FOURTH FIVE-YEAR REVIEW REPORT FOR SWOPE OIL AND CHEMICAL SUPERFUND SITE PENNSAUKEN TOWNSHIP. CAMDEN COUNTY, NEW JERESY

Prepared by

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LIST OF ABBREVIATIONS & ACRONYMS

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
BGS	Below Ground Surface
CEA	Classification Exception Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CD	Consent Decree
Cis-DCE	Cis-1,2-Dichloroethene
COC	Contaminant of Concern
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
FS	Feasibility Study
FFS	Focused Feasibility Study
FYR	Five-Year Review
ICs	Institutional Controls
MNA	Monitored Natural Attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NJDEP	New Jersey Department of Environmental Protection
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PCOR	Preliminary Close Out Report
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SVE	Soil Vapor Extraction
SVOCs	Semivolatile Organic Compounds
TCE	Trichloroethene
µg/L	Micrograms per Liter
VOCs	Volatile Organic Compounds

I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP) (40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fourth FYR for the Swope Oil and Chemical Company Superfund Site. The triggering action for this statutory review is the completion date of the previous FYR. The FYR has been prepared due to the fact that hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

The Site consists of three separate units called operable units (OUs), two of which will be addressed in this FYR. The OU1 Record of Decision (ROD) addressed removal of contaminated material, removal of surface soil, the excavation of heavily contaminated areas such as lagoons, and the placement of a cap.

The OU2 ROD addressed the subsurface soil through the use of a Soil Vapor Extraction System. It also deferred installation of the OU1 cap until actions under OU2 were completed and evaluated. Evaluation of these soil borings indicated that there is residual contamination in the subsurface soil. Therefore, it was necessary to construct the OU1 cap. Since the residual contamination is addressed by the OU1 cap, OU2 activities are considered complete, and OU2 is therefore no longer subject to a FYR."

The OU3 ROD addressed the groundwater contamination through Monitored Natural Attenuation in the shallow aquifer and sampling of the deep aquifer. It also confirmed that cap originally called for in the OU1 ROD would be constructed over the entire 1.9-acre property.

Work on all of the Operable Units has been completed and activities under the approved Operation and Maintenance Plan continues. The Preliminary Close Out Report for the Site was issued by EPA on September 4, 2015.

The Swope Oil and Chemical Superfund Site FYR was led by Renee Gelblat, the EPA Remedial Project Manager. Participants included Robert M. Alvey, P.G., hydrogeologist, Julie McPherson, human health risk assessor, Mindy Pensak, ecological risk assessor, William J. Reilly, lawyer, and Natalie Loney, community coordinator. The Potentially Responsible Party (PRPs) and the local government officials were notified of the initiation of the five-year review. The review began on 12/2/2016.

Site Background

The Site is approximately two acres in size and is located at 8281 National Highway in an industrialized area of Pennsauken Township, Camden County, New Jersey. It is bounded to the southeast by National Highway, and to the north and southwest by railroad rights-of-way and warehouses. Numerous commercial and industrial properties are located within 0.5 miles of the Site in all directions. The closest

surface water body is the Pennsauken Creek, which is located 0.8 miles northeast of the Site. The Pennsauken Creek flows in a northwesterly direction to the Delaware River, which is situated about 1.2 miles northwest of the Site. The nearest residential areas are in the communities of Delair and Morrisville, which are located about 0.5 miles west and 0.8 miles southwest of the Site, respectively. Pennsauken High School is located approximately 0.5 miles to the northeast (Figure 1).

Land and Resource Use

From 1965 through 1979, the Swope Oil and Chemical Company operated a chemical reclamation facility at the Site. The facility has been inactive since December 1979. All of the facility buildings have been removed. The Site is currently surrounded by a fence and is vacant except for monitoring wells.

Two groundwater aquifers underlie the Site. They are both classified as Class II A groundwater aquifers by the New Jersey Department of Environmental Protection (NJDEP), which means they can be used for potable water. Currently, both aquifers are being used as sources of potable water with treatment.

The natural regional groundwater flow direction at the Site is northward toward the Delaware River. However, the significant levels of regular groundwater pumping for industrial and residential uses have changed the groundwater flow direction in both the shallow and deep aquifers in the vicinity of the Site. The exact groundwater flow direction has varied over time and is dependent on changes to municipal groundwater pumping. In general, groundwater flow direction in the deep aquifer has been consistently to the south, under the influence of the pumping wells near Camden, NJ. However, groundwater flow direction in the shallow aquifer has been variable, as it strongly affected by changes in the pumping rates of nearby well fields.

The current land use for the area surrounding the Site is light industrial and it is expected to remain so in the future. This area also includes the 600 acre Pennsauken Landfill. The nearby industries, along with the Pennsauken Landfill, are likely contributing contaminants to the regional groundwater aquifers that are similar to the contaminants originating from the Site.

As noted above, the groundwater flow direction in the shallow aquifer has been shown to vary over time. As a result, whether the other local sources are upgradient or downgradient of the Site also varies, as does whether contamination from the other sources is moving onto or away from the Site.

