



**Evergreen Resources Management**  
2 Righter Parkway, Suite 200  
Wilmington, DE 19803

January 31, 2018

Mr. David Brown, P.G.  
Pennsylvania Department of Environmental Protection  
2 East Main Street  
Norristown, Pennsylvania 19401

**RE: Philadelphia Refinery Remediation Program  
Groundwater Remediation Status Report, Second Half 2017**

Dear Mr. Brown:

Enclosed for your review is the second half 2017 semi-annual summary report for Operation & Maintenance (O&M) work completed at the Philadelphia Energy Solutions Refining & Marketing LLC (PES) Philadelphia Refining Complex (Complex) and the Sunoco Partners Marketing and Terminals L.P. (SPMT) Belmont Terminal between July 1, 2017 and December 31, 2017. Detailed information regarding O&M activity is included in the attached tables for the PES Complex and Belmont Terminal as prepared by Stantec Consulting Services Inc. (Stantec). This letter summarizes the information detailed in the tables plus additional activities under the "Work Plan for Site Wide Approach under the One Cleanup Program" (Site Wide Approach) such as investigations of the various Areas of Interest (AOIs).

In compliance with the 2003 Consent Order and Agreement (CO&A) entered into between Sunoco Inc., (R&M) (Sunoco) and the Pennsylvania Department of Environmental Protection (PADEP) for the PES Complex located at 3144 Passyunk Avenue in Philadelphia, Pennsylvania, Sunoco has completed site characterization activities for all 11 AOIs. The Complex has since entered into the Pennsylvania One Cleanup Program. On November 30, 2011, Sunoco submitted a Site Wide Approach to the PADEP and the United States Environmental Protection Agency (USEPA). The Site Wide Approach clarified the technical method beyond the CO&A and provided an anticipated schedule for future Act 2 submissions with respect to the Philadelphia Refinery remediation program. Effective December 30, 2013, Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC (Evergreen) assumed Sunoco legacy remediation liabilities with respect to the PES Complex. All remediation of Sunoco's/Atlantic's historic environmental liabilities at the PES Complex and Belmont Terminal will be managed moving forward by Evergreen. Status and anticipated dates of forthcoming Remedial Investigation Report (RIR) submittals will be updated in the semi-annual Groundwater Remediation Status Reports. This particular status report will include an updated schedule for submittals under Act 2 within each AOI section.

Evergreen will continue to submit the required documentation and implement remedial obligations. Evergreen will submit a report with the O&M summary, Act 2 submittal updates, figures, and tables on an annual basis coinciding with the annual groundwater gauging and monitoring. On the alternating six-month interval, Evergreen will submit an abbreviated letter report detailing the O&M summary with limited tables and without figures.

## **AOI 1 – Belmont Terminal / No. 1 Tank Farm / No. 2 Tank Farm**

### **Consent Order / Characterization Status**

Sunoco submitted to the PADEP and the USEPA a Site Characterization Report (SCR) for AOI 1 dated June 30, 2005. Based on comments received by the PADEP with regard to the AOI 1 SCR, Sunoco prepared and submitted to the PADEP a revised SCR for AOI 1 dated July 17, 2006. The recommendations in the AOI 1 report were to supplement the existing remediation system along the northwestern portion of the Belmont Terminal and southeastern portion of the No. 2 Tank Farm. Sunoco has implemented these actions as detailed in previous quarterly reports. In addition, Sunoco provided the PADEP a Remedial Action Plan (RAP) for AOI 1 in January 2008. As a result of the 26<sup>th</sup> Street North Remediation System study and the S-50 Area (26<sup>th</sup> Street South) investigation, an addendum to the RAP was considered necessary. In December 2008, a RAP Addendum for AOI 1 was submitted to address the 26<sup>th</sup> Street North Remediation System data analysis and the 26<sup>th</sup> Street South investigation and subsequent remedial actions. Evergreen submitted a revised RIR for AOI 1 on August 5, 2016 which was approved by the PADEP on November 1, 2016.

### **Belmont Terminal Remediation System— Operation During the Second Half of 2017**

The Belmont Terminal Remediation System consists of two components including the Frontage Road System and the Loading Rack System.

On August 30, 2012, the Frontage Road system was turned off and will remain offline unless there are significant increases in light non-aqueous phase liquid (LNAPL) in the recovery wells. The recovery wells were gauged on August 4, 2017 and November 8, 2017, and no LNAPL was detected.

The Loading Rack system consists of six dual-phase pumping systems (RW-4, RW-21, RW-22, RW-23, RW-24, and RW-25). Each recovery well contains separate pumps controlled by density floats and conductivity probes to pump groundwater and LNAPL. Recovered groundwater is discharged to an onsite process sewer. LNAPL thicknesses are checked weekly, and pumps are turned on/off as needed based on recoverable LNAPL accumulations in each recovery well. The recovered LNAPL is stored in a 5,000-gallon holding tank, the contents of which are recycled by the refinery on an as needed basis. During the reporting period the pumps in RW-4, RW-23 and RW-24 were active.

The Belmont Terminal Remediation System was operational during the reporting period. System performance and operational status for the Loading Rack system can be found in **Appendix 1**. A total of 1,302,022 gallons of groundwater and 832 gallons of LNAPL was recovered by this system during the second half of 2017.

### **Shunk Street Sewer Ventilation System and Biofilter – Operation During the Second Half of 2017**

The biofilter was operational for the reporting period. Details of the Shunk Street Sewer Ventilation System and Biofilter operational status during the second half of 2017 can be found in **Appendix 1**.

### **26th Street Sewer Area – System Performance and Operation During the Second Half of 2017**

#### **26<sup>th</sup> Street North Remediation System:**

Sunoco conducted a performance assessment of the 26<sup>th</sup> Street North Remediation System to evaluate the effectiveness of remediation in this area. In general reporting of groundwater and LNAPL recovery provides limited indication of system performance, and should be supplemented with measurements related to

maintaining water-table drawdown and inducing a hydraulic gradient towards collection points. It was concluded in the AOI 1 RAP Addendum that the extent of LNAPL has not changed significantly.

The 26<sup>th</sup> Street Sewer North Remediation system was modified in 2015 to increase the overall effectiveness of the system and was restarted on October 12, 2015. All of the four-inch diameter recovery wells (S-180, S-181, S-182, S-183, S-184, S-185, S-186, S-187, S-188, S-189, S-190, S-191, and S-192) were replaced with six-inch diameter recovery wells. Additionally, RW-400 and RW-402 are connected to the system for a total of fifteen recovery wells.

Within each well, a QED Environmental Systems Model AP-4+T AutoPump was installed to recover groundwater and LNAPL. Each recovery well contains a two-inch diameter lateral discharge line that connects to a four-inch high density polyethylene (HDPE) trunk line, which transfers the total fluids to an onsite process sewer. The pumps utilize compressed air, which is supplied by a Kaeser rotary screw air compressor. A one-inch diameter air line runs to each recovery well and is reduced to a 3/8-inch diameter line in each well vault at the pneumatic pumps.

The 26<sup>th</sup> Street Sewer North Remediation System was operational during the reporting period. Details for the 26<sup>th</sup> Street Sewer North Remediation System performance data and operational status can be found in **Appendix 1**. A total of 6,800,227 gallons of total fluids was recovered by this system during the second half of 2017.

#### 26<sup>th</sup> Street South Remediation System:

A comprehensive groundwater investigation was conducted in the S-50 area. This data and proposed remedial action was included in the AOI 1 RAP Addendum. To minimize the migration of soluble phase contaminants, a biologically active aerobic barrier utilizing a thirty-point oxygen injection system was installed in 2009.

Due to the presence of LNAPL within the capture zone, the 26<sup>th</sup> Street South Remediation System was shut off on August 22, 2014. The system remained off for the second half of 2017. The conceptualization of a remediation system will be evaluated in the Site-wide Cleanup Plan.

#### 26th Street and Packer Avenue Sewers Biofilter Remediation System – Operation During the Second Half of 2017

The 26<sup>th</sup> Street and Packer Avenue Sewers Biofilter system was upgraded including replacing the compost beds, repairing the duct work, and replacing or repairing the fans. The system was restarted on June 6, 2016 for final stages of startup and system startup was completed on November 10, 2016. The system was operational during the second half of 2017. Details for the 26<sup>th</sup> Street and Packer Avenue Sewer Biofilter system performance data and operational status can be found in **Appendix 1**.

### **AOI 2 – Point Breeze Processing Area**

#### Consent Order / Characterization Status

The AOI 2 SCR/RIR was submitted to the PADEP and the USEPA on September 29, 2010. A revised RIR was completed in July 2017. PADEP approved the report on October 18, 2017.

#### Pollock Street West End Remediation System – Operation During the Second Half of 2017

During October 2011, heavier than usual quantities of oil were observed within the Pollock Street sewer outfall. As a result, Sunoco completed the expansion of the existing vertical recovery well remediation system in the vicinity of the Pollock Street sewer outfall in February 2012. The system, referred to as the Pollock Street West

End system, consists of a total of ten 4-inch diameter recovery wells on the east side of River Road and twenty 6-inch diameter recovery wells on the west side of River Road. Product thicknesses are checked bi-weekly, and pumps are turned on/off as needed based on recoverable LNAPL accumulations in each well. Groundwater and LNAPL are removed from select recovery wells using pneumatic submersible pumps. All liquids are processed through an oil/water separator. Water is discharged to a refinery process sewer (S-10 Sump), and LNAPL is recovered in a series of two 550-gallon tanks and then recycled by the PES Complex. A report describing the details of the investigation and remediation performed in response to the oil observed in the Pollock Street sewer outfall was submitted to the PADEP and the USEPA on June 29, 2012.

The Pollock Street West End Remediation System was turned off December 19, 2016 to evaluate LNAPL recharge. The system remained off during the reporting period with the following exceptions:

- The system was turned on October 26, 2017 to evaluate the potential to recover LNAPL in the proximity of the Pollock Street sewer outfall. Recovery wells RW-104, RW-105, RW-113, RW-125, RW-128, and RW-129 were activated. Due to a lack of recoverable LNAPL, the system was turned off November 29.

A total of 279,100 gallons of groundwater was recovered by the Pollock Street West End system during the second half of 2017. During the reporting period, no LNAPL was recovered by the system. Operational and performance data can be found in **Appendix 1**.

#### Pollock Street Vertical Well Remediation System – Operation During the Second Half of 2017

The Pollock Street Vertical Well Remediation System originally consisted of RW-101, RW-102, and RW-103. All other vertical wells were previously turned off or incorporated into the Pollock Street West End Remediation System. On April 4, 2013, the vertical recovery wells were turned off for main discharge line cleaning and the installation of a new pump at horizontal well HW-1. Subsequently, HW-1 maintained adequate drawdown; therefore, the Pollock Street Vertical Well Remediation System was no longer needed. The recovery equipment was removed from RW-101, RW-102, and RW-103 on August 2, 2013.

#### Pollock Street Horizontal Well Remediation System – Operation During the Second Half of 2017

The Pollock Street Horizontal Well Remediation System consists of HW-1, HW-2, and HW-3. HW-1 was installed in July 2004 along the north side of the Pollock Street sewer from approximately RW-103 to approximately 100 feet west of RW-101. HW-2 and HW-3 were installed from approximately RW-103 to the intersection of Pollock Street and 16<sup>th</sup> Street in the first quarter of 2006. Groundwater and LNAPL from HW-1 and HW-2 discharge directly into a Benzene National Emission Standard for Hazardous Air Pollutants (NESHAP) controlled sewer, whereas groundwater and LNAPL from HW-3 discharges directly into an onsite process sewer.

Totalizers were installed in HW-1 and HW-2 on May 25, 2013 and July 6, 2015 respectively. The estimated flow rate for HW-3, as determined by pump testing, is 15.38 gallons per minute (gpm).

