

**FOURTH FIVE-YEAR REVIEW REPORT FOR
CROSSLEY FARM SUPERFUND SITE
BERKS COUNTY, PENNSYLVANIA**



AUGUST 2019

Prepared by

**U.S. Environmental Protection Agency
Region 3
Philadelphia, Pennsylvania**

A handwritten signature in blue ink, appearing to read "P. Leonard", is written over a horizontal dashed line.

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September 5, 2019

Date

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
Cis-1,2-DCE	Cis-1,2-Dichloroethylene
COC	Contaminant of Concern
DNAPL	Dense Non-Aqueous Phase Liquid
EPA	United States Environmental Protection Agency
EPIC	Environmental Photographic Interpretation Center
ESD	Explanation of Significant Differences
FY	Fiscal Year
FYR	Five-Year Review
GAC	Granular Activated Carbon
gpm	Gallons per Minute
GWTS	Groundwater Treatment System
HSCA	Hazardous Sites Cleanup Act
IC	Institutional Control
MCL	Maximum Contaminant Level
µg/L	Micrograms per Liter
µg/m ³	Micrograms per Cubic Meter
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
MSC	Medium Specific Concentration
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PADEP	Pennsylvania Department of Environmental Protection
PCE	Tetrachloroethylene
PDI	Pre-design Investigation
POET	Point-of-Entry Treatment
ppbv	Parts per Billion by Volume
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
SSDS	Subslab Depressurization System
TCE	Trichloroethylene
TCFM	Trichlorofluoromethane
Trans-1,2-DCE	Trans-1,2-Dichloroethylene
TVECS	Tank Vapor Emissions Control System
UU/UE	Unlimited Use and Unrestricted Exposure
VOC	Volatile Organic Compound
VVP	Vacuum Verification Point

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy 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 pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fourth FYR for the Crossley Farm Superfund site (the Site). The triggering action for this statutory review is the completion date of the previous FYR, September 17, 2014. The FYR has been prepared because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of three operable units (OUs). OU1 addresses point-of-entry treatment (POET) for residential drinking water wells. OU2 addresses sitewide groundwater contamination. OU3 addresses vapor intrusion from contaminated groundwater. The FYR addresses all OUs.

The EPA remedial project manager (RPM) led the FYR. Additional participants from EPA included the community involvement coordinator (CIC), human health and ecological risk assessors, a hydrogeologist and legal counsel. The project manager and section leader group manager from the Pennsylvania Department of Environmental Protection (PADEP) also participated in the review. Skeo provided EPA contractor support for this FYR. The review began on November 16, 2018. Appendix A provides a list of the resources used in preparation of this FYR. Appendix B provides site status information. Appendix C provides a chronology of significant site events.

Site Background

The Site is located on a 209-acre farm in a rural area in Hereford Township, Berks County, Pennsylvania, about 7 miles southwest of the city of Allentown (Figure 1). The farm is located on the southern side of Huffs Church Road and east of Dale Road approximately 3 miles west-northwest of State Route 100 and northwest of the borough of Bally (Figure 2). The Site was the location of known and alleged waste disposal areas at the Crossley Farm property and groundwater contamination associated with the disposal areas.

The Site currently consists of farmland, with the crest of Blackhead Hill near the middle of the farmland. The hill is very steeply sloped to the west and south of its peak, but it is fairly level to the north and east where farming occurs. A water treatment building, which houses equipment to clean up the Site's contaminated groundwater, is located along an access road from Dale Road.

Residential areas surround the Crossley Farm property. Residents in the vicinity of the Crossley Farm property rely on groundwater for drinking water. Point-of-entry groundwater treatment (POET) systems have been installed in homes affected by site groundwater contamination to ensure the water is safe for consumption. Vapor mitigation systems have also been installed in some homes to prevent exposures to contaminated vapors associated with the Site's groundwater plume.

The Site is underlain by 40 feet, to more than 300 feet, of overburden (soil, saprolite, alluvium and colluvium), which overlies fractured crystalline rocks (granite gneiss, hornblende gneiss, quartzite and feldspathic sandstone) and fractured carbonate rocks (dolomite). The substantial variation in the thickness of the overburden is due to the extensive fracturing and faulting, as well as the composition of the underlying bedrock, groundwater chemistry and the steep topography.

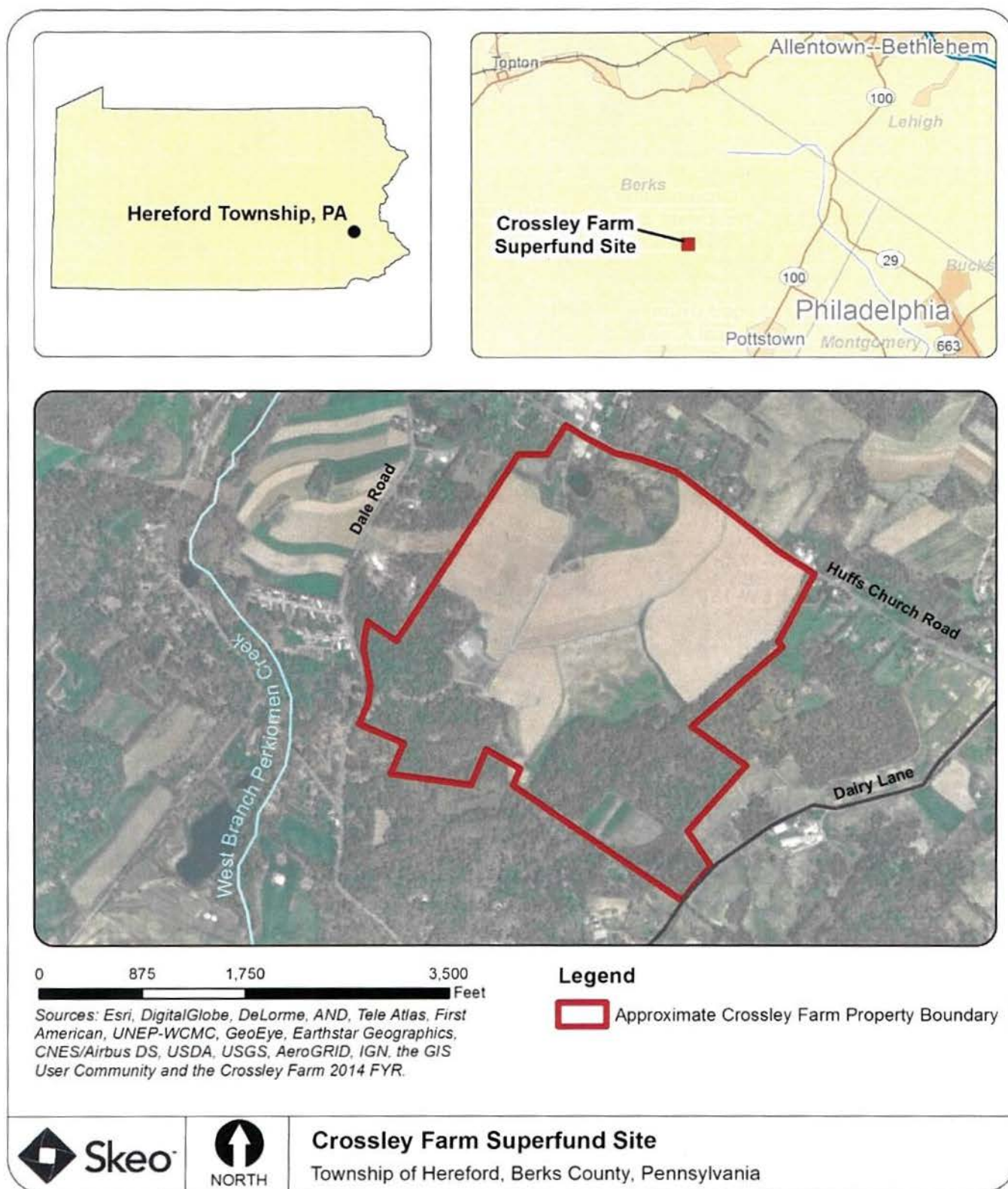
The groundwater flow in the area of the Site has been conceptualized as a two-component system, consisting of overburden and the underlying bedrock. The overburden has generally been thought to have lower hydraulic conductivity than the underlying bedrock. However, extensive heterogeneity results in exceptions to this two-component concept. At some locations, the overburden is very hydraulically conductive, perhaps more than the underlying bedrock. At other locations, the two-component system is not clearly present, and the overburden contains increasing portions of weathered bedrock, and rock competence increases incrementally, with depth.

There are several components to the horizontal groundwater gradient. While contamination migrates along the northwestern and western gradients, the potentiometric surface and contaminant trends indicate there is substantial mass transport along the southern gradient. It is also suspected that considerable contaminant mass follows deep preferential flow pathways.

FIVE-YEAR REVIEW SUMMARY FORM

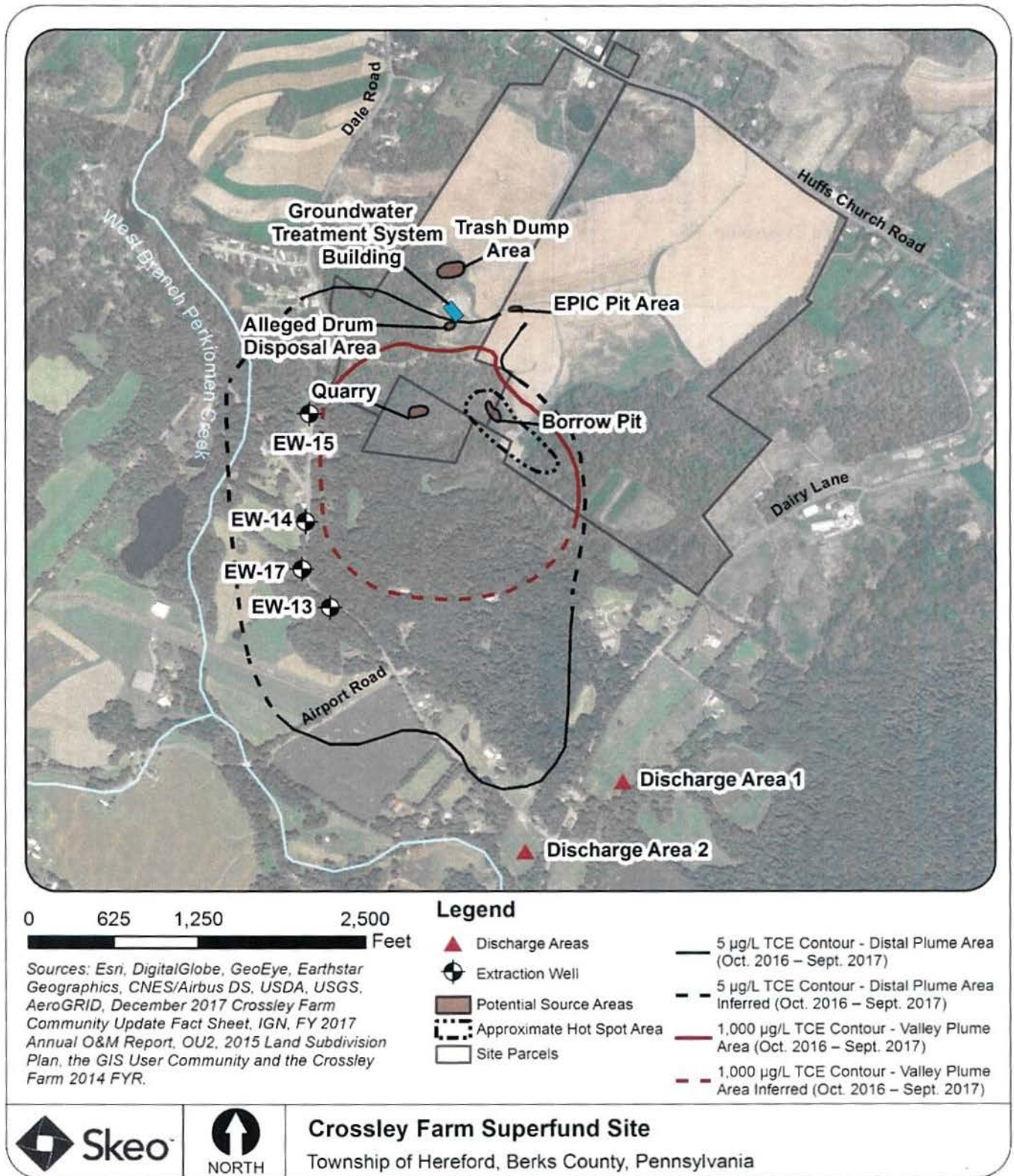
Site Name: Crossley Farm		
EPA ID: PAD981740061		
Region: 3	State: PA	City/County: Hereford Township/Berks
NPL Status: Final		
Multiple OUs? Yes	Has the Site achieved construction completion? No	
Lead agency: EPA		
Author name: Roy Schrock, with additional support provided by Skeo		
Author affiliation: EPA Region 3		
Review period: 11/26/2018 – 9/17/2019		
Date of site inspection: 11/29/2018		
Type of review: Statutory		
Review number: 4		
Triggering action date: 9/17/2014		
Due date (five years after triggering action date): 9/17/2019		

