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

January 31, 2018

Mr. Richard Staron, 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 2018

Dear Mr. Staron:

This semi-annual summary report is 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, 2018 and December 31, 2018. 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 AOIs. The Complex has since entered into the Pennsylvania One Cleanup Program. On November 30, 2011, Sunoco submitted the 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. Remediation of Sunoco's/Atlantic's historic environmental liabilities at the PES Complex and Belmont Terminal will be managed moving forward by Evergreen. Environmental liabilities following the September 8, 2012 purchase and transfer of the Philadelphia Refinery to PES are managed by PES.

Evergreen will continue to submit the required documentation and implement remedial obligations. Evergreen will submit a report with the O&M summary and Act 2 submittal updates 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 – Point Breeze Refinery No. 1 Tank Farm and No. 2 Tank Farm; and Belmont Terminal

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 26th Street North Remediation System study and the S-50 Area (26th 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 26th Street North Remediation System data analysis as well as the 26th 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 2018

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 31, 2018 and November 28, 2018, 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 a PES process sewer. LNAPL thicknesses are monitored, 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 pumped out and recycled on an as needed basis. During the reporting period the pumps in RW-4, RW-23, RW-24, and RW-25 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.** Totals of 3,365,391 gallons of groundwater and 145.1 gallons of LNAPL were recovered by this system during the second half of 2018.

Shunk Street Sewer Ventilation System and Biofilter – Operation During the Second Half of 2018

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 2018 can be found in **Appendix 1**.

26th Street Sewer Area – System Performance and Operation During the Second Half of 2018

26th Street North Remediation System:

The 26th Street North Remediation system was modified in 2015 to increase the overall effectiveness of the system and was restarted on October 12, 2015. 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 pump.

The 26th Street North Remediation System was operational during the reporting period. Details for the 26th Street Sewer North Remediation System performance data and operational status can be found in **Appendix 1**. A total of 9,666,446 gallons of total fluids was recovered by this system during the second half of 2018.

26th Street South Remediation System:

A biologically active aerobic barrier utilizing a thirty-point oxygen injection system, referred to as the 26th St. South Remediation System, was installed in 2009 to minimize the migration of soluble phase contaminants. Due to the presence of LNAPL within the capture zone, the 26th Street South Remediation System was shut off on August 22, 2014. The system remained off for the second half of 2018. 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 2018

The 26th Street and Packer Avenue Sewers Biofilter Remediation System consists of three 14,000 cubic feet per minute (CFM)) blowers and four treatment beds. The system was designed to ventilate/extract petroleum hydrocarbon vapors from the Packer Avenue/Pollock Street and 26th Street Intercepting Sewers and remove volatile organic compounds (VOCs) from the effluent air stream by sorption and biological degradation.

The system was operational during the second half of 2018. Details for the 26th Street and Packer Avenue Sewer Biofilter system performance data and operational status can be found in **Appendix 1**.

AOI 2 – Point Breeze Refinery

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 2018

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 (OWS). 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. During the first half of 2018 the system was turned on for maintenance and focused LNAPL removal. The system was off during the second half of 2018. Operational and performance data can be found in **Appendix 1**.

Pollock Street Vertical Well Remediation System – Operation During the Second Half of 2018

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 2018

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 16th Street in the first quarter of 2006. Groundwater and LNAPL from the horizontal wells discharge directly into onsite process sewers.

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 6,032,528 gallons of total fluids was recovered by the Pollock Street Horizontal Well Remediation System during the reporting period.

Pollock Street Sewer Outfall – Operation During the Second Half of 2018

The Pollock Street Sewer outfall is checked by PES personnel and 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 2018 due to the absence of recoverable oil in the outfall.

Short Pier Remediation System – Operation During the Second Half of 2018

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 and findings are recorded. Evergreen has not been notified of any observed LNAPL at the outfall during the second half of 2018.

AOI 3 – Point Breeze Refinery, Impoundment Area

There are no groundwater or LNAPL remediation systems operated by Evergreen 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.

Evergreen is aware that PES conducted some remedial activities in this area during the second half of 2018 related to an underground line leak. Information concerning these activities should be obtained from PES.

AOI 4 – Point Breeze Refinery, 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. Five off-site monitoring wells (S-374, S-375, S-376, S-377, and S-378) were installed during November 2018. A RIR Addendum is expected to be submitted in 2019.

Penrose Avenue Remediation System – Operation During the Second Half of 2018

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. LNAPL thicknesses are monitored, and pumps are turned on/off as needed based on recoverable LNAPL accumulations in each recovery well. On February 21, 2018 pumps were installed in S-221, S-236, and S-237 to address LNAPL in those wells. From May 5, 2018 through September 6, 2018 the Penrose Avenue Remediation system was not operational during system upgrades. In addition to configuration changes to improve the access and safety for operation of the system, a Falco catalytic oxidizer was installed and the OWS was replaced. The presence of LNAPL in S-221, S-236, and S-237 will be evaluated to determine the continued operation of the wells.

During the system upgrade in the second half of 2018, iSOC® oxygen delivery equipment was installed in RW-706, RW-709, RW-711, RW-712, RW-713, RW-714, and RW-715. The equipment infuses oxygen into the groundwater to enhance natural attenuation of petroleum hydrocarbons. Operation of the iSOC equipment is in the shakedown and configuration stage including the collection of field groundwater parameters. Equipment details and reporting of the performance data and operational status will be included in future reports following the completion of system start up and commissioning.

Following the upgrades, the LNAPL remediation system was turned on September 6, 2018 and operated the remainder of reporting period. Total fluids pumping was active at recovery wells RW-700, RW-701, RW-702, RW-703, RW-704, S-221, S-236, and S-237. System performance data and operational status for the Penrose Avenue Remediation System can be found in **Appendix 1**. A total of 872,100 gallons of groundwater and 189 gallons of LNAPL were recovered by the Penrose Avenue Remediation System during the reporting period.

S-30 and S-36 Remediation Systems – Operation During the Second Half of 2018

Recovery wells S-34, S-35, and S-36 remained offline in 2018. On March 28, 2018 recovery well S-30 was activated due to an accumulation of LNAPL. The S-30 Remediation System consists of an LNAPL pump, probe assembly, and control panel. The recovered LNAPL is stored in a 2,500-gallon holding tank, the contents of which are recycled by the PES Complex on an as needed basis. System performance data and operational status can be found in **Appendix 1**. A total of 188.8 gallons of LNAPL were recovered by the S-30 LNAPL Remediation System during the reporting period.

AOI 5 – Girard Point Refinery, 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 2018

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

AOI 6 – Girard Point Refinery, 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 and was approved by the PADEP on February 26, 2018.

27 Pump House Remediation System – Operation During the Second Half of 2018

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 Refinery, 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. The RIR was approved in correspondence dated August 30, 2017.

3 Separator Remediation System – Operation During the Second Half of 2018

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 Refinery 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 PES Complex. In 2013, PES assumed primary responsibility for the 3 Separator System due to the newer PES releases from the sewer system, which connects 137 Unit to the No. 4 separator, in the vicinity of the No. 3 separator.

The 3 Separator Remediation System was operational during the second half of 2018. System operation details and performance data for the system can be found in **Appendix 1**. A total of 1,611,993 gallons of groundwater and 647.4 gallons of LNAPL were recovered by the 3 Separator Remediation System during the second half of 2018.

AOI 8 – Point Breeze Refinery, 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. PADEP issued an approval letter on March 22, 2018.

Northern Boundary/Verizon Area

The northern boundary of AOI 8 near the South District Work Center of Verizon Pennsylvania, LLC (Verizon SDWC) property is being evaluated for offsite impacts and potential system installation. An assessment of vapor intrusion was completed at the Verizon SDWC Property and was reported in the December 2017 RIR. Ambient and indoor

air samples collected within AOI 8 and at the adjacent Verizon SDWC property did not exceed the EPA Region III Regional Screening Levels for Industrial Air (RSL).