Site History

The Swope Oil and Chemical Company began operating a chemical reclamation facility at the Site in 1965. Materials believed to have been processed there include phosphate esters, hydraulic fluids, paints and varnishes, solvents, oils, plasticizers, and printing ink. During operation of the facility, waste liquids and sludges were either discharged to an excavated unlined lagoon, contained in a tank farm, or contained in an exposed drum storage area. These operations resulted in the contamination of surface and subsurface soil, as well as groundwater. Contaminants in surface soil included polychlorinated biphenyls (PCBs), semivolatile organic compounds (SVOCs) and volatile organic compounds (VOCs). Subsurface soil was primarily contaminated with VOCs and SVOCs. Contamination in groundwater at the Site consists primarily of chlorinated VOCs.

In 1975, the NJDEP cited the Swope Oil and Chemical Company for operating without proper permits. Swope Oil was cited again in 1979 for failure to prepare, maintain, or fully implement a Spill Prevention, Control and Countermeasures Plan. The company ceased operations in December 1979. When the facility ceased operating, contaminated material remained at the Site in drums, tanks, in an unlined lagoon, and in the form of buried sludge.

The Site was proposed for inclusion on the National Priorities List (NPL) in July 1982 and finalized on the NPL in September 1983.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Swope Oil and Chemical Company		
EPA ID: NJD041743220		
Region: 2	**State:** NJ	**City/County:** Pennsauken Township/Camden County
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal Project Manager): Renee Gelblat		
Author affiliation: EPA		
Review period: 5/25/2012 - 3/30/2017		
Date of site inspection: 12/22/2016		
Type of review: Statutory		
Review number: 4		
Triggering action date: 5/25/2012		
Due date *(five years after triggering action date)*: 5/25/2017		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

OU1 Surface Soil: The results of EPA's OU1 RI/FS showed the presence of elevated levels of PCBs and SVOCs in surface soil. Exposure to surface soils by users of the property or trespassers prior to the OU1 remedial actions could have presented a significant health hazard.

OU3 Groundwater: Groundwater beneath the Site was contaminated primarily with chlorinated VOCs. There are potential threats to human health from exposure via inhalation or ingestion to VOCs in the groundwater of the shallow aquifer.

The Screening Level Ecological Risk Assessment which EPA approved in January 2007, showed that there were no unacceptable risks to ecological receptors from groundwater at the Site. Therefore, no further ecological risk assessment was warranted. The potential for environmental/ecological impacts was examined as part of the Supplemental RI. Due to the extensive nature of surficial activities performed as part of the OU 1 remedial action, little of the original site habitat remained.

Response Actions

The Site was addressed through an initial response and remedial actions at three OUs. OU1 addresses surficial contamination at the Site. OU2 addresses contaminated subsurface soils which have acted as a source of groundwater contamination. OU3 addresses groundwater contamination. These actions are summarized below.

Initial Response

In February 1984, EPA completed a Focused Feasibility Study (FFS) of the drums and lagoon waste. In May 1984, a group of Potentially Responsible Parties (PRPs) entered into an Administrative Order on Consent (AOC) with EPA to remove drummed waste and 3,000 tons of lagoon sludge and install a fence to restrict access and to prevent contact with contaminants. These activities took place from 1984 to 1986.

Remedy Selection

OU1 Remedy Selection:

The OU1 ROD for the Site was issued by EPA on September 27, 1985. The Remedial Action Objectives (RAOs) for OU1 are:

- Minimize the risk to the public from exposure to waste and contaminated soil on the Site;
- Prevent the migration of contamination from wastes left on the Site;

- Protect workers from on-site wastes during remedial action; and

- Eliminate the future risk of ingestion by present and potential users from contaminated groundwater resulting from the Site.

The major components of the OU1 ROD included the removal of tanks and buildings, the excavation of buried sludge and lagoon material, and removal of 1.5 feet of PCB-contaminated soils to a goal of 5 parts per million (ppm). The materials removed from the Site were to be taken off-site for incineration or disposal. After the materials were removed, the ROD required that a cap be placed to cover the entire Site. In addition, a supplemental RI/FS was required to evaluate the nature and extent of subsurface soil and groundwater contamination related to the Site and to evaluate and develop remedial alternatives for the groundwater.

OU2 Remedy Selection:

A Supplemental RI/FS was initiated in October 1988 to evaluate the nature and extent of groundwater and subsurface soil contamination at the Site and to develop appropriate remedial alternatives. The Supplemental RI/FS was completed in July 1991.

The OU2 ROD for the Site was issued by EPA on September 27, 1991. The RAO for OU2 was:

- To mitigate the leaching of organic subsurface soil contaminants into the groundwater.

The major components of the OU2 remedy are:

- In-place treatment, utilizing Soil Vapor Extraction with biodegradation, of contaminated subsurface soil; and

- Implementation of a groundwater monitoring program, for a period of five years, to assess the effectiveness of the remedy and to evaluate the need for groundwater remediation.

The cleanup goals for the OU2 Site subsurface soil are 1 milligram/kilogram (mg/kg) for total VOCs and 10 mg/kg for SVOCs. These values were established to be protective of groundwater.

