pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
SOUTHEAST REGIONAL OFFICE

MEMO

TO Sachin Shankar, P.E.
Assistant Regional Director

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

THROUGH Susan Kennedy, P.G.
Professional Geologist Manager

DATE April 13, 2017

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 3144 W. Passyunk Ave. Philadelphia, PA 19145	Evergreen Resources Management Operations 2 Righter Parkway, Suite 200 Wilmington, DE 19803	Mingo Avenue 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 are being addressed simultaneously. There are presently seven open tank incidents associated with six regulated storage tanks in AOI 9 (51-11557). A site characterization report for these tanks was received on February 8, 2017 and is under review.

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 around 100′ or greater. Shallow groundwater depths range from ~1′ to 12′.

In 2009, 2015, and 2016 approximately 170 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), and benzo(b)fluoranthene exceeded at one location at 1–2′ (100 mg/kg). Lead exceeded the site-specific standard of 2240 mg/kg in 12 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 70 active monitoring wells are present in AOI 9. Six of these are deep (70–90′), 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 of the PRM. The wells were gauged and sampled in 2009, 2015, and 2016, with up to five rounds of analytical data for some wells. Samples were analyzed for 10 VOCs, 10 SVOCs, and lead.

Three aquifers are defined in the report. A shallow perched aquifer is present in a thicker section of artificial fill above the Holocene clay unit on the eastern side of the SRTF. Flow is inferred to the west with possible convergence towards a central area where the clay unit in the Holocene alluvium is absent. The perched aquifer is not present west of 2nd Street (also the location of the Schuylkill West Side Interceptor combined sewer). An unconfined aquifer exists throughout the site in the alluvium, Trenton Gravel, and PRM Upper Sand. Groundwater elevations are depressed (< –5′), likely reflecting pumping of the Mingo Basin on the south side which is maintained at a –10′ to –11′ water elevation. Flow is complex and inferred to the south and radially to the west and southwest. The lower aquifer occurs in the PRM Lower Sand unit; flow is inferred to the south.

Persistent LNAPL has been found in the perched aquifer near the blending building, which has been fingerprinted as dominantly gasoline. In 2016 LNAPL also occurred in two wells screened in the unconfined aquifer on the western side. That petroleum was characterized as light/middle distillate. Recent site LNAPL is < 1′ thick.

The groundwater sample results indicated exceedences of MSCs for several VOCs, benzo(a)-pyrene, benzo(g,h,i)perylene, and lead. In the lower aquifer there were exceedences of only MTBE. Benzene and MTBE are the only contaminants with possibly contiguous, widespread exceedences. Three plumes are described. One, in the perched aquifer, originates at the blending area in the south (maximum benzene ~7000 µg/L), but it does not appear to reach the property boundary. A second, more extensive area of contamination in the western section occurs in the unconfined aquifer (representative maximum benzene ~1000 µg/L). This plume potentially extends offsite to the west; it has not been delineated. MTBE plumes were identified in isolated unconfined aquifer and lower aquifer wells at the southwestern property boundaries (~200 µg/L). Langan concluded that the plumes are generally stable.

Stantec performed Quick Domenico modeling of the benzene plume near the western boundary. The model was partially calibrated using onsite data and conservative, site-specific inputs. The groundwater gradient was assumed to continue unchanged offsite to the west. The maximum estimated extent of the plume was ~1700′ offsite, which encompasses several parcels of the Eastwick Industrial Park.

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 discharges to the river. It is not considered a surface water body. Groundwater appears to flow away from the river. There have been minor exceedences in some wells near the river and basin.

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. Indoor air samples were collected in 2012, 2015, and 2016 at buildings that are not positively pressurized. None of the results exceeded occupational limits (such as OSHA PELs). There were not exceedences of applicable DEP

screening values other than at the pump house. Outdoor air samples were also collected at 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 Disapproved Date	March 28, 2016
RIR Addendum Received Date	February 8, 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 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 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 December 2015 AOI 9 RIR in a March 10, 2016 e-mail. Supplemental material addressing some of these comments was received on March 23, 2016. The February 2017 RIR addendum updates the previous report.

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.

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. 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.

DEP Final Action Approval/Disapproval Letter:

The RIR addendum addressed many of the issues raised by the review of the December 2015 RIR. However, delineation of groundwater contamination offsite has still not been accomplished. I recommend disapproving the RIR.

- Site characterization data indicate that contamination exceeds Statewide health standard MSCs at the western property boundary, along Essington Avenue, and at the southwestern property boundary. Evergreen has not installed any offsite monitoring wells downgradient of AOI 9. Delineating the horizontal extent of groundwater contamination is required by Title 25 Pa. Code Section 250.408(a), (b), and (e).
- Understanding groundwater flow and the extent of groundwater contamination offsite is necessary to assess potentially complete offsite exposure pathways, such as groundwater use and vapor intrusion. [§250.404]

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