Figure 1: Site Vicinity Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

Figure 2: Detailed Site Map



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II. RESPONSE ACTION SUMMARY

Basis for Taking Action

The Crossley Farm operated as a dairy farm between 1927 and 2000. From the mid-1960s to the mid-1970s, a local manufacturing plant sent many drums of liquid waste to the Crossley Farm for disposal. The plant was believed to have used trichloroethylene (TCE) as a degreaser from at least the mid-1960s until 1973 and tetrachloroethylene (PCE) from at least the early 1960s until 1980. Household trash was also disposed of at the Site.

In 1983, PADEP identified TCE and PCE above drinking water standards in residential wells downgradient of the Crossley Farm property. PADEP issued a health advisory, warning residents not to drink from the contaminated wells. The Pennsylvania Emergency Management Agency provided temporary water supplies to the community.

EPA conducted the first regional groundwater study from 1987 to 1988. The study delineated a contaminated groundwater plume extending approximately 7,000 feet downgradient from the Crossley Farm property. The study also concluded that the source of the plume was on the farm and in the vicinity of Blackhead Hill. EPA listed the Site on the Superfund program's National Priorities List (NPL) on October 14, 1992. EPA conducted the OU1 remedial investigation and feasibility study (RI/FS) at the Site between 1994 and 1997.

EPA conducted the OU2 RI/FS from 1997 until 2001, which included a baseline risk assessment. The OU2 RI/FS investigated several potential source areas, including the Trash Dump, the Quarry, the Borrow Pit Area, the Alleged Drum Disposal Area and the Environmental Photographic Interpretation Center (EPIC) Pit Area (Figure 2). The EPIC Pit Area was identified as the location of 1,200 buried drums. Through the installation of additional monitoring wells and extensive testing of residential supply wells, the RI and subsequent post-RI investigations also confirmed that TCE existed as a dense non-aqueous phase liquid (DNAPL) in the Borrow Pit Area, and the dissolved-phase groundwater plume with TCE concentrations exceeding the maximum contaminant level (MCL) of 5 micrograms per liter ($\mu\text{g/L}$) extended approximately 2.5 miles downgradient of the farm and affected residential wells.

EPA's 2001 OU2 baseline risk assessment evaluated human exposures to groundwater, surface water (including springs), sediments and soil. It also evaluated exposures to milk from the farm's dairy cows and fish in nearby surface water bodies. The results of the risk assessment indicated that residential, industrial and construction worker exposures to groundwater resulted in the highest cancer risks, predominantly due to TCE. The screening level ecological risk assessment did not identify any risks to ecological populations.

EPA completed the OU3 RI in September 2012. The OU3 RI involved collecting additional data to support the evaluation of potential residential health risks associated with exposure to site-related volatile organic compounds (VOCs) via vapor intrusion from the Site's contaminated groundwater plume. The evaluation concluded that there is a potential for vapor intrusion of site-related contaminants from contaminated groundwater to indoor air to occur at the Site at concentrations that could pose an unacceptable cancer and/or noncancer risk to human health.

Response Actions

Removal Actions

EPA has conducted several removal actions at the Site since initial discovery of contamination. In December 1986, EPA began installing POET systems on the contaminated residential wells. EPA installed 15 POET systems as part of the removal action between December 1986 and January 1987.

In 1998, EPA excavated 1,200 drums and 15,000 tons of contaminated soil from the EPIC Pit Area on Site. EPA disposed of all excavated materials at approved and permitted off-site hazardous waste disposal facilities.

In November 2006 EPA installed vapor mitigation systems in two homes to prevent exposures to contaminated vapors associated with the Site's groundwater plume.

Remedial Actions

OU1

EPA issued an interim Record of Decision (ROD) for OU1 in June 1997. The action provided POET systems to residents affected by contamination from the Site, with additional systems available as needed. The interim ROD did not specify remedial action objectives (RAOs), but the primary goal of the interim remedial action was to reduce contaminant concentrations in residential water supplies to below drinking water standards (MCLs). The interim ROD also required sampling of the treatment systems and nearby residences every six months.

EPA issued an Explanation of Significance Differences (ESD) for the OU1 interim remedy in August 2006. The ESD changed sampling of residential wells near the Site to once a year for homes with treatment systems and to every two years for homes without treatment systems. The reduction in the sampling frequency was based on the historical results conducted over more than a decade that showed the general areal shape of the contaminated groundwater plume had not expanded further away from the source areas.

OU2

EPA issued an interim ROD for OU2 in September 2001. The remedy included groundwater extraction and treatment for the Hot Spot Area, which is defined by TCE concentrations greater than 100,000 µg/L in groundwater, as well as institutional controls to restrict use of contaminated groundwater at the Site. The OU2 interim ROD also clarified that property owners are responsible for groundwater treatment systems in homes built after 2001.

EPA issued an ESD for the OU2 interim remedy in July 2004. The ESD changed the groundwater treatment technology from an on-site plant using air stripping to an on-site plant using advanced oxidation process. This ESD also shifted the operation and maintenance (O&M) responsibility for the OU1 residential well sampling to PADEP.

In July 2008, EPA issued an amendment to the OU2 interim ROD. The OU2 ROD Amendment changed the focus of the remedial action to address groundwater contamination in the Valley Plume Area first, rather than the Hot Spot Area. EPA defined the Valley Plume Area as the plume that contains TCE concentrations greater than 1,000 µg/L that originates from the Hot Spot Area on the top of Blackhead Hill and extends downgradient south into the valley.

The OU2 ROD Amendment listed the following RAOs:

- Establish a hydraulic containment system that will intercept and cut-off VOC groundwater contamination greater than 1,000 µg/L TCE (Valley Plume Area).
- Prevent or minimize any further migration of the Valley Plume Area to protect the downgradient residential water supply and to reduce contamination in the aquifer and surface water springs downgradient of the hydraulic containment system.
- For the long term, restore the groundwater downgradient of the Valley Plume Area to drinking water standards.
- For the long term, restore the surface water and springs to drinking water and aquatic water quality standards.

The OU2 ROD Amendment identified the following major remedy components:

- Design and installation of a groundwater extraction system for interception and containment of the Valley Plume Area.
- Design and installation of a treatment plant for VOC-contaminated groundwater.
- Discharge of treated water via injection wells, infiltration gallery or to the West Branch Perkiomen Creek.

- O&M of the groundwater extraction system, treatment plant and equipment.
- Long-term groundwater monitoring.
- Institutional controls to protect the treatment plant, extraction well system, injection locations, the infiltration gallery and the discharge system to Perkiomen Creek
- Establishment of a groundwater management zone to restrict use of untreated groundwater affected by the Site.

The OU2 ROD Amendment also clarified that there are three areas of groundwater contamination: the Hot Spot Area or Source Area (where DNAPL was identified), the Valley Plume Area, and an Extended or Distal Plume Area. The three areas of contaminated groundwater extend almost 3 miles down the valley from Blackhead Hill. The OU2 ROD Amendment, with extraction wells in the valley, is considered the first step of a multi-step groundwater cleanup. A subsequent step of the remediation process will be to address the Hot Spot Area. Due to the size and complexity of the groundwater plume and geology at the Site, the OU2 ROD Amendment clarified that EPA would select the final remedy for the Site in a future decision document.

The OU2 ROD Amendment identified MCLs as interim cleanup levels for groundwater at the Site. Table 1 summarizes the initial Hot Spot Area and Valley Plume Area groundwater contaminants of concern (COCs) as identified in the OU2 ROD Amendment. The OU2 ROD Amendment also stated that if the MCLs are met, the final groundwater cleanup levels would consider the complete list of site-specific chemicals to determine the cumulative site-specific risk.

Table 1: Groundwater COC Interim Cleanup Levels

Constituent ^a	Hot Spot Area COC	Valley Plume Area COC	Cleanup Level ^b (µg/L)
Carbon tetrachloride	X		5
1,2-Dichloroethane	X		5
1,1-Dichloroethylene	X		7
Cis-1,2-dichloroethylene (cis-1,2-DCE) ^d	X	X	70
Methylene chloride ^c	X		5
PCE ^{c,d}	X	X	5
Trans-1,2-dichloroethylene (trans-1,2-DCE)	X		100
1,1,2-Trichloroethane	X		5
TCE ^{c,d}	X	X	5
Trichlorofluoromethane (TCFM)		X	1,300 ^e
Vinyl chloride	X		2

Notes:

a) From Tables 1 and 3 of the 2008 OU2 ROD Amendment.

b) Cleanup levels are the federal MCLs, except where noted.

c) Also identified as a COC in the 1997 OU1 ROD.

d) Also identified as a COC for the OU2 Hot Spot Area in the 2001 OU2 ROD.

e) Value for TCFM is a screening value and not a cleanup level; it is based on the EPA Regional Screening Level (RSL) in effect at the time of the 2008 OU2 ROD Amendment because an MCL had not been established.

X = Indicates selection as a COC for the plume area specified.

Blank cell = Indicates that COC was not selected for the plume area specified.

OU3

In September 2012, EPA issued the OU3 ROD as an interim remedial action for vapor intrusion from contaminated groundwater at the Site. The OU3 ROD listed the following RAOs:

- Protect current and future residents from adverse health effects that may result from exposure to VOC-contaminated vapors within residences attributable to the Site's groundwater contamination plume.
- Prevent and/or minimize contaminant migration from subsurface vapor intrusion into residential indoor air.

The OU3 interim remedy consists of:

- Installation of vapor intrusion mitigation systems at residences that overlie the site-related groundwater contamination plume.
- O&M of the vapor mitigation systems.
- Institutional controls to provide builders of future buildings with information pertaining to vapor intrusion at the Site and the areal extent of the shallow groundwater contamination plume to help them decide whether new homes or occupied buildings should be constructed with a vapor intrusion mitigation system.