The OU2 remedy was expected to address the migration of VOCs and SVOCs from soil to groundwater. Therefore, EPA postponed the decision to construct the OU1 cap until after the OU2 SVE remedy was fully implemented and completed and post remedy subsurface soil cores were analyzed.

OU3 Remedy Selection and Decision to Implement the OU1 Cap:

The RI/FS for groundwater was conducted from September 2006 (signing of the AOC) to September 2010 (issuance of the OU3 ROD).

The OU3 ROD was issued on September 29, 2010. In the ROD, EPA presented an analyses of samples taken from subsurface soil borings which showed that, in limited areas, subsurface soil contamination remained at levels above the cleanup levels specified in the OU2 ROD after the Soil Vapor Extraction (SVE) system had been turned off. Therefore, the cap required by the OU1 ROD would need to be

constructed to protect groundwater. The OU3 ROD also describes the remedy for the groundwater. The RAOs for the groundwater are to:

- Prevent or minimize potential current and future human exposures including ingestion of and dermal contact with groundwater that presents a significant risk to public health and the environment;

- Minimize the further migration of site-related contamination in the groundwater; and

- Restore the aquifer to drinking water standards within a reasonable time frame.

The selected remedy requires Monitored Natural Attenuation (MNA) in the shallow aquifer and monitoring in the deep aquifer. The ROD also called for institutional controls such as the establishment of a Classification Exception Area (CEA), to minimize the potential for exposure to contaminated groundwater until the aquifer meets the cleanup goals, and deed restrictions to protect the integrity of the cap. EPA recognizes that there are other sources of groundwater contamination in the vicinity of the Site and that full restoration of the aquifer to drinking water standards may be difficult to achieve. These other groundwater contamination sources may be addressed under other Federal, State or local authorities.

Status of Implementation

OU1 Remedial Actions

In August 1986, EPA entered into an AOC with a group of fifteen PRPs for the performance of the remedy for surficial contamination specified in the OU1 ROD. In September 1986, eight PRPs entered into a separate AOC with EPA for the performance of the Supplemental RI/FS and for the design and installation of a cap at the Site.

The surficial remedial action program was completed by August 1989. Subsequent to excavation, certified clean backfill material was utilized to bring the Site up to grade. The installation of a cap, which was a remedial activity specified in the OU1 ROD for the subsurface soil, was postponed to provide for the installation of monitoring wells, performance of treatability studies during the Supplemental RI/FS and to allow the subsurface soil to be treated as part of OU2 remedy as described below.

OU2 Remedial Actions

Pre-design sampling and remedial design activities were performed by a group of PRPs and culminated in the start-up and shakedown of the SVE system in early February 1997. A final inspection of the SVE system was conducted by representatives of EPA and NJDEP on October 28, 1997. The Operation and Maintenance (O&M) Plan for the SVE system was approved by EPA on February 7, 1998. The OU2 Remedial Action Report, which signifies completion of the OU2 remedy, was approved by EPA on March 9, 1998. The components of the system were removed as part of construction of the OU1 cap.

Post-SVE Operation Subsurface Soil Sampling

In 2006, the PRP Group conducted the planned subsurface soil boring sampling program to determine the effectiveness of the SVE system. Fourteen soil borings were drilled on-site and three borings were drilled off-site. Five samples were collected from each boring for analyses. The Revised Performance Soil Boring Program Report was approved by EPA in May 2010 and showed that some areas of the subsurface soil remained contaminated at levels above the cleanup goals. Therefore, it was determined that the OU1 cap would be constructed.

Since the remaining contamination is addressed by the OU1 cap, OU2 activities are considered complete, therefore, the OU2 remedy is not addressed further in this FYR.

Groundwater Monitoring

As required by the OU2 ROD, groundwater beneath the site, in both the shallow and deep aquifers, were sampled to determine if a groundwater remedy was warranted. Contamination in the shallow aquifer was shown to be related to site activities and, therefore, a groundwater remedy was selected for the shallow aquifer. However, analyses of the groundwater samples showed that contamination in the deep aquifer was similar to contamination found in the area from other sources and could not be attributed only to site activities. Therefore, the deep aquifer is being monitored.

<u>OU3 Remedial Actions and OU1 Cap Construction</u>

OU1 Cap Construction

On March 21, 2011, EPA and the PRP group entered into an AOC for the design of the OU1 Cap. On March 20, 2012 a Consent Decree was lodged with the court for construction of the OU1 cap along with design and construction of the OU3 groundwater remedy. Construction of the cap took place from May 5, 2014 through July 7, 2014.

Construction of the cap included a barrier with permeability of no greater than 1x10-7 centimeters per second (cm/s). The cap consists of a 60-millimeter thick synthetic geomembrane placed over the prepared subgrade, overlain by (in ascending order): (i) a single-sided geocomposite drainage layer composed of geotextile, heat bonded to a geonet; (ii) 18 inches of protective cover soil; and (iii) a 6-inch vegetated topsoil layer. The final cap surface is approximately 2 feet higher than pre-existing conditions and is sloped to control stormwater run-off. The completed cap was permanently stabilized with grassy vegetation. Construction of the cap was completed with inspection by EPA on July 17, 2014.