The Pollock Street Horizontal Well Remediation System was operational during the reporting period. System performance data and operational status can be found in **Appendix 1**. A total of 6,494,174 gallons of total fluids was recovered by Pollock Street Horizontal Well Remediation System during the reporting period.

#### Pollock Street Sewer Outfall – Operation During the Second Half of 2017

The Pollock Street Sewer outfall is checked and maintained by PES personnel and all findings are recorded. This practice will continue and identified LNAPL will be handled with spill control equipment to minimize or prevent

releases to the Schuylkill River. Evergreen has continued to maintain a skimmer system located in the tide gate area. The skimmer discharges to a refinery process sewer (S-13 Sump). The skimmer will be activated if recoverable quantities of LNAPL are observed at the tide gate area. Except for the completion of preventative maintenance and equipment testing, the outfall skimmer remained off for the second half of 2017 due to the absence of recoverable oil in the outfall.

#### Short Pier Remediation System – Operation During the Second Half of 2017

There was no evidence of LNAPL migration to the Schuylkill River during the reporting period. Unless evidence of LNAPL migration to the river occurs, the Short Pier Remediation System will remain offline.

#### Passyunk Avenue Sewer

The Passyunk Avenue Sewer combined sewer overflow outfall (CSO) is checked by PES personnel once per shift at low tide and findings are recorded. Evergreen has not been notified of any observed LNAPL at the outfall during the second half of 2017.

### **AOI 3 – Impoundment Area**

There are no groundwater or LNAPL remediation systems active in this area. The AOI 3 SCR/RIR was submitted to the PADEP and the USEPA on September 27, 2010. The SCR/RIR stated that given the limited occurrence and mobility of LNAPL observed in RW-2, the former remediation system in this area will remain offline. A revised RIR for AOI 3 was submitted March 20, 2017, and approved on June 14, 2017. The disposition of remediation systems in AOI 3 will be revisited in the Site-wide Cleanup Plan.

### **AOI 4 – No. 4 Tank Farm Area**

#### Consent Order / Characterization Status

AOI 1 and AOI 4 were identified by Sunoco as the first areas of the refinery to be investigated in accordance with the Phase II Corrective Action Schedule included in the Current Conditions Report (CCR). Sunoco submitted a SCR to the PADEP and the USEPA for AOI 4 on August 24, 2006. A repackaged SCR/RIR was submitted to the agencies on October 16, 2013. A “Disapproval of Remedial Investigation Report” was received from the PADEP on January 16, 2014. A revised RIR was submitted on March 24, 2017. The revised RIR was disapproved by the PADEP in a letter dated June 21, 2017.

#### Penrose Avenue Remediation System – Operation During the Second Half of 2017

Following characterization of AOI 4, Sunoco installed a hydraulic control system on the southern border of AOI 4. This system is permitted for discharge to the Philadelphia Water Department (PWD) and by Philadelphia Air Management Services (AMS). Installation of the Penrose Avenue Remediation System was completed in December 2012. Following minor modifications to the system to facilitate water discharge monitoring in accordance with the PWD groundwater discharge permit, the system was started on March 20, 2013.

The system was operational during the reporting period. System performance data and operational status can be found in **Appendix 1**. A total of 745,400 gallons of groundwater and 564 gallons of LNAPL were recovered by the Penrose Avenue Remediation System during the reporting period.

**S-30 and S-36 LNAPL Remediation Systems – Operation During the Second Half of 2017**

Recovery wells S-30, S-34, S-35, and S-36 remained offline in 2017. Due to accumulation of LNAPL in S-30, a new pump, probe, and control panel are planned for installation in 2018.

**AOI 5 – Girard Point South Tank Field**

**Consent Order / Characterization Status**

In accordance with the Site Wide Approach, a SCR/RIR/Cleanup Plan was submitted to the PADEP and the USEPA on December 13, 2011. Sunoco received a Remedial Investigation Report/Cleanup Plan disapproval letter from the PADEP on March 15, 2012. A revised RIR was submitted on January 16, 2016 and was approved by the PADEP on May 2, 2017.

**9 Berth Remediation System – Operation During the Second Half of 2017**

The 9 Berth Remediation System was taken offline in January 2009 and remains offline due to limited presence of LNAPL.

**AOI 6 – Girard Point Chemicals Processing Area**

**Consent Order / Characterization Status**

AOI 6 was identified by Sunoco as the third area of the refinery to be investigated in accordance with the Phase II Corrective Action Schedule included in the CCR. A SCR for AOI 6 was submitted to the PADEP and the USEPA on September 29, 2006. A repackaged SCR/RIR was submitted to the agencies on September 3, 2013. PADEP issued a disapproval letter on November 27, 2013. A revised RIR was submitted on November 21, 2017.

**27 Pump House Remediation System – Operation During the Second Half of 2017**

The 27 Pump House Remediation System was turned off September 20, 2010 due to absence of recoverable LNAPL. Passive remediation began on October 10, 2010 with the installation of absorbent socks in wells B-124, B-132, B-137, B-139, B-142, B-143, and B-147. Based on limited recoverable LNAPL in the proximal wells, passive remediation was discontinued on January 26, 2015.

**AOI 7 – Girard Point Fuels Processing Area**

**Consent Order / Characterization Status**

In accordance with the Site Wide Approach, a repackaged AOI 7 SCR/RIR was submitted to the PADEP and the USEPA on February 29, 2012. A RIR Addendum was submitted to the agencies on September 19, 2013. On December 18, 2013, Sunoco received comments on the RIR Addendum from the PADEP. These comments were addressed in the revised RIR that was submitted June 9, 2017. AOI 7 RIR dated June 9, 2017 was submitted to PADEP. The RIR was approved in correspondence dated August 30, 2017.

### No. 3 Separator / Bulkhead Remediation System – Operation During the Second Half of 2017

On July 12, 2011, Sunoco reported a hydrocarbon sheen on the Schuylkill River to the National Response Center. The sheen was directly adjacent to the Girard Point No. 3 Separator. In response to the sheen on the river, Sunoco investigated the source of hydrocarbons to the river through the installation of monitoring wells and exploratory excavation around a process sewer junction box associated with the 137 Crude Unit and the No. 3 Separator. The monitoring wells demonstrated measurable oil on the water table, and the exploratory excavation revealed integrity issues with the junction box. The junction box and associated bulkhead penetration were sealed with concrete.

Construction of a ten recovery well hydraulic control system was completed on August 23, 2012 and included RW-801, RW-802, RW-803, RW-804, RW-805, RW-806, RW-807, RW-808, RW-809, and RW-810. Groundwater and LNAPL are extracted using pneumatic submersible pumps, and total fluids pass through an oil/water separator. Water is discharged to an onsite process sewer, and LNAPL is recovered in a 1,100-gallon holding tank and recycled by the refinery.

The No. 3 Separator / Bulkhead Remediation System was operational during the second half of 2017. System operation details and performance data for the system can be found in **Appendix 1**. A total of 1,287,600 gallons of groundwater and 180 gallons of LNAPL were recovered by the No. 3 Separator / Bulkhead Remediation System during the second half of 2017.

### AOI 8 – Point Breeze North Yard

#### Consent Order / Characterization Status

A SCR was submitted to the PADEP on September 30, 2008. A repackaged SCR/RIR incorporating the PADEP's comments was submitted to the PADEP and the USEPA on January 31, 2012. Comments from the PADEP on the SCR/RIR were received by email on July 7, 2012. A revised RIR dated December 21, 2017 was submitted to the PADEP.

Evergreen is evaluating the performance history of existing remediation systems in AOI 8. A test well (N-157) was recently installed and a well performance test recently conducted to evaluate the feasibility of total fluids recovery as a remedial option near the adjacent South District Work Center of Verizon Pennsylvania, LLC (Verizon SDWC) Property.

#### Northern Boundary/Verizon Area

The northern boundary of AOI 8 near the Verizon property is being evaluated for offsite impacts and potential system installation. This includes an assessment of vapor intrusion at the Verizon property. A vapor intrusion evaluation was completed in and near all occupied buildings in AOI 8, as well as the Verizon SDWC Property.

### PGW Border Remediation System – Operation During the Second Half of 2017

The PGW Border Remediation System is offline. Although recovery wells operating within the AOI 8 remediation systems have been out of operation for several years, the PGW Border System will be further evaluated for startup, optimization, and efficiency to address LNAPL (and possibly other dissolved-phase contaminants in the area) as a part of Cleanup Plan activities.

### Jackson Street Sewer Remediation System – Operation During the Second Half of 2017

The Jackson Street Sewer Remediation System consists of two components, a total fluids system with submersible pumps recovering groundwater and LNAPL (Jackson Street System) and a vapor suppression water curtain installed in the Jackson Street sewer (Jackson Street Water Curtain).

The Jackson Street System is offline. Due to limited LNAPL presence in the area, the system will remain off unless there are significant increases in LNAPL in the proximal wells. The Jackson Street CSO is reportedly checked once per shift by PES personnel for a sheen or the presence of LNAPL. Evergreen has not been notified of any observed LNAPL at the outfall during the second half of 2017.

The Jackson Street Sewer Water Curtain was operational during the second half of 2017. Due to reliability issues, the flow meter for the water curtain was taken out of service in December 2009. Water flow rate is irrelevant to system operation. System data and operational status for the second half of 2017 is included in **Appendix 1**.

Sunoco agreed at a July 30, 2009 meeting to sample the air in the sewer onsite and offsite following notification from the PADEP of a neighborhood (28<sup>th</sup> and McKean Streets) complaint. No complaints regarding sewer odors were received during the second half of 2017.

Evergreen will continue to operate the Jackson Street Water Curtain and report performance information in semi-annual Philadelphia Refinery Groundwater Remediation Status Reports. Details regarding plans to maintain this vapor mitigation system will be included in a future Act 2 deliverable. A required second round of air sampling will be completed and presented in a future Act 2 deliverable. No other vapor intrusion assessment activities are recommended for AOI 8.

### North Yard Bulkhead and No. 3 Tank Farm Separator Remediation System – Operation During the Second Half of 2017

The North Yard Bulkhead and No. 3 Tank Farm Separator Remediation System was taken offline due to limited LNAPL presence in the area. The system will remain off unless there are significant increases in LNAPL in the proximal wells.

## **AOI 9 – Schuylkill River Tank Farm**

There are no groundwater or LNAPL remediation systems operational in AOI 9. A SCR was submitted to the PADEP and the USEPA on October 30, 2009. A revised RIR was submitted to the agencies in December 2015. The RIR was denied and a RIR Addendum to address the deficiencies was submitted on February 8, 2017. On April 18, the PADEP disapproved the RIR Addendum.

## **AOI 10 – West Yard**

There are no groundwater or LNAPL remediation systems operational in AOI 10. A SCR/RIR was submitted to the PADEP and the USEPA on June 29, 2011. Approval of the RIR was received from the PADEP on January 6, 2012. An ecological assessment was conducted in 2015 and 2016 and an Ecological Risk Assessment Report was submitted in June 2016.

A Solid Waste Management Unit (SWMU) closure letter which addressed past disposal areas located in AOI 10 and AOI 8 (SWMU 1 and SWMU 2 respectively) was submitted the USEPA on February 16, 2016. On November 29,



2016, the USEPA issued a response letter denying the no further action request for SWMU 1. Evergreen collected additional information in 2017 to address the USEPA letter and 2016 PADEP comments on the 2011 SCR/RIR and the Ecological Risk Assessment Report. Results will be provided in a future submittal.

### **AOI 11 – Deep Aquifer**

The SCR/RIR was submitted to the PADEP and the USEPA on September 12, 2011. Sunoco received comments to the report by email on December 9, 2011. The Final Report was submitted to the agencies on June 21, 2013. Sunoco received a “Disapproval of Final Report” from the PADEP dated September 26, 2013.