In the second half of 2018, Evergreen evaluated the feasibility of LNAPL recovery as a remedial option near the adjacent Verizon SDWC Property. Additional pilot testing activities for remediation options other than LNAPL recovery will be conducted in this area in 2019.

PGW Border Remediation System – Operation During the Second Half of 2018

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 Remediation System area is being further evaluated for LNAPL recovery as a part of Site Wide Cleanup Plan activities.

Jackson Street Sewer Remediation System – Operation During the Second Half of 2018

The Jackson Street Sewer Remediation System consists of two components, an inactive total fluids system with submersible pumps that formerly recovered groundwater and LNAPL (Jackson Street System) and a vapor suppression water curtain installed in the Jackson Street Sewer Remediation System (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 Water Curtain was operational during the second half of 2018 and is monitored weekly. Vapor readings are collected at the water curtain and at the intercepting chamber along 26th Street. System data and operational status for the second half of 2018 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 (28th and McKean Streets) complaint. No complaints regarding sewer odors were received during the second half of 2018.

Evergreen will continue to operate the Jackson Street Water Curtain and report performance information in semi-annual Philadelphia Refinery Remediation Status Reports. Details regarding plans to maintain this vapor mitigation system will be included in a future Act 2 deliverable.

North Yard Bulkhead and No. 3 Tank Farm Separator Remediation System – Operation During the Second Half of 2018

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 due to lack of offsite wells. Evergreen has obtained information from

existing offsite wells and during October and November 2018, completed the installation of five offsite monitoring wells (S-146SRTF, S-147SRTF, S-148SRTF, S-149SRTF, S-150SRTF).

AOI 10 – Point Breeze Refinery, 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 groundwater sampling of select 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. Evergreen expects to develop a point of compliance well list for quarterly gauging and sampling during 2019 which will replace the current monitoring program.

Liquid level measurements collected during the third quarter of 2018 are provided in **Table 1**. The fourth quarter 2018 liquid level measurements are provided in **Table 2** of this report.

Please contact me at (302) 477-1305 or 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 2018 Gauging Data
Table 2 – Fourth Quarter 2018 Gauging Data
Appendix 1 – Remediation System Recovery Data

cc: Mr. Paul Gotthold
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Philadelphia, Pennsylvania 19103

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Philadelphia Water Department
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File: ENFOS

TABLES

Table 1
Third Quarter 2018 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	S-179	8/30/2018	---	19.13	---	5.40	unconfined	Static	
AOI 1	S-180	8/30/2018	---	18.20	---	4.00	unconfined	Static	
AOI 1	S-181	8/30/2018	---	18.77	---	4.09	NYC	Static	
AOI 1	S-182	8/30/2018	---	18.84	---	4.16	unconfined	Pumping	
AOI 1	S-183	8/30/2018	---	19.28	---	4.20	unconfined	Pumping	
AOI 1	S-184	8/30/2018	---	18.93	---	4.55	unconfined	Pumping	
AOI 1	S-185	8/30/2018	---	19.35	---	4.53	unconfined	Pumping	
AOI 1	S-186	8/30/2018	---	19.72	---	4.64	unconfined	Pumping	
AOI 1	S-187	8/30/2018	---	19.88	---	4.63	unconfined	Static	
AOI 1	S-188	8/30/2018	---	20.11	---	4.71	unconfined	Pumping	
AOI 1	S-189	8/30/2018	---	21.11	---	4.68	unconfined	Pumping	
AOI 1	S-190	8/30/2018	---	20.93	---	4.64	NYC	Pumping	
AOI 1	S-191	8/30/2018	---	21.18	---	4.65	unconfined	Pumping	
AOI 1	S-192	8/30/2018	---	21.35	---	4.67	unconfined	Pumping	
AOI 1	S-400	8/30/2018	---	23.50	---	8.19	lower aquifer	Static	
AOI 1	S-402	8/30/2018	---	17.65	---	15.80	NYC	Static	
AOI 2	River1	8/20/2018	---	7.90	---	NM	NYC	Static	at 11:00
AOI 2	RW-100	8/20/2018	17.53	17.75	0.22	3.17	NYC	Static	
AOI 2	RW-101	8/20/2018	16.70	16.73	0.03	3.07	NYC	Static	
AOI 2	RW-102	8/20/2018	14.02	14.11	0.09	3.44	NYC	Static	
AOI 2	RW-103	8/20/2018	16.65	17.42	0.77	3.27	NYC	Static	
AOI 2	RW-104	8/20/2018	---	5.60	---	3.36	NYC	Static	
AOI 2	RW-105	8/20/2018	7.14	7.14	<0.01	1.55	NYC	Static	
AOI 2	RW-106	8/20/2018	---	6.43	---	2.87	NYC	Static	
AOI 2	RW-107	8/20/2018	---	8.00	---	2.55	NYC	Static	
AOI 2	RW-108	8/20/2018	---	6.78	---	3.12	NYC	Static	
AOI 2	RW-109	8/20/2018	---	6.52	---	3.33	NYC	Static	
AOI 2	RW-113	8/20/2018	---	7.66	---	2.57	NYC	Static	
AOI 2	RW-114	8/20/2018	---	10.28	---	2.73	NYC	Static	
AOI 2	RW-115	8/20/2018	---	7.50	---	2.70	NYC	Static	
AOI 2	RW-116	8/20/2018	---	7.97	---	2.84	NYC	Static	
AOI 2	RW-117	8/20/2018	6.95	6.99	0.04	2.83	NYC	Static	
AOI 2	RW-118	8/20/2018	---	8.83	---	2.99	NYC	Static	
AOI 2	RW-119	8/20/2018	9.97	9.97	<0.01	2.89	NYC	Static	
AOI 2	RW-120	8/20/2018	---	10.32	---	3.26	NYC	Static	
AOI 2	RW-121	8/20/2018	---	12.46	---	2.84	NYC	Static	
AOI 2	RW-122	8/20/2018	---	7.38	---	2.86	NYC	Static	
AOI 2	RW-123	8/20/2018	---	7.10	---	2.87	NYC	Static	
AOI 2	RW-124	8/20/2018	---	6.23	---	2.93	NYC	Static	
AOI 2	RW-125	8/20/2018	---	11.71	---	2.56	NYC	Static	
AOI 2	RW-126	8/20/2018	---	6.35	---	2.88	NYC	Static	
AOI 2	RW-127	8/20/2018	---	11.05	---	2.85	NYC	Static	
AOI 2	RW-128	8/20/2018	6.64	7.07	0.43	1.73	NYC	Static	
AOI 2	RW-129	8/20/2018	---	7.48	---	2.35	NYC	Static	
AOI 2	S-64	8/20/2018	---	5.69	---	4.87	NYC	Static	
AOI 2	S-65	8/20/2018	8.10	8.10	<0.01	2.53	NYC	Static	
AOI 2	S-93	8/20/2018	15.38	15.38	<0.01	2.88	NYC	Static	
AOI 2	S-313	8/20/2018	---	18.02	---	2.88	NYC	Static	
AOI 2	S-315	8/20/2018	---	18.30	---	2.17	NYC	Static	
AOI 2	S-316	8/20/2018	NM	NM	NM	NM	NYC	Static	unable to access
AOI 2	S-406	8/20/2018	---	9.27	---	2.93	NYC	Static	
AOI 2	S-420	8/20/2018	---	6.31	---	2.95	NYC	Static	
AOI 3	RW-2	8/21/2018	10.89	10.91	0.02	0.40	NYC	Static	
AOI 3	S-283	8/31/2018	10.30	12.95	2.65	0.15	NYC	Static	
AOI 3	S-382	8/31/2018	16.43	19.40	2.97	3.08	NYC	Static	
AOI 3	S-414	8/31/2018	21.27	23.96	2.69	0.53	NYC	Static	