OU3 Remedial Actions

A full round of groundwater sampling in all fourteen wells took place in October 2012 prior to construction of the cap. As necessary, groundwater monitoring wells were lengthened during construction of the cap and no new wells were added to the monitoring network. The remedial action report was approved on February 19, 2015.

IC Summary Table

Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date
Groundwater	Yes	Yes	Sitewide	Restrict installation of groundwater wells and groundwater use.	CEA established in New Jersey on February 4, 2014
Subsurface Soil	Yes	Yes	Sitewide	Protect the integrity of the cap	A Deed Notice was filed on August 23, 2016

Systems Operations/Operation & Maintenance

The O&M Plan for OU3 was approved on September 15, 2014. Quarterly groundwater monitoring of the shallow aquifer resumed in March 2015 and continues. The groundwater monitoring system consists of 14 monitoring wells installed in the shallow aquifer and eight wells in the deep aquifer. Samples from the shallow groundwater wells are taken quarterly and the deep wells are sampled annually. The wells are sampled for MNA indicator parameters, iron, manganese as well as VOCs. The primary Site compounds of concern (COCs) are PCE, TCE, and cis-DCE.

Currently, O&M activities associated with OU1 consist of assuring that Site security measures are in place for the landfill cap and that the integrity of the cap is maintained

Potential site impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the Site.

III. PROGRESS SINCE THE LAST REVIEW

Protectiveness Determinations/Statements from the 2012 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Will be Protective	The remedy at OU 1 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.
2	Protective	The remedy at OU 2 is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled.

No issues were raised as part of the 2012 FYR.

The following activities have been completed since September 2012:

- The OU2 SVE system has completed operations and has been removed.
- Construction of the OU1 cap and OU3 groundwater monitoring system was completed (inspected and approved July 17, 2014).
- Two years (2015 and 2016) of groundwater monitoring have been completed.
- The final Remedial Action Report for OU3 was approved on February 19, 2015.
- The Preliminary Close Out Report (PCOR) was approved on September 4, 2015.
- The CEA for groundwater was established by NJDEP on February 4, 2014.
- Deed notice was filed with NJDEP on August 23, 2016

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On November 14, 2016, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 38 Superfund sites in New York and New Jersey, including the Swope Oil and Chemical Site. The announcement can be found at the following web address: https://www.epa.gov/sites/production/files/2016-11/documents/five_year_reviews_fy2017_final.pdf. In addition to this notification, NJDEP and local officials were contacted directly and invited to attend the Site visit.

The results of the review and the report will be made available at the Site information repository located at the Pennsauken Free Library, 5605 North Crescent Boulevard, Pennsauken, New Jersey 08110-1834 or at the U.S. EPA Records Center, Region 2, 290 Broadway, 18th Floor, New York, New York 10007-1866 or online at https://www.epa.gov/superfund/swope-oil.

Data Review

In 2015, after the construction of the OU1 cap was completed and in accordance with the approved Quality Assurance Project Plan, post construction groundwater sampling of monitoring wells began. The 14 shallow wells (80 to 150 feet below the ground surface (bgs)) are shown in Figure 2 are distributed as follows:

- On-Site wells: GM-01S, GM-03RS, MW-01, MW-02, and MW-04;
- Off-Site upgradient wells: GM-02S, GM-05S and MW-10S;
- Off-Site downgradient/sidegradient wells: GM-08S, MW-07, MW-09S, and MW-11S; and
- Off-Site sidegradient wells: GM-06S and GM-07S.

The 8 deep wells (deeper than 150 feet bgs) are: GM-01D, GM-02D, GM-03D, GM-04D, GM-05D, GM-06D, GM-07D and GM-08D.

Groundwater elevation data is taken before each groundwater monitoring sampling event. The analyses of the shallow groundwater level data sets were generally consistent with the findings of previous studies in 2008/2009 and 2012 and indicate the following:

- The hydraulic gradient in the shallow aquifer at the Site is fairly flat;
- Shallow groundwater typically flows onto the Site from the southeast and from the north/northeast converging in the southeastern portion of the Site;
- Shallow groundwater on the Site generally flows off site towards the west; and
- Shallow aquifer groundwater flow conditions continue to vary in response to local groundwater pumping.

The wells are sampled for MNA indicator parameters, iron, manganese as well as VOCs. PCE, TCE, and cis-DCE, which are the primary Site compounds of concern (COCs). The shallow groundwater is sampled quarterly and the deep groundwater is sampled annually. EPA collects and analyzes split samples in the spring (shallow wells only) and fall (shallow and deep wells). To date, the results of the EPA split sample analyses have been statistically similar to the analytical results obtained by the PRP's laboratory.

The results from the 2015 and 2016 sampling events were provided to EPA in the Year 1 (2015) and Year 2 (2016) Annual Monitored Natural Attenuation Report Operable Unit 3. The concentrations of PCE and TCE detected in shallow groundwater in 2015 and 2016 were similar to the concentrations detected in October 2012, prior to the installation of the OU1 Cap. The 2015 and 2016 shallow groundwater analytical results indicate that potential off-site PCE and TCE source to the southeast and to the north/northwest may be impacting shallow groundwater beneath the Site. Continued sampling will be conducted to develop a more definitive trend in the data and to further assess whether non-site sources are contributors.

