simultaneously. There are two open tank incidents associated with two regulated storage tanks in AOI 3 (51-19781). A site characterization report for these tanks was received on March 28, 2017 and is under review.

Site Findings:

Unconsolidated materials at AOI 3, with increasing depth, consist of fill, alluvium (sand, silt, and clay), the Trenton Gravel (sand and gravel), and the Potomac-Raritan-Magothy (PRM) formations (sand and clay units). The Wissahickon Formation bedrock is around 70–90' deep. Shallow groundwater depths range from ~3' to ~15'.

In 2010–2016 approximately 100 soil samples were collected in AOI 3. Previously sampling was performed in 1988–1990 in the area known as the former ballfields and in 2006–2007 at two ASTs. Samples were obtained for general characterization, in monitoring well borings, at regulated storage tanks with reported incidents, and to delineate previously identified exceedences. Samples were typically analyzed for 10 VOCs, 10 SVOCs, and lead.

Soil results showed exceedences of soil-to-groundwater MSCs for benzene and lead; there were also minor exceedences of ethylbenzene and 1,2,4-trimethylbenzene. Direct contact MSC exceedences were identified for lead east of Tank 833 (maximum 3100 mg/kg) and at one location in the southeast (5500 mg/kg).

Over 70 monitoring wells are present in AOI 3. Six wells are screened in the PRM Lower Sand aquifer (~60–85' depths). The shallow wells are ~10–30' deep, and they are screened in the fill, alluvium, Trenton Gravel, and/or PRM Upper Sand. Wells were gauged several times and sampled up to five times in 2010–2016. Samples were analyzed for 10 VOCs, 10 SVOCs, and lead.

Langan designated an area of perched groundwater which primarily flows from thick fill on the eastern side of AOI 3 radially outward toward the west. Groundwater flow in the shallow unconfined aquifer is inferred from the north and south converging in the center of AOI 3. There the PRM Middle Clay unit is thin or absent, allowing shallow groundwater to recharge the lower aquifer. Groundwater flow is inferred toward the southwest in the lower aquifer. A LNAPL plume is present in the northeast across the AOI 4 boundary. There are other occurrences of LNAPL in isolated wells. LNAPL is characterized as light, middle, and heavy distillate with recent maximum thicknesses ~1'. Langan concluded that LNAPL plumes are stable and relatively immobile.

Several VOCs and SVOCs as well as lead exceed groundwater MSCs. Substances with spatially extensive and consistent exceedences include benzene, MTBE, toluene, 1,2,4-TMB, and lead. Benzene, MTBE, and lead also exceed in lower aquifer wells. Elevated benzene (> 10,000 µg/L) occurs in three wells in the northwest, near the river. No plumes are known to cross the southeast property boundary. Maximum concentrations of selected contaminants are listed below (2009–2016).

Substance	Shallow Aquifer Maximum (µg/L)	Lower Aquifer Maximum (µg/L)	MSC (µg/L)
Benzene	150,000	340	5
MTBE	120	160	20
Toluene	80,000		1000
1,2,4-TMB	330		62
Lead	20	14	5

Insufficient data is available to understand plume stability. Possibly increasing benzene and MTBE concentrations are indicated in the lower aquifer. Further groundwater monitoring will be performed, and a fate-and-transport analysis will be prepared for future submittal. No groundwater use exists at the refinery, and none has been identified in the vicinity of the facility.

A PNDI review was performed in August 2015. DCNR identified two plant species of concern. The Pennsylvania Fish and Boat Commission identified the eastern redbelly turtle and the Atlantic sturgeon as species of concern. AECOM performed an ecological evaluation that indicated the inland basins and wetland area were not probable habitats for the turtle.

Occupied structures in AOI 3 of potential concern for vapor intrusion include two warehouse buildings and a large number of contractor trailers. Indoor air samples were collected in 2016 at the warehouses and two trailers. None of the results exceeded occupational limits (such as OSHA PELs); benzene exceeded DEP's screening value. Outdoor air samples were also collected at four locations of potential exposure to vapors from subsurface sources. Those results did not exceed occupational limits.

Site Cleanup History:

NIR Received Date December 14, 2016

RIR Received Date March 22, 2017

An initial NIR was submitted October 16, 2006; it was revised with updated information on November 17, 2014 and December 14, 2016. 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 site characterization report was submitted for AOI 3 on September 27, 2010 under the Clean Water Program agreement. The site entered into the One Cleanup Program with DEP and EPA on November 8, 2011.

On May 6, 2015 DEP approved a 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:

Sunoco operated a total fluids recovery system for LNAPL and groundwater contamination at RW-2 in the northeast. The system startup date was not reported. LNAPL was recycled in the process, and groundwater was discharged to the process sewer and treated at the facility's WWTP. The system was shut down in 2009 because of a lack of recoverable LNAPL. Approximately 31,000 gal of LNAPL were recovered.

Evergreen intends to attain a site-specific standard with pathway elimination for soil and groundwater. Soil direct contact exceedences and potential LNAPL exposures will be addressed in a cleanup plan. Further vapor intrusion evaluation will be conducted. Groundwater contamination will be managed with a use restriction. An environmental covenant will be required. Institutional controls, such as OSHA workplace requirements, may be utilized for the inhalation pathway.

A fate-and-transport model will be developed for the entire refinery site and provided in a future report. This analysis will include a surface water assessment. Further ecological evaluation is required for two plant species, the eastern redbelly turtle, and the Atlantic sturgeon.

DEP Final Action Approval/Disapproval Letter:

I recommend approving the RIR. Soil and groundwater have been characterized and exceedences are adequately delineated in AOI 3. DEP will communicate several comments and concerns that require follow-up to Evergreen by e-mail.

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