Table 1
Third Quarter 2018 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-700	8/21/2018	---	17.06	---	0.95	unconfined	Pumping	
AOI 4	RW-701	8/21/2018	---	17.22	---	1.05	unconfined	Pumping	
AOI 4	RW-702	8/21/2018	---	1.41	---	19.55	unconfined	Pumping	
AOI 4	RW-703	8/21/2018	---	19.73	---	0.89	unconfined	Pumping	
AOI 4	RW-704	8/21/2018	---	17.75	---	2.48	unconfined	Pumping	
AOI 4	RW-705	8/21/2018	---	14.55	---	1.37	unconfined	Static	
AOI 4	RW-706	8/21/2018	---	14.92	---	0.97	unconfined	Static	
AOI 4	RW-707	8/21/2018	---	15.28	---	1.01	unconfined	Static	
AOI 4	RW-708	8/21/2018	14.49	14.42	-0.07	1.01	unconfined	Static	
AOI 4	RW-709	8/21/2018	---	14.25	---	1.05	unconfined	Static	
AOI 4	RW-710	8/21/2018	---	15.12	---	0.76	unconfined	Static	
AOI 4	RW-711	8/21/2018	---	14.45	---	1.04	unconfined	Static	
AOI 4	RW-712	8/21/2018	---	14.75	---	0.81	unconfined	Static	
AOI 4	RW-713	8/21/2018	---	13.95	---	1.07	unconfined	Static	
AOI 4	RW-714	8/21/2018	---	14.16	---	1.05	unconfined	Static	
AOI 4	RW-715	8/21/2018	---	14.35	---	1.02	unconfined	Static	
AOI 4	RW-716	8/21/2018	---	14.52	---	1.03	unconfined	Static	
AOI 4	RW-717	8/21/2018	---	14.53	---	1.08	unconfined	Static	
AOI 4	S-30	8/21/2018	21.82	22.32	0.50	1.24	unconfined	Static	
AOI 4	S-34	8/21/2018	---	16.55	---	4.34	unconfined	Static	
AOI 4	S-35	8/21/2018	---	19.89	---	1.05	unconfined	Static	
AOI 4	S-36	8/21/2018	23.07	23.07	<0.01	1.17	unconfined	Static	
AOI 4	S-221	8/21/2018	21.81	22.39	0.58	1.12	unconfined	Pumping	
AOI 4	S-236	8/21/2018	21.90	21.19	-0.71	1.20	unconfined	Pumping	
AOI 4	S-237	8/21/2018	21.64	22.40	0.76	1.04	unconfined	Pumping	
AOI 5	RWBH-1	8/23/2018	3.68	3.85	0.17	25.83	unconfined	Static	
AOI 5	RWBH-2	8/23/2018	2.60	5.32	2.72	8.16	unconfined	Static	
AOI 6	B-124	8/23/2018	4.92	6.99	2.07	3.66	NYC	Static	
AOI 6	B-132	8/23/2018	5.00	5.01	0.01	1.87	NYC	Static	
AOI 6	B-135	8/23/2018	5.08	5.09	0.01	1.30	NYC	Static	
AOI 6	B-136	8/23/2018	4.81	4.82	0.01	4.34	NYC	Static	
AOI 6	B-137	8/23/2018	4.39	5.97	1.58	4.13	NYC	Static	
AOI 6	B-139	8/23/2018	NM	NM	NM	NM	NYC	Static	unable to locate
AOI 6	B-142	8/23/2018	6.91	7.76	0.85	2.72	NYC	Static	
AOI 6	B-143	8/23/2018	4.58	5.64	1.06	4.26	NYC	Static	
AOI 6	B-147	8/23/2018	5.71	5.72	0.01	3.19	NYC	Static	
AOI 7	RW-801	8/23/2018	---	18.80	---	-12.53	NYC	Pumping	
AOI 7	RW-802	8/23/2018	---	19.85	---	-14.15	NYC	Pumping	
AOI 7	RW-803	8/23/2018	---	20.55	---	-14.77	NYC	Pumping	
AOI 7	RW-804	8/23/2018	---	20.00	---	-14.22	NYC	Pumping	
AOI 7	RW-805	8/23/2018	---	17.30	---	-11.55	NYC	Pumping	
AOI 7	RW-806	8/23/2018	---	20.40	---	-14.99	NYC	Pumping	
AOI 7	RW-807	8/23/2018	---	16.10	---	-9.26	NYC	Pumping	
AOI 7	RW-808	8/23/2018	---	18.50	---	-12.42	NYC	Pumping	
AOI 7	RW-809	8/23/2018	---	19.80	---	-13.25	NYC	Pumping	
AOI 7	RW-810	8/23/2018	---	14.50	---	-8.06	NYC	Pumping	

Table 1
Third Quarter 2018 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 8	N-137	8/31/2018	16.91	17.02	0.11	8.66	unconfined	Static	
AOI 8	N-138	8/31/2018	26.61	26.96	0.35	8.61	unconfined	Static	
AOI 8	N-139	8/31/2018	26.44	26.72	0.28	8.50	unconfined	Static	
AOI 8	N-142	8/31/2018	---	26.01	---	8.55	unconfined	Static	
AOI 8	N-144	8/31/2018	---	25.57	---	8.71	unconfined	Static	
AOI 8	N-145	8/31/2018	---	17.33	---	8.66	unconfined	Static	
AOI 8	N-146	8/31/2018	---	16.81	---	9.50	unconfined	Static	
AOI 8	N-155	8/31/2018	---	25.74	---	NM	lower aquifer	Static	
AOI 8	N-157	8/31/2018	---	27.06	---	NM	lower aquifer	Static	
AOI 8	RW-200	8/23/2018	---	5.43	---	6.59	unconfined	Static	
AOI 8	RW-201	8/23/2018	22.38	22.45	0.07	9.60	unconfined	Static	
AOI 8	RW-203	8/23/2018	---	19.79	---	11.31	unconfined	Static	
AOI 8	RW-204	8/23/2018	18.57	18.80	0.23	9.98	unconfined	Static	
AOI 8	RW-205	8/23/2018	18.75	18.80	0.05	10.92	unconfined	Static	
AOI 8	RW-206	8/23/2018	20.57	22.30	1.73	10.18	unconfined	Static	
AOI 8	RW-300	8/23/2018	14.64	14.88	0.24	6.96	lower aquifer	Static	
AOI 8	RW-301	8/23/2018	---	11.87	---	10.54	unconfined	Static	
AOI 8	RW-302	8/23/2018	---	13.20	---	10.89	unconfined	Static	
AOI 8	RW-303	8/23/2018	---	13.85	---	11.13	unconfined	Static	
AOI 8	RW-304	8/23/2018	---	14.69	---	10.59	unconfined	Static	
AOI 8	RW-305	8/23/2018	---	14.72	---	10.55	unconfined	Static	
AOI 8	RW-306	8/23/2018	12.87	12.87	<0.01	10.72	unconfined	Static	
AOI 8	RW-307	8/23/2018	---	14.56	---	8.70	unconfined	Static	
AOI 8	RW-308	8/23/2018	---	16.55	---	9.06	unconfined	Static	
AOI 8	RW-309	8/23/2018	---	15.47	---	9.76	unconfined	Static	
AOI 8	RW-500	8/23/2018	---	2.07	---	5.49	unconfined	Static	
AOI 8	RW-501	8/23/2018	---	4.46	---	5.33	unconfined	Static	
AOI 8	RW-502	8/23/2018	8.13	8.63	0.50	4.30	unconfined	Static	
BELMONT	RW-1	8/31/2018	NM	NM	NM	NM	unconfined	Static	unable to access - vehicle on lid
BELMONT	RW-4	8/23/2018	---	9.90	---	20.55	NYC	Static	at 9:00
BELMONT	RW-4	8/31/2018	25.43	25.84	0.41	4.93	NYC	Static	
BELMONT	RW-6	8/31/2018	---	26.18	---	4.88	unconfined	Static	
BELMONT	RW-7	8/31/2018	---	23.30	---	4.91	unconfined	Static	
BELMONT	RW-15	8/31/2018	---	26.37	---	3.68	unconfined	Static	
BELMONT	RW-21	8/31/2018	24.25	24.25	<0.01	4.62	unconfined	Static	
BELMONT	RW-22	8/31/2018	---	22.11	---	4.92	unconfined	Static	
BELMONT	RW-23	8/31/2018	22.23	22.23	<0.01	4.91	NYC	Pumping	
BELMONT	RW-24	8/31/2018	22.40	22.41	0.01	4.77	unconfined	Pumping	
BELMONT	RW-25	8/31/2018	25.22	25.57	0.35	4.87	NYC	Pumping	
BELMONT	RW-26	8/31/2018	---	25.20	---	4.01	unconfined	Static	
BELMONT	RW-27	8/31/2018	---	25.74	---	3.97	unconfined	Static	
BELMONT	RW-28	8/31/2018	---	25.10	---	4.64	unconfined	Static	
BELMONT	RW-29	8/31/2018	---	25.45	---	3.99	unconfined	Static	
BELMONT	RW-30	8/31/2018	---	25.32	---	4.07	unconfined	Static	
BELMONT	RW-31	8/31/2018	---	25.29	---	4.09	unconfined	Static	
BELMONT	RW-32	8/31/2018	---	23.81	---	5.24	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
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.
NYC = Not yet classified