Status of Implementation

EPA settled with two responsible parties for the Site. EPA entered into a Consent Decree with Temrac Company, Inc. in March 2009 and a second Consent Decree with Ruth Crossley and the Estate of Harry Crossley in November 2008.

OU1 Residential Well Treatment Systems

EPA conducted the OU1 remedial design from September 1997 to June 1999. EPA contractors installed POET systems at affected residences between September 1999 and February 2001, when PADEP assumed O&M of the units. By September 2001, 43 POET systems were installed. Additional POET systems were added as necessary between 2001 and 2018.

Between December 2017 and June 2018, PADEP, with EPA approval, removed 14 residential POET systems in part or whole, or gave the treatment systems to the property owners for their use. These systems were deemed unnecessary because groundwater COC concentrations were below detection limits in the residential wells. OU1 currently consists of 49 residential well treatment systems. Annual sampling of the residential wells, including those where systems were removed, and O&M of the treatment systems is ongoing by PADEP. Wells with removed POET systems are sampled biennially.

OU2 Groundwater

EPA began construction of the groundwater treatment system (GWTS) in June 2010. Groundwater treatment consists of VOC removal by air stripping and secondary (polishing) treatment by liquid phase carbon absorption and bag filtration. The GWTS is designed to treat a combined influent VOC concentration of 3,400 µg/L at 1,000 gallons per minute (gpm). Operation of the treatment plant began in October 2012. Groundwater is extracted from four extraction wells (EW-13, EW-14, EW-15 and EW-17) located along Dale Road, treated at the groundwater treatment plant and discharged at two discharge areas shown in Figure 2 (Discharge Area 1 and Discharge Area 2). Treated effluent is subject to the requirements of a National Pollutant Discharge Elimination System (NPDES) permit equivalency, issued by PADEP in September 2013. Appendix Table J-2 summarizes treatment requirements.

The GWTS also includes a tank vapor emissions control system (TVECS) to treat vapor emissions from the influent tank that are subsequently vented into the atmosphere through an exhaust stack on the north side of the building. The original, passive TVECS was modified in September 2015 to an active system and prevents

migration of VOC vapors to the GWTS indoor air. Treated vapor emissions from the air strippers are vented into the atmosphere through exhaust stacks from the vapor granular activated carbon vessels.¹

EPA is currently performing the remedial design for the OU2 Hot Spot Area. Phase 1 field work for the pre-design investigation (PDI) was conducted between October 2016 and March 2017. Phase 2 field work for the PDI was conducted between January 2018 and June 2018. The PDI included installation of one new well. The final design for the OU2 Hot Spot Area is expected in 2020.

OU3 Vapor Intrusion

EPA finalized the OU3 remedial design in January 2014. From March 2014 to August 2015, EPA conducted the OU3 remedial action. The remedial action included installation of vapor mitigation systems at 18 residences and upgrades to one of the vapor mitigation systems originally installed during the 2006 removal action. One homeowner declined mitigation services. In 2015, EPA transferred O&M responsibilities for the mitigation systems to PADEP.

Institutional Control (IC) Review

In July 2005 PADEP recorded a Hazardous Sites Cleanup Act (HSCA) Section 512 Order for the entire Crossley Farms property (parcels 52549103304348, 52549001494247 and 52549001289758) with the Berks County Recorder of Deeds office. The 512 Order restricted any activities on the Site that would disturb or interfere with any response actions at the Site. It also provided the state, its agents and contractors access to the Site for ongoing response actions.

In June 2015, the current property owner subdivided the Crossley Farms property into two lots: Lot 1 and Lot 2. The subdivision was recorded with the Berks County Recorder of Deeds as instrument number 2015019630. Lot 1 is 175 acres and includes the agricultural fields, a farmhouse serviced by a private well and on-lot sewage system, and various outbuildings used for farming operations. The farmhouse and private well are located north of Huffs Church Road, upgradient of the groundwater contaminant plume. Lot 2 consists of 37 acres and encompasses the former source areas as well as the GWTS building. EPA is finalizing plans for an easement across Lot 1 to allow continued access to Lot 2, the GWTS building and remedial components.

In September 2017, PADEP modified the 2005 512 Order, such that it applies solely to Lot 2 (former source areas including parcel 52549001289758 and portions of parcels 52549001494247 and 52549103304348). The modification was recorded as instrument number 2017035510 with the Berks County Recorder of Deeds. Lot 1 is no longer subject to the restrictions imposed by the 2005 512 Order because this portion of the Site is not associated with ongoing response actions. Appendix D includes a copy of the revised 512 Order.

EPA decision documents require additional institutional controls to protect remedy components on other residential property (such as the discharge system to Perkiomen Creek), to establish a groundwater management zone to restrict use of untreated groundwater affected by the Site, and to provide builders with information to determine if vapor intrusion mitigation systems are needed on new construction homes. There are no formal township ordinances in place for residential areas near the Crossley Farm property and EPA cannot require the townships to implement such ordinances. However, on March 6, 2017, EPA issued an informational letter and provided plume maps (to be used as the groundwater management zone) to both Hereford Township and Washington Township. EPA's letter requested that Hereford Township and Washington Township notify parties requesting a building permit of the potential need for a domestic well filtration system and a vapor intrusion mitigation system within the groundwater management zone. EPA and PADEP will continue to work with the townships to ensure these informational controls remain effective. EPA will also provide updated plume maps to the townships annually. EPA has easements in place for those portions of properties on which the discharge areas

¹ The GWTS remains exempt from the requirement for an air quality permit, per 40 CFR Part 63 National Emission Standards for Hazardous Air Pollutants exemption for federal agency facilities, and the PADEP Air Quality Permit Exemption, as total VOC emissions are less than eight tons per year, and emissions of any single hazardous air pollutant are less than one ton per year.

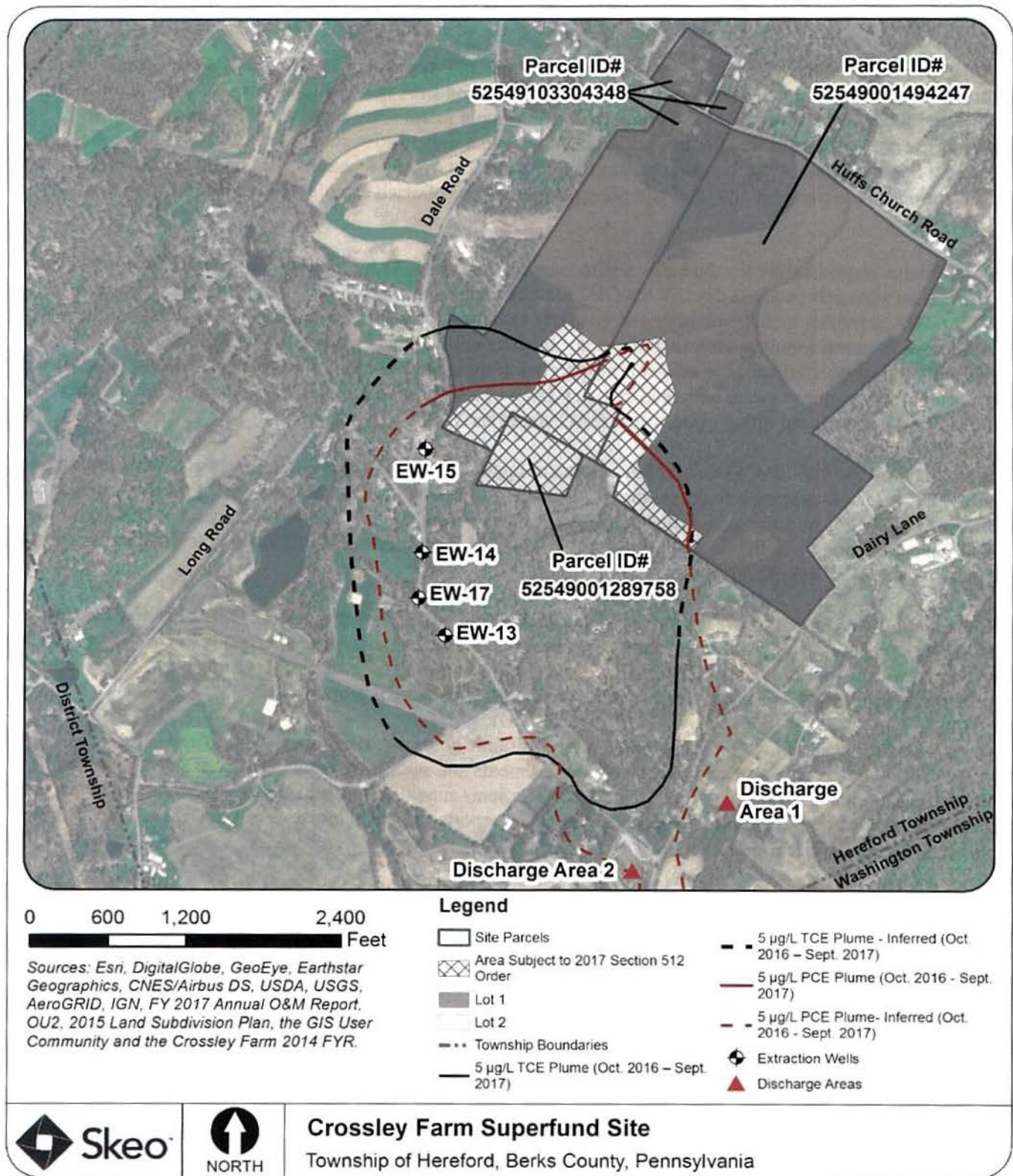
are located. Extraction wells are located on Commonwealth of Pennsylvania right-of-ways, and formal institutional controls to protect remedy components in these areas are not necessary.

TCE and PCE are the most prevalent groundwater contaminants at the Site, and they have been used to define the extent of the groundwater plume. Figure 3 shows the portions of the site parcels that are subject to the revised 2017 512 Order. Figure 3 also shows the extent of TCE and PCE contamination in privately-owned residential properties. Table 2 summarizes planned and implemented institutional controls.

Table 2: Summary of Planned and/or Implemented Institutional Controls (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 (or planned)
Response action components, including the treatment plant, extraction well system, injection locations, the infiltration gallery and the discharge system to Perkiomen Creek	Yes	Yes	Lot 2 which consists of parcel 52549001289758 and portions of parcels 52549001494247 and 52549103304348	Restrict activities that would disturb or interfere with response actions at the Site	HSCA Section 512 Order (Issued July 2005 and modified September 2017)
			Parcels with extraction wells	Restrict activities that would disturb or interfere with response actions at the Site	Extraction wells are located on Pennsylvania right-of-way property
			Parcels with discharge areas	Restrict activities that would disturb or interfere with response actions at the Site	Easements are in place for the portions of those parcels with discharge areas
Groundwater	Yes	Yes	Parcels overlying the groundwater plume (Figure 3)	Notify parties requesting a building permit of the potential need for a domestic well filtration system and ensure that builders of new homes have information to determine if new buildings should be constructed with a vapor intrusion mitigation system	EPA has provided Hereford Township and Washington Township plume maps that serve as the groundwater management zone. Both townships notify parties requesting a building permit of the potential need for a domestic well filtration system and a vapor intrusion mitigation system. (EPA informational letter and maps sent March 2017)

Figure 3: Institutional Control Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

Systems Operations/Operation and Maintenance (O&M)

OU1

PADEP assumed responsibility for O&M activities for the POET systems in 2001. PADEP contractors sample the treatment systems annually and submit the results to PADEP and EPA in annual Sampling & Treatment System Monitoring Summary Reports. PADEP contractors also sample select non-treated potable wells and spring locations every two years to identify any additional homes that may need systems. The 2018 Sampling & Treatment System Monitoring Report indicates that 49 treatment system locations, 102 non-treated well locations and 30 springs are included in the OU1 sampling program. The collected samples are analyzed for VOCs.

