pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
SOUTHEAST REGIONAL OFFICE

MEMO

TO Stephan Sinding
Regional Manager, Environmental Cleanup and Brownfields

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

THROUGH Walter Payne, P.G.
Professional Geologist Manager

DATE September 23, 2013

RE ECB: Land Recycling Program
Act 2 Technical Memo Summary
Former Sunoco Philadelphia Refinery AOI-11
Final Report
eFACTS PF No. 745291
3144 Passyunk Avenue
City of Philadelphia
Philadelphia County

Property Owner Name and Site Address:

Owner	**Remediator**	**Site**
Philadelphia Energy Solutions Refining and Marketing LLC	Sunoco, Inc.	
3144 Passyunk Ave.	10 Industrial Highway MS4	3144 Passyunk Ave.
Philadelphia, PA 19145	Lester, PA 19029	Philadelphia, PA 19145

Coordinates: 39.9130°N, 75.1985°W

Act 2 Standard(s) Sought:

☐ Soil
☐ SS ☐ BG ☐ SHS

☒ GW (nonresidential)
☒ SS ☐ BG ☐ SHS

Property Size: 1300 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 under Philadelphia Energy Solutions (PES). Sunoco, Inc. is now a subsidiary of Energy Transfer Partners, L.P.

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 consists of multiple process units, above-ground storage tanks, pipelines, as well as truck and railcar transfer equipment. This includes the Belmont Terminal which is owned and operated by Sunoco Logistics Partners L.P.

Site Findings:
AOI-11 is the designation for the deep groundwater in the Lower (or Farrington) Sand of the Potomac-Raritan-Magothy aquifer. In most areas of the site the Lower Sand is overlain by the Middle Clay member. Generally the Lower Sand aquifer does not directly connect with the Delaware or Schuylkill Rivers. Sunoco installed ~45 deep monitoring wells onsite in the period 1984–2010. Most wells were sampled at least three times in 2008–2010 and Sunoco performed four consecutive quarters of attainment sampling in 2012–2013. Inferred groundwater flow in the deep aquifer is to the southeast in the north, progressively changing to the south, southwest, and west with distance to the south.

No LNAPL was found in any wells. SHS MSC exceedences were identified in selected wells for benzene, naphthalene, MTBE, chrysene, arsenic, and cobalt. There were pervasive exceedences of manganese and iron. Several wells with exceedences either were at the point of compliance or were not delineated downgradient toward the POC. With the exception of wells exceeding for manganese and iron, maximum concentrations in the period 2008–2013 were as follows:

Well	AOI	Contaminant	Max (µg/L)	MSC (µg/L)
A-19D	5	MTBE	64	20
A-19D	5	arsenic	23	10
N-44D	8	benzene	10	5
N-50D	8	benzo(a)pyrene	0.54	0.2
N-50D	8	benzo(g,h,i)perylene	0.41	0.26
N-50D	8	chrysene	5	1.9
S-38D2	4	benzene	110	5
S-8	3	MTBE	69	20
S-22	3	benzene	28	5
S-22	3	MTBE	75	20
S-106D	9	MTBE	300	20
S-120D	9	MTBE	47	20
S-264	1	cobalt	36	31

About 35 wells had consistent manganese exceedences, with 23 of them over 1000 µg/L. The maximum concentration was 20,500 µg/L (S-46D); the MSC for manganese is 300 µg/L and the SMCL is 50 µg/L. The highest manganese levels were generally in the northeast section of the facility (AOI-1, 2, and 8). The maximum iron concentration was 1,690,000 µg/L (S-38D); the SMCL is 300 µg/L.

Sunoco provided fate and transport analyses for contaminants with potential impacts to the Schuylkill or Delaware Rivers or offsite properties using the Quick Domenico model. They concluded that contaminants either would not reach the rivers or would not exceed calculated wasteload allocations in the rivers. At least one area may have an offsite benzene impact from well S-38D2. There was no fate-and-transport analysis for manganese and iron in offsite groundwater.

Site Cleanup History:

NIR Received Date	October 16, 2006
RIR Received Date	September 12, 2011
DEP RIR Comments	December 9, 2011
FR Received Date	June 28, 2013

DEP signed a CO&A with Sunoco in December 1993 which was replaced by a new agreement in December 2003. It requires corrective action to achieve an Act 2 standard for the entire facility. DEP received the NIR in October 2006, and the site entered the One Cleanup Program for joint RCRA and Act 2 actions in November 2011. An August 2012 CO&A established that Sunoco retained environmental liability for preexisting contamination upon sale of the refinery to PES.

Discussion of Cleanup Involved and Demonstration of Attainment:

No active remediation was performed. Sunoco seeks to attain a nonresidential site-specific standard by demonstrating and maintaining no complete exposure pathways. A PaGWIS well search indicated there were no residential or agricultural supply wells within 1 mile of the facility's property line. Sunoco would establish an environmental covenant to ensure future use would remain nonresidential and to restrict groundwater use. They proposed to continue annual sampling of the deep wells.

DEP Final Action Approval/Disapproval Letter:

There are several deficiencies with the final report that were communicated to Sunoco in a September 12, 2013 e-mail. They are listed below. Various other concerns were also enumerated in the e-mail.

- There are no point-of-compliance monitoring wells at the western, downgradient edge of AOI-9. [§250.704(b)]
- The evaluation of groundwater exposure pathways for potential human receptors is incomplete. This includes an unidentified well downgradient of AOI-9 and water supply wells in New Jersey. [§250.404(a)]
- The groundwater fate-and-transport analysis was deficient. The selection of certain input parameters was inadequately justified, such as the source concentrations, the dispersivity values, the first-order decay rates, and the hydraulic conductivity. The models were not calibrated. [§250.411(c), 204(f)(5)(iii)]

- No fate-and-transport analysis was provided for inorganic substances in the deep aquifer to estimate the extent of the offsite contamination. [§250.411(c), 204(f)(5)]
- The postremediation care plan did not clearly describe how the institutional controls would be implemented. [§250.411(d), 204(g)]

I recommend issuing a technical deficiency letter.

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