Table 2
Fourth Quarter 2018 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-401	29-Nov-18	21.81	22.07	0.26	2.91	NYC	Static	
AOI 1	RW-402	29-Nov-18	---	23.05	---	-1.34	unconfined	Pumping	
AOI 1	RW-403	29-Nov-18	---	21.26	---	2.87	unconfined	Static	
AOI 1	RW-404	29-Nov-18	---	22.55	---	1.19	unconfined	Static	
AOI 1	RW-405	29-Nov-18	24.72	25.09	0.37	-0.66	NYC	Static	
AOI 1	RW-406	29-Nov-18	24.49	24.77	0.28	4.05	NYC	Static	
AOI 1	S-179	29-Nov-18	---	19.66	---	4.87	unconfined	Static	
AOI 1	S-180	29-Nov-18	---	23.10	---	-0.90	unconfined	Static	
AOI 1	S-181	29-Nov-18	19.57	19.60	0.03	3.28	NYC	Static	
AOI 1	S-182	29-Nov-18	---	23.55	---	-0.55	unconfined	Pumping	
AOI 1	S-183	29-Nov-18	---	26.25	---	-2.77	unconfined	Pumping	
AOI 1	S-184	29-Nov-18	---	23.95	---	-0.47	unconfined	Pumping	
AOI 1	S-185	29-Nov-18	---	25.10	---	-1.22	unconfined	Pumping	
AOI 1	S-186	29-Nov-18	---	28.70	---	-4.34	unconfined	Pumping	
AOI 1	S-187	29-Nov-18	---	20.58	---	3.93	unconfined	Static	
AOI 1	S-188	29-Nov-18	---	25.00	---	-0.18	unconfined	Pumping	
AOI 1	S-189	29-Nov-18	---	25.20	---	0.59	unconfined	Pumping	
AOI 1	S-190	29-Nov-18	---	25.90	---	-0.33	NYC	Pumping	
AOI 1	S-191	29-Nov-18	---	23.80	---	2.03	unconfined	Pumping	
AOI 1	S-192	29-Nov-18	---	26.00	---	0.02	unconfined	Pumping	
AOI 2	River1	16-Nov-18	---	10.40	---	NM	NYC	Static	at 10:10
AOI 2	RW-104	16-Nov-18	---	7.36	---	1.60	NYC	Static	
AOI 2	RW-105	16-Nov-18	6.85	6.86	0.01	1.83	NYC	Static	
AOI 2	RW-106	16-Nov-18	---	6.77	---	2.53	NYC	Static	
AOI 2	RW-107	16-Nov-18	---	8.39	---	2.16	NYC	Static	
AOI 2	RW-108	16-Nov-18	---	7.33	---	2.57	NYC	Static	
AOI 2	RW-109	16-Nov-18	---	6.60	---	3.25	NYC	Static	
AOI 2	RW-113	16-Nov-18	---	7.97	---	2.26	NYC	Static	
AOI 2	RW-114	16-Nov-18	---	10.26	---	2.75	NYC	Static	
AOI 2	RW-115	16-Nov-18	---	7.81	---	2.39	NYC	Static	
AOI 2	RW-116	16-Nov-18	---	8.25	---	2.56	NYC	Static	
AOI 2	RW-117	16-Nov-18	7.28	7.38	0.10	2.49	NYC	Static	
AOI 2	RW-118	16-Nov-18	---	9.24	---	2.58	NYC	Static	
AOI 2	RW-119	16-Nov-18	---	10.33	---	2.52	NYC	Static	
AOI 2	RW-120	16-Nov-18	---	10.60	---	2.98	NYC	Static	
AOI 2	RW-121	16-Nov-18	---	12.82	---	2.48	NYC	Static	
AOI 2	RW-122	16-Nov-18	---	7.74	---	2.50	NYC	Static	
AOI 2	RW-123	16-Nov-18	---	7.46	---	2.51	NYC	Static	
AOI 2	RW-124	16-Nov-18	---	6.52	---	2.64	NYC	Static	
AOI 2	RW-125	16-Nov-18	---	11.43	---	2.84	NYC	Static	
AOI 2	RW-126	16-Nov-18	---	6.25	---	2.98	NYC	Static	
AOI 2	RW-127	16-Nov-18	---	11.40	---	2.50	NYC	Static	
AOI 2	RW-128	16-Nov-18	6.28	7.47	1.19	1.99	NYC	Static	
AOI 2	RW-129	16-Nov-18	---	6.42	---	3.41	NYC	Static	
AOI 2	S-64	16-Nov-18	---	5.88	---	4.68	NYC	Static	
AOI 2	S-65	16-Nov-18	8.55	8.56	0.01	2.07	NYC	Static	
AOI 2	S-93	16-Nov-18	---	15.63	---	2.62	NYC	Static	
AOI 2	S-313	16-Nov-18	18.37	18.37	<0.01	2.54	NYC	Static	
AOI 2	S-315	16-Nov-18	---	8.43	---	12.04	NYC	Static	
AOI 2	S-316	16-Nov-18	NM	NM	NM	NM	NYC	Static	unable to access
AOI 2	S-406	16-Nov-18	---	9.19	---	3.01	NYC	Static	
AOI 2	S-420	16-Nov-18	---	6.62	---	2.64	NYC	Static	
AOI 3	RW-2	27-Nov-18	11.66	12.27	0.61	-0.49	NYC	Static	
AOI 4	RW-700	24-Oct-18	---	20.90	---	-2.89	unconfined	Pumping	
AOI 4	RW-701	24-Oct-18	---	20.30	---	-2.03	unconfined	Pumping	
AOI 4	RW-702	24-Oct-18	---	33.80	---	-12.85	unconfined	Pumping	
AOI 4	RW-703	24-Oct-18	---	29.70	---	-9.08	unconfined	Pumping	
AOI 4	RW-704	24-Oct-18	---	21.25	---	-1.02	unconfined	Pumping	
AOI 4	RW-705	24-Oct-18	---	14.40	---	1.52	unconfined	Static	
AOI 4	RW-706	24-Oct-18	---	14.51	---	1.38	unconfined	Static	