OU2

EPA maintains responsibility for the long-term response action (LTRA) for the GWTS. A water treatment system operator is on site each business day. EPA's OU2 remedial action contractor also monitors the system remotely. GWTS LTRA activities include monthly and quarterly sampling for VOCs and metals, respectively, in the extraction wells; semi-monthly sampling of treatment system influent and effluent for VOCs, total dissolved solids and total suspended solids; weekly air monitoring of the tank vapor emissions control system; monthly air monitoring of the vapor granular activated carbon (GAC) vessel (used to remove VOCs from the air stripper effluent); and quarterly sampling of the vapor GAC vessel for VOCs.

During this FYR period, EPA's OU2 LTRA contractor upgraded the ventilation system in the GWTS building to reduce TCE levels in indoor air to acceptable levels (recent sampling results are addressed in the data review section of this FYR). Additional significant LTRA activities during this FYR period included the changeout of 10,000 pounds of carbon in the liquid GAC vessel in June 2015 and changeout of 30,000 pounds of carbon in the vapor GAC vessel in August 2016.

In September 2016, EPA's contractor prepared and implemented the Discharge Area 2 Operation and Monitoring Plan. The plan addresses EPA-directed short-term modifications of the discharge operations to Discharge Area 2. The purpose of the modifications is to vary the discharge flow rates to the two discharge areas and observe the resultant effects within Discharge Area 2 and the neighboring residential property.

To assess performance of the GWTS at maintaining hydraulic control of the Valley Plume Area, EPA's OU2 remedial action contractor collects water level measurements and samples groundwater from select monitoring wells and residential wells throughout the Site for VOCs semi-annually. The remedial action contractor submits annual Operations and Maintenance Reports to EPA. The reports present summaries of the OU2 LTRA activities conducted during the fiscal year.

OU3

PADEP assumed responsibility for O&M of the vapor mitigation systems in 2015. PADEP contractors conduct annual monitoring of the 19 systems and makes repairs to the systems as needed. Monitoring results are submitted to EPA and PADEP in annual Sampling & Treatment System Monitoring Reports. Only one vapor mitigation system (residence W-2) has a vapor-phase carbon filter. The carbon filter on this system is replaced at least semi-annually or when needed. Between November 2018 and March 2019, EPA and the OU3 remedial action contractor also performed inspections of the 19 vapor intrusion mitigation systems to support the FYR. Additional information is available in the Data Review section of this report.

III. PROGRESS SINCE THE PREVIOUS REVIEW

Table 3 includes the protectiveness determinations and statements from the 2014 FYR Report. Table 4 summarizes the recommendations and the status of those recommendations from the 2014 FYR Report.

Table 3: Protectiveness Determinations from the 2014 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The OU1 remedy is protective of human health and the environment. Point-of-entry filtration systems prevent any potential exposure to contaminated drinking water.
2	Will be Protective	The OU2 remedy is expected to be protective of human health and the environment upon completion. In the interim, remedial actions to date are beginning to address groundwater concentrations that result in unacceptable risks.
3	Will be Protective	The OU3 remedy is expected to be protective of human health and the environment when vapor mitigation systems to prevent hazardous vapors from entering and concentrating in homes have been completed.

Table 4: Status of Recommendations from the 2014 FYR Report

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
2	Additional institutional controls are necessary to protect the extraction well system, the infiltration gallery and the discharge systems to Perkiomen Creek, and for residential areas near the Crossley Farm property.	EPA will work with the townships that surround the Site (Hereford and Washington Townships) to establish ordinances that will address vapor intrusion issues, restrict the use of groundwater impacted by the Site, and protect components of the treatment system located on private property (including extraction wells, underground piping, and discharge areas).	Completed	EPA sent informational letters to Hereford Township and Washington Township and included plume maps that serve as the groundwater management zone. Both townships notify parties requesting a building permit of the potential need for a domestic well filtration system and a vapor intrusion mitigation system.	03/06/2017

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Community Involvement and Site Interviews

EPA published a public notice in the *Town & Country* newspaper on July 3, 2019. It stated that the FYR was underway and invited the public to submit any comments to the EPA. Appendix E includes a copy of the public notice. The results of the review and the report will be made available at the Site's information repository, the Hereford Township Building, located at 3131 Seisholtzville Road in Macungie, Pennsylvania.

During the FYR process, the PADEP project manager and EPA OU2 and OU3 remedial action contractors completed interview summary forms to document any perceived problems or successes with the remedy that has been implemented to date. The responses from the interview forms are summarized below. Appendix F includes the completed interview forms.

All respondents had a favorable impression of the project. They believe that cleanup efforts at the Site are progressing well. Respondents also noted that the current remedy for OU1, water treatment systems, is working to

safeguard drinking water for affected residents. The remedy for OU3, vapor mitigation systems, is working as planned to protect residents from vapors from the Site's groundwater plume. The respondents also believe the interim remedy for OU2 is operating as designed. However, the PADEP project manager noted that EPA is currently working on addressing outstanding issues for OU2, including source area contamination and performance issues with Discharge Area 2. The OU2 LTRA contractor noted that modifications were recently made to the venting system of the water treatment building to reduce TCE levels in indoor air to acceptable levels.

PADEP believes the institutional controls are effective because the townships contact PADEP when plans for new homes with well water are brought to the attention of the townships.

The FYR process also included community interviews with parties affected by the Site, including the Township Secretary and nearby residents. The interviews were conducted in person during a site visit on March 25, 2019. The purpose was to document the perceived status of the Site, any perceived problems or successes with the remedy, as well as knowledge of institutional controls at the Site. The community interviews are summarized below.

The Township Secretary has a long knowledge of the cleanup project and is the primary contact for the Township in fielding questions related to the project. Many of the questions received by the Township involve requests for information from realtors or prospective home buyers. The Secretary stated they direct such inquiries to the site-specific website. The Secretary feels informed about the informational institutional controls that exist for the Site, specifically controls that restrict the use of groundwater impacted by the Site. The Secretary did not have any concerns related to the cleanup or about potential risks from the Site. The Secretary requested that EPA help to provide a site update for the Township newsletter, which is usually published each fall.

Resident No. 1 is directly impacted by the Site as their home has a vapor mitigation system installed as a result of the project. This resident also serves as a Township Supervisor. The resident is familiar with the project as well as the LTRA activities taking place. The resident was familiar with the informational institutional controls that exist for the Site and stated that in their role as Township Supervisor, they are very transparent in educating homeowners about the restrictions that are in place. The resident expressed a concern about the dialogue between EPA, the State and the contractors for both entities. The specific concern is in relation to the resident's water filtration system, which was installed as part of this project. It appears there is a need for the water filters to be changed more frequently by the state's contractor due to an iron bacterium that has developed on the filters. While the state's contractor described this issue in detail to the homeowner, it was not apparent that this issue was relayed to the State or EPA. The resident questioned what types of dialogue occur between all parties and suggested this should be improved. The RPM later followed up directly with the state's contractor about the water filter issue.

In regard to communications, the resident stated they have received EPA fact sheets in the past and continuous informational updates would be beneficial. In addition, they recommended an informational meeting might be useful for the community, and that EPA should try to share site successes where possible. For instance, the resident suggested using visuals to show how the groundwater plume has improved over the years. EPA staff discussed this suggestion and will try to incorporate in the future where possible.

Resident No. 2 is aware of the Site and cleanup as they have a vapor mitigation system as a result of the project. The resident was not aware of the informational institutional controls that exist as part of the Site. EPA staff took the time to describe some of the institutional controls that are in place. The resident did not express any concerns about the cleanup of the Site but did state that they use bottled water as a way to avoid potential risk from drinking water. They stated that the bottled water did come as an expense, but one they felt was necessary. The resident stated they receive the EPA fact sheets and Township newsletters and felt they were useful. Overall, they felt very grateful for EPA and its work on the Site.

Data Review

This data review included evaluation of the data presented in the October 2018 Sampling & Treatment System Monitoring Report for OU1 and OU3, prepared by PADEP's contractor AECOM, as well as the 2016 through 2018 annual operations and maintenance reports for OU2, prepared by EPA's LTRA contractor CDM Smith. The 2014 to 2018 residential well and spring sampling results provided by AECOM were also reviewed. TCE and PCE are the most prevalent contaminants at the Site and are therefore the focus of this review.

OU1

PADEP contractors collect water samples annually from the residential treatment systems to monitor their effectiveness at treating contaminated drinking water. Three samples are collected at each location: untreated water, water between the treatment system carbon units, and treated water. Detected concentrations are compared to MCLs and the Pennsylvania residential groundwater medium specific concentrations (MSCs), which are the same as or more stringent than the MCLs. Samples were not collected from those locations where homeowners could not be reached or otherwise did not grant access. VOC concentrations in all treated water samples during this FYR period were below MCLs/MSCs, indicating the treatment systems are operating as designed and treated water is safe to drink. In addition, between December 2017 and June 2018, PADEP removed 14 residential treatment systems because the systems were unnecessary; groundwater COC concentrations were below detection limits in the untreated well water based on sampling results from the past five years, as presented in AECOM's annual monitoring reports.

PADEP contractors also collect samples every two years (on a rotating schedule) from 102 non-treated wells and 30 springs to determine the need for additional residential treatment systems. PADEP provides a copy of the residential sampling results to the property owners. Of the 132 non-treated well and spring locations included in the OU1 sampling program, VOCs were detected above MCLs/MSCs at only five spring locations and two residential locations (W-137 and W-139) (Table 5); VOCs were not detected above reporting limits at most sampling locations during this FYR period. Residential well W-137, located in a mobile home community, is included on PADEP's non-treated well list because it does not have a well-specific filter, but water from this well is processed through the treatment system for well W-30. Residential well W-139 is located on a property with two wells. The other well (W-29) on the same property has a treatment system in place. W-139 is not used for drinking water or other purposes. Additionally, a subsequent sampling event at W-139 in 2018 did not report VOCs above MCLs/MSCs. Therefore, neither of the two wells with MCL/MSC exceedances warrant additional follow-up at this time because there are no current exposures to site-related contaminated groundwater.

VOC concentrations in the springs with MCL/MSC exceedances are decreasing over time (Table 5). Table 6 summarizes those non-treated wells and springs with VOCs below MCLs/MSCs during this FYR period. Untreated water and spring sampling results for this FYR period indicate that additional treatment systems are not necessary at this time.

Table 5: Untreated Well (W) or Spring (S) Locations with VOC Detections Above MCLs/MSCs, 2014-2018

Location	2014	2015	2016	2017	2018
VOC Detected Above MCL/MSC ^a (Concentration, µg/L)					
Springs					
S-64	PCE (6.31)	NS	--	NS	--
S-101	NS	TCE (9.14)	NS	--	NS
S-177	TCE (40.2)	NS	TCE (6.5) PCE (5.8)	NS	--
S-178	TCE (12.8)	NS	TCE (22.9)	NS	TCE (6.82)
S-180	NS	PCE (6.36)	NS	PCE (5.24)	NS
Untreated Wells					
W-137 ^b	NS	TCE (8.07)	NS	NS	NS
W-139 ^c	NS	NS	cis-1,2-DCE (119) TCE (164)	NS	--
<i>Notes:</i>					

Location	2014	2015	2016	2017	2018
	VOC Detected Above MCL/MSCa (Concentration, µg/L)				
a)	MCLs/MSCs for TCE and PCE are 5 µg/L. The MCL/MSCa for cis-1,2-DCE is 70 ug/L.				
b)	Although W-137 is included on the non-treated water list, this well is part of the mobile home community and is processed through the W-30 treatment system.				
c)	W-139 is located on a property with two wells. The other well on site (W-29) has a treatment system in place. W-139 is not used for drinking water.				
NS = Not sampled. Untreated well and spring locations are sampled every other year.					
-- = Detected concentrations did not exceed MSC.					