### **Groundwater Monitoring**

The current monitoring program consists of quarterly groundwater and LNAPL gauging of select wells, annual groundwater and LNAPL gauging of site-wide wells, and annual groundwater sampling of select perimeter monitoring wells. During the first, third, and fourth quarters, select wells are gauged to monitor LNAPL thicknesses and determine hydraulic effects of targeted remediation systems. The site-wide annual well gauging event is typically conducted during the second quarter of each year with results used to identify the presence of LNAPL and determine groundwater flow patterns. Annual perimeter groundwater sampling typically is performed in the second quarter in conjunction with annual site-wide gauging.

Liquid level measurements collected during the third quarter of 2017 are provided in **Table 1**. The fourth quarter 2017 liquid level measurements are provided in **Table 2** of this report.

Please contact me at (302) 477-1305 or [tldoerr@evergreenresmgt.com](mailto:tldoerr@evergreenresmgt.com) with any questions or comments.

Best Regards,

Evergreen Resources Management Operations



Tiffani L. Doerr, PG  
Project Manager

Enclosures:    Table 1 – Third Quarter 2017 Gauging Data  
                    Table 2 – Fourth Quarter 2017 Gauging Data  
                    Appendix 1 – Remediation System Recovery Data

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File: ENFOS

## **TABLES**

Table 1  
Third Quarter 2017 Gauging Data  
Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC

AOI	Well ID	Date	Depth to LNAPL (feet btoc)	Depth to Water (feet btoc)	Apparent LNAPL Thickness (feet)	Corrected Groundwater Elevation (ft NAVD 88)	Well Classification	Static or Pumping	Comments
AOI 1	RW-110	8/3/2017	---	17.29	---	0.38	unconfined	Static	
AOI 1	RW-111	8/3/2017	---	17.46	---	0.26	unconfined	Static	
AOI 1	RW-112	8/3/2017	---	17.39	---	0.22	unconfined	Static	
AOI 1	RW-401	8/3/2017	21.10	21.22	0.12	3.65	NYC	Static	
AOI 1	RW-402	8/3/2017	---	24.15	---	-2.44	unconfined	Static	
AOI 1	RW-403	8/3/2017	---	21.31	---	2.82	unconfined	Static	
AOI 1	RW-404	8/3/2017	---	22.63	---	1.11	unconfined	Static	
AOI 1	RW-405	8/3/2017	24.80	25.33	0.53	-0.77	NYC	Static	
AOI 1	RW-406	8/3/2017	23.25	23.52	0.27	5.29	NYC	Static	
AOI 1	S-179	8/3/2017	---	19.67	---	4.86	unconfined	Static	
AOI 1	S-180	8/3/2017	---	24.05	---	-1.85	unconfined	Pumping	
AOI 1	S-181	8/3/2017	---	23.20	---	-0.34	NYC	Pumping	
AOI 1	S-182	8/3/2017	---	23.55	---	-0.55	unconfined	Pumping	
AOI 1	S-183	8/3/2017	---	26.25	---	-2.77	unconfined	Pumping	
AOI 1	S-184	8/3/2017	---	23.95	---	-0.47	unconfined	Pumping	
AOI 1	S-185	8/3/2017	---	25.10	---	-1.22	unconfined	Pumping	
AOI 1	S-186	8/3/2017	---	28.70	---	-4.34	unconfined	Pumping	
AOI 1	S-187	8/3/2017	---	24.40	---	0.11	unconfined	Pumping	
AOI 1	S-188	8/3/2017	---	25.00	---	-0.18	unconfined	Pumping	
AOI 1	S-189	8/3/2017	---	25.20	---	0.59	unconfined	Pumping	
AOI 1	S-190	8/3/2017	---	25.90	---	-0.33	NYC	Pumping	
AOI 1	S-191	8/3/2017	---	23.80	---	2.03	unconfined	Pumping	
AOI 1	S-192	8/3/2017	---	26.00	---	0.02	unconfined	Pumping	
AOI 2	River1	8/1/2017	---	11.20	---		NYC	Static	at 13:10
AOI 2	RW-100	8/1/2017	---	17.70	---	3.03	NYC	Static	
AOI 2	RW-101	8/1/2017	16.76	17.16	0.40	2.96	NYC	Static	
AOI 2	RW-102	8/1/2017	14.41	14.42	0.01	3.06	NYC	Static	
AOI 2	RW-103	8/1/2017	16.26	17.03	0.77	3.66	NYC	Static	
AOI 2	RW-104	8/1/2017	---	6.40	---	2.56	NYC	Static	
AOI 2	RW-105	8/1/2017	---	7.68	---	1.00	NYC	Static	
AOI 2	RW-106	8/1/2017	---	6.71	---	2.59	NYC	Static	
AOI 2	RW-107	8/1/2017	---	9.05	---	1.50	NYC	Static	
AOI 2	RW-108	8/1/2017	---	7.63	---	2.27	NYC	Static	
AOI 2	RW-109	8/1/2017	---	6.92	---	2.93	NYC	Static	
AOI 2	RW-113	8/1/2017	---	8.02	---	2.21	NYC	Static	
AOI 2	RW-114	8/1/2017	10.63	10.63	<0.01	2.39	NYC	Static	
AOI 2	RW-115	8/1/2017	---	7.75	---	2.45	NYC	Static	
AOI 2	RW-116	8/1/2017	---	8.27	---	2.54	NYC	Static	
AOI 2	RW-117	8/1/2017	7.33	7.34	0.01	2.45	NYC	Static	
AOI 2	RW-118	8/1/2017	---	9.02	---	2.80	NYC	Static	
AOI 2	RW-119	8/1/2017	10.25	10.25	<0.01	2.61	NYC	Static	
AOI 2	RW-120	8/1/2017	11.04	11.04	<0.01	2.55	NYC	Static	
AOI 2	RW-121	8/1/2017	---	12.69	---	2.61	NYC	Static	
AOI 2	RW-122	8/1/2017	7.75	7.75	<0.01	2.50	NYC	Static	
AOI 2	RW-123	8/1/2017	---	7.41	---	2.56	NYC	Static	
AOI 2	RW-124	8/1/2017	---	6.55	---	2.61	NYC	Static	
AOI 2	RW-125	8/1/2017	---	11.71	---	2.56	NYC	Static	
AOI 2	RW-126	8/1/2017	---	6.80	---	2.43	NYC	Static	
AOI 2	RW-127	8/1/2017	---	11.84	---	2.06	NYC	Static	
AOI 2	RW-128	8/1/2017	7.18	7.19	0.01	1.25	NYC	Static	
AOI 2	RW-129	8/1/2017	---	7.87	---	1.96	NYC	Static	
AOI 2	S-313	8/1/2017	---	17.61	---	3.29	NYC	Static	
AOI 2	S-315	8/1/2017	---	17.92	---	2.55	NYC	Static	
AOI 2	S-316	8/1/2017	---	15.57	---	5.33	NYC	Static	
AOI 3	RW-2	8/2/2017	11.23	11.90	0.67	-0.07	NYC	Static	
AOI 4	RW-700	8/2/2017	---	20.90	---	-2.89	unconfined	Pumping	top of pump at 20.90 ft btoc
AOI 4	RW-701	8/2/2017	---	20.30	---	-2.03	unconfined	Pumping	top of pump at 20.30 ft btoc
AOI 4	RW-702	8/2/2017	---	33.80	---	-12.85	unconfined	Pumping	top of pump at 33.80 ft btoc
AOI 4	RW-703	8/2/2017	---	29.70	---	-9.08	unconfined	Pumping	top of pump at 29.70 ft btoc
AOI 4	RW-704	8/2/2017	---	21.25	---	-1.02	unconfined	Pumping	top of pump at 21.25 ft btoc
AOI 4	RW-705	8/2/2017	---	15.21	---	0.71	unconfined	Static	
AOI 4	RW-706	8/2/2017	---	15.30	---	0.59	unconfined	Static	
AOI 4	RW-707	8/2/2017	---	15.65	---	0.64	unconfined	Static	
AOI 4	RW-708	8/2/2017	---	14.87	---	0.62	unconfined	Static	
AOI 4	RW-709	8/2/2017	---	14.63	---	0.67	unconfined	Static	
AOI 4	RW-710	8/2/2017	---	15.53	---	0.35	unconfined	Static	
AOI 4	RW-711	8/2/2017	---	14.50	---	0.99	unconfined	Static	
AOI 4	RW-712	8/2/2017	---	14.92	---	0.64	unconfined	Static	

Table 1  
Third Quarter 2017 Gauging Data  
Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC

AOI	Well ID	Date	Depth to LNAPL (feet btoc)	Depth to Water (feet btoc)	Apparent LNAPL Thickness (feet)	Corrected Groundwater Elevation (ft NAVD 88)	Well Classification	Static or Pumping	Comments
AOI 4	RW-713	8/2/2017	---	14.37	---	0.65	unconfined	Static	
AOI 4	RW-714	8/2/2017	---	14.63	---	0.58	unconfined	Static	
AOI 4	RW-715	8/2/2017	---	14.72	---	0.65	unconfined	Static	
AOI 4	RW-716	8/2/2017	---	14.88	---	0.67	unconfined	Static	
AOI 4	RW-717	8/2/2017	---	14.93	---	0.68	unconfined	Static	
AOI 4	S-30	8/2/2017	21.35	27.81	6.46	0.93	unconfined	Static	
AOI 4	S-34	8/2/2017	---	19.85	---	1.04	unconfined	Static	
AOI 4	S-35	8/2/2017	---	20.32	---	0.62	unconfined	Static	
AOI 4	S-36	8/2/2017	23.47	23.47	<0.01	0.77	unconfined	Static	
AOI 5	RWBH-1	8/7/2017	5.48	5.65	0.17	-0.17	unconfined	Static	
AOI 5	RWBH-2	8/7/2017	3.40	6.57	3.17	0.43	unconfined	Static	
AOI 6	B-124	8/7/2017	4.33	6.71	2.38	4.19	NYC	Static	
AOI 6	B-132	8/7/2017	4.41	4.46	0.05	2.45	NYC	Static	
AOI 6	B-135	8/7/2017	---	4.65	---	1.73	NYC	Static	
AOI 6	B-136	8/7/2017	4.72	4.73	0.01	4.43	NYC	Static	
AOI 6	B-137	8/7/2017	3.82	5.16	1.34	4.73	NYC	Static	
AOI 6	B-139	8/7/2017	NM	NM	NM	NM	NYC	Static	well destroyed
AOI 6	B-142	8/7/2017	6.41	7.26	0.85	3.22	NYC	Static	
AOI 6	B-143	8/7/2017	4.04	4.88	0.84	4.83	NYC	Static	
AOI 6	B-147	8/7/2017	5.00	5.11	0.11	3.89	NYC	Static	
AOI 6	SUMP-1	8/7/2017	4.83	4.92	0.09	5.86	NYC	Static	
AOI 7	River4	8/7/2017	---	9.00	---	---	NYC	Static	at 10:15
AOI 7	RW-801	8/7/2017	---	18.90	---	-12.63	NYC	Pumping	top of pump at 18.90 ft btoc
AOI 7	RW-802	8/7/2017	---	19.85	---	-14.15	NYC	Pumping	top of pump at 19.85 ft btoc
AOI 7	RW-803	8/7/2017	---	22.10	---	-16.32	NYC	Pumping	top of pump at 22.10 ft btoc
AOI 7	RW-804	8/7/2017	---	20.00	---	-14.22	NYC	Pumping	top of pump at 20.00 ft btoc
AOI 7	RW-805	8/7/2017	---	17.15	---	-11.40	NYC	Pumping	top of pump at 17.15 ft btoc
AOI 7	RW-806	8/7/2017	---	20.40	---	-14.99	NYC	Pumping	top of pump at 20.40 ft btoc
AOI 7	RW-807	8/7/2017	---	18.90	---	-12.06	NYC	Pumping	top of pump at 18.90 ft btoc
AOI 7	RW-808	8/7/2017	---	18.10	---	-12.02	NYC	Pumping	top of pump at 18.10 ft btoc
AOI 7	RW-809	8/7/2017	---	19.70	---	-13.15	NYC	Pumping	top of pump at 19.70 ft btoc
AOI 7	RW-810	8/7/2017	---	14.20	---	-7.76	NYC	Pumping	top of pump at 14.20 ft btoc
AOI 8	N-137	8/9/2017	17.32	17.38	0.06	8.26	unconfined	Static	changed out wick
AOI 8	N-138	8/9/2017	26.97	27.03	0.06	8.31	unconfined	Static	changed out wick
AOI 8	N-139	8/9/2017	26.76	26.95	0.19	8.20	unconfined	Static	changed out wick
AOI 8	N-142	8/9/2017	---	26.44	---	8.12	unconfined	Static	
AOI 8	N-144	8/9/2017	---	25.73	---	8.55	unconfined	Static	
AOI 8	N-145	8/9/2017	---	17.92	---	8.07	unconfined	Static	
AOI 8	N-146	8/9/2017	17.50	18.11	0.61	8.75	unconfined	Static	
AOI 8	N-155	8/9/2017	---	26.08	---	---	lower aquifer	Static	
AOI 8	River2	8/9/2017	NM	NM	NM	NM	NYC	Static	no access, fenced off, need preplan to enter
AOI 8	RW-200	8/9/2017	---	5.74	---	6.28	unconfined	Static	
AOI 8	RW-201	8/9/2017	22.72	23.23	0.51	9.20	unconfined	Static	
AOI 8	RW-202	8/9/2017	---	20.33	---	9.18	unconfined	Static	
AOI 8	RW-203	8/9/2017	22.40	22.62	0.22	8.68	unconfined	Static	
AOI 8	RW-204	8/9/2017	19.27	20.74	1.47	9.15	unconfined	Static	
AOI 8	RW-205	8/9/2017	19.12	22.07	2.95	10.29	unconfined	Static	
AOI 8	RW-206	8/9/2017	21.06	23.10	2.04	9.66	unconfined	Static	
AOI 8	RW-300	8/9/2017	14.90	15.12	0.22	6.70	lower aquifer	Static	
AOI 8	RW-301	8/9/2017	---	12.05	---	10.36	unconfined	Static	
AOI 8	RW-302	8/9/2017	---	13.30	---	10.79	unconfined	Static	
AOI 8	RW-303	8/9/2017	---	14.07	---	10.91	unconfined	Static	
AOI 8	RW-304	8/9/2017	---	14.70	---	10.58	unconfined	Static	
AOI 8	RW-305	8/9/2017	---	14.84	---	10.43	unconfined	Static	
AOI 8	RW-306	8/9/2017	12.99	12.99	<0.01	10.60	unconfined	Static	
AOI 8	RW-307	8/9/2017	---	14.68	---	8.58	unconfined	Static	
AOI 8	RW-308	8/9/2017	---	16.71	---	8.90	unconfined	Static	
AOI 8	RW-309	8/9/2017	---	15.57	---	9.66	unconfined	Static	
AOI 8	RW-500	8/9/2017	---	2.47	---	5.09	unconfined	Static	
AOI 8	RW-501	8/9/2017	---	6.24	---	3.55	unconfined	Static	
AOI 8	RW-502	8/9/2017	8.21	8.55	0.34	4.23	unconfined	Static	
BELMONT	RW-1	8/4/2017	---	25.48	---	4.07	unconfined	Static	
BELMONT	RW-4	8/4/2017	---	27.64	---	2.81	NYC	Static	
BELMONT	RW-6	8/4/2017	---	26.79	---	4.27	unconfined	Static	
BELMONT	RW-7	8/4/2017	---	24.00	---	4.21	unconfined	Static	
BELMONT	RW-15	8/4/2017	---	26.90	---	3.15	unconfined	Static	
BELMONT	RW-21	8/4/2017	---	24.73	---	4.13	unconfined	Static	
BELMONT	RW-22	8/4/2017	---	22.84	---	4.19	unconfined	Static	

Table 1  
Third Quarter 2017 Gauging Data  
Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC

AOI	Well ID	Date	Depth to LNAPL (feet btoc)	Depth to Water (feet btoc)	Apparent LNAPL Thickness (feet)	Corrected Groundwater Elevation (ft NAVD 88)	Well Classification	Static or Pumping	Comments
BELMONT	RW-23	8/4/2017	27.40	27.80	0.40	-0.37	NYC	Pumping	
BELMONT	RW-24	8/4/2017	22.80	26.35	3.55	3.54	unconfined	Pumping	Cleaned the screen and adjusted the product pump level
BELMONT	RW-25	8/4/2017	25.85	26.41	0.56	4.17	NYC	Static	
BELMONT	RW-26	8/4/2017	---	25.70	---	3.51	unconfined	Static	
BELMONT	RW-27	8/4/2017	---	26.16	---	3.55	unconfined	Static	
BELMONT	RW-28	8/4/2017	---	25.29	---	4.45	unconfined	Static	
BELMONT	RW-29	8/4/2017	---	25.95	---	3.49	unconfined	Static	
BELMONT	RW-30	8/4/2017	---	25.76	---	3.63	unconfined	Static	
BELMONT	RW-31	8/4/2017	---	25.72	---	3.66	unconfined	Static	
BELMONT	RW-32	8/4/2017	---	19.77	---	9.28	unconfined	Static	
BELMONT	RW-400	8/4/2017	---	27.40	---	0.79	unconfined	Static	

Notes:

For product thicknesses <0.01 ft, the corrected groundwater elevation was calculated using 0.01 foot.

LNAPL = Light non-aqueous phase liquid

ft = Feet

toc = Top of casing

ft btoc = Feet below top of casing

NAVD 88 = North American Vertical Datum of 1988

--- = LNAPL not present

NM = Field reading not measured and/or corrected groundwater elevation not calculated due to lack of surveyed reference elevation or down well pump.

NA = Not Accessible, Not Applicable, or Not Available

NYC = Not yet classified

Table 2  
Fourth Quarter 2017 Gauging Data  
Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC

AOI	Well ID	Date	Depth to LNAPL (feet btoc)	Depth to Water (feet btoc)	Apparent LNAPL Thickness (feet)	Corrected Groundwater Elevation (ft NAVD 88)	Well Classification	Static or Pumping	Comments
AOI 1	RW-110	11/9/2017	---	16.80	---	0.87	unconfined	Static	
AOI 1	RW-111	11/9/2017	---	16.90	---	0.82	unconfined	Static	
AOI 1	RW-112	11/9/2017	---	16.85	---	0.76	unconfined	Static	
AOI 1	RW-401	11/9/2017	21.83	22.05	0.22	2.90	NYC	Static	
AOI 1	RW-402	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 24.15 ft btoc
AOI 1	RW-403	11/9/2017	---	21.95	---	2.18	unconfined	Static	
AOI 1	RW-404	11/9/2017	---	22.93	---	0.81	unconfined	Static	
AOI 1	RW-405	11/9/2017	24.87	25.46	0.59	-0.85	NYC	Static	
AOI 1	RW-406	11/9/2017	24.10	24.45	0.35	4.42	NYC	Static	
AOI 1	S-179	11/9/2017	---	20.84	---	3.69	unconfined	Static	
AOI 1	S-180	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 24.05 ft btoc
AOI 1	S-181	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 23.2 ft btoc
AOI 1	S-182	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 23.55 ft btoc
AOI 1	S-183	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 26.25 ft btoc
AOI 1	S-184	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 23.95 ft btoc
AOI 1	S-185	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 25.1 ft btoc
AOI 1	S-186	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 28.7 ft btoc
AOI 1	S-187	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 24.4 ft btoc
AOI 1	S-188	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 25 ft btoc
AOI 1	S-189	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 25.2 ft btoc
AOI 1	S-190	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 25.9 ft btoc
AOI 1	S-191	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 23.8 ft btoc
AOI 1	S-192	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 26 ft btoc
AOI 2	C-HEADER	11/9/2017	---	8.45	---	12.16	NYC	Static	
AOI 2	PZ-100	11/9/2017	---	16.26	---	1.81	NYC	Static	
AOI 2	PZ-101	11/9/2017	---	6.01	---	11.16	NYC	Static	
AOI 2	River1	11/9/2017	---	11.10	---		NYC	Static	at 10:00
AOI 2	RW-100	11/9/2017	18.40	18.90	0.50	2.26	NYC	Static	
AOI 2	RW-101	11/9/2017	17.96	18.35	0.39	1.76	NYC	Static	
AOI 2	RW-102	11/9/2017	14.91	14.93	0.02	2.56	NYC	Static	
AOI 2	RW-103	11/9/2017	17.30	18.05	0.75	2.62	NYC	Static	
AOI 2	RW-104	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 13.6 ft btoc
AOI 2	RW-105	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 14.45 ft btoc
AOI 2	RW-106	11/9/2017	---	7.80	---	1.50	NYC	Static	
AOI 2	RW-107	11/9/2017	---	9.76	---	0.79	NYC	Static	
AOI 2	RW-108	11/9/2017	---	7.68	---	2.22	NYC	Static	
AOI 2	RW-109	11/9/2017	---	7.52	---	2.33	NYC	Static	
AOI 2	RW-113	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 20.4 ft btoc
AOI 2	RW-114	11/9/2017	11.74	11.74	<0.01	1.28	NYC	Static	
AOI 2	RW-115	11/9/2017	---	8.88	---	1.32	NYC	Static	
AOI 2	RW-116	11/9/2017	---	9.27	---	1.54	NYC	Static	
AOI 2	RW-117	11/9/2017	8.08	8.35	0.27	1.67	NYC	Static	
AOI 2	RW-118	11/9/2017	---	10.15	---	1.67	NYC	Static	
AOI 2	RW-119	11/9/2017	11.20	11.20	<0.01	1.66	NYC	Static	
AOI 2	RW-120	11/9/2017	---	11.98	---	1.60	NYC	Static	
AOI 2	RW-121	11/9/2017	---	13.69	---	1.61	NYC	Static	
AOI 2	RW-122	11/9/2017	---	8.55	---	1.69	NYC	Static	
AOI 2	RW-123	11/9/2017	---	8.32	---	1.65	NYC	Static	
AOI 2	RW-124	11/9/2017	---	7.34	---	1.82	NYC	Static	
AOI 2	RW-125	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 20.95 ft btoc
AOI 2	RW-126	11/9/2017	---	7.51	---	1.72	NYC	Static	
AOI 2	RW-127	11/9/2017	---	12.38	---	1.52	NYC	Static	
AOI 2	RW-128	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 20.4 ft btoc
AOI 2	RW-129	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 20.6 ft btoc
AOI 2	RW-600	11/9/2017	---	5.74	---	3.31	NYC	Static	
AOI 2	RW-601	11/9/2017	---	9.53	---	2.15	NYC	Static	
AOI 2	S-48	11/9/2017	19.83	20.05	0.22	1.40	NYC	Static	
AOI 2	S-62	11/9/2017	---	18.86	---	2.52	NYC	Static	
AOI 2	S-63	11/9/2017	NM	NM	NM	NM	NYC	Static	
AOI 2	S-64	11/9/2017	---	6.75	---	3.81	NYC	Static	
AOI 2	S-65	11/9/2017	---	10.06	---	0.56	NYC	Static	wick in well
AOI 2	S-91	11/9/2017	---	19.50	---	3.63	NYC	Static	
AOI 2	S-92	11/9/2017	12.92	12.93	0.01	7.15	NYC	Static	
AOI 2	S-93	11/9/2017	---	16.31	---	1.94	NYC	Static	

Table 2  
Fourth Quarter 2017 Gauging Data  
Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC

AOI	Well ID	Date	Depth to LNAPL (feet btoc)	Depth to Water (feet btoc)	Apparent LNAPL Thickness (feet)	Corrected Groundwater Elevation (ft NAVD 88)	Well Classification	Static or Pumping	Comments
AOI 2	S-130	11/9/2017	19.30	19.30	<0.01	3.19	NYC	Static	
AOI 2	S-131	11/9/2017	---	14.77	---	3.99	NYC	Static	
AOI 2	S-132	11/9/2017	---	17.30	---	3.73	NYC	Static	
AOI 2	S-133	11/9/2017	---	17.86	---	4.16	NYC	Static	
AOI 2	S-134	11/9/2017	---	20.14	---	1.89	NYC	Static	
AOI 2	S-135	11/9/2017	20.09	23.33	3.24	2.65	NYC	Static	
AOI 2	S-136	11/9/2017	---	17.15	---	3.44	NYC	Static	
AOI 2	S-137	11/9/2017	---	15.34	---	4.70	NYC	Static	
AOI 2	S-138	11/9/2017	NM	NM	NM	NM	NYC	Static	
AOI 2	S-139	11/9/2017	---	19.47	---	1.99	NYC	Static	
AOI 2	S-140	11/9/2017	NM	NM	NM	NM	NYC	Static	well destroyed
AOI 2	S-141	11/9/2017	19.97	19.99	0.02	1.95	NYC	Static	
AOI 2	S-142	11/9/2017	18.93	19.22	0.29	0.87	NYC	Static	
AOI 2	S-143	11/9/2017	NM	NM	NM	NM	NYC	Static	well damaged
AOI 2	S-156	11/9/2017	---	17.32	---	3.52	NYC	Static	
AOI 2	S-157	11/9/2017	16.03	16.04	0.01	3.91	NYC	Static	
AOI 2	S-159	11/9/2017	16.14	16.15	0.01	2.73	NYC	Static	
AOI 2	S-165	11/9/2017	---	16.77	---	1.34	unconfined	Static	
AOI 2	S-166	11/9/2017	---	16.72	---	1.51	unconfined	Static	
AOI 2	S-174	11/9/2017	10.32	10.60	0.28	9.26	NYC	Static	
AOI 2	S-175	11/9/2017	17.63	18.58	0.95	2.28	NYC	Static	
AOI 2	S-176	11/9/2017	---	11.23	---	8.90	NYC	Static	
AOI 2	S-177	11/9/2017	NA	NA	NA	NA	unconfined	Static	no access-area flooded around well
AOI 2	S-178	11/9/2017	NA	NA	NA	NA	unconfined	Static	no access-area flooded around well
AOI 2	S-246A	11/9/2017	---	10.69	---	1.07	NYC	Static	
AOI 2	S-247	11/9/2017	---	10.92	---	1.17	NYC	Static	
AOI 2	S-248	11/9/2017	---	9.75	---	1.05	NYC	Static	
AOI 2	S-249	11/9/2017	---	10.50	---	2.11	NYC	Static	
AOI 2	S-251	11/9/2017	---	17.25	---	2.02	NYC	Static	
AOI 2	S-252	11/9/2017	---	17.36	---	1.93	NYC	Static	
AOI 2	S-253	11/9/2017	---	18.70	---	2.13	NYC	Static	
AOI 2	S-254	11/9/2017	19.13	19.38	0.25	1.72	NYC	Static	
AOI 2	S-303	11/9/2017	---	20.10	---	2.49	NYC	Static	
AOI 2	S-304	11/9/2017	---	15.37	---	8.81	unconfined	Static	
AOI 2	S-306	11/9/2017	---	20.74	---	1.73	NYC	Static	
AOI 2	S-313	11/9/2017	18.67	18.73	0.06	2.22	NYC	Static	
AOI 2	S-314	11/9/2017	---	18.85	---	1.85	NYC	Static	
AOI 2	S-315	11/9/2017	19.05	19.10	0.05	1.41	NYC	Static	
AOI 2	S-316	11/9/2017	---	16.02	---	4.88	NYC	Static	
AOI 2	S-317	11/9/2017	---	18.28	---	1.91	NYC	Static	
AOI 2	S-333	11/9/2017	---	12.53	---	1.20	NYC	Static	
AOI 2	S-346	11/9/2017	18.00	18.64	0.64	1.36	NYC	Static	
AOI 2	S-347	11/9/2017	17.67	18.31	0.64	1.33	NYC	Static	
AOI 2	S-348	11/9/2017	13.28	15.20	1.92	6.07	NYC	Static	
AOI 2	S-349	11/9/2017	15.00	15.25	0.25	3.58	NYC	Static	
AOI 2	S-406	11/9/2017	---	10.16	---	2.04	NYC	Static	
AOI 2	S-420	11/9/2017	---	6.68	---	2.58	NYC	Static	
AOI 2	S-425	11/9/2017	---	8.57	---	NM	unconfined	Static	
AOI 2	S-426	11/9/2017	---	5.92	---	NM	unconfined	Static	
AOI 2	S-427	11/9/2017	---	6.21	---	NM	NYC	Static	
AOI 3	RW-2	11/9/2017	11.54	12.49	0.95	-0.44	NYC	Static	
AOI 4	RW-700	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 20.9 ft btoc
AOI 4	RW-701	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 20.3 ft btoc
AOI 4	RW-702	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 33.8 ft btoc
AOI 4	RW-703	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 29.7 ft btoc
AOI 4	RW-704	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 21.25 ft btoc
AOI 4	RW-705	11/9/2017	---	14.97	---	0.95	unconfined	Static	
AOI 4	RW-706	11/9/2017	---	15.62	---	0.27	unconfined	Static	
AOI 4	RW-707	11/9/2017	---	15.95	---	0.34	unconfined	Static	
AOI 4	RW-708	11/9/2017	---	15.23	---	0.26	unconfined	Static	
AOI 4	RW-709	11/9/2017	---	14.98	---	0.32	unconfined	Static	
AOI 4	RW-710	11/9/2017	---	15.80	---	0.08	unconfined	Static	
AOI 4	RW-711	11/9/2017	---	15.11	---	0.38	unconfined	Static	
AOI 4	RW-712	11/9/2017	---	15.26	---	0.30	unconfined	Static	



Table 2  
Fourth Quarter 2017 Gauging Data  
Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC

AOI	Well ID	Date	Depth to LNAPL (feet btoc)	Depth to Water (feet btoc)	Apparent LNAPL Thickness (feet)	Corrected Groundwater Elevation (ft NAVD 88)	Well Classification	Static or Pumping	Comments
AOI 4	RW-713	11/9/2017	---	14.80	---	0.22	unconfined	Static	
AOI 4	RW-714	11/9/2017	---	14.85	---	0.36	unconfined	Static	
AOI 4	RW-715	11/9/2017	---	15.02	---	0.35	unconfined	Static	
AOI 4	RW-716	11/9/2017	---	15.20	---	0.35	unconfined	Static	
AOI 4	RW-717	11/9/2017	---	15.20	---	0.41	unconfined	Static	
AOI 4	S-30	11/9/2017	21.57	29.15	7.58	0.56	unconfined	Static	
AOI 4	S-34	11/9/2017	---	8.60	---	12.29	unconfined	Static	
AOI 4	S-35	11/9/2017	---	20.35	---	0.59	unconfined	Static	
AOI 4	S-36	11/9/2017	---	23.77	---	0.46	unconfined	Static	
AOI 5	RWBH-1	11/9/2017	7.23	7.23	<0.01	-1.89	unconfined	Static	
AOI 5	RWBH-2	11/9/2017	3.19	5.38	2.19	0.72	unconfined	Static	
AOI 6	B-124	11/9/2017	5.32	6.86	1.54	3.36	NYC	Static	
AOI 6	B-132	11/9/2017	4.91	4.97	0.06	1.95	NYC	Static	
AOI 6	B-135	11/9/2017	---	5.03	---	1.35	NYC	Static	
AOI 6	B-136	11/9/2017	4.64	4.65	0.01	4.51	NYC	Static	
AOI 6	B-137	11/9/2017	4.62	5.75	1.13	3.96	NYC	Static	
AOI 6	B-139	11/9/2017	NM	NM	NM	NM	NYC	Static	well damaged
AOI 6	B-142	11/9/2017	7.13	8.02	0.89	2.49	NYC	Static	
AOI 6	B-143	11/9/2017	5.36	6.25	0.89	3.50	NYC	Static	
AOI 6	B-147	11/9/2017	6.31	6.48	0.17	2.57	NYC	Static	
AOI 7	River4	11/9/2017	NA	NA	NA	NA	NYC	Static	not accessible-bulkhead construction
AOI 7	RW-801	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 18.8 ft btoc
AOI 7	RW-802	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 19.85 ft btoc
AOI 7	RW-803	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 22.1 ft btoc
AOI 7	RW-804	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 20 ft btoc
AOI 7	RW-805	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 17.3 ft btoc
AOI 7	RW-806	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 20.4 ft btoc
AOI 7	RW-807	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 18.85 ft btoc
AOI 7	RW-808	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 18.15 ft btoc
AOI 7	RW-809	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 19.8 ft btoc
AOI 7	RW-810	11/9/2017	NM	NM	NM	NM	NYC	Pumping	top of pump at 14.2 ft btoc
AOI 8	N-137	11/13/2017	17.84	18.08	0.24	7.71	unconfined	Static	changed out wick
AOI 8	N-138	11/13/2017	27.53	27.87	0.34	7.70	unconfined	Static	reinstalled wick in well
AOI 8	N-139	11/13/2017	27.28	27.69	0.41	7.63	unconfined	Static	reinstalled wick in well
AOI 8	N-142	11/13/2017	26.96	27.12	0.16	7.58	unconfined	Static	reinstalled wick in well
AOI 8	N-144	11/13/2017	---	26.58	---	7.70	unconfined	Static	
AOI 8	N-145	11/13/2017	---	18.43	---	7.56	unconfined	Static	
AOI 8	N-146	11/13/2017	17.96	18.85	0.89	8.27	unconfined	Static	
AOI 8	N-155	11/13/2017	---	26.65	---		lower aquifer	Static	
AOI 8	River2	11/13/2017	NA	NA	NA	NA	NYC	Static	not accessible, fenced off, need preplan to enter
AOI 8	RW-200	11/13/2017	---	6.25	---	5.77	unconfined	Static	
AOI 8	RW-201	11/13/2017	23.17	23.66	0.49	8.75	unconfined	Static	
AOI 8	RW-202	11/13/2017	---	20.69	---	8.82	unconfined	Static	
AOI 8	RW-203	11/13/2017	22.81	23.04	0.23	8.27	unconfined	Static	
AOI 8	RW-204	11/13/2017	19.53	20.99	1.46	8.89	unconfined	Static	
AOI 8	RW-205	11/13/2017	19.42	22.13	2.71	10.01	unconfined	Static	
AOI 8	RW-206	11/13/2017	21.51	23.53	2.02	9.21	unconfined	Static	
AOI 8	RW-300	11/13/2017	15.47	15.73	0.26	6.13	lower aquifer	Static	
AOI 8	RW-301	11/13/2017	---	12.52	---	9.89	unconfined	Static	
AOI 8	RW-302	11/13/2017	---	13.80	---	10.29	unconfined	Static	
AOI 8	RW-303	11/13/2017	---	14.56	---	10.42	unconfined	Static	
AOI 8	RW-304	11/13/2017	---	15.27	---	10.01	unconfined	Static	
AOI 8	RW-305	11/13/2017	---	15.25	---	10.02	unconfined	Static	
AOI 8	RW-306	11/13/2017	13.33	13.34	0.01	10.25	unconfined	Static	
AOI 8	RW-307	11/13/2017	---	14.88	---	8.38	unconfined	Static	
AOI 8	RW-308	11/13/2017	---	16.91	---	8.70	unconfined	Static	
AOI 8	RW-309	11/13/2017	---	15.82	---	9.41	unconfined	Static	
AOI 8	RW-500	11/13/2017	---	2.83	---	4.73	unconfined	Static	
AOI 8	RW-501	11/13/2017	---	5.97	---	3.82	unconfined	Static	
AOI 8	RW-502	11/13/2017	8.83	9.45	0.62	3.59	unconfined	Static	
BELMONT	RW-1	11/17/2017	NA	NA	NA	NA	unconfined	Static	not accessible-vehicle on vault lid
BELMONT	RW-4	11/17/2017	---	29.42	---	1.03	NYC	Static	
BELMONT	RW-6	11/17/2017	---	27.05	---	4.01	unconfined	Static	
BELMONT	RW-7	11/17/2017	---	24.27	---	3.94	unconfined	Static	