Table 2
Fourth Quarter 2018 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-707	24-Oct-18	---	14.83	---	1.46	unconfined	Static	
AOI 4	RW-708	24-Oct-18	14.00	14.12	0.12	1.47	unconfined	Static	
AOI 4	RW-709	24-Oct-18	---	13.84	---	1.46	unconfined	Static	
AOI 4	RW-710	24-Oct-18	---	14.67	---	1.21	unconfined	Static	
AOI 4	RW-711	24-Oct-18	---	13.96	---	1.53	unconfined	Static	
AOI 4	RW-712	24-Oct-18	---	14.14	---	1.42	unconfined	Static	
AOI 4	RW-713	24-Oct-18	---	13.55	---	1.47	unconfined	Static	
AOI 4	RW-714	24-Oct-18	---	13.74	---	1.47	unconfined	Static	
AOI 4	RW-715	24-Oct-18	---	13.91	---	1.46	unconfined	Static	
AOI 4	RW-716	24-Oct-18	---	14.07	---	1.48	unconfined	Static	
AOI 4	RW-717	24-Oct-18	---	14.10	---	1.51	unconfined	Static	
AOI 4	S-30	28-Nov-18	20.72	21.18	0.46	2.35	unconfined	Pumping	
AOI 5	RWBH-1	26-Nov-18	5.65	6.08	0.43	23.80	unconfined	Static	
AOI 5	RWBH-2	26-Nov-18	1.69	5.20	3.51	8.91	unconfined	Static	
AOI 6	B-124	26-Nov-18	4.08	6.33	2.25	4.47	NYC	Static	
AOI 6	B-132	26-Nov-18	4.60	4.69	0.09	2.26	NYC	Static	
AOI 6	B-135	26-Nov-18	4.95	4.95	<0.01	1.44	NYC	Static	
AOI 6	B-136	26-Nov-18	4.02	4.02	<0.01	5.14	NYC	Static	
AOI 6	B-137	26-Nov-18	3.70	5.37	1.67	4.81	NYC	Static	
AOI 6	B-142	26-Nov-18	6.45	7.48	1.03	3.15	NYC	Static	
AOI 6	B-143	26-Nov-18	3.91	4.72	0.81	4.96	NYC	Static	
AOI 6	B-147	26-Nov-18	4.83	4.84	0.01	4.07	NYC	Static	
AOI 7	RW-801	17-Dec-18	---	18.80	---	-12.53	NYC	Pumping	
AOI 7	RW-802	17-Dec-18	---	19.85	---	-14.15	NYC	Pumping	
AOI 7	RW-803	17-Dec-18	---	20.55	---	-14.77	NYC	Pumping	
AOI 7	RW-804	17-Dec-18	---	20.80	---	-15.02	NYC	Pumping	
AOI 7	RW-805	17-Dec-18	---	17.30	---	-11.55	NYC	Pumping	
AOI 7	RW-806	17-Dec-18	---	20.40	---	-14.99	NYC	Pumping	
AOI 7	RW-807	17-Dec-18	---	16.10	---	-9.26	NYC	Pumping	
AOI 7	RW-808	17-Dec-18	---	18.50	---	-12.42	NYC	Pumping	
AOI 7	RW-809	17-Dec-18	NM	NM	NM	NM	NYC	Pumping	unable to access
AOI 7	RW-810	17-Dec-18	---	14.50	---	-8.06	NYC	Pumping	
AOI 8	N-137	01-Nov-18	16.75	16.96	0.21	8.81	unconfined	Static	passive bailer
AOI 8	N-138	01-Nov-18	26.38	26.75	0.37	8.84	unconfined	Static	passive bailer
AOI 8	N-139	01-Nov-18	26.14	26.53	0.39	8.77	unconfined	Static	passive bailer
AOI 8	N-142	01-Nov-18	---	25.85	---	8.71	unconfined	Static	
AOI 8	N-144	01-Nov-18	---	25.43	---	8.85	unconfined	Static	
AOI 8	N-145	01-Nov-18	---	17.08	---	8.91	unconfined	Static	
AOI 8	N-146	01-Nov-18	16.68	16.82	0.14	9.62	unconfined	Static	
AOI 8	N-155	01-Nov-18	---	25.51	---	NM	lower aquifer	Static	
AOI 8	N-157	01-Nov-18	---	26.77	---	NM	lower aquifer	Static	
BELMONT	RW-1	28-Nov-18	NM	NM	NM	NM	unconfined	Static	unable to access - vehicle on lid
BELMONT	RW-4	28-Nov-18	25.65	25.85	0.20	4.76	NYC	Static	
BELMONT	RW-6	28-Nov-18	---	26.13	---	4.93	unconfined	Static	
BELMONT	RW-7	28-Nov-18	---	23.35	---	4.86	unconfined	Static	
BELMONT	RW-15	28-Nov-18	---	26.21	---	3.84	unconfined	Static	
BELMONT	RW-21	28-Nov-18	24.35	24.35	<0.01	4.52	unconfined	Static	
BELMONT	RW-22	28-Nov-18	---	22.26	---	4.77	unconfined	Static	
BELMONT	RW-23	28-Nov-18	---	28.33	---	-1.20	NYC	Pumping	
BELMONT	RW-24	28-Nov-18	26.50	26.75	0.25	0.62	unconfined	Pumping	
BELMONT	RW-25	28-Nov-18	29.40	29.73	0.33	0.69	NYC	Pumping	
BELMONT	RW-26	28-Nov-18	---	24.55	---	4.66	unconfined	Static	
BELMONT	RW-27	28-Nov-18	---	25.33	---	4.38	unconfined	Static	
BELMONT	RW-28	28-Nov-18	---	25.07	---	4.67	unconfined	Static	
BELMONT	RW-29	28-Nov-18	---	24.27	---	5.17	unconfined	Static	
BELMONT	RW-30	28-Nov-18	---	25.08	---	4.31	unconfined	Static	
BELMONT	RW-31	28-Nov-18	---	25.11	---	4.27	unconfined	Static	
BELMONT	RW-32	28-Nov-18	---	6.70	---	22.35	unconfined	Static	
BELMONT	RW-400	29-Nov-18	---	27.40	---	0.79	unconfined	Pumping	

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
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
Belmont Terminal
Loading Rack Remediation System
Second Half 2018

Date	Total Flow (gallons)	Period Total Flow (gallons)	Average Flow Rate (gpm)	LNAPL Recovered in Period (gallons)	Total LNAPL Recovered (gallons)
5-Jul-18	97,546,847	167,915	16.66	0.0	254,994
12-Jul-18	97,713,188	166,341	16.50	54.1	255,048
19-Jul-18	97,884,848	171,660	17.03	0.0	255,048
26-Jul-18	97,884,848	0	0.00	0.0	255,048
31-Jul-18	98,175,385	290,537	40.35	2.9	255,051
9-Aug-18	98,417,671	242,286	18.69	6.7	255,058
13-Aug-18	98,492,747	75,076	13.03	5.0	255,063
20-Aug-18	98,492,747	0	0.00	0.0	255,063
31-Aug-18	98,492,747	0	0.00	0.0	255,063
7-Sep-18	98,492,747	0	0.00	0.0	255,063
12-Sep-18	98,493,578	831	0.12	0.0	255,063
18-Sep-18	98,649,632	156,054	18.06	0.0	255,063
26-Sep-18	98,820,108	170,476	14.80	0.0	255,063
3-Oct-18	98,957,930	137,822	13.67	0.0	255,063
11-Oct-18	99,165,607	207,677	18.03	0.0	255,063
18-Oct-18	99,311,218	145,611	14.45	0.0	255,063
25-Oct-18	99,462,760	151,543	15.03	3.5	255,067
1-Nov-18	99,608,906	146,146	14.50	0.0	255,067
8-Nov-18	99,757,395	148,489	14.73	8.8	255,075
14-Nov-18	99,883,301	125,906	14.57	0.0	255,075
21-Nov-18	100,036,391	153,090	15.19	19.0	255,094
28-Nov-18	100,183,922	147,531	14.64	15.5	255,110
7-Dec-18	100,392,834	208,912	16.12	12.5	255,122
14-Dec-18	100,524,017	131,183	13.01	4.2	255,127
21-Dec-18	100,650,769	126,752	12.57	12.9	255,139
26-Dec-18	100,744,323	93,554	12.99	0.0	255,139

Notes:
gpm: gallons per minute
LNAPL: Light Non-Aqueous Phase Liquid

The Belmont Terminal Remediation System consist of the Loading Rack system (RW-4 and RW-21 through RW-25) and the Frontage Road system (RW-15 and RW-26 through RW-32). Both systems have a dedicated totalizer.