The 2015 Mann-Kendall analysis results indicate that concentrations of PCE and TCE in shallow groundwater are primarily stable or have no discernable trend at upgradient and on-Site locations, and that concentrations of the reductive dechlorination daughter products, vinyl chloride (VC) and ethene, are stable downgradient of the Site. Comparison of the 2015 results with sampling results from the 4th quarter 2016 sampling round indicated no significant difference.

Shallow aquifer groundwater samples collected in October and December 2015 (third and fourth quarter sampling) were also analyzed for 1,4-dioxane. Detections were reported in several wells above the New Jersey Interim Groundwater Quality Standard of 0.4 ug/L. Comparison of the 2015 results with previously collected samples from 2012, was not possible due to the high laboratory detection limits for 1,4-dioxane used in the 2012 analyses. However, the 2016 sampling results for 1,4-dioxane were similar to the 2015 results. The highest detections were at MW-02 (38.4 µg/L) and MW-9S (23.4 µg/L). MW-02 is on the western edge on the former Swope property and MW-9S is offsite to the west. Therefore, it is possible that the 1,4-dioxane is a site-related contaminant.

In 2015, the highest concentration of TCE was detected at off-Site, upgradient well MW-10S (115 µg/L). The 4th Quarter 2016 sampling results for TCE at MW-10S were 132 ug/L. The presence of TCE in groundwater at concentrations significantly above the MCL and New Jersey Groundwater Quality Standard (NJGWQS) at MW-10S, which is upgradient of the Site, is indicative of an ongoing off-site source of TCE which impacts to shallow groundwater beneath the Site.

The deep aquifer beneath the Site is separated from the shallow aquifer by an aquitard approximately 35 feet thick beneath the Site. The existence of PCE, TCE, in the deep aquifer provides evidence of regional VOC impacts. In 2016, the concentration of PCE in six (6) of the eight (8) deep aquifer monitoring wells were lower than 2012 levels, and the concentrations of TCE were generally comparable to the 2012 levels. The overall concentration trends for PCE and TCE in the deep aquifer are generally declining. cis-DCE was not detected above the NJGWQS at any of the 8 deep monitoring wells.

Site Inspection

The inspection of the Site was conducted on December 12, 2016. In attendance from EPA were Renee Gelblat, Remedial Project Manager and Robert Alvey, hydrogeologist, along with Kelly Fifer from *de maximus* (PRP oversight contractor) and Mary DeFlaun from Geosyntec (PRP contractor). The local (Pennsauken Township) officials and representatives of NJDEP were invited but did not attend. The purpose of the inspection was to visually assess the status of the Site.

During the Site inspection, the cap and all the groundwater monitoring wells were observed to be in good condition. The fence surrounding the Site is also in good condition.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

The selected remedies for the Swope Oil and Chemical Superfund Site are functioning as intended by the decision documents and are protective of human health and the environment.

For OU1: Removal of contaminated materials and media was completed in August 1989. The final component of the OU1 ROD, the site-wide cap was completed and inspected by EPA on July 17, 2014. Construction of the cap and implementation of all the institutional controls completes all the remediation requirements of the OU1 ROD. O&M for the cap includes periodic inspection of the condition of the cap and maintenance as necessary. As of the 5-year review inspection in December 2016, the cap was in good condition.

For OU3: An O&M Plan for the Site was approved in April 2014. The O&M Plan includes groundwater sampling for both MNA of the shallow aquifer and long term monitoring of the deep aquifer. These sampling programs are conducted through a Field Sampling Plan and Quality Assurance Project Plan for the Site. EPA has also conducted laboratory analysis of split samples from the monitoring well network to assess the accuracy and reliability of the results from the PRPs' laboratory. Sampling results to date have been generally consistent between EPA and PRP labs.

A CEA/Well Restriction Area, was also established by NJDEP on February 4, 2014. This institutional control was required as part of the OU3 ROD. Both the CEA and Deed Notice (OU1) are institutional controls to minimize the potential for exposure to contaminated groundwater.

Groundwater Trends

During OU1 activities, contaminated surface soil were removed. During OU2 activities, over 21,000 pounds of contamination was removed from the subsurface soil. These activities removed the majority

of the sources of groundwater. Completion of construction of the OU1 cap in July 2014 was the final remediation activity at the Site. In 2015, groundwater monitoring resumed and is ongoing. As shown in the Table 1, the 2015 Mann-Kendall analysis results indicate that concentrations of PCE and TCE in shallow groundwater are primarily stable or have no discernable trend at upgradient and on-Site locations. Concentrations of the reductive dechlorination daughter products such as vinyl chloride (VC) and ethene, are stable downgradient of the Site. Comparison of the 2015 results with sampling results from the 4th quarter 2016 sampling round indicated no significant difference.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

For OU1: OU1 addresses the surface soil. The risk assessment process has changed somewhat since the original risk assessment was performed in 1983. In addition, chemical specific toxicity values have changed since the surface soil was originally assessed. Under the OU1 remedy, the major sources of contamination were removed and 1.5 feet of the surface soil was excavated.