Table 2  
Fourth Quarter 2017 Gauging Data  
Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC

AOI	Well ID	Date	Depth to LNAPL (feet btoc)	Depth to Water (feet btoc)	Apparent LNAPL Thickness (feet)	Corrected Groundwater Elevation (ft NAVD 88)	Well Classification	Static or Pumping	Comments
BELMONT	RW-15	11/17/2017	---	26.96	---	3.09	unconfined	Static	
BELMONT	RW-21	11/17/2017	NA	NA	NA	NA	unconfined	Static	no access-hinges broken on vault lid
BELMONT	RW-22	11/17/2017	---	23.08	---	3.95	unconfined	Static	
BELMONT	RW-23	11/17/2017	23.20	23.29	0.09	3.91	NYC	Static	
BELMONT	RW-24	11/17/2017	25.87	26.04	0.17	1.26	unconfined	Pumping	
BELMONT	RW-25	11/17/2017	26.11	26.61	0.50	3.95	NYC	Static	
BELMONT	RW-26	11/17/2017	---	25.77	---	3.44	unconfined	Static	
BELMONT	RW-27	11/17/2017	---	26.32	---	3.39	unconfined	Static	
BELMONT	RW-28	11/17/2017	---	25.22	---	4.52	unconfined	Static	
BELMONT	RW-29	11/17/2017	---	25.96	---	3.48	unconfined	Static	
BELMONT	RW-30	11/17/2017	---	25.73	---	3.66	unconfined	Static	
BELMONT	RW-31	11/17/2017	---	25.75	---	3.63	unconfined	Static	
BELMONT	RW-32	11/17/2017	---	23.00	---	6.05	unconfined	Static	
BELMONT	RW-400	11/9/2017	NM	NM	NM	NM	unconfined	Pumping	top of pump at 27.4 ft btoc

Notes:

For product thicknesses <0.01 ft, the corrected groundwater elevation was calculated using 0.01 foot.

LNAPL = Light non-aqueous phase liquid

ft = Feet

toc = Top of casing

ft btoc = Feet below top of casing

NAVD 88 = North American Vertical Datum of 1988

--- = LNAPL not present

NM = Field reading not measured and/or corrected groundwater elevation not calculated due to lack of surveyed reference elevation or down well pump.

NA = Not Accessible, Not Applicable, or Not Available

NYC = Not yet classified

# **APPENDIX 1**

## **Remediation System Recovery Data**

**Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC**  
**Groundwater and LNAPL Recovery Systems Operational Data**  
**AOI 1: Belmont Terminal Remediation System**  
**Second Half 2017**

Date	Total Flow (gallons)	Period Total Flow (gallons)	Average Flow Rate (gpm)	LNAPL Recovered in Period (gallons)	Total LNAPL Recovered (gallons)
7-Jul-17	93,034,844	63,625	6.31	0.0	253,374
13-Jul-17	93,046,468	11,624	1.35	16.6	253,391
21-Jul-17	93,094,814	48,346	4.20	0.0	253,391
26-Jul-17	93,144,484	49,670	6.90	0.0	253,391
4-Aug-17	93,285,846	141,362	10.91	91.3	253,482
11-Aug-17	93,391,756	105,910	10.51	108.1	253,590
17-Aug-17	93,470,142	78,386	9.07	0.0	253,590
24-Aug-17	93,563,231	93,089	9.24	112.5	253,703
30-Aug-17	93,666,546	103,315	11.96	58.1	253,761
8-Sep-17	93,714,586	48,040	3.71	152.1	253,913
14-Sep-17	93,739,915	25,329	2.93	122.9	254,036
21-Sep-17	93,760,281	20,366	2.02	81.4	254,117
29-Sep-17	93,801,623	41,342	3.59	32.4	254,149
6-Oct-17	93,801,623	0	0.00	0.0	254,149
12-Oct-17	93,842,998	41,375	4.79	56.6	254,206
18-Oct-17	93,850,069	7,071	0.82	0.0	254,206
27-Oct-17	93,850,069	0	0.00	0.0	254,206
2-Nov-17	93,863,890	13,821	1.60	0.0	254,206
10-Nov-17	93,863,895	5	0.00	0.0	254,206
17-Nov-17	93,888,813	24,918	2.47	0.0	254,206
22-Nov-17	93,909,228	20,415	2.84	0.0	254,206
1-Dec-17	93,944,961	35,733	2.76	0.0	254,206
8-Dec-17	93,973,897	28,936	2.87	0.0	254,206
14-Dec-17	94,064,805	90,908	10.52	0.0	254,206
22-Dec-17	94,170,315	105,510	9.16	0.0	254,206
29-Dec-17	94,273,241	102,926	10.21	0.0	254,206

**Notes:**

LNAPL: Light Non-Aqueous Phase Liquid

The Belmont Terminal systems consist of the Loading Rack system (RW-4, RW-21, RW-22, RW-23, RW-24, and RW-25) and the Frontage Road system (RW-15 and RW-26, RW-27, RW-28, RW-29, RW-30, RW-31, and RW-32). Both systems have a dedicated totalizer. During the reporting period, Loading Rack system recovery wells RW-4, RW-23, and RW-24 were active. On August 30, 2012, the Frontage Road system was turned off and remained off for the reporting period. The system will remain offline unless there is a significant increase of LNAPL in the recovery wells. The recovery wells were routinely gauged, and no product was detected during the second half of 2017.

The Belmont Terminal Remediation System was operational during the reporting period with the following exceptions:

- From April 4 through July 26, RW-24 was off due to access issues and product pump failure. On July 26, the product pump was replaced and the well was returned to service. While the RW-24 pump was not operational, the flow meter underreported the flow rate of the recovered groundwater from the Loading Rack system due to insufficient flow through the flow meter.
- From September 8 through December 8, RW-23 was not operational. On December 8, the submersible pump motor was replaced and the well was returned to service.

**Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC**  
**AOI 1: Shunk Street Sewer Ventilation System and Biofilter**  
**Organic Vapor Concentrations**

**Second Half 2017**

Date	Flow Rate (CFM)	Sewer Air PID (ppm)	Total Flow PID (ppm)	Treatment Cell Effluent PID (ppm)			Treatment Cell Media Temperature (°F)		
				Cell #1	Cell #2	Cell #3	Cell #1	Cell #2	Cell #3
7-Jul-17	3,700	0	0	0	0	0	75	75	75
13-Jul-17	3,700	1	1	0	0	0	86	86	86
21-Jul-17	3,700	1	1	0	0	0	80	80	80
26-Jul-17	3,700	0	0	0	0	0	78	78	78
4-Aug-17	3,700	0	0	0	0	0	86	86	86
11-Aug-17	3,700	1	1	0	0	0	80	80	80
17-Aug-17	3,700	0	0	0	0	0	74	74	74
24-Aug-17	3,700	1	1	0	0	0	78	78	78
30-Aug-17	3,700	2	2	0	0	0	76	76	76
8-Sep-17	3,700	1	1	0	0	0	78	78	78
14-Sep-17	3,700	0	0	0	0	0	80	80	80
21-Sep-17	3,700	0	0	0	0	0	80	80	80
29-Sep-17	3,700	0	0	0	0	0	74	74	74
6-Oct-17	3,700	0	0	0	0	0	74	74	74
12-Oct-17	3,700	0	0	0	0	0	72	72	72
20-Oct-17	3,700	1	1	0	0	0	74	74	74
27-Oct-17	3,700	1	1	0	0	0	75	75	75
2-Nov-17	3,700	0	0	0	0	0	70	70	70
10-Nov-17	3,700	0	0	0	0	0	70	70	70
17-Nov-17	3,700	0	0	0	0	0	68	68	68
22-Nov-17	3,700	0	0	0	0	0	66	66	66
1-Dec-17	3,700	0	0	0	0	0	68	68	68
8-Dec-17	3,700	0	0	0	0	0	63	63	63
14-Dec-17	3,700	0	0	0	0	0	63	63	63
22-Dec-17	3,700	0	0	0	0	0	60	60	60
29-Dec-17	3,700	0	0	0	0	0	60	60	60
5-Jan-18	3,700	0	0	0	0	0	60	60	60

**Notes:**

CFM: cubic feet per minute

ppm: parts per million

°F: Degrees Fahrenheit

Vapor concentrations are collected using a MultiRAE Lite Photoionization Detector (PID).

The Sewer Air reading is collected from the Shunk Street sewer air stream only.

The air stripper was taken offline on June 17, 2004; therefore, the Total Flow is equal to the Sewer Air reading.

The system was operational for the reporting period with the following exception:

- On September 8, the system was off while the belt for the blower was replaced. Upon completion of the preventative maintenance, the system was returned to service.

**Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC**  
**AOI 1: Shunk Street Sewer Ventilation System and Biofilter**  
**pH Data**  
**Second Half 2017**

Date	Leachate pH	Biofilter Treatment Cell - Soil pH		
		Cell 1	Cell 2	Cell 3
26-Jul-17	6.75	NM	NM	NM
30-Aug-17	6.89	NM	NM	NM
29-Sep-17	NA	6.79	6.79	6.53
12-Oct-17	NA	NM	NM	NM
22-Nov-17	NA	NM	NM	NM
14-Dec-17	7.30	6.88	6.71	6.55

**NOTES:**

Leachate pH readings are collected on a monthly basis when leachate is present.

Media pH readings are collected on a quarterly basis.

NA = No leachate available to record pH.

NM = Not Measured

The system was operational for the reporting period with the following exception:

- On September 8, the system was off while the belt for the blower was replaced. Upon completion of the preventative maintenance, the system was returned to service.

**Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC**  
**Total Fluids Recovery System Operational Data**  
**AOI 1: 26th Street Remediation System**  
**Second Half 2017**

Date	Total Flow (gallons)	Period Total Flow (gallons)	Calculated System Flow Rate (gpm)	LNAPL Recovered in Period (gallons)	Total LNAPL Recovered (gallons)
7-Jul-17	77,571,166	359,510	27.74	NA	9,148.60
12-Jul-17	77,780,470	209,304	29.07	NA	9,148.60
20-Jul-17	78,074,575	294,106	25.53	NA	9,148.60
25-Jul-17	78,379,567	304,992	42.36	NA	9,148.60
3-Aug-17	78,927,646	548,078	42.29	NA	9,148.60
9-Aug-17	79,198,596	270,950	31.36	NA	9,148.60
16-Aug-17	79,565,609	367,013	36.41	NA	9,148.60
22-Aug-17	79,888,918	323,309	37.42	NA	9,148.60
28-Aug-17	79,888,918	0	0.00	NA	9,148.60
4-Sep-17	79,888,918	0	0.00	NA	9,148.60
11-Sep-17	79,888,918	0	0.00	NA	9,148.60
18-Sep-17	79,888,918	0	0.00	NA	9,148.60
25-Sep-17	79,888,918	0	0.00	NA	9,148.60
2-Oct-17	79,888,918	0	0.00	NA	9,148.60
12-Oct-17	80,687,830	798,912	55.48	NA	9,148.60
19-Oct-17	80,957,369	269,539	26.74	NA	9,148.60
25-Oct-17	81,196,092	238,723	27.63	NA	9,148.60
1-Nov-17	81,554,033	357,941	35.51	NA	9,148.60
9-Nov-17	81,961,841	407,808	35.40	NA	9,148.60
17-Nov-17	82,310,666	348,826	30.28	NA	9,148.60
21-Nov-17	82,505,297	194,630	33.79	NA	9,148.60
30-Nov-17	82,912,241	406,944	31.40	NA	9,148.60
6-Dec-17	83,132,734	220,493	25.52	NA	9,148.60
13-Dec-17	83,384,734	252,000	25.00	NA	9,148.60
20-Dec-17	83,659,111	274,378	27.22	NA	9,148.60
29-Dec-17	84,011,882	352,771	27.22	NA	9,148.60

**Notes**

LNAPL: Light Non-Aqueous Phase Liquid

The Total Flow and Total LNAPL Recovered includes historical totals from former recovery wells RW-400 through RW-406.

