



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

DATE January 14, 2014

RE ECB: Land Recycling Program and Tanks Program
Act 2 and Corrective Action Technical Memo Summary
Former Sunoco Philadelphia Refinery AOI 4
Remedial Investigation Report and Site Characterization Report
eFACTS PF No. 770318
Tank Facility IDs 51-19781
3144 Passyunk Avenue
City of Philadelphia
Philadelphia County

Property Owner Name and Site Address:

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

Coordinates: 39.9098°N, 75.1965°W

Act 2 Standard(s) Sought:

Soil (nonresidential)
 SS BG SHS

GW (nonresidential)
 SS BG SHS

Site Size: 105 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.

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, railcar, and barge transfer equipment. This includes the Belmont Terminal which is owned and operated by Sunoco Logistics Partners L.P.

Area of Interest 4 (AOI 4) is known as the Point Breeze No. 4 Tank Farm Area. It is bordered by AOIs 1 and 2 to the north, AOI 3 to the west, Penrose Avenue to the southeast, and 26th Street to the east. (The nearest surface water body, the Schuylkill River, is ~1200' to the west.) Approximately 40 above-ground storage tanks have been located in AOI 4, as well as oil pipelines and pump stations.

This combined RIR/SCR includes a site-wide remedial investigation and as well as characterizations of six regulated ASTs with open incidents (Facility ID 51-19781):

Release Date	Incident ID	Sunoco Tank	DEP Tank	Material
3/16/2000	6229	PB 843	111A	crude oil
1/7/2008	45998	PB 844	112A	crude oil
5/29/2002	6227	PB 846	114A	recovered oil
9/3/2006	37051	PB 847	115A	crude oil
9/3/2005	35654	PB 881	120A	crude oil
10/15/2006	37107	PB 885	124A	crude oil

Site Findings:

The stratigraphy below AOI 4, from the surface to bedrock, consists of recent fill and alluvium, the Trenton Gravel Formation, the Middle/Lower Clay unit and the Lower Sand unit of the Potomac-Raritan-Magothy aquifer, and the Wissahickon Formation schist.

Soil sampling was performed in 2005 and 2013. About 30 surface (0–2') and 53 subsurface (2–15') samples were collected, and numerous additional samples were obtained for individual AST closures and investigations. Analytes from DEP's petroleum short list included up to 10 VOCs, 11 SVOCs, and lead. Sunoco adopted surface direct contact MSCs for the subsurface samples to account for possible future excavation and shallow emplacement of deeper soils. There were some exceedences of soil-to-groundwater MSCs, primarily of benzene (up to 36 mg/kg). There were also seven exceedences of nonresidential direct contact MSCs for lead throughout AOI 4, with a range of 1620 to 25,800 mg/kg.

Soil investigations at several tanks for closure assessments or release investigations indicated some minor soil-to-groundwater MSC exceedences. Tank 844 had a single benzene exceedence. Tank 846 had a single naphthalene exceedence. The information provided in the RIR/SCR on the six tanks with open incidents was insufficient for DEP to perform complete reviews.

There are about 65 shallow and/or intermediate depth wells (generally ~15–30' deep) and four deep wells in the AOI that have been installed since 1982. Most wells have been sampled at least twice (2005 and 2013); about 17 wells installed in 2013 were sampled one time. Additional, approximately annual, sampling is performed of selected wells. The shallow depth to water range is ~15–26'. Different groundwater flow directions have been inferred for different areas of AOI 4. The gradient is to the northwest in the northwest section, to the east in the northeast section, and to the south and southeast in the southern section.

Monitoring well sampling indicated exceedences of nonresidential SHS MSCs for several substances. Analytes for recent testing have consisted of 10 VOCs, 10 SVOCs, and lead. (Note that wells with LNAPL were not sampled.) Significant exceedences are tabulated below.

Substance	Maximum (µg/L)	NR MSC (µg/L)	Number*
Benzene	7400	5	25
Toluene	9600	1000	4
Ethylbenzene	1300	700	3
Naphthalene	430	100	6
MTBE	270	20	5
1,2,4-trimethylbenzene	1370	62	6
1,3,5-trimethylbenzene	470	53	5

* Number of wells with one or more exceedences of the standard.

The most widespread contaminant of concern is benzene. Wells with exceedences are scattered throughout the AOI with many other wells below the standard. The primary groundwater plume is at the southeast border of AOI 4, with some of the highest levels of benzene and other contaminants. This plume has presumably migrated offsite.

