pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
SOUTHEAST REGIONAL OFFICE

MEMO

TO Stephan Sinding
Regional Manager, Environmental Cleanup and Brownfields

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

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

DATE March 24, 2016

RE ECB: Land Recycling Program
Act 2 Technical Memo Summary
AOI 9—Schuylkill River Tank Farm
Remedial Investigation Report
eFACTS PF No. 778379
Mingo Avenue
City of Philadelphia
Philadelphia County

Property Owner Name and Site Address:

Owner	**Remediator**	**Site**
Philadelphia Energy Solutions	Evergreen Resources Management Operations	
3144 W. Passyunk Ave.	2 Righter Parkway, Suite 200	Mingo Avenue
Philadelphia, PA 19145	Wilmington, DE 19803	Philadelphia, PA 19153

Coordinates: 39.8997°N, 75.2216°W

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

Property Size: 211 acres

Project Site History:
Area of Interest 9 of the Philadelphia Refinery complex (AOI 9) consists of the Schuylkill River Tank Farm (SRTF). Petroleum refining began at the facility circa 1870. Tanks at the SRTF were constructed beginning circa 1952 and total around 37 vessels. The SRTF was formerly operated by Chevron (previously Gulf) as part of the Girard Point Refinery, and it was purchased by Sunoco in 1994. 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.

Petroleum contamination exists in AOI 9 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 will also be addressed through Act 2 reporting. There are presently seven open tank incidents associated with six regulated storage tanks in AOI 9 (51-11557).

Release Date	Incident ID	Sunoco Tank	DEP Tank	Material
2/14/1991	46760	SR-33	025A	No. 6 fuel oil
10/29/1994	46764	SR-59	041A	heavy platformate
5/30/2001	4407	SR-59	041A	gasoline
7/7/2003	31881	SR-90	055A	No. 6 fuel oil
1/21/2004	33031	SR-7	007A	gasoline
3/20/2012	43616	SR-16	011A	gasoline
4/18/2012	45951	SR-26	021A	gasoline

Site Findings:
Unconsolidated materials at the SRTF 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 depth to Wissahickon Formation bedrock is at least 80′. Shallow groundwater depths range from ~1′ to 12′.

In 2009 and 2015 162 soil borings were advanced in AOI 9, and a couple hundred soil samples were collected at various depths. Samples were obtained for general characterization, in monitoring well borings, at areas of concern identified in a 2009 Water Quality Program inspection, at tanks with known releases, in areas of other releases, at mapped locations of historic leaded tank bottoms and lead/oily sludge disposal, and to delineate previously identified exceedences. Samples were analyzed for 10 VOCs, 10 SVOCs, and lead.

Sample results showed numerous exceedences of soil-to-groundwater MSCs for VOCs. There were direct contact MSC exceedences for 1,2,4-trimethylbenzene at 3–4′ in two borings near the blending building (maximum 681 mg/kg). Benzo(a)pyrene exceeded the direct contact MSC in two locations at 1–2′ (maximum 73 mg/kg). Lead exceeded the site-specific standard of 2240 mg/kg in 11 borings (maximum 5470 mg/kg). TCLP tests were run on samples exceeding the lead standard; the results of five samples exceeded 5000 µg/L.

About 60 active monitoring wells are present in AOI 9. Eight of these are deep (~30–90′), screened entirely in the Lower Sand of the PRM. The shallow wells are typically 15′ deep, and they are screened either in the upper alluvium and fill, into the Trenton Gravel, or possibly the top of the Lower Sand. The wells were gauged and sampled in 2009 and 2015, with up to four rounds of data for some wells. Samples were analyzed for 10 VOCs, 10 SVOCs, and lead.

Shallow groundwater flow is inferred toward the central-western area of AOI 9, where a clay unit found elsewhere appears to be absent. Shallow groundwater evidently flows away from the Schuylkill River and the Mingo Creek basin. Deeper groundwater flow in the Lower Sand was interpreted to flow away from the gap in the clay unit, generally toward the southwest, south, and southeast. LNAPL was identified in only one shallow well near the blending building. It was fingerprinted as dominantly gasoline.

The groundwater sample results indicated exceedences of MSCs for several VOCs, benzo(a)-pyrene, benzo(g,h,i)perylene, and lead. In the deeper aquifer there were exceedences of only benzene and MTBE. Contamination is localized at the blending building area in the south and a broad area of the west-central portion of AOI 9, including the property boundary. Langan concluded that the blending area plume (maximum benzene 7210 µg/L) is stable and does not reach the property boundary. Only MTBE exceeds in deeper wells near the blending building (< 100 µg/L).