The 26th Street Sewer Area (26th Street North) system consists of 20 total fluids recovery wells [15 wells on-site along 26th Street (S-180, S-181, S-182, S-183, S-184, S-185, S-186, S-187, S-188, S-189, S-190, S-191, S-192, RW-400, & RW-402) and five wells offsite on CSX property (S-193, S-194, S-265, S-267, & S-268)] which discharge directly to a process sewer; therefore, the volume of recoverable LNAPL cannot be quantified.

- On July 7, S-190 was not functional, the pump was reset and restarted.
- On June 20, pump for S-187 was removed for maintenance and repairs. On July 20, the pump was reinstalled and returned to service.
- On July 26, system turned off during compressor service. The system was restarted after the preventative maintenance.
- On August 24, the system was off due to compressor/electrical issues. On October 12, the system was repaired and returned to service.
- On October 12, the pump for RW-188 was not operational. The pump was removed for repair.
- On October 19, pumps in S-185 and S-188 were not operational. The pumps were reset and restarted.
- On October 25, the pump in S-188 was not operational, the pump was removed for maintenance and repair.
- On November 1, the pump for S-188 was reinstalled and returned to service. Additionally, the pump in S-184 was not operational. It was reset and restarted.
- On December 13, the pumps in S-181, S-188, and S-190 were not operational. The pumps in S-181 and S-190 were reset and restarted. The pump in S-188 was replaced.
- On December 20, the pumps in S-181, S-186, S-190, and S-192 were not operational. The pumps in S-181 and S-186 are inoperable pending maintenance and repair. The pumps in S-190 and S-192 were reset and restarted.
- On December 29, the system is off due to cold weather and air compressor operational issues. The system will be returned to service when the ambient temperature exceeds freezing point and the air compressor is repaired or replaced.

**Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC**  
**AOI 1: 26th Street & Packer Avenue Sewers Biofilter Remediation System**  
**Organic Vapor Concentrations**

**Second Half 2017**

Date	Biofilter Influent			Biofilter Effluent							
	Packer Ave. (ppm)	26 <sup>th</sup> Street (ppm)	ST-1 (Combined Influent) (ppm)	Cell-1N	Cell-1S	Cell-2N	Cell-2S	Cell-3N	Cell-3S	Cell-4N	Cell-4S
7/6/2017	0.0	1.0	1	0.0	0.0	0.0	0.0	NA	NA	NA	NA
7/12/2017	29.0	38.0	48	0.0	0.0	0.0	0.0	NA	NA	NA	NA
7/19/2017	29.0	39.0	35	0.0	0.0	0.0	0.0	NA	NA	NA	NA
7/25/2017	0.0	2.0	1	0.0	0.0	0.0	0.0	NA	NA	NA	NA
8/2/2017	0.0	3.0	3	0.0	0.0	0.0	0.0	NA	NA	NA	NA
8/8/2017	11.0	22.0	30	0.0	0.0	0.0	0.0	NA	NA	NA	NA
8/18/2017	0.0	4.0	4	0.0	0.0	0.0	0.0	NA	NA	NA	NA
8/23/2017	4.0	9.0	9	0.0	0.0	0.0	0.0	NA	NA	NA	NA
1/0/1900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
1/0/1900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
9/14/2017	10.0	2.0	19	0.0	0.0	0.0	0.0	NA	NA	NA	NA
9/21/2017	33.0	80.0	49	0.0	0.0	0.0	0.0	NA	NA	NA	NA
9/26/2017	0.0	2.0	2	0.0	0.0	0.0	0.0	NA	NA	NA	NA
10/3/2017	0.0	9.0	6	0.0	0.0	0.0	0.0	NA	NA	NA	NA
10/10/2017	0.0	8.0	9	0.0	0.0	0.0	0.0	NA	NA	NA	NA
10/17/2017	8.0	9.0	39	0.0	0.0	0.0	0.0	NA	NA	NA	NA
10/24/2017	5.0	9.0	14	0.0	0.0	0.0	0.0	NA	NA	NA	NA
11/2/2017	30.0	25.0	17	0.0	0.0	0.0	0.0	NA	NA	NA	NA
11/8/2017	0.0	8.0	5	0.0	0.0	0.0	0.0	NA	NA	NA	NA
11/17/2017	16.0	24.0	28	0.0	0.0	0.0	0.0	NA	NA	NA	NA
11/21/2017	0.0	1.0	1	0.0	0.0	0.0	0.0	NA	NA	NA	NA
11/28/2017	0.0	7.0	7	0.0	0.0	0.0	0.0	NA	NA	NA	NA
12/5/2017	0.0	4.0	4	0.0	0.0	0.0	0.0	NA	NA	NA	NA
12/12/2017	39.0	17.0	45	0.0	0.0	0.0	0.0	NA	NA	NA	NA
12/19/2017	19.0	14.0	18	0.0	0.0	0.0	0.0	NA	NA	NA	NA
12/29/2017	7.0	22.0	28	0.0	0.0	0.0	0.0	NA	NA	NA	NA

**Notes:**

ppm: parts per million

NA: Not applicable

NM: Field reading not measured due to system upgrades

Vapor concentrations are collected using a MultiRAE Lite Photoionization Detector (PID).

The system was operational for the first half of 2017 with the following exception:

- On December 19, the system was not operational due to a power failure. The system was reset and restarted.



**Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC**  
**AOI 1: 26th Street & Packer Avenue Sewers Biofilter Remediation System**  
**pH Data**

**Second Half 2017**

Date	Leachate pH	Biofilter Bed - Soil pH			
		Cell 1	Cell 2	Cell 3	Cell 4
25-Jul-17	7.99	7.28	7.24	---	---
29-Aug-17	7.63	---	---	---	---
26-Sep-17	7.76	7.19	7.33	---	---
24-Oct-17	7.35	---	---	---	---
28-Nov-17	7.19	---	---	---	---
12-Dec-17	7.23	7.22	7.28	---	---

**Notes:**

Media pH readings are collected on a quarterly basis.

Cells 3 and 4 were shut off on June 18, 2010 and remained off for the reporting period as they are not currently needed for vapor treatment.

The system was operational for the reporting period with the following exception:

- On December 19, the system was not operational due to a power failure. The system was reset and restarted.

**Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC**  
**Groundwater and LNAPL Recovery System Operational Data**  
**AOI 2: Pollock Street West End Remediation System**

Date	Period Total Flow (gallons)	Total Flow (gallons)	LNAPL Recovered in Period (gallons)	Total LNAPL Recovered (gallons)
5-Jul-17	0	30,426,205	0.0	60,642
10-Jul-17	0	30,426,205	0.0	60,642
17-Jul-17	0	30,426,205	0.0	60,642
24-Jul-17	0	30,426,205	0.0	60,642
1-Aug-17	0	30,426,205	0.0	60,642
10-Aug-17	0	30,426,205	0.0	60,642
14-Aug-17	0	30,426,205	0.0	60,642
21-Aug-17	0	30,426,205	0.0	60,642
28-Aug-17	0	30,426,205	0.0	60,642
5-Sep-17	0	30,426,205	0.0	60,642
12-Sep-17	0	30,426,205	0.0	60,642
19-Sep-17	0	30,426,205	0.0	60,642
26-Sep-17	0	30,426,205	0.0	60,642
6-Oct-17	1,300	30,427,505	0.0	60,642
9-Oct-17	15,700	30,443,205	0.0	60,642
16-Oct-17	41,200	30,484,405	0.0	60,642
23-Oct-17	37,000	30,521,405	0.0	60,642
30-Oct-17	36,900	30,558,305	0.0	60,642
6-Nov-17	38,600	30,596,905	0.0	60,642
13-Nov-17	38,400	30,635,305	0.0	60,642
20-Nov-17	34,200	30,669,505	0.0	60,642
29-Nov-17	35,800	30,705,305	0.0	60,642
4-Dec-17	0	30,705,305	0.0	60,642
11-Dec-17	0	30,705,305	0.0	60,642
18-Dec-17	0	30,705,305	0.0	60,642
29-Dec-17	0	30,705,305	0.0	60,642

**Notes:**

LNAPL: Light Non-Aqueous Phase Liquid

NM: Not Measured

The Pollock Street West End system was started on February 23, 2012. The groundwater and LNAPL recovery totals do not include historical totals from the former Pollock Street Vertical system recovery wells.

On December 19, the system was shut off to observe LNAPL recharge in wells. The system remained off during the reporting period with the following exception:

- The system was turned on October 26 to evaluate the potential to recover LNAPL in the proximity of the Pollock Street sewer outfall. Recovery wells RW-104, RW-105, RW-113, RW-125, RW-128, and RW-129 were activated. Due to a lack of recoverable LNAPL, the system was turned off November 29.

**Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC**  
**Total Fluids Recovery System Operational Data**  
**AOI 2: Pollock Street Horizontal Well Remediation System**  
**Second Half 2017**

Actual Dates in Period	Reporting Period (Internal)	Days in Period	HW-1 Days of Operation Within Period	HW-1 Water Recovered During Period (gallons)	HW-2 Days of Operation Within Period	HW-2 Water Recovered During Period (gallons)	HW-3 Days of Operation Within Period	HW-3 Water Recovered During Period (gallons)	Total Fluids Extracted During Period (gallons)	Total Fluids Extracted (gallons)	LNAPL Recovered During Period (gallons)
6/27/2017 - 7/31/2017	Jul 2017	35	Totalizer	510,200	Totalizer	32,775	35	775,152	1,318,127	97,468,835	NA
8/01/2017 - 8/22/2017	Aug 2017	22	Totalizer	422,300	Totalizer	16,380	22	487,238	925,918	98,394,753	NA
8/23/2017 - 9/18/2017	Sep 2017	27	Totalizer	407,100	Totalizer	13,646	27	597,974	1,018,720	99,413,474	NA
9/19/2017 - 9/30/2017	end 3Q2017	12	Totalizer	110,600	Totalizer	3,145	12	265,766	379,511	99,792,985	NA
9/19/2017 - 10/23/2017	Oct 2017	35	Totalizer	489,100	Totalizer	16,015	35	775,152	1,280,267	100,693,741	NA
10/24/2017 - 11/20/2017	Nov 2017	28	Totalizer	262,000	Totalizer	13,787	28	620,122	895,909	101,589,649	NA
11/21/2017 - 12/19/2017	Dec 2017	29	Totalizer	397,800	Totalizer	15,164	29	642,269	1,055,233	102,644,882	NA
12/20/2017 - 12/31/2017	end Q42017	12	Totalizer	137,000	Totalizer	4,214	12	265,766	406,980	103,051,862	NA

**Notes:**

LNAPL: Light Non-Aqueous Phase Liquid

NA: Not Applicable

Pump tests were performed in March 2011 for the horizontal wells so that recovered volumes could be estimated based on flow rates and system up-time, beginning in the second quarter of 2011. A second pump test was completed following the installation of a new pump at HW-1 on May 13, 2013. The HW-1 flow rate was estimated at 10 gallons per minute (gpm), HW-2 at 3.73 gpm, and HW-3 at 15.38 gpm. Beginning May 25, 2013, HW-1 flow is measured and reported by a totalizer. HW-2 flow is measured and reported by a totalizer as of July 6, 2015.

HW-1 was operational for the reporting period.