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 reporting period.

The Loading Rack system was operational during the reporting period with the following exceptions:

On August 13, the system was turned off for site wide LNAPL transmissivity. The groundwater recovery portion of the system was returned to service on September 13. The LNAPL pumps remained off to observe LNAPL recovery potential.

On September 18, the LNAPL recovery pumps were returned to service.
On October 11, The LNAPL pump in RW-4 was not operational. The pump was replaced and returned to service.

From November 18 through the end of the reporting period, the LNAPL pump in RW-4 was not operational in "auto" mode. LNAPL was removed from the well during weekly O&M visits using the LNAPL pump on "manual" mode pending repair of the LNAPL pump controls.

Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC
AOI 1: Shunk Street Sewer Ventilation System and Biofilter
Organic Vapor Concentrations
Second Half 2018

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
5-Jul-18	3700	0.0	0.0	0.0	0.0	0.0	90	90	90
12-Jul-18	3700	0.0	0.0	0.0	0.0	0.0	82	82	82
19-Jul-18	3700	0.0	0.0	0.0	0.0	0.0	82	82	82
26-Jul-18	3700	0.0	0.0	0.0	0.0	0.0	82	82	82
31-Jul-18	3700	0.0	0.0	0.0	0.0	0.0	82	82	82
9-Aug-18	3700	0.0	0.0	0.0	0.0	0.0	87	87	87
17-Aug-18	3700	0.0	0.0	0.0	0.0	0.0	92	92	92
24-Aug-18	3700	0.0	0.0	0.0	0.0	0.0	85	85	85
31-Aug-18	3700	0.0	0.0	0.0	0.0	0.0	85	85	85
5-Sep-18	3700	0.0	0.0	0.0	0.0	0.0	85	85	85
12-Sep-18	3700	1.0	1.0	0.0	0.0	0.0	77	77	77
18-Sep-18	3700	0.0	0.0	0.0	0.0	0.0	78	78	78
26-Sep-18	3700	0.0	0.0	0.0	0.0	0.0	78	78	78
3-Oct-18	3700	0.0	0.0	0.0	0.0	0.0	78	78	78
11-Oct-18	3700	0.0	0.0	0.0	0.0	0.0	76	76	76
18-Oct-18	3700	0.0	0.0	0.0	0.0	0.0	68	68	68
25-Oct-18	3700	0.0	0.0	0.0	0.0	0.0	70	70	70
1-Nov-18	3700	0.0	0.0	0.0	0.0	0.0	72	72	72
8-Nov-18	3700	0.0	0.0	0.0	0.0	0.0	78	78	78
14-Nov-18	3700	0.0	0.0	0.0	0.0	0.0	60	60	60
21-Nov-18	3700	0.0	0.0	0.0	0.0	0.0	60	60	60
28-Nov-18	3700	4.0	4.0	0.0	0.0	0.0	58	58	58
7-Dec-18	3700	2.0	2.0	0.0	0.0	0.0	58	58	58
14-Dec-18	3700	2.0	2.0	0.0	0.0	0.0	62	62	62
21-Dec-18	3700	3.0	3.0	0.0	0.0	0.0	62	62	62
26-Dec-18	3700	3.0	3.0	0.0	0.0	0.0	60	60	60

Notes:
CFM = cubic feet per minute
PID = Photoionization Detector
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 during the reporting period.

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

First Half 2018

Date	Leachate pH	Biofilter Treatment Cell - Soil pH		
		Cell 1	Cell 2	Cell 3
31-Jul-18	7.35	NM	NM	NM
24-Aug-18	7.13	NM	NM	NM
26-Sep-18	7.22	6.93	7.15	6.88
25-Oct-18	7.07	NM	NM	NM
28-Nov-18	7.01	7.00	7.08	6.99
26-Dec-18	6.95	NM	NM	NM

Notes:
Leachate and recordings are collected on a quarterly basis.

Media pH recordings were collected on a monthly basis prior to December 2013. In December 2013, an Air Cleaning Device Installation Permit Application for Minor Emission Sources was submitted to the City of Philadelphia Air Management Services (AMS) with a Request to Modify Plan Approval No: 01092. AMS approved the aforementioned documents on December 23, 2013 thus reducing the media pH monitoring to a quarterly basis.
NM = Not measured

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

Second Half 2018

Date	Total Flow (gallons)	Period Total Flow (gallons)	Calculated System Flow Rate (gpm)	LNAPL Recovered in Period (gallons)	Total LNAPL Recovered (gallons)
3-Jul-18	91,695,722	396,835	45.93	NA	9,148.60
10-Jul-18	92,123,114	427,392	42.40	NA	9,148.60
18-Jul-18	92,545,898	422,784	36.70	NA	9,148.60
24-Jul-18	92,914,567	368,669	42.67	NA	9,148.60
1-Aug-18	93,519,828	605,261	52.54	NA	9,148.60
9-Aug-18	93,970,721	450,893	39.14	NA	9,148.60
17-Aug-18	93,970,721	0	0.00	NA	9,148.60
24-Aug-18	93,970,721	0	0.00	NA	9,148.60
30-Aug-18	93,970,721	0	0.00	NA	9,148.60
10-Sep-18	94,860,770	890,050	56.19	NA	9,148.60
18-Sep-18	95,497,942	637,171	55.31	NA	9,148.60
25-Sep-18	95,956,380	458,438	45.48	NA	9,148.60
2-Oct-18	96,357,564	401,184	39.80	NA	9,148.60
9-Oct-18	96,740,402	382,838	37.98	NA	9,148.60
16-Oct-18	97,101,770	361,368	35.85	NA	9,148.60
26-Oct-18	97,583,594	481,824	33.46	NA	9,148.60
31-Oct-18	97,812,410	228,816	31.78	NA	9,148.60
5-Nov-18	98,044,466	232,056	32.23	NA	9,148.60
12-Nov-18	98,353,519	309,053	30.66	NA	9,148.60
21-Nov-18	98,809,452	455,933	35.18	NA	9,148.60
29-Nov-18	99,381,650	572,198	49.67	NA	9,148.60
6-Dec-18	99,779,609	397,958	39.48	NA	9,148.60
12-Dec-18	100,072,505	292,896	33.90	NA	9,148.60
20-Dec-18	100,608,761	536,256	46.55	NA	9,148.60
26-Dec-18	100,965,334	356,573	41.27	NA	9,148.60

Notes:

gpm: gallons per minute

LNAPL: Light Non-Aqueous Phase Liquid

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

The 26th Street North Remediation system consists of 20 total fluids recovery wells [15 active 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 inactive wells offsite on CSX property (S-193, S-194, S-265, S-267, & S-268)]. The offsite wells on the CSX property have not been activated. The system discharges directly to a process sewer; therefore, the volume of recoverable LNAPL cannot be quantified.

The system was operational for the second half of 2018 with the following exceptions:

On July 10, the pumps in S-184 and S-188 were not operational. The pumps were removed for repair and maintenance.

On July 18, the pump for S-188 was returned to service.

On August 1, S-190 and RW-402 were not operational; the pumps were reset and returned to service.

On August 13, the system was turned off during transmissivity testing at the site. On September 10, the system was returned to service

On September 10, S-189 was not operational. The pump was reset and returned to service.

On September 25, the pump for S-184 was repaired and returned to service.

On October 9, S-180, S-181, S-182, S-185, S-186, S-187, S-189 and S-192 were not operational. S-182, S-185, S-186, S-189, and S-192 were reset and returned to service. S-180, S-181, and S187 were removed for cleaning and repair.

On November 29, S-190 was not operational. The pump was removed for cleaning and repair.

On December 20, S-190 and S-187 were returned to service.