Measurable LNAPL was observed in 24 of 82 monitoring and recovery wells gauged in June 2013. The largest mapped LNAPL body is in the southeast, with thicknesses up to 2.5'. More isolated LNAPL bodies have been identified at several other locations, including S-29 and S-30 (4.6'), S-35 (0.7'), S-220 (0.9'), S-282 (1.0'), and S-104 (1.5'). A trace LNAPL thickness was discovered at S-369, in the northeast corner of AOI 4. LNAPL was fingerprinted and classified as middle distillate, gasoline, and light-end feedstock. API modeling indicated that the LNAPL in the southeast as well as LNAPL at S-29/30 and S-365 could be mobile.

Fate-and-transport analyses were performed for contaminants in wells with the potential to impact areas beyond the property line. Langan utilized the Quick Domenico model. The primary area of concern was the plume in the southeast. Naphthalene, MTBE, and trimethylbenzenes were estimated to degrade to SHS MSCs within 40' of the property line. Benzene transport distances were estimated up to ~850', which would extend beyond roadway and rail line right-of-ways. These models were not calibrated.

Indoor and ambient air sampling was performed in 2012 at 15 Pump House, which is the only occupied building in AOI 4. Contaminant concentrations in indoor air were similar in magnitude to but somewhat less than outdoor ambient air. Sunoco evaluated the results against OSHA PELs and ACGIH TLVs. All concentrations were more than 100 times below these limits.

AOI 4 is industrialized and has impermeable or gravel surface cover in many areas. A 2013 PNDI request indicated a potential threatened and/or endangered species conflict. A subsequent clearance letter from the Pennsylvania Fish and Boat Commission stated that no conflict exists.

Site Cleanup History:

NIR Received Date October 16, 2006

RIR Received Date October 18, 2013

DEP signed a CO&A with Sunoco in December 1993 which was succeeded by a new agreement in December 2003. It requires corrective action to achieve an Act 2 standard for the entire facility and any offsite areas with contamination. A site characterization report was submitted for AOI 4 under the CO&A in August 2005. 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 buyer-seller CO&A established that Sunoco retained environmental liability for preexisting contamination upon sale of the refinery to PES. Reports are submitted to satisfy both Act 2 and Act 32 obligations.

Discussion of Cleanup Involved and Demonstration of Attainment:

In 2002 recovered oil was released from Tank PB-846 (114A). Sunoco apparently excavated soil, but no information on this remediation was reported to DEP.

In 2004 a substantial quantity of crude oil was released from Tank PB-880 (119A). Sunoco excavated 279 tons of impacted soil and performed attainment sampling. DEP approved the RACR for this incident on January 10, 2005.

In 2004 crude oil was released from Tank PB-826 (100A). Sunoco removed residual oil and impacted soil. DEP approved the RACR for this incident on March 7, 2005.

In 2005 crude oil was released from Tank PB-881 (120A). An unspecified amount of soil was excavated. Post-excavation sampling indicated no exceedences.

In 2006 a substantial quantity of crude oil was released from Tank PB-885 (124A). An unspecified amount of soil was excavated. Twenty-seven attainment samples were analyzed for combined petroleum short list VOCs and SVOCs. There were two benzene exceedences, but the results satisfied the 75%/10x rule.

LNAPL recovery was conducted at S-30 from January 1996 until November 2010. This system skimmed oil from a single well. The cumulative LNAPL recovery was 39,658 gal. Operation ended because of a lack of recoverable oil.

LNAPL skimming was initiated at S-36 in September 2004. Skimmers were added to nearby wells S-34 and S-35 in late 2006. System operations ceased in July 2010. The cumulative LNAPL recovery was 1025 gal. Operation ended because of a lack of recoverable oil.

The Penrose Avenue Recovery System was installed near the southeast border of AOI 4 in 2013. It consists of 16 total fluids recovery wells that pump to a trailer-mounted oil-water separator. Oil is stored in a tank and removed by vacuum truck; water is treated by a biofilter prior to discharge to the Philadelphia sanitary sewer. Vapors are controlled by carbon drums. Through September 2013 3.7 million gallons of water had been pumped and 192 gal of LNAPL recovered. The recovery system also provides hydraulic control for the plume near the property boundary.