HW-2 was operational for the reporting period with the following exceptions:

- On August 7 and September 5, the flow meter was not operational. The meter was cleaned and returned to service. The recorded flow may be biased low due to the flow meter's status.

HW-3 was operational for the reporting period.

**Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC**  
**Groundwater and LNAPL Recovery System Operational Data**  
**AOI 4: Penrose Avenue Remediation System**  
**Second Half 2017**

Date	Period Total Flow (gallons)	Total Flow (gallons)	Average Daily Flow (gpd)	LNAPL Recovered in Period (gallons)	Total LNAPL Recovered (gallons)
06-Jul-17	42,330	17,208,000	4,233	11.6	3850.0
11-Jul-17	28,640	17,236,640	5,728	10.7	3860.7
19-Jul-17	9,980	17,246,620	1,248	2.9	3863.6
25-Jul-17	29,870	17,276,490	4,978	0.0	3863.6
02-Aug-17	41,870	17,318,360	5,234	12.2	3875.8
08-Aug-17	34,200	17,352,560	5,700	15.8	3891.6
15-Aug-17	23,730	17,376,290	3,390	10.9	3902.5
23-Aug-17	37,860	17,414,150	4,733	6.5	3909.0
29-Aug-17	38,690	17,452,840	6,448	8.2	3917.2
07-Sep-17	58,710	17,511,550	6,523	12.8	3930.0
12-Sep-17	31,780	17,543,330	6,356	7.4	3937.4
19-Sep-17	39,230	17,582,560	5,604	12.4	3949.8
25-Sep-17	27,740	17,610,300	4,623	7.9	3957.7
03-Oct-17	35,040	17,645,340	4,380	1.9	3959.6
10-Oct-17	27,960	17,673,300	3,994	20.1	3979.7
17-Oct-17	13,380	17,686,680	1,911	10.0	3989.7
24-Oct-17	29,410	17,716,090	4,201	35.8	4025.5
31-Oct-17	23,980	17,740,070	3,426	37.3	4062.8
08-Nov-17	29,370	17,769,440	3,671	53.2	4116.0
14-Nov-17	23,710	17,793,150	3,952	36.5	4152.5
21-Nov-17	31,300	17,824,450	4,471	33.8	4186.3
27-Nov-17	28,280	17,852,730	4,713	30.5	4216.8
05-Dec-17	13,580	17,866,310	1,698	55.1	4271.9
12-Dec-17	17,620	17,883,930	2,517	45.1	4317.0
19-Dec-17	12,500	17,896,430	1,786	45.7	4362.7
29-Dec-17	14,640	17,911,070	1,464	39.7	4402.4

**Notes:**

gpd: gallons per day

LNAPL: Light Non-Aqueous Phase Liquid

OWS: Oil/water separator

The Penrose Avenue Remediation System consisting of 18 recovery wells (RW-700 through RW-717) was started on March 20, 2013. Groundwater and LNAPL are extracted using pneumatic pumps, and total fluids pass through an OWS. The groundwater is discharged to the Philadelphia Water Department (PWD) sanitary sewer system along Penrose Avenue, and LNAPL is recovered in a 550-gallon storage tank.

The Penrose Avenue Remediation System was operational during the reporting period with the following exceptions:

- On July 11, the system was turned off pending the OWS cleaning.
- On July 19, the OWS was cleaned and the system was returned to service. Upon restarting the system, the flow meter not operational. The meter was removed, cleaned, and reinstalled. The system was returned to service.
- On August 15, the system was not operational due to a high water alarm for the OWS. The system was reset and returned to operation.
- On September 19, the flow meter was not operational. The meter was cleaned and reinstalled. The system was returned to service.
- On September 25, the system was not operational during OWS cleaning. The system was restarted and returned to service after the OWS maintenance.
- On October 17, RW-700 not operational, the pump was repaired and returned to service.

**Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC**  
**Biofiltration Operational Data**  
**AOI 4: Penrose Avenue Remediation System**  
**Second Half 2017**

Date	Biofilter								GAC	
	Flow Rate		Temperature		Humidity (%)	Dewpoint (°F)	Vapor Concentration		Vapor Concentration	
	Influent (CFM)	Effluent (CFM)	Influent (°F)	Effluent (°F)			Influent (ppm)	Effluent (ppm)	GAC-1 Effluent (ppm)	GAC-2 Effluent (ppm)
6-Jul-17	19.5	34.6	72	70	84.2	68.2	58	28	0	0
11-Jul-17	16.7	34.8	80	72	80.2	71.3	112	40	6	0
19-Jul-17	17.3	35.1	80	74	83.3	73.9	48	0	0	0
25-Jul-17	15.2	34.3	72	68	81.5	66.1	79	28	0	0
2-Aug-17	15.7	35.1	82	72	78.9	72	68	4	0	0
8-Aug-17	17.8	33.7	70	64	84.9	63.9	25	0	0	0
15-Aug-17	16.3	34.6	76	70	88	76	17	0	0	0
23-Aug-17	17.6	32.4	84	76	78.9	72.3	37	11	0	0
29-Aug-17	22.4	33.2	84	76	92	66.1	60	43	0	0
7-Sep-17	23.6	34.1	68	64	82.8	61.1	77	30	0	0
12-Sep-17	17.6	34.3	74	64	75.1	61.2	83	39	0	0
19-Sep-17	17.1	33.7	78	72	73.1	59.6	79	43	0	0
25-Sep-17	17.7	34.8	92	80	89.3	64.2	66	21	0	0
3-Oct-17	18.7	35.8	62	54	79.8	54.6	18	17	0	0
10-Oct-17	17.1	33.9	74	70	84.2	67.9	39	16	0	0
17-Oct-17	16.3	34.8	74	70	93.3	48.3	74	26	0	0
24-Oct-17	17.1	35	74	66	88.4	67.9	81	29	0	0
31-Oct-17	18.6	34.9	60	52	76.3	47.7	87	41	0	0
8-Nov-17	22.1	35.8	54	46	97.9	46.4	119	88	1	0
14-Nov-17	17.7	32.1	54	46	97.6	59.4	63	41	2	0
21-Nov-17	19.6	35.1	64	54	93.6	54.9	56	40	4	0
27-Nov-17	19.6	35.1	64	54	93.6	54.9	56	40	4	0
5-Dec-17	22.1	33.2	78	64	96.3	68.4	132	50	3	0.65
12-Dec-17	21.8	31.9	66	54	77.2	50.6	142	86	0	0
19-Dec-17	23.6	33.1	68	60	76.1	54.3	72	39	0	0.8

**NOTES:**

GAC = Granular activated carbon

CFM = Cubic feet per minute

°F = Degrees Fahrenheit

ppm = Parts per million

NM = Field reading not measured

Vapor concentrations are collected using a MultiRAE Lite Photoionization Detector (PID).

**Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC**  
**Recovery System Operational Data**  
**AOI 7: 3 Separator System**  
**Second Half 2017**

Date	Total Flow (gallons)	Period Total Flow (gallons)	Calculated System Flow Rate (gpm)	LNAPL Recovered in Period (gallons)	Total LNAPL Recovered (gallons)
5-Jul-17	18,926,585	77,300	107.36	4.7	112,351.9
10-Jul-17	18,973,185	46,600	64.72	2.4	112,354.3
18-Jul-17	19,043,185	70,000	97.22	2.4	112,356.6
24-Jul-17	19,089,885	46,700	64.86	0.0	112,356.6
31-Jul-17	19,157,085	67,200	93.33	9.6	112,366.3
7-Aug-17	19,223,685	66,600	92.50	29.6	112,395.9
14-Aug-17	19,281,585	57,900	80.42	2.5	112,398.4
22-Aug-17	19,341,585	60,000	83.33	20.3	112,418.8
28-Aug-17	19,391,885	50,300	69.86	2.6	112,421.3
7-Sep-17	19,462,085	70,200	97.50	16.3	112,437.6
11-Sep-17	19,514,085	52,000	72.22	11.7	112,449.3
18-Sep-17	19,565,985	51,900	72.08	2.6	112,451.9
26-Sep-17	19,629,885	63,900	88.75	17.0	112,468.9
2-Oct-17	19,658,485	28,600	39.72	3.1	112,472.0
10-Oct-17	19,701,085	42,600	59.17	4.7	112,476.7
16-Oct-17	19,737,185	36,100	50.14	4.9	112,481.6
24-Oct-17	19,788,385	51,200	71.11	5.0	112,486.6
30-Oct-17	19,823,785	35,400	49.17	8.6	112,495.2
7-Nov-17	19,885,185	61,400	85.28	3.5	112,498.7
14-Nov-17	19,930,785	45,600	63.33	5.4	112,504.1
20-Nov-17	19,962,985	32,200	44.72	7.4	112,511.5
29-Nov-17	20,011,685	48,700	67.64	9.5	112,521.1
6-Dec-17	20,042,285	30,600	42.50	1.9	112,523.0
11-Dec-17	20,064,385	22,100	30.69	3.9	112,526.9
20-Dec-17	20,102,985	38,600	53.61	0.0	112,526.9
29-Dec-17	20,136,885	33,900	47.08	0.0	112,526.9

**Notes:**

gpm: gallons per minute

LNAPL: Light Non-Aqueous Phase Liquid

OWS: Oil/water separator

The 3 Separator System is a hydraulic control system constructed of ten recovery wells (RW-801 through RW-810) which was started on August 23, 2012. Groundwater and LNAPL are extracted using pneumatic submersible pumps, and total fluids pass through an OWS. Water is discharged to an on-site process sewer, and LNAPL is recovered in a tank and recycled by the refinery.

The system was operational for the reporting period with the exception of the following:

- On July 18, RW-807 was not operational. The pump was serviced and returned to operation.
- On August 14, RW-802 not operational. The pump was removed, replaced with a spare pump, and the well was returned to service.
- On September 1, the system was turned off during scheduled oil water separator cleaning. The system was returned to service.
- On September 5, RW-801 was not operational. The well was to service with a repaired pump.
- On October 2, RW-802 was not operational. The pump was removed for cleaning and maintenance.
- On October 10, the pump for RW-802 was reinstalled and the well was returned to service.
- On December 20, RW-807 was not operational due to the cold weather conditions. The well will be returned to service upon warmer weather conditions.

**Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC**  
**AOI 8: Jackson Street Sewer Water Curtain**  
**Second Half 2017**

Date	PID readings (ppm)			Comments
	Blower	Water Curtain	Interceptor Chamber	
06-Jul-17	NA	0.0	0.0	
10-Jul-17	NA	0.0	0.0	
20-Jul-17	NA	0.0	0.0	
24-Jul-17	NA	0.0	0.0	
04-Aug-17	NA	0.0	0.0	
09-Aug-17	NA	0.0	0.0	
16-Aug-17	NA	0.0	0.0	
23-Aug-17	NA	0.0	0.0	
31-Aug-17	NA	0.0	0.0	
08-Sep-17	NA	0.0	0.0	
14-Sep-17	NA	0.0	0.0	
22-Sep-17	NA	0.0	0.0	
29-Sep-17	NA	0.0	0.0	
06-Oct-17	NA	0.0	0.0	
11-Oct-17	NA	0.0	0.0	
20-Oct-17	NA	0.0	0.0	
25-Oct-17	NA	0.0	0.0	
02-Nov-17	NA	0.0	0.0	
09-Nov-17	NA	0.0	0.0	
13-Nov-17	NA	0.0	0.0	
22-Nov-17	NA	0.0	0.0	
29-Nov-17	NA	0.0	0.0	
07-Dec-17	NA	0.0	0.0	
15-Dec-17	NA	0.0	0.0	
20-Dec-17	NA	0.0	0.0	
29-Dec-17	NA	0.0	0.0	

**NOTES:**

PID: Photoionization detector

ppm: parts per million

NA: Not Available (PID readings are not collected at the blower.)

Vapor concentrations are collected using a MultiRAE Lite PID.

The totalizer was removed on December 11, 2009.

The system was operational for the reporting period.