Under the requirements of the OU1 ROD, contaminated surface soil has been excavated and replaced with clean fill and the entire Site has been capped. Since the direct exposure to contaminated surface and subsurface soil has been interrupted through construction of the OU1 cap, human health is currently protected. The groundwater is also protected because the cap prevents movement of the contaminated subsurface soils into the groundwater. Under the approved O&M plan, the integrity of the cap is regularly inspected.

For OU3*:* OU3 addresses the groundwater. After completion of construction of the OU1 cap in July 2014, there has been quarterly groundwater sampling of the shallow groundwater and annual sampling of the deep groundwater. EPA now has sampling results for 2015 and 2016. Since the cap was installed, the ground water concentrations of Site related COCs continue to exceed their respective MCLs, NJDEP GWQSs or RSLs and have generally remained at steady levels. However, other contaminants (i.e. 1,4-dioxane), have only recently been detected and levels have slightly increased since their first detection.

Currently, no one is consuming the water and, since the site is covered by a CEA and no drinking water wells can be added, the groundwater exposure pathway has been interrupted.

Vapor Intrusion Investigation

The PRP Group conducted a Vapor Intrusion Study at the Site and the adjoining properties from March 26 to April 3, 2009. A total of nine sub-slab samples were taken from the SVE treatment building on-site and two off-site locations. The only exceedance of the NJDEP soil gas screening levels for both residential and non-residential uses was for the concentrations of PCE at one location on-site. This was at the SVE treatment building, which was a temporary and uninhabited structure. The SVE treatment building has since been removed from the Site. There were no exceedances at the off-site sampling locations. Therefore, the vapor intrusion study identified no current unacceptable risk from the contaminants of concern at or near the Site. The Final Soil Vapor Intrusion Investigation Report was submitted on January 18, 2010 and approved by EPA on May 5, 2010.

This evaluation shows a potential for a vapor intrusion problem if a building were to be erected over the plume. There were no buildings on the Site at the time of the vapor intrusion screening and, currently,

there are no buildings at the Site. If a building was to be constructed at the Site, further investigations would be necessary.

Ecological Risk

There is no unacceptable ecological risk at the Site. As part of the OU1 remedy, the top 1.5 feet of surface soil was removed across the site. It was replaced with 2 feet of clean fill to cover the underlying soil. Currently, the 1.9-acre site is capped and the vegetated cover consists of grass. It is unlikely to support any complex terrestrial ecosystem, but may support invertebrates and some small mammals. In addition, since contaminated soil is no longer exposed, constituents present in the subsurface soil are not likely to be transported off site via erosional runoff or wind.

QUESTION C: Has any **other** information come to light that could call into question the protectiveness of the remedy?

No

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
OU1 and OU3

VII. PROTECTIVNESS STATEMENT

Protectiveness Statement(s)	
Operable Unit: 1	*Protectiveness Determination:* Protective
Protectiveness Statement: The remedy at OU1 is protective of human health and the environment.	

Protectiveness Statement(s)	
Operable Unit: 3	*Protectiveness Determination:* Protective
Protectiveness Statement: The remedy at OU3 is protective of human health and the environment.	

Sitewide Protectiveness Statement
Protectiveness Determination: Protective
Protectiveness Statement: The remedies implemented for the Site are protective of human health and the environment.

VIII. NEXT REVIEW

The next FYR report for the Swope Oil and Chemical Company Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