Langan and Sunoco concluded that all exposure pathways were incomplete with the exception of direct contact with shallow soil. Refinery protocols prevent exposure to contaminated subsurface soil. Groundwater is not used, worker contact with groundwater is restricted by the facility's health and safety protocols, and there are no groundwater receptors near AOI 4. LNAPL is located within the AOI 4 boundaries but worker contact is limited by health and safety rules. Some LNAPL may be mobile, but either is distant from property boundaries or is controlled by the Penrose Avenue Recovery System. Indoor air sampling indicates no exceedences of OSHA PELs.

The report includes a human health risk assessment with a derivation of a site-specific standard for lead in soil. Because the submission does not satisfy the administrative requirements of a risk assessment report, it has not been reviewed here.

DEP Final Action Approval/Disapproval Letter:

There are several significant administrative and technical deficiencies with the AOI 4 RIR/SCR that are listed below. Various other concerns will also be enumerated in a comment e-mail to Sunoco, and these must be resolved prior to submission of a revised RIR/SCR and eventually a final report.

- The report was submitted only as an Act 2 RIR. However, it includes a risk assessment (§9.0 and Appendix L). A risk assessment report (RAR) is required for developing site-specific standards [§250.405, 250.409, and 250.601]. Submission of a RAR must be noted on the transmittal sheet, include payment of the \$250 review fee, and include municipal and public notifications.
- Based on knowledge of past releases and the existence of LNAPL in AOI 4, there should be additional soil investigation [§250.408(b)].
- Soil boring logs were not included in the report [§250.408(c)].
- The horizontal extent of LNAPL and groundwater contamination at the southeast boundary of the AOI was not delineated. An investigation is required beyond the property boundary [§250.408(e)].
- The extent of LNAPL around well S-369 was not delineated [§250.408].
- Five regulated tanks have open incidents that were not addressed in the RIR/SCR [§ 245.309(a) and 245.310(a)].

Sunoco Tank	DEP Tank	Incident Date	Incident ID	Material
823	097A	3/26/1993	45961	hydrocracker gas oil

Sunoco Tank	DEP Tank	Incident Date	Incident ID	Material
842	110A	10/10/1996	6226	crude oil
253	056A	8/27/1998	45966	diesel
848	116A	6/25/2007	38093	crude oil
252	055A	6/28/2007	38094	No. 2 fuel oil

- Information was provided on the closure of Tank 843, but the March 16, 2000 crude oil release at this tank was not addressed (Incident No. 6229) [§245.309].
- Closure sampling at Tank 844 in 2006 revealed a benzene exceedence in soil. This was a reportable release and corrective action is required for this tank [§245.309(a)].
- There was a recovered oil release at Tank 846 on May 29, 2002 (Incident No. 6227). Additional information is required on remedial actions that were performed [§245.310(a)(4)]. Sunoco has not demonstrated attainment of an Act 2 standard for this tank.
- There was a crude oil release at Tank 847 on September 3, 2006 (Incident No. 37501). Additional information is required on interim remedial actions that were performed [§245.310(b)(5)].
- There was a crude oil release at Tank 881 on September 3, 2005 (Incident No. 35654). Additional information is required on interim remedial actions that were performed [§245.310(a)(4), 245.310(b)(5)].
- Soil sampling at Tank 881 indicated that the Statewide health standard was achieved. The report must demonstrate that the Act 2 attainment sampling requirements were satisfied [§250.703 and 250.707(b)].
- There was a crude oil release at Tank 885 on October 15, 2006 (Incident No. 37107). Additional information is required on interim remedial actions that were performed [§245.310(a)(4), 245.310(b)(5)].
- The fate-and-transport analysis requires a fuller consideration of input parameter values (such as source concentrations, hydraulic conductivity, dispersivity, and first-order decay rates). Model calibration is necessary for the plume at the southeast AOI 4 boundary [§250.408(a)].
- Sunoco must document how refinery health and safety procedures eliminate worker exposure to contaminated soil and LNAPL [§250.404].

I recommend issuing a disapproval letter.

DEP Contact:	C. David Brown	Phone:	484.250.5796
Site Contact:	Jim Oppenheim, Sunoco, Inc. Chuck Barksdale, PES	Phone:	610.833.3444 215.339.2074
Site Consultant:	Kevin McKeever, Langan Engineering & Environmental Services	Phone:	215.864.0640