Table 6: Untreated Well (W) or Spring (S) Locations Meeting MCLs/MSCs, 2014-2018

2014		2015		2016		2017		2018	
Springs									
S-46	S-179	S-69	S-143	S-46	S-199	S-69	S-142	S-46	S-178
S-63	S-199	S-71	S-181	S-63	S-208	S-71	S-143	S-63	S-179
S-88	S-207	S-85	S-209	S-64	S-212	S-85	S-181	S-64	S-199
S-102	S-208	S-88		S-140	S-211	S-88	S-209	S-102	S-207
S-140	S-212	S-141		S-144	S-301	S-101		S-140	S-208
S-164	S-500	S-142		S-179		S-141		S-144	S-211
								S-177	S-301
Untreated Wells									
W-1	W-127	W-6	W-188	W-1	W-134	W-6	W-188	W-1	W-153
W-7	W-128	W-10	W-195	W-7	W-135	W-10	W-197	W-7	W-154
W-13	W-130	W-31	W-197	W-12	W-147	W-31	W-210	W-12	W-157
W-14	W-132	W-32		W-13	W-148	W-32	W-213	W-13	W-160
W-21	W-134	W-36		W-14	W-153	W-45	W-214	W-14	W-162
W-31	W-135	W-48		W-15	W-154	W-48		W-21	W-163
W-32	W-146	W-54		W-21	W-157	W-54		W-33	W-174
W-33	W-147	W-57		W-33	W-160	W-57		W-36	W-182
W-36	W-148	W-60		W-38	W-162	W-60		W-38	W-184
W-37	W-153	W-65		W-44	W-163	W-65		W-43	W-187
W-38	W-154	W-66		W-45	W-166	W-66		W-54	W-193
W-39	W-157	W-79		W-47	W-167	W-79		W-73	W-198
W-44	W-160	W-90		W-62	W-172	W-106		W-78	W-200
W-45	W-161	W-106		W-73	W-174	W-107		W-89	W-201
W-47	W-162	W-107		W-78	W-182	W-109		W-90	W-202
W-73	W-163	W-109		W-83	W-184	W-126		W-92	W-203
W-78	W-166	W-126		W-84	W-187	W-129		W-96	W-204
W-82	W-167	W-129		W-87	W-193	W-131		W-98	W-214
W-84	W-172	W-131		W-89	W-198	W-133		W-103	
W-89	W-174	W-133		W-90	W-200	W-136		W-108	
W-90	W-184	W-136		W-92	W-201	W-146		W-109	
W-92	W-187	W-146		W-96	W-202	W-149		W-125	
W-96	W-193	W-149		W-98	W-203	W-150		W-128	
W-98	W-198	W-156		W-102	W-204	W-155		W-130	
W-103	W-200	W-165		W-103		W-156		W-134	
W-106	W-201	W-168		W-108		W-168		W-135	
W-107	W-202	W-169		W-125		W-169		W-139	
W-115	W-203	W-170		W-128		W-170		W-147	
W-125	W-204	W-175		W-130		W-175		W-148	

GWTS Operation

The Valley Plume Area GWTS has been operating since October 2012. Three of the four extraction wells operated with minimal downtime during this FYR period. Extraction well EW-15 was not operated between October 2014 and April 14, 2016, due to an effect on the water level at a nearby residential well. EPA installed a deeper replacement well at the residence in April and May 2016. Pumping of EW-15 resumed on April 15, 2016. Extraction wells EW-14 and EW-15 were also shut down periodically between February and April 2017 to investigate potential effects on another residential well. Investigation results found that neither EW-14 nor EW-15 affected the water level at this residential well. Pumping resumed at both extraction wells on April 18, 2017. The extraction wells did affect the water level in W-259, which was subsequently replaced.

TCE concentrations detected in water samples from the extraction wells during the most recent reporting period (fiscal year [FY] 2017) ranged from 62 µg/L in EW-14 to 1,000 µg/L in EW-17. PCE concentrations in water samples from the extraction wells during the reporting period ranged from 24 µg/L in EW-15 to 120 µg/L in EW-17. Figures G-1 and G-2 in Appendix G show that TCE concentrations in extraction wells have decreased since system startup and PCE concentrations have remained steady.

TCE and PCE concentrations in the combined influent during FY 2017 ranged from 360 µg/L to 760 µg/L, and an estimated concentration of 32 µg/L to 75 µg/L, respectively, compared to TCE and PCE groundwater cleanup criterion of 5 µg/L. However, cis-1,2-DCE was below its cleanup criterion of 70 µg/L and trichlorofluoromethane (TCFM) was below its current RSL of 520 µg/L (RSL based on a hazard index (HI) of 0.1) in all combined groundwater influent samples during FY 2017. Figure G-3 in Appendix G shows concentrations of TCE and PCE in the combined groundwater influent since October 2012. TCE concentrations in the combined influent have decreased since system startup and PCE concentrations have remained consistent with no considerable increase or decrease in concentration. TCE in the combined influent was measured at 2,100 µg/L at system startup but has decreased to 100 µg/L in October 2018.

During the FY 2017 reporting period, about 60 million gallons of groundwater were extracted and treated by the GWTS. Although contaminant mass removal is not a direct goal of the interim remedy, the mass removal for the reporting period is estimated at 395 pounds of TCE and 42 pounds of PCE. Since startup on October 12, 2012, approximately 218.9 million gallons of groundwater have been extracted and treated, resulting in removal of an estimated 2,137 pounds of TCE and 99 pounds of PCE. Figure G-4 in Appendix G shows the cumulative extracted groundwater volume and estimated TCE and PCE mass removal.

All treated groundwater effluent samples from the GWTS met the NPDES equivalent permit requirements during this FYR period (FYs 2015 to 2017).

Concentrations of TCE in indoor air samples from the GWTS building collected during FY 2015 ranged from 357 micrograms per cubic meter (µg/m³) (65.9 parts per billion by volume [ppbv]) to 3,600 µg/m³ (663 ppbv). Results in FY 2016 ranged from non-detect to 415 µg/m³ (76.6 ppbv). These indoor air concentrations were above the EPA composite worker ambient air regional screening level (RSL) of 8.8 µg/m³ (1.6 ppbv). These results prompted EPA to upgrade the ventilation system in the GWTS building to reduce TCE levels in indoor air to acceptable levels. Following system modifications, concentrations of TCE in the six indoor air samples collected in the GWTS during the FY 2017 reporting period were below the EPA composite worker ambient air RSL and ranged from non-detect (i.e., less than 0.5 µg/m³) to an estimated 1.1 µg/m³.

Plume Containment

Figures G-5 and G-6 in Appendix G show the extent of TCE and PCE contamination, respectively, based on data collected between October 2016 and September 2017. Although Hot Spot Area concentrations remain elevated, the groundwater extraction system is addressing contamination in the Valley Plume Area. Several residential wells have shown decreasing concentrations since startup of the extraction system in 2012. The TCE and PCE pre-treatment concentrations at residential wells W-22 and W-100, which are located within the estimated capture

area of the Valley Plume Area extraction wells, have decreased significantly since 2012, as shown in Figure G-7 in Appendix G. Similar decreasing concentration trends were observed for residential wells W-3, W-9, W-17, W-23, W-24 and W-205, located in the southern part of the TCE plume (Figure G-7, Appendix G). Figure G-8 and Figure G-9 in Appendix G show the deep potentiometric surface contours, including the estimated capture of the extraction wells, in October 2016 and March 2017. Additionally, as previously noted, TCE concentrations in the combined influent from all extraction wells has also decreased significantly since the system started (TCE at 2,100 µg/L at system startup decreased to 100 µg/L in October 2018).

The FY 2017 Report states that the potentiometric surface contours as well as the declining contaminant trends at residential wells W-22 and W-100 suggest that sufficient hydraulic control for contamination migrating to the west from the source area (near the Borrow Pit Area) was achieved near extraction wells EW-13, EW-14 and EW-17. However, the steady contaminant concentrations at residential wells located immediately downgradient of the extraction wells (W-2, W-16, W-18, W-29 and W-206 on Figure G-5; trends shown in Figure G-10) suggest that capture was incomplete between EW-14 and EW-15 during this evaluation period, likely due to the intermittent operation of EW-15. EW-15 is again operating and is expected to maintain hydraulic control to the west.

EPA is always evaluating options to improve the Valley Plume Area GWTS performance. Possible measures may include adjusting pumping rates of existing extraction wells to maintain hydraulic capture while minimizing effects on residential wells and producing a three-dimensional site conceptual model. The structural geology of the area is highly complex and even with additional lithologic and hydrologic data, uncertainties in capture may remain. Treatment systems on residential wells and vapor mitigation systems in affected homes ensure there are no complete exposure pathways to contaminated media.

EPA is currently in the design phase for the OU2 Hot Spot Area to determine how best to clean up this groundwater. Additionally, EPA is performing a Remedial Investigation of the OU2 Distal Plume. EPA plans to select a final site remedy pending the outcome of the investigation and evaluation of potential cleanup options.

OU3

PADEP contractors inspect and monitor the vapor mitigation systems installed in 19 homes. Inspection of the systems includes recording and evaluating the systems' manometer readings to determine if maintenance is necessary. During the 2018 sampling event, all manometer readings were found to be in the acceptable range indicating that the systems were operating normally. Only one residence (W-2) has a vapor mitigation system equipped with a vapor-phase carbon filter. The carbon was changed in 2018.

EPA and the OU3 remedial action contractor also performed inspections of the 19 vapor intrusion mitigation systems to support the FYR. The inspections were conducted between November 2018 and March 2019. EPA was able to schedule system inspections at all but one residence (RW-183). EPA discussed the system operation with the resident, visually inspected the systems for visual signs of wear or damage, verified that the vacuum fans were operating or noted those that were not, measured the total subslab depressurization system (SSDS) vacuum recorded at the suction point's U-Tube manometer, and measured the subslab pressure field by measuring the vacuum at the vacuum verification points (VVPs) with a digital micromanometer.

The results of the residential inspections are summarized in Table G-11 in Appendix G. The VVP measurements from 2014 represent the initial vacuum when the systems were first turned on. The VVP measurements from 2015 represent the vacuum after the system had been operational for approximately 6 months. The 2018 and 2019 readings represent the current vacuum measurements performed for the FYR. Some changes to the distribution of the pressure field over time are normal. The system design specifications called for an average vacuum of 0.02 inches of water to be measured across all VVPs, with a minimum vacuum of 0.001 inches of water at each individual VVP.

The results of the inspections indicate that overall, the systems are functioning as designed. The most prevalent issue was that multiple VVPs could not be located because they had either been destroyed, covered with flooring

material, or obstructed by heavy furniture, and not all U-Tubes were located. Even at the residences with compromised VVPs, the total pressure fields as measured by the U-Tubes (where available) were typically strong.