Record of Decision for OU1, September 1985

Record of Decision for OU2, September 1991

Record of Decision for OU3, September 2010

Swope Third Five Year Review, May 2012

Preliminary Close Out Report, September 2015

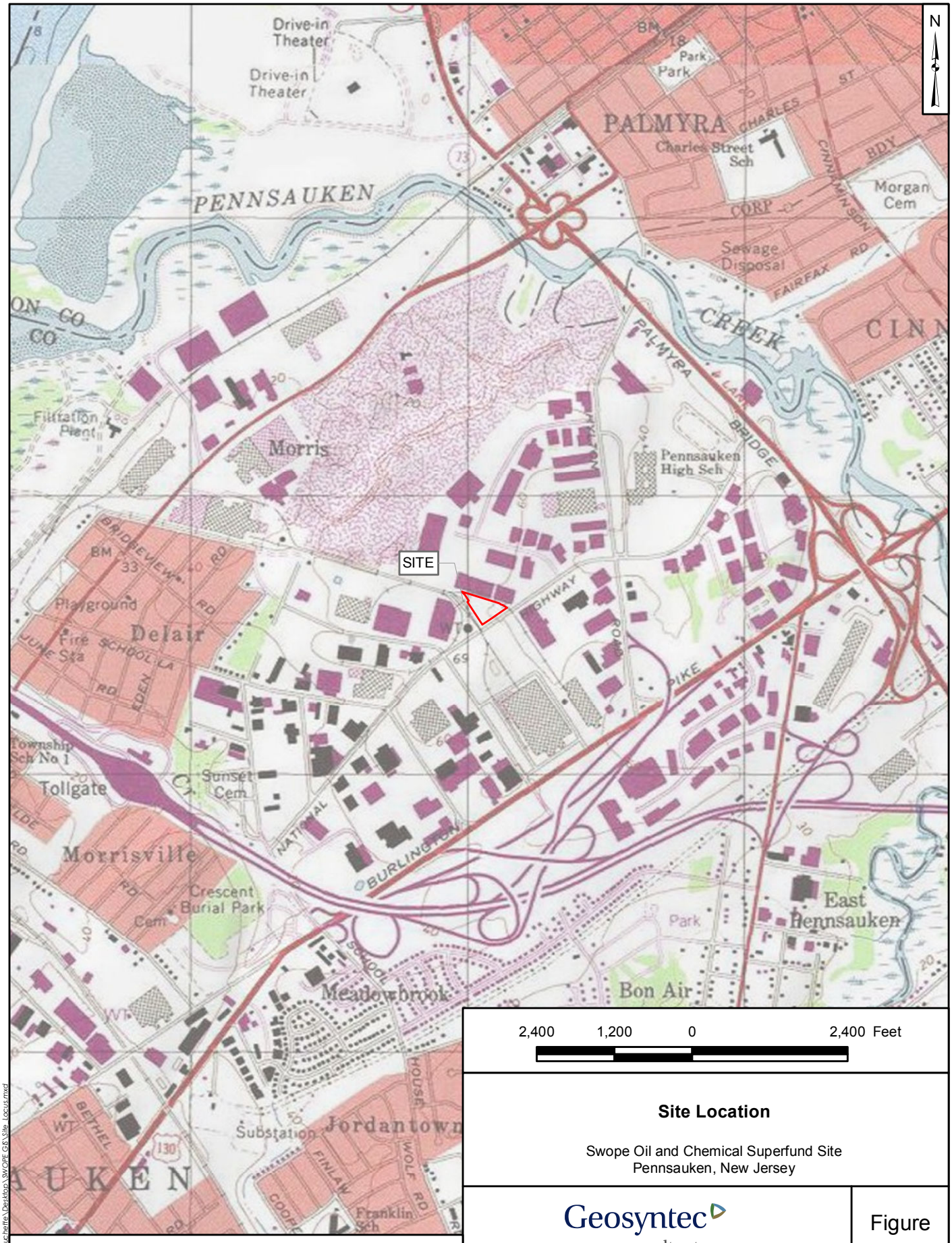
Operation and Maintenance Plan for OU3, April 2014

2015 Annual MNA Report

2016 Annual MNA Report

Swope EDD Database for groundwater data

APPENDIX B Figures and Tables



Site Location

Swope Oil and Chemical Superfund Site
Pennsauken, New Jersey

Geosyntec consultants

Ewing, NJ | November 2012

Figure 1

Base Map: USGS Camden (1999) 7.5 x 7.5 Minute Quadrangle.