The broader western plume presumably extends offsite, but it has not been delineated with offsite wells. It affects both the shallow and deep aquifers. Substances exceeding MSCs include benzene (maximum 1800 µg/L), MTBE (189 µg/L), and 1,3,5-trimethylbenzene (680 µg/L). Concentrations of some contaminants in some wells have shown decreases since 2009. Langan concluded that the plume is stable.

The Schuylkill River adjoins AOI 9 to the east, and it is the nearest surface water body. However, it is over 1000′ distant from the nearest liquid product storage. Mingo Creek to the south is a city-operated storm water control basin that empties to the river. It is not considered a surface water body. Groundwater appears to flow away from the river and basin. There have been minor exceedences in some wells near the river and basin.

The report indicates that a PNDI review was performed in September 2015. There was a decision of no impacts of concern following further communications with DCNR and the Fish and Boat Commission.

There are several occupied buildings in the SRTF. Three sets of indoor air samples were collected in 2012 and 2015 at buildings that are not positively pressurized. None of the results exceeded OSHA PELs. Benzene and naphthalene exceeded EPA's industrial RSL in some samples. Indoor benzene concentrations were commonly higher than outdoor concentrations, but this may reflect activities in the buildings rather than vapor intrusion. Evergreen intends to comply with PELs as all workers in the buildings are regulated by OSHA.

Site Cleanup History:
NIR Received Date November 17, 2014
RIR Received Date December 31, 2015

An initial NIR was submitted October 16, 2006; it was revised with updated information 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 site characterization report was submitted for AOI 9 on October 30, 2009 under the Clean Water Program agreement. The site entered into the One Cleanup Program with DEP and EPA on November 8, 2011.

On December 16, 2012 DEP approved the SCR for Tank SR-16. On November 3, 2015 DEP approved the SCR for Tank SR-7. Both reports were approved for the site-specific standard in soil.

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.

DEP commented on the AOI 9 RIR in a March 10, 2016 e-mail. Supplemental material addressing some of these comments was received on March 23, 2016.

Discussion of Cleanup Involved and Demonstration of Attainment:
Sunoco operated a total fluids recovery system for LNAPL and groundwater contamination in the blending area. The system startup date was not reported. Two recovery wells were used. The system was taken offline in 2004 because of a lack of recoverable LNAPL. At least 1900 gal of LNAPL were removed.

Exceedences of direct contact MSCs and the lead site-specific numerical standard in surface soil will be remedied by excavations or capping. Exceedences of direct contact MSCs at depths below 2′ will be addressed with the facility's excavation and health-and-safety procedures.

Evergreen intends to attain a site-specific standard with pathway elimination for soil and groundwater. Remaining direct contact exceedences and potential LNAPL exposures will be managed with engineering and/or institutional controls. Groundwater contamination will be managed with a use restriction. An environmental covenant will be required.

A fate-and-transport model will be developed for the entire refinery site and provided in a future RIR.

DEP Final Action Approval/Disapproval Letter:
There is one major and several minor deficiencies with the remedial investigation report. I recommend disapproving the RIR.

- Site characterization data indicate that benzene and other substances exceed Statewide health standard MSCs at the western property boundary, along Essington Avenue. There are no offsite wells west of the property line. The report acknowledges that the plume is not delineated in this area. Delineating the horizontal extent of groundwater contamination is required by Title 25 Pa. Code Section 250.408(a), (b), and (e).
- Groundwater elevations and flow directions are inadequately determined at the western property boundary. [§250.408(e)]
- Understanding groundwater flow and the extent of groundwater contamination is necessary to assess potentially complete offsite exposure pathways, such as groundwater use and vapor intrusion. [§250.404]
- The report does not address the inhalation exposure pathway for outdoor workers to vapors from contaminated soil, groundwater, and LNAPL. [§250.404]
- Some data, such as monitoring well gauging, was incomplete. Historical soil and groundwater data was not included. [§250.408(c)]

The RIR did not comply with the corrective action reporting requirements of a SCR (Sections 245.309 and 310(a)). Evergreen will be required to submit complete SCRs for the seven open tank incidents.

DEP Contact:	C. David Brown	**Phone:**	484.250.5796
Site Contact:	Jim Oppenheim, Evergreen Charles Barksdale, PES Refining & Marketing	**Phone:**	302.477.0192 215.339.2074
Site Consultant:	Kevin McKeever, Langan	**Phone:**	215.491.6518