Fans were either not operating or not operating well at six residences, and the U-Tubes were found but not functional at two residences. PADEP repaired the fans and U-Tubes on June 28, 2019 and the systems are functioning as expected.

As TCE concentrations in shallow groundwater decrease, the need for vapor mitigation systems in the current residential properties is also expected to decrease.

Site Inspection

The site inspection took place on November 29, 2018. In attendance were the EPA RPM and PADEP project manager and section leader. Also in attendance were EPA contractor personnel from CDM Smith (LTRA contractor), Tetra Tech (OU3 remedial action contractor) and Skeo (EPA FYR contractor). The purpose of the site inspection was to assess the protectiveness of the remedy. Appendix H is a site inspection checklist. Appendix I includes photographs from the site inspection.

Participants accessed the Site via a gravel road off Huffs Church Road. Site inspection participants began the site inspection at the OU2 groundwater treatment plant. The plant is operating as intended and is in good condition. The plant treats groundwater pumped from four extraction wells along Dale Road. O&M personnel are on site daily to monitor the system. The system can also be monitored remotely. The OU2 contractor indicated that the tank vapor emissions control system was recently modified from a passive system to an active one, to control vapor emissions from the influent tank.

Site inspection participants also drove through the Site and around its perimeter and observed the groundwater Hot Spot Area, Discharge Area 1 located off Dairy Lane and Discharge Area 2 located along Dale Road, as well as extraction wells and monitoring wells across the Site. No issues of concern were noted.

Prior to the site inspection, Skeo personnel visited the local information repository for the Site, the Hereford Township Building, located at 3131 Seisholtzville Road in Macungie, Pennsylvania. No files were available. Township personnel indicated that information about the Site can be found at EPA's online repository.

V. TECHNICAL ASSESSMENT

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

Question A Summary:

Yes, the interim remedies for OU1, OU2 and OU3 are functioning as intended by the decision documents. EPA has not yet selected a final remedy for the Site.

The interim remedy for OU1 – POET systems on residential water supplies – is functioning as intended by the decision documents. The treatment systems actively clean up drinking water to safe standards and protect human health. PADEP samples the systems regularly and provides maintenance when needed to ensure long-term protectiveness. During this FYR period, the number of residential wells requiring treatment has decreased. PADEP, with EPA approval, was able to remove 14 residential treatment systems because the systems were unnecessary due to continued lack of contamination in the untreated water. Many additional untreated residential well and spring sampling locations consistently meet drinking water standards.

The interim remedy for OU2 is working toward intercepting and containing contamination in the Valley Plume Area of the Site. Data collected during this FYR period indicate the Valley Plume Area GWTS maintained sufficient hydraulic control for groundwater contamination migrating to the west from the source area near extraction wells EW-13, EW-14 and EW-17. Several residential wells in the western and southern parts of the

plumes show decreasing TCE concentrations since startup of the extraction system in 2012. TCE concentrations in shallow groundwater also have generally decreased since the initiation of pumping activities. However, capture was incomplete between EW-14 and EW-15 during this evaluation period, due to the intermittent operation of EW-15. EW-15 is again operating and is expected to maintain hydraulic control to the west. EPA is continuing to monitor and improve flow to Discharge Area 2. Treated groundwater from the GWTS consistently meets NPDES permit equivalency discharge limits. Monitoring inside the GWTS building indicates indoor air is safe for occupants of the building.

EPA completed construction of the OU3 interim remedy – vapor intrusion mitigation systems at residences that overlie the site-related groundwater – in August 2015. The systems prevent or minimize contaminant migration from subsurface vapor intrusion into residential indoor air and protect human health and the environment by preventing the buildup of hazardous vapors in homes. PADEP maintains the systems regularly to ensure long-term protectiveness.

PADEP has issued a HSCA Section 512 Order on Lot 2 of the Crossley Farm property, which limits any use of the property that interferes with the remedies. EPA decision documents require additional institutional controls to protect remedy components on other properties (such as the discharge system to Perkiomen Creek), to establish a groundwater management zone to restrict use of untreated groundwater affected by the Site, and to provide area builders with information to determine if vapor intrusion mitigation systems are needed on new construction homes. Although local ordinances are not in place, Hereford Township and Washington Township notify parties requesting a building permit of the need for a groundwater treatment system and a vapor mitigation system. PADEP contractors are also onsite every year to sample homes with treatment systems and homes without treatment systems every other year. During the Site visits, they also verify with the townships that the notification measures are being implemented. These informational controls continue to be effective controls for eliminating potential human exposure pathways at the Site.

EPA is currently conducting the remedial design for the OU2 Hot Spot Area. EPA is also performing a Remedial Investigation of the OU2 Distal Plume. EPA plans to select a final site remedy pending the outcome of the investigation and evaluation of potential cleanup options.

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

Question B Summary:

Yes, the exposure assumptions, interim cleanup levels and RAOs remain valid. The toxicity factors for TCE used in the 2001 baseline risk assessment have become more stringent, meaning TCE risks would be higher than originally calculated. However, this would not affect site cleanup goals or RAOs; interim groundwater cleanup goals for identified COCs rely on the MCLs, which have not changed since the 2008 OU2 ROD Amendment (Appendix J). The OU2 ROD Amendment also stated that once the MCLs are met, EPA will evaluate the complete list of site-specific chemicals to determine cumulative risk.

The groundwater screening level identified in the OU2 ROD Amendment for TCFM (1,300 µg/L) was the EPA RSL in effect at the time. The current tapwater RSL for TCFM is 5,200 µg/L (based on a HI of 1) and 520 µg/L (based on a HI of 0.1). The RSLs are based on default exposure parameters and factors that represent reasonable maximum exposure conditions for long-term/chronic exposures as well as current toxicity values. The annual monitoring reports currently compare TCFM concentrations to the more stringent RSL of 520 µg/L.

The 2014 FYR Report presented an evaluation of residual soil contamination remaining in the EPIC Pit following EPA's 1998 soil and drum removal action. This FYR updated the comparison using the current residential soil RSLs and found the residual soil contamination to be within acceptable levels (Appendix K). No changes have occurred since the 2014 FYR.

Emerging chemical 1,4-dioxane has been sampled for at the Site. The 2013 NPDES sampling included 1,4-dioxane for the groundwater analytical suite; all concentrations were below detection levels.

For ecological risk, the most significant change in the risk assessment process is that it now recognizes the potential importance of exposure at the groundwater and surface water interface and the methods to measure and assess this potential route of exposure. Ecological risks were evaluated by EPA during the 2001 RI. The most significant ecological effect at the Site was from contaminated springs that reach the surface throughout the study area. The evaluation identified risks, but the only way to improve the conditions at the spring and seep locations is continued containment of the Valley Plume. Before a final remedy is selected and implemented, EPA will initiate further ecological investigation of the Perkiomen Creek to ensure that discharge of treated water is carefully monitored and does not have a detrimental effect on the water quality of Perkiomen Creek. In addition, as part of the OU2 Distal Plume RI, EPA plans to sample the surface water at suspected groundwater discharge locations. EPA will use this data in the distal plume RI to evaluate ecological risk.

EPA is making progress towards meeting site RAOs, as evidenced by decreasing contamination concentrations in groundwater and springs in areas downgradient of the Valley Plume Area (Tables 5 and 6). Restoration of groundwater downgradient of the Valley Plume Area to drinking water standards and restoration of the surface water and springs to drinking water and aquatic water quality standards is ongoing.

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

No other information has come to light that could call into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

OU(s) without Issues/Recommendations Identified in the FYR:	
OU1, OU2, OU3	
Issues and Recommendations Identified in the FYR:	
No issues affecting protectiveness of the remedy were identified in the FYR.	

OTHER FINDINGS

An additional recommendation was identified during the FYR. This recommendation does not affect current and/or future protectiveness.

- Evaluate if modifications are necessary to Discharge Area 2 to improve performance.
- Finalize an easement to allow continued access to Lot 2 of the Crossley Farm property. Lot 2 contains the GWTS and remedial components.
- Update the site repository with site documents.

VII. PROTECTIVENESS STATEMENT

Operable Unit:

OU1

Protectiveness Determination:

Protective

Protectiveness Statement:

The OU1 remedy is protective of human health and the environment. Point-of-entry residential treatment systems prevent any potential exposure to contaminated drinking water.

Operable Unit:

OU2

Protectiveness Determination:

Will be Protective

Protectiveness Statement:

The OU2 remedy is expected to be protective of human health and the environment upon completion. In the interim, remedial actions to date are beginning to address groundwater concentrations that result in unacceptable risks. Institutional controls are in place to prevent exposures to contaminated groundwater.

Operable Unit:

OU3

Protectiveness Determination:

Protective

Protectiveness Statement:

The OU3 remedy is protective of human health and the environment. Vapor mitigation systems installed in residences prevent hazardous vapors from entering and concentrating in homes. Informational institutional controls are in place to prevent exposures to contaminated vapors.

VIII. NEXT REVIEW

The next FYR Report for the Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

- 2018 Sampling & Treatment System Monitoring Summary Report, Crossley Farm OU-1 & OU-3 Sites, Hereford Township, Pennsylvania. Prepared by AECOM for PADEP. October 2018.
- Explanation of Significant Differences for OU1. Crossley Farm Superfund Site, Hereford Township, Berks County, Pennsylvania. Prepared by EPA Region 3. August 2006.
- Explanation of Significant Differences for OU2. Crossley Farm Superfund Site, Berks County, Pennsylvania. Prepared by EPA Region 3. July 2004.
- Fiscal Year 2015 Annual Operations and Maintenance Report for Crossley Farm Superfund Site, Operable Unit 2, Berks County, Pennsylvania. Prepared by CDM Federal Programs Corporation for EPA Region 3. June 2016.
- Fiscal Year 2016 Annual Operations and Maintenance Report for Crossley Farm Superfund Site, Operable Unit 2, Berks County, Pennsylvania. Prepared by CDM Federal Programs Corporation for EPA Region 3. June 2017.
- Fiscal Year 2017 Annual Operations and Maintenance Report for Crossley Farm Superfund Site, Operable Unit 2, Berks County, Pennsylvania. Prepared by CDM Federal Programs Corporation for EPA Region 3. August 2018.
- Historical Data Summary Tables, Residential Well and Spring Sampling Results, 2014-2018. Excel file, prepared by AECOM.
- Record of Decision Amendment. Operable Unit 2 – Groundwater. Crossley Farm Superfund Site, Hereford and Washington Townships, Berks County, Pennsylvania. Prepared by EPA Region 3. July 2008.
- Record of Decision for OU1 Interim Action Crossley Farm Superfund Site, Huff's Church, Berks County, Pennsylvania. Prepared by EPA Region 3. June 1997.
- Record of Decision for OU2 Interim Action Crossley Farm Superfund Site, Huff's Church, Berks County, Pennsylvania. Prepared by EPA Region 3. September 2001.
- Record of Decision for OU3 Interim Action Crossley Farm Superfund Site, Huff's Church, Berks County, Pennsylvania. Prepared by EPA Region 3. September 2012.
- Remedial Action Completion Report for Operable Unit 3 (OU-3). Crossley Farm Superfund Site. Prepared by EPA Region 3. August 2015.
- Remedial Investigation Report for Crossley Farm Site. Hereford Township, Berks County, Pennsylvania. Volume 1-3. Prepared by Tetra Tech NUS, Inc. July 2001.
- Second Five-Year Review Report. Crossley Farm Superfund Site, Hereford Township, Berks County, Pennsylvania. Prepared by EPA. September 2009.
- Third Five-Year Review Report. Crossley Farm Superfund Site, Hereford Township, Berks County, Pennsylvania. Prepared by EPA. September 2014.

APPENDIX B – SITE STATUS

Current human exposures at the Site are under control.
Current groundwater migration is under control.

☒ All ☐ Some ☐ None

☐ Yes ☒ No






☒ Yes ☐ No Farming occurs on part of the Site.

APPENDIX C – SITE CHRONOLOGY

Table C-1: Site Chronology

Event	Date
Local residents complained of odors in supply wells; PADEP identified well contamination and issued a health advisory on groundwater use	1983
EPA conducted a preliminary assessment	1984
EPA began the OU1 removal action to install point-of-entry carbon filters on the most contaminated residential wells	December 1986
EPA listed the Site on the NPL	October 1992
The Agency for Toxic Substances and Disease Registry completed a preliminary public health assessment	February 1993
EPA began the OU1 RI/FS	September 1994
EPA completed the OU1 RI/FS; EPA finalized the OU1 ROD	June 1997
EPA began the OU2 RI/FS	October 1997
EPA began the OU2 removal action to remove drums buried in a pit	May 1998
EPA completed the OU2 removal action	October 1998
EPA began the OU1 remedial action	September 1999
EPA completed the OU1 remedial action installing point-of-entry carbon filters on residential wells	January 2000
EPA completed the OU2 RI/FS; EPA finalized the OU2 Hot Spot Area ROD	September 2001
EPA began the hot spot OU2 groundwater remedial design	November 2001
EPA completed the OU2 hot spot groundwater remedial design	May 2004
EPA finalized the OU2 ESD changing groundwater treatment from air stripping to an advanced oxidation process	July 2004
EPA completed the Site's first FYR Report	September 2004
EPA completed the OU1 ESD; the ESD changed the frequency of well sampling in the vicinity of the Site from biannual to annual for residential wells with treatment systems and every two years for residential wells without treatment systems	August 2006
EPA began the OU3 removal action; the removal action included installation of vapor mitigation systems in two homes	November 2006
EPA completed the OU3 removal action	September 2007
EPA began the OU3 RI/FS	October 2007
EPA signed the OU2 ROD Amendment to focus groundwater cleanup on containing the groundwater contaminant plume in the Valley Plume Area	July 2008
EPA entered into a Consent Decree with Ruth Crossley and the estate of Harry Crossley	November 2008
EPA entered into a Consent Decree with the Tarmac Company, Inc.	March 2009
EPA began the OU2 Valley Plume area groundwater remedial action	September 2009
EPA completed the Site's second FYR Report	September 2009
EPA completed the OU2 Valley Plume Area groundwater remedial design	September 2012
EPA completed the OU3 RI/FS and signed the OU3 ROD	September 2012
EPA began operation of the OU2 GWTS	October 2012
EPA began the OU3 vapor intrusion remedial design	November 2012
EPA began the OU2 sitewide groundwater remedial design and began the OU3 vapor intrusion remedial action	July 2013
EPA completed the OU3 vapor intrusion remedial design	September 2013
EPA completed the third FYR Report	September 2014
EPA completed the OU3 vapor intrusion remedial action	September 2015
EPA began the OU2 RI/FS for the Source Area	February 2018

APPENDIX D – 2017 REVISED HSCA SECTION 512 ORDER

 		INSTRUMENT # 2017035510 RECORDED DATE: 09/26/2017 02:46:46 PM  4672008-0016R
Frederick C. Sheeler Berks County Recorder of Deeds Berks County Services Center 3rd Floor 633 Court Street Reading, PA 19601 Office: (610) 478-3380 - Fax: (610) 478-3359 Website: www.countyofberks.com/recorder		
Document Type: MISC INSTRUMENT WITH JUDICIAL FEE	Transaction #: 5168526 Document Page Count: 7 Operator Id: mmartello	
PARCEL ID(s): (See doc for additional parcel #'s) 52549001289758 52549001494247 52549103304348	SUBMITTED BY: YDASP 1129 E HIGH STREETPO BOX 776 POTTSTOWN, PA 19464 (610) 323-1400	
* PROPERTY DATA: ** PLEASE SEE DOCUMENT OR INDEX FOR PROPERTY DATA		
FEES / TAXES: RECORDING FEES: MISC INSTRUMENT WITH JUDICIAL FEE \$26.00 RECORDS IMPROVEMENT FUND \$5.00 JUDICIAL FEE \$35.50 WRIT TAX \$0.50 ADDITIONAL PAGE FEE \$12.00 PARCEL ID FEE \$30.00 Total: \$109.00		INSTRUMENT #: 2017035510 Recorded Date: 09/26/2017 02:46:46 PM I hereby CERTIFY that this document is recorded in the Recorder of Deeds Office in Berks County, Pennsylvania.   Frederick C. Sheeler Recorder of Deeds

OFFICIAL RECORDING COVER PAGE

Page 1 of 8

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NOTE: If document data differs from cover sheet, document data always supersedes.
 *COVER PAGE DOES NOT INCLUDE ALL DATA. PLEASE SEE INDEX AND DOCUMENT FOR ANY ADDITIONAL INFORMATION.

Prepared By: David L. Allebach, Jr., Esquire
1129 East High Street
P. O. Box 776
Pottstown, PA 19464-0776
(610) 323-1400

Return To: David L. Allebach, Jr., Esquire
1129 East High Street
P. O. Box 776
Pottstown, PA 19464-0776
(610) 323-1400

Property: Huffs Church Road
Parcel I.D.: 52549001289758
Hereford Township

Property: Huffs Church Road
Parcel I.D.: 52549001494247
Hereford Township

Property: 1271 Huffs Church Road
Parcel I.D.: 52549103304348
Hereford Township

**pennsylvania**DEPARTMENT OF ENVIRONMENTAL
PROTECTION**COMMONWEALTH OF PENNSYLVANIA****DEPARTMENT OF ENVIRONMENTAL PROTECTION***In the Matter of:*

Ruth E. Crossley and the	:	Hazardous Sites Cleanup Act
Estate of Harry G. Crossley, and	:	Section 512 Order
Warner W. Tuttle	:	Crossley Farm NPL Site
1271 Huffs Church Road	:	Hereford Township
Barto, Pennsylvania 19504-9024	:	Berks County, Pennsylvania

ADMINISTRATIVE ORDER

NOW, this 27th day of July 2017, the Commonwealth of Pennsylvania, Department of Environmental Protection ("Department"), has found and determined the following:

- A. The Department is the agency with the duty and authority to administer and to enforce the Hazardous Sites Cleanup Act ("HSCA"), Act of October 18, 1988, P.L. 756, 35 P.S. §§ 6020.101 - 6020.1305; Section 1917-A of the Administrative Code of 1929, Act of April 9, 1929, P.L. 177, as amended, 71 P.S. § 510-17 ("Administrative Code") and the rules and regulations promulgated thereunder.
- B. The Crossley Farms Site ("Site") has an address of 1271 Huffs Church Road, Barto, Pennsylvania 19504-9024, and is located in Hereford Township, Berks County, Pennsylvania. The Site originally consisted of 212.153 acres located along the southern side of Huffs Church Road on top of Blackhead Hill, approximately three miles west-northwest of State Road 100. Residential housing is concentrated to the northwest and south of the Site.
- C. A portion of the Site operated as an unpermitted landfill from approximately the mid-1960s to the mid-1970s and received numerous drums of mostly liquid wastes, believed to be a variety of solvents.
- D. Because of groundwater contamination at the Site, on December 1, 1986, the U.S. Environmental Protection Agency ("EPA") initiated an emergency removal action to provide bottled water and carbon filtration systems to property owners with drinking water wells located downgradient of the Site.
- E. On October 14, 1992, the Site was added to EPA's National Priorities List. Since that time, EPA has initiated several response actions at the Site, including the removal of approximately 1200 drums containing "hazardous substances" as that term is defined at Section 103 of HSCA, 35 P.S. § 6020.103, and 13,000 cubic yards of contaminated soil, the installation of additional point of entry treatment systems in affected homes, and the implementation of on-site treatment of contaminated groundwater.
- F. EPA has implemented a remedial action at the Site, as set forth in its Record of Decision dated September 28, 2001 and the Explanation of Significant Differences dated July

- 26, 2004. EPA issued an amended ROD on July 28, 2008 which focused on the groundwater plume that extends into the valley plume south of the Site.
- G. On July 6, 2005, the Department issued an administrative order to Ruth E. Crossley, individually and Ruth E. Crossley Executrix of the Estate of Harry G. Crossley ("2005 Order"). The 2005 Order applied to the entire 212.153 acres of the Site and was recorded on July 19, 2005 in the Berks County Recorder of Deeds in Deed Book Volume 4628, Pg. 149.
- H. The documents described in Paragraph F were incorporated by reference into the 2005 Order. The remedial action for the Site includes the treatment of groundwater at an onsite plant through the use of an air stripper prior to discharge. This remedial action requires some use of property on the farm for long-term use to house the treatment technology. Institutional controls will be implemented to monitor groundwater and to restrict the use of groundwater at the Site.
- I. The Site is now owned by Warner W. Tuttle, 1271 Huffs Church Road, Barto, Pennsylvania 19504-9024 ("Owner"). Ruth E. Crossley, individually and Ruth E. Crossley Executrix of the Estate of Harry G. Crossley ("Grantors") granted and conveyed the Site to Mr. Tuttle by deed dated March 27, 2007 and recorded in the Berks County Recorder of Deeds in Deed Book Volume 5109, Pg. 126.
- J. On June 11, 2015, Mr. Tuttle subdivided the Site into two separate parcels, Lot 1 and Lot 2. The Subdivision was recorded on the same date with the Berks County Recorder of Deeds as Instrument Number 2015019630.
- K. As set forth on the Subdivision Map, Lot 1 is 175.153 acres in size and include agricultural fields, a farmhouse serviced by a private well and an onlot sewage system, and various outbuildings used for farming operations. Lot 1 is no longer considered to be part of the Site. No hazardous substance was disposed of on the 175.153 acres that comprise Lot 1. Lot 2 consists of 37 acres. Lot 2 will be maintained as vacant agricultural land and encompasses the existing hazardous substances cleanup site. As noted on the Subdivision map, there is a permanent cleanup easement on Lot 2. There is also a 50-foot-wide site access easement through Lot 1 ("Easement"). The Easement consists of a total area of 2.32 acres. The Easement originates at Huffs Church Road and crosses Lot 1 to its end at the treatment building on Lot 2.
- L. The Department is responsible for partial funding and eventual operation and maintenance of the remedy. The activities described in this Paragraph and Paragraph G constitute a "response," as that term is defined in HSCA.
- M. The past and present conditions at Lot 2 constitute a "release" or threatened "release" of "hazardous substances," as those terms are defined in Section 103 of HSCA, 35 P.S. § 6020.103.

- N. For purposes of this Order, the Department has determined that Warner W. Tuttle, Ruth E. Crossley and the Estate of Harry G. Crossley are "responsible persons," as that term is defined in Section 103 of HSCA, 35 P.S. § 6020.103, and as that term is used in Section 701 of HSCA, 35 P.S. § 6020.701, with respect to the release and threatened release of hazardous substances on Lot 2.
- O. Pursuant to Section 512(a) of HSCA, 35 P.S. § 6020.512(a), a site at which hazardous substances remain after completion of a response action shall not be put to a use that would disturb or be inconsistent with the response action implemented. The Department shall have the authority to issue an order precluding or requiring cessation of activity at a facility that the Department finds would disturb or be inconsistent with the response action it has implemented.
- P. Section 512(a) of HSCA, 35 P.S. § 6020.512(a), further states that the Department shall require the local county recorder of deeds to record an order under this subsection in a manner which will assure its disclosure in the ordinary course of a title search of the subject property. An order under this subsection, when recorded, shall be binding upon subsequent purchasers.
- Q. Pursuant to Section 512(b) of HSCA, 35 P.S. § 6020.512(b), the grantor, in every deed for the conveyance of property on which a hazardous substance is either presently being disposed of or has ever been disposed of by the grantor or to the grantor's actual knowledge, shall include in the property description section of the deed an acknowledgment of the hazardous substance disposal. To the extent the information is available, the acknowledgment shall include, but not be limited to, the surface area size and exact location of the disposed of substances and a description of the types of hazardous substances contained therein. This property description shall be made a part of the deed for all future conveyances or transfers of the subject property. A description of any response undertaken with respect to disposal of the hazardous substance shall also be made a part of the deed.
- R. Section 503(c) of HSCA, 35 P.S. § 6020.503(c), provides that the Department may enter at reasonable time a site for the purposes of effectuating a response action.
- NOW, THEREFORE, under the authority of Sections 503, 512 and 1102 of HSCA, 35 P.S. §§ 6020.503, 6020.512 and 6020.1102, and Section 1917-A of the Administrative Code, 71 P.S. § 510-17, it is hereby ORDERED that:
1. This Administrative Order modifies the Department's Administrative Order of July 6, 2005, which was applicable to the entire 212.153 acres of the Site. This Administrative Order modifies the Department's Administrative Order of July 6, 2005 such that it applies solely to Lot 2. Except as set forth in Paragraph 4, below, the 175.153 acres that constitute Lot 1 shall no longer be subject to the restrictions imposed by the Department's Administrative Order of July 6, 2005.

2. No activities shall be conducted on Lot 2 that would in any manner disturb or interfere with any response actions on Lot 2, including the remedial action described in Paragraphs G and H, above.
3. The Owner shall provide the Department, as well as its agents, contractors, and subcontractors, access to Lot 2 to: (a) conduct inspections; (b) conduct investigation, operation and maintenance activities; and (c) implement any additional response actions.
4. The Site Access Easement through Lot 1, as described more fully in Paragraph K, above, and as set forth in the Subdivision Map _____, shall be maintained to allow the Department, as well as its agents, contractors, and subcontractors, unrestricted access to Lot 2.
5. The documents described in Paragraph F, above, are incorporated herein by reference.
6. Within thirty (30) days of receipt of this Order, the Owner shall record with the Berks County Recorder of Deeds, this Order and Exhibits to the property deed found in the Berks County Recorder of Deeds in Deed Book Volume 5109 Pg. 126, in a manner that will assure its disclosure in the ordinary course of a title search of the subject property.
7. Within ten (10) days of recording this Order with the Berks County Recorder of Deeds, the Owner shall provide the Department with written documentation acknowledging that the action required in Paragraph 6 of this Order has been satisfactorily completed.
8. The Department specifically reserves all rights to institute any administrative, civil, or criminal action, at law or in equity, including, but not limited to, the assessment of civil penalties, and the issuance of orders; to abate, prevent harm or threat of harm to the environment or the public health and safety, resulting from the violations specified herein or any other violations of statute, rules and regulations, permit or order.
9. The requirements of this Order shall be binding upon subsequent purchasers of the Site, or any portions thereof.

10. Unless and until the Department gives written notice to the contrary, all notices, requests, reports, or other correspondence required to be submitted by the Order to the Department shall be addressed as follows:

Program Manager
Environmental Cleanup & Brownfields Program
Department of Environmental Protection
Southcentral Regional Office
909 Elmerton Avenue
Harrisburg, Pennsylvania 17110

11. Except as modified herein, the Department's 2005 Order remains in full force and effect.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in Braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

If you want to challenge this action, your appeal must reach the Board within 30 days. You do not need a lawyer to file an appeal with the Board. Important legal rights are at stake, however, so you should show this document to a lawyer at once. If you cannot afford a lawyer, you may qualify for free pro bono representation. Call the Secretary to the Board (717-787-3483) for more information.

FOR THE COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

 07/27/2017

Benjamin P. Stone-Thorus
Environmental Program Manager
Environmental Cleanup & Brownfields Program

COMMONWEALTH OF PENNSYLVANIA

COUNTY OF Dauphin

SS:

On this 27th day of July, 2017 before me, the undersigned officer, personally appeared Benjamin P. Stone-Thonus, who acknowledged himself to be the Program Manager of the Environmental Cleanup and Brownfields Program of the Commonwealth of Pennsylvania, Department of Environmental Protection, South-Central Regional Office whose name is subscribed to this Administrative Order, and acknowledged that he executed same for the purposes therein contained.

In witness whereof, I hereunto set my hand and official seal.

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Sara A. Bomberger, Notary Public
Susquehanna Twp., Dauphin County
My Commission Expires Dec. 3, 2020
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

Sara A. Bomberger
Notary Public

APPENDIX E – PUBLIC NOTICE

EPA PUBLIC NOTICE

EPA REVIEWS CLEANUP CROSSLEY FARM SUPERFUND SITE

The U.S. Environmental Protection Agency (EPA) is reviewing the cleanup that is ongoing at the Crossley Farm Superfund Site located in Hereford Township, Pennsylvania. EPA inspects sites regularly to ensure that cleanups conducted protect public health and the environment. EPA's 2014 review of the site concluded that the cleanup was working as designed. Additionally, the installation of vapor mitigation systems at 18 residences was implemented to ensure protectiveness in the long term. Findings from the current review being conducted will provide an update on groundwater cleanup and the vapor mitigation systems. The review will be available September 2019.

To access detailed site information, including the review report once finalized, visit: <https://www.epa.gov/superfund/crossley>

For questions or to provide site-related information for the review, contact:
Gina Soscia, EPA Community Involvement Coordinator
215-814-5538 or soscia.gina@epa.gov

APPENDIX F – INTERVIEW FORMS

Crossley Farm Superfund Site	Five-Year Review Interview Form
Site Name: Crossley Farm	EPA ID No.: PAD981740061
Interviewer Name: Johnny Zimmerman-Ward	Affiliation: Skeo
Subject Name: Larry B. Smith	Affiliation: PADEP
Subject Contact Information: 717-705-4842	
Time: N/A	Date: 12/17/2018
Interview Location: N/A	
Interview Format (circle one): In Person Phone Mail Other: Email	
Interview Category: State Agency	

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

Remedial efforts at the project are progressing well. There are some issues currently being worked on by EPA. These include connecting the source area wells to the treatment building, modifying the treatment system for the significantly higher VOC concentrations, and the infiltration gallery 2 situation with handling the treated water discharged there. This gallery does not perform as constructed and water flows to the adjacent homeowner's downgradient property. Currently, this is not an issue with the property owner.

2. What is your assessment of the current performance of the remedy in place at the Site?

The current remedy is sufficient for safeguarding drinking water for homeowner's living where the groundwater plume has affected their well water. Remedial efforts at the impacted groundwater plume's source area are now being conducted. When the extraction wells in this area are operating, the groundwater quality on site and off site should show significant improvements. Sampling performed hydrologically downgradient of the current four operating extraction wells indicate capture of the groundwater plume. It is somewhat uncertain that directly south of the source area, the deep plume, if present, is being captured.

The extraction wells along Dale Road capture impacted groundwater to the west-southwest and not to the area to the south. There are no sensitive receptors in the south area; therefore, it isn't certain if any additional deep wells would be needed to be installed there.

All homeowners within the project area have had water treatment systems installed where warranted.

The vapor intrusion systems are also maintaining and exceeding indoor air quality to acceptable health standards.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities from residents in the past five years?

Only one homeowner expressed interest in having their vapor intrusion system re-evaluated ([REDACTED]).

PADEP's contractor performs O&M on the homeowner's well water treatment systems and annual checks on the vapor intrusion systems. Any maintenance problems that arise with these systems are immediately dealt with.

There are several water treatment systems that have had the sediment filter installed after the post treatment. When mud is pumped into the system from the well instead of the sediment filter, it is discharged directly into the carbon beds, which is a problem. PADEP has reconfigured several systems to avoid this happening in the future.

4. Has your office conducted any site-related activities or communications in the past five years? If so, please describe the purpose and results of these activities.

Yes, resident owners of water treatment systems have issues with their systems' operations, such as low water pressure and minor leaks. PADEP has all issues investigated and corrected.

EPA and PADEP communicate regularly regarding site activities - for example, operation of the groundwater treatment and vapor intrusion systems, and regarding other issues.

5. Are you aware of any changes to state laws that might affect the protectiveness of the Site's remedy?

No.

6. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

The easement finalization will allow for Lot 2 to be accessible in the future. The township is to contact PADEP regarding new homes that require well water; therefore, that isn't an issue.

7. Are you aware of any changes in projected land use(s) at the Site?

No.

8. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

No.

9. Do you consent to have your name included along with your responses to this questionnaire in the FYR Report?

Yes.

Crossley Farm Superfund Site**Five-Year Review Interview Form****Site Name:** Crossley Farm**EPA ID No.:** PAD981740061**Interviewer Name:** Johnny Zimmerman-Ward**Affiliation:** Skeo**Subject Name:** James Romig**Affiliation:** CDM Smith**Subject Contact Information:** N/A**Time:** N/A**Date:** 2/11/2019**Interview Location:** N/A**Interview Format (circle one):** In Person

Phone

Mail

Other: Email

Interview Category: O&M Contractor (OU2)

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

Cleanup of the Site and maintenance activities at the groundwater treatment system have proceeded in accordance with EPA's schedule. Farming activities at the Site have continued without interruption during investigation, construction and O&M activities.

2. What is your assessment of the current performance of the remedy in place at the Site?

The remedy is operating as designed.

3. What are the findings from the monitoring data? What are the key trends in contaminant levels that are being documented over time at the Site?

Pumping activities are decreasing TCE levels in the Valley Plume. However, until the Source Area is addressed, cessation of pumping would result in full or partial rebound of these levels.

4. Is there a continuous on-site O&M presence? If so, please describe staff responsibilities and activities. Alternatively, please describe staff responsibilities and the frequency of site inspections and activities if there is not a continuous on-site O&M presence.

A system operator physically inspects the system each business day and performs minor maintenance items. The system is remotely monitored by office personnel. Both receive automated alarm notifications. Additional staff provides O&M support on an as-needed basis.

5. Have there been any significant changes in site O&M requirements, maintenance schedules or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

No significant changes to site O&M requirements have been required.

6. Have there been unexpected O&M difficulties or costs at the Site since start-up or in the last five years? If so, please provide details.

Indoor air levels of TCE were measured in excess of EPA's designated action level for the Site of $8.8 \mu\text{g}/\text{m}^3$ (EPA's non-cancer indoor air RSL for workers). In response, modifications were made converting the tank venting systems to an active system; modified the off-gas ducting joints; and adjusted the ventilation system to increase air exchanges and reduce TCE levels to below $8.8 \mu\text{g}/\text{m}^3$. The ventilation changes resulted in increased heating costs in the winter months.

7. Have there been opportunities to optimize O&M activities or sampling efforts? Please describe changes and any resulting or desired cost savings or improved efficiencies.

EPA decreased the frequency of long-term remedial action monitoring activities from quarterly to twice per year. In the near future, EPA will begin discussions with PADEP regarding potentially decreasing