Path: C:\Users\jfuchette\Desktop\SWOPE GIS\Site_Locus.mxd

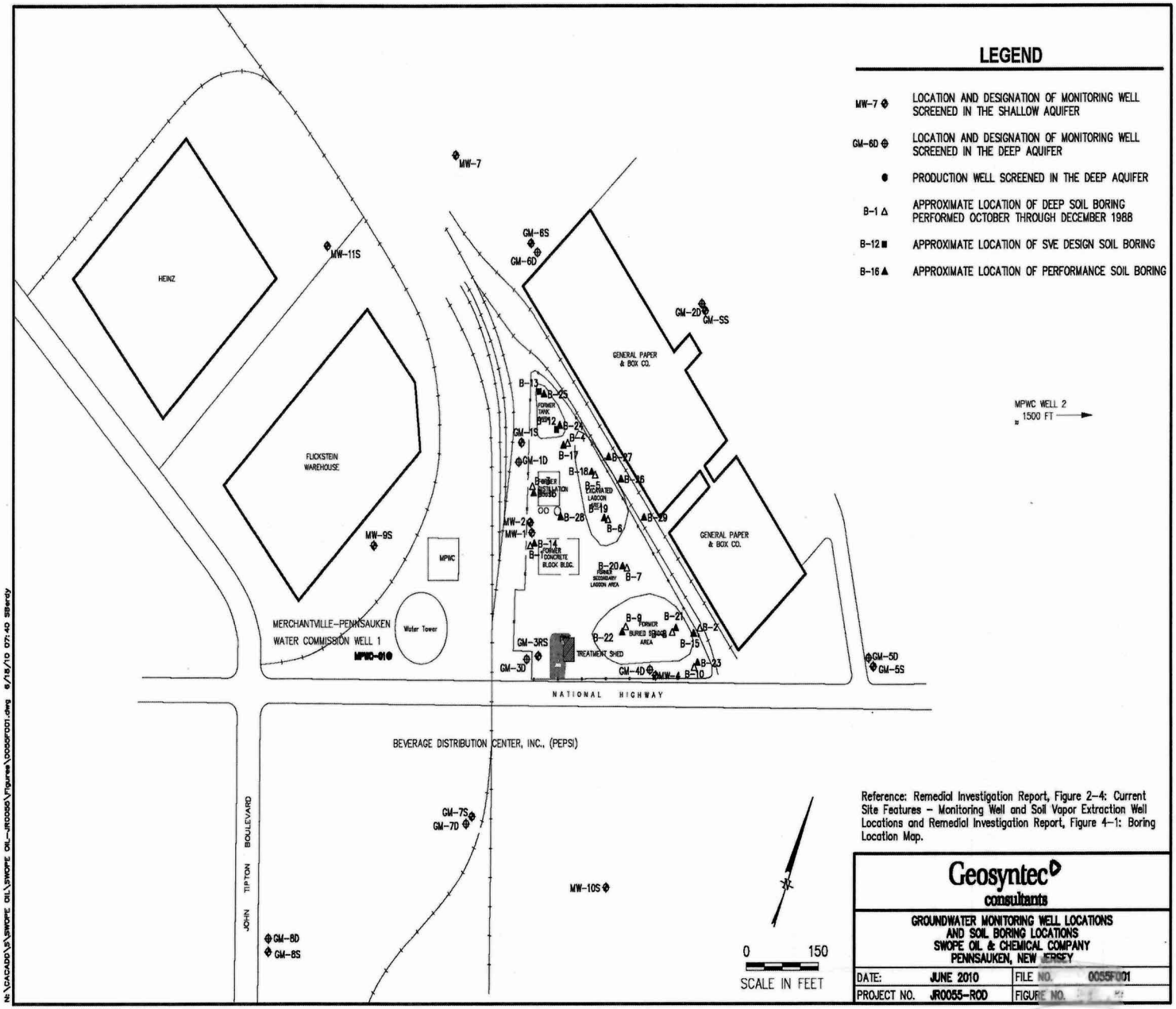

LEGEND
MW-7 LOCATION AND DESIGNATION OF MONITORING WELL SCREENED IN THE SHALLOW AQUIFER
GM-6D LOCATION AND DESIGNATION OF MONITORING WELL SCREENED IN THE DEEP AQUIFER
PRODUCTION WELL SCREENED IN THE DEEP AQUIFER
B-1 APPROXIMATE LOCATION OF DEEP SOIL BORING PERFORMED OCTOBER THROUGH DECEMBER 1988
B-12 APPROXIMATE LOCATION OF SVE DESIGN SOIL BORING
B-16 APPROXIMATE LOCATION OF PERFORMANCE SOIL BORING
HEINZ
FLICKSTEIN WAREHOUSE
GENERAL PAPER & BOX CO.
MERCHANTVILLE-PENNSAUKEN WATER COMMISSION WELL 1
MPWC-01
Water Tower
MPWC
TREATMENT SHED
NATIONAL HIGHWAY
BEVERAGE DISTRIBUTION CENTER, INC., (PEPSI)
JOHN TIPTON BOULEVARD
MPWC WELL 2
1500 FT
0
150
SCALE IN FEET
Reference: Remedial Investigation Report, Figure 2-4: Current Site Features - Monitoring Well and Soil Vapor Extraction Well Locations and Remedial Investigation Report, Figure 4-1: Boring Location Map.
Geosyntec consultants
GROUNDWATER MONITORING WELL LOCATIONS
AND SOIL BORING LOCATIONS
SWOPE OIL & CHEMICAL COMPANY
PENNSAUKEN, NEW JERSEY
DATE: JUNE 2010
FILE NO. 0055F001
PROJECT NO. JR0055-ROD
FIGURE NO.

FIGURE 2

Table 1 Mann-Kendall Analysis Results Year 1 and 2 (2015 and 2016) Annual MNA Report

Location	Location Relative to the Site	PCE	TCE	cDCE	VC	Ethene
GM-01S	on-Site	No Trend	Stable	Stable	NA	NA
GM-02S	off-Site upgradient	No Trend	No Trend	No Trend	No Trend	NA
GM-03RS	on-Site	Stable	No Trend	Decreasing	Decreasing	NA
GM-05S	off-Site upgradient	Stable	No Trend	Increasing	NA	NA
GM-06S	off-Site sidegradient	No Trend	Increasing	Increasing	NA	NA
GM-07S	off-Site sidegradient	No Trend	Decreasing	Stable	NA	NA
GM-08S	off-Site downgradient/sidegradient	NA	Stable	No Trend	NA	NA
MW-01	on-Site	No Trend	No Trend	Stable	NA	NA
MW-02	on-Site	Decreasing	Stable	Stable	NA	NA
MW-04	on-Site	Stable	Stable	No Trend	NA	NA
MW-07	off-Site downgradient/sidegradient	Stable	No Trend	Stable	NA	NA
MW-09S	off-Site downgradient/sidegradient	Stable	Stable	Stable	Stable	Stable
MW-10S	off-Site upgradient	Stable	Stable	Stable	NA	No Trend
MW-11S	off-Site downgradient/sidegradient	Stable	Stable	Stable	NA	No Trend

NA = Not analyzed due to < 50% detection frequency.

"No Trend" does not imply the absence of a trend. It simply means that the Mann-Kendall test could not discern either an upward or downward trend for the given data set.