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

Second Half 2018

Date	Leachate pH	Biofilter Bed - Soil pH			
		Cell 1	Cell 2	Cell 3	Cell 4
25-Jul-18	7.39	7.55	7.32	NM	NM
20-Aug-18	7.26	7.55	7.32	NM	NM
24-Sep-18	7.08	7.22	7.16	NM	NM
25-Oct-18	7.17	7.22	7.16	NM	NM
28-Nov-18	6.97	7.04	7.12	NM	NM
19-Dec-18	7.07	7.04	7.12	NM	NM

Notes:

Media pH readings are collected on a quarterly basis.

NM: not measured

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 during the reporting period with the following exceptions:

On July 11, blower #2 was not operational due to belt failure. The belts were replaced and the blower was returned to service.

On August 8, blower #3 was not operational due to belt failure. The belts were replaced and the blower was returned to service.

On December 5, the system was not operational. The system was reset and returned to operation.

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 2018

Date	Biofilter Influent			Biofilter Effluent							
	Packer Ave. (ppm)	26th Street (ppm)	ST-1 (Combined Influent) (ppm)	Cell-1N	Cell-1S	Cell-2N	Cell-2S	Cell-3N	Cell-3S	Cell-4N	Cell-4S
5-Jul-18	0.0	1.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
11-Jul-18	5.0	17.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
19-Jul-18	10.0	7.0	7	0.0	0.0	0.0	0.0	NA	NA	NA	NA
25-Jul-18	1.0	2.0	7	0.0	0.0	0.0	0.0	NA	NA	NA	NA
31-Jul-18	0.0	1.0	1	0.0	0.0	0.0	0.0	NA	NA	NA	NA
9-Aug-18	0.0	1.0	1	0.0	0.0	0.0	0.0	NA	NA	NA	NA
17-Aug-18	0.0	0.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
20-Aug-18	1.0	1.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
27-Aug-18	3.0	0.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
4-Sep-18	6.0	4.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
12-Sep-18	0.0	1.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
18-Sep-18	9.0	11.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
24-Sep-18	8.0	8.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
1-Oct-18	6.0	9.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
10-Oct-18	0.0	1.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
17-Oct-18	29.0	18.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
24-Oct-18	11.0	5.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
31-Oct-18	22.0	6.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
6-Nov-18	3.0	1.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
13-Nov-18	5.0	9.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
21-Nov-18	100.8	73.7	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
28-Nov-18	28.0	36.0	0	0.0	0.0	0.0	0.0	NA	NA	NA	NA
5-Dec-18	37.0	39.0	32	0.0	0.0	0.0	0.0	NA	NA	NA	NA
12-Dec-18	56.0	44.0	32	0.0	0.0	0.0	0.0	NA	NA	NA	NA
19-Dec-18	29.0	41.0	32	0.0	0.0	0.0	0.0	NA	NA	NA	NA
26-Dec-18	37.0	52.0	32	0.0	0.0	0.0	0.0	NA	NA	NA	NA

Notes:

ppm: parts per million

NA: Not applicable

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

The system was operational for the second half of 2018 with the following exceptions:

On July 11, blower #2 was not operational due to belt failure. The belts were replaced and the blower was returned to service.

On August 8, blower #3 was not operational due to belt failure. The belts were replaced and the blower was returned to service.

On December 5, the system was not operational. The system was reset and returned to operation.

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

Second Half 2018

Date	Period Total Flow (gallons)	Total Flow (gallons)	LNAPL Recovered in Period (gallons)	Total LNAPL Recovered (gallons)
2-Jul-18	0	30,713,105	0.0	60,637
9-Jul-18	0	30,713,105	0.0	60,637
16-Jul-18	0	30,713,105	0.0	60,637
23-Jul-18	0	30,713,105	0.0	60,637
30-Jul-18	0	30,713,105	0.0	60,637
6-Aug-18	0	30,713,105	0.0	60,637
13-Aug-18	0	30,713,105	0.0	60,637
20-Aug-18	0	30,713,105	0.0	60,637
27-Aug-18	0	30,713,105	0.0	60,637
3-Sep-18	0	30,713,105	0.0	60,637
10-Sep-18	0	30,713,105	0.0	60,637
17-Sep-18	0	30,713,105	0.0	60,637
24-Sep-18	0	30,713,105	0.0	60,637
1-Oct-18	0	30,713,105	0.0	60,637
8-Oct-18	0	30,713,105	0.0	60,637
15-Oct-18	0	30,713,105	0.0	60,637
22-Oct-18	0	30,713,105	0.0	60,637
29-Oct-18	0	30,713,105	0.0	60,637
5-Nov-18	0	30,713,105	0.0	60,637
12-Nov-18	0	30,713,105	0.0	60,637
16-Nov-18	0	30,713,105	0.0	60,637
21-Nov-18	0	30,713,105	0.0	60,637
29-Nov-18	0	30,713,105	0.0	60,637
5-Dec-18	0	30,713,105	0.0	60,637
12-Dec-18	0	30,713,105	0.0	60,637
17-Dec-18	0	30,713,105	0.0	60,637
24-Dec-18	0	30,713,105	0.0	60,637

Notes:

LNAPL: Light Non-Aqueous Phase Liquid

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.

The system was off during the reporting period.

Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC
Total Fluids Recovery System Operational Data
AOI 2: Pollock Street Horizontal Wells

Second Half 2018

Actual Dates in Period	Reporting Period (Internal)	Days in Period	HW-1 Water Recovered During Period (gallons)	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)
6/20/2018 - 7/24/2018	Jul 2018	35	439,900	19,212	35	775,152	1,234,264.0	109,284,823	NA
7/25/2018 - 8/17/2018	Aug 2018	24	266,300	13,593	20	442,944	722,837.0	110,007,660	NA
8/18/2018 - 9/17/2018	Sep 2018	31	107,700	3,228	7	155,030	265,958.4	110,273,618	NA
9/18/2018 - 9/30/2018	end Q3 2018	12	176,160	4,690	12	265,766	446,616.7	110,720,235	NA
9/18/2018 - 10/22/2018	Oct 2018	35	537,800	10,790	35	775,152	1,323,742.0	111,597,360	NA
10/23/2018 - 11/21/2018	Nov 2018	30	461,900	11,930	30	664,416	1,138,246.0	112,735,606	NA
11/22/2018 - 12/24/2018	Dec 2018	33	612,100	4,523	33	730,858	1,347,480.6	114,083,087	NA
12/25/2018 - 12/31/2018	end Q4 2018	6	90,840	0	6	132,883	223,723.2	114,306,810	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.

The system was operational during the reporting period with the following exceptions:

On August 13, the three pumps (HW-1, HW-2, and HW-3 were turned off during LNAPL transmissivity testing. The horizontal wells were returned to service on September 10.

From December 11 through the end of the reporting period, the pump for HW-2 was not operational pending pump and motor replacement.

Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC

LNAPL Recovery System Operational Data
AOI 4: S-30 Remediation System

Second Half 2018

Date	LNAPL Recovered in Period (gallons)	Total LNAPL Recovered (gallons)
5-Jul-18	0.0	39,820
11-Jul-18	4.7	39,825
19-Jul-18	4.7	39,830
25-Jul-18	9.0	39,839
31-Jul-18	13.4	39,852
10-Aug-18	22.9	39,875
17-Aug-18	18.5	39,893
24-Aug-18	0.0	39,893
31-Aug-18	0.0	39,893
4-Sep-18	0.0	39,893
10-Sep-18	4.4	39,898
17-Sep-18	9.2	39,907
24-Sep-18	11.1	39,918
1-Oct-18	9.3	39,927
10-Oct-18	12.7	39,940
18-Oct-18	9.7	39,950
24-Oct-18	4.9	39,955
31-Oct-18	9.8	39,965
6-Nov-18	4.9	39,969
13-Nov-18	0.0	39,969
28-Nov-18	4.9	39,974
5-Dec-18	9.9	39,984
12-Dec-18	14.9	39,999
18-Dec-18	9.9	40,009
26-Dec-18	0.0	40,009
31-Dec-18	0.0	40,009

NOTES:

LNAPL: Light Non-Aqueous Phase Liquid

The reported volume recovered for total fluids accounts from the historical recovery for the S-30 Remediation System.

There is no groundwater recovery at S-30 (product skimming systems only).
During the reporting period the S-30 Remediation System was operational with the following exception:

July 5, the product recovery pump was inoperable. Troubleshooting of the pump was conducted and the pump was returned to service.

From August 17 through September 4, the system was not operational during transmissivity testing at the site.

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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 2018

Date	Period Total Flow (gallons)	Total Flow (gallons)	Average Daily Flow (gpd)	LNAPL Recovered in Period (gallons)	Total LNAPL Recovered (gallons)
02-Jul-18	0	19,154,570	0	0.0	5589.0
09-Jul-18	0	19,154,570	0	0.0	5589.0
16-Jul-18	0	19,154,570	0	0.0	5589.0
23-Jul-18	0	19,154,570	0	0.0	5589.0
30-Jul-18	0	19,154,570	0	0.0	5589.0
06-Aug-18	0	19,154,570	0	0.0	5589.0
13-Aug-18	0	19,154,570	0	0.0	5589.0
21-Aug-18	0	19,154,570	0	0.0	5589.0
06-Sep-18	1,460	19,156,030	91	104.7	5693.7
21-Sep-18	126,600	19,282,630	8,440	24.7	5718.4
25-Sep-18	30,090	19,312,720	7,523	20.2	5738.6
10-Oct-18	98,490	19,411,210	6,566	0.0	5738.6
17-Oct-18	46,140	19,457,350	6,591	3.8	5742.4
24-Oct-18	75,570	19,532,920	10,796	1.3	5743.7
31-Oct-18	70,710	19,603,630	10,101	0.0	5743.7
06-Nov-18	26,150	19,629,780	4,358	15.1	5758.8
13-Nov-18	49,500	19,679,280	7,071	0.0	5758.8
19-Nov-18	52,290	19,731,570	8,715	5.6	5764.4
27-Nov-18	0	19,731,570	0	0.0	5764.4
05-Dec-18	4,380	19,735,950	548	9.5	5773.9
12-Dec-18	146,780	19,882,730	20,969	3.8	5777.7
18-Dec-18	64,460	19,947,190	10,743	0.0	5777.7
26-Dec-18	76,240	20,023,430	9,530	0.0	5777.7
31-Dec-18	3,240	20,026,670	648	0.0	5777.7

Note:

gpd: gallons per day

LNAPL: Light Non-Aqueous Phase Liquid

The Penrose Avenue Remediation System consisting of 18 recovery wells (RW-700 through RW-717) was started on March 20, 2013. On February 21, 2018, pumps were installed in S-221, S-236, and S-237 to address LNAPL in those wells. Groundwater and LNAPL are extracted using pneumatic pumps and total fluids pass through an oil/water separator (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 system was operational during the reporting period with the following exceptions:

The system was not operational through September 6 due to system upgrades.

On October 24, the system shakedown and testing was complete and the system was returned to service.

On arrival, the system was not operational due to a high OWS alarms. The system was reset and returned to

On November 27, the system was not operational due to an OWS alarm. The system was reset and returned to

On December 5, the system was not operational due to an OWS alarm. The system was reset and returned to

On December 18, the system was not operational due to an OWS alarm. The system was reset and returned to

On December 19, the catalytic oxidizer was not operating. The oxidizer settings was adjusted and returned to

On December 31, the system was not operational due to an OWS alarm. The system was reset and returned to

Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC
Recovery System Operational Data
AOI 7: 3 Separator Remediation System
Second Half 2018

Date	Total Flow (gallons)	Period Total Flow (gallons)	Calculated System Flow Rate (gpm)	LNAPL Recovered in Period (gallons)	Total LNAPL Recovered (gallons)
5-Jul-18	21,509,885	122,700	170.42	19.8	112,911.7
9-Jul-18	21,509,885	0	0.00	0.0	112,911.7
17-Jul-18	21,619,885	110,000	152.78	7.5	112,919.3
24-Jul-18	21,664,785	44,900	62.36	12.7	112,932.0
30-Jul-18	21,708,185	43,400	60.28	28.8	112,960.8
10-Aug-18	21,775,785	67,600	93.89	13.2	112,974.0
17-Aug-18	21,826,585	50,800	70.56	32.2	113,006.2
22-Aug-18	21,864,585	38,000	52.78	16.4	113,022.6
29-Aug-18	21,901,184	36,599	50.83	30.4	113,053.0
4-Sep-18	21,934,583	33,399	46.39	76.3	113,129.2
10-Sep-18	21,980,182	45,599	63.33	100.9	113,230.1
17-Sep-18	22,075,381	95,199	132.22	66.5	113,296.6
25-Sep-18	22,158,081	82,700	114.86	37.3	113,334.0
2-Oct-18	22,225,481	67,400	93.61	28.5	113,362.5
9-Oct-18	22,241,981	16,500	22.92	8.5	113,371.0
15-Oct-18	22,310,581	68,600	95.28	14.1	113,385.1
22-Oct-18	22,363,581	53,000	73.61	14.0	113,399.1
29-Oct-18	22,409,081	45,500	63.19	14.0	113,413.1
5-Nov-18	22,459,581	50,500	70.14	30.4	113,443.5
12-Nov-18	22,530,681	71,100	98.75	30.6	113,474.1
21-Nov-18	22,602,880	72,199	100.28	18.6	113,492.6
26-Nov-18	22,675,779	72,899	101.25	6.3	113,498.9
4-Dec-18	22,770,178	94,399	131.11	20.2	113,519.1
11-Dec-18	22,836,078	65,900	91.53	7.2	113,526.3
17-Dec-18	22,892,778	56,700	78.75	5.5	113,531.8
26-Dec-18	22,999,178	106,400	147.78	7.5	113,539.4

Notes:
gpm: gallons per minute
LNAPL: Light Non-Aqueous Phase Liquid

The 3 Separator Remediation 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 oil/water separator (OWS). Water is discharged to an on-site process sewer and LNAPL is recovered in a tank and recycled by the PES Complex.

The system was operational for the reporting period with the following exceptions:
On August 22, RW-802 and RW-806 were not operational; RW-802 was reset and returned to service. RW-806 was out of service pending replacement parts.
On September 4, RW-806 was repaired and returned to service.

On October 9, the system was not operational due to an OWS alarm. The system was reset and returned to service.

On October 29, RW-802 and RW-807 were not operational. Replacement pumps were installed and both wells were returned to service.

Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC
AOI 8: Jackson Street Water Curtain

Second Half 2018

Date	PID readings (ppm)			Comments
	Blower	Water Curtain	Interceptor Chamber	
05-Jul-18	NA	0.0	0.0	
13-Jul-18	NA	0.0	0.0	
19-Jul-18	NA	0.0	0.0	
27-Jul-18	NA	0.0	0.0	
03-Aug-18	NA	0.0	0.0	
10-Aug-18	NA	0.0	0.0	
17-Aug-18	NA	0.0	0.0	
27-Aug-18	NA	0.0	0.0	
05-Sep-18	NA	0.0	0.0	
12-Sep-18	NA	0.0	0.0	
18-Sep-18	NA	0.0	0.0	
26-Sep-18	NA	0.0	0.0	
04-Oct-18	NA	0.0	0.0	
11-Oct-18	NA	0.0	0.0	
19-Oct-18	NA	0.0	0.0	
26-Oct-18	NA	0.0	0.0	
01-Nov-18	NA	0.0	0.0	
08-Nov-18	NA	0.0	0.0	
14-Nov-18	NA	0.0	0.0	
14-Nov-18	NA	0.0	0.0	
05-Dec-18	NA	0.0	0.0	
14-Dec-18	NA	0.0	0.0	
20-Dec-18	NA	0.0	0.0	
26-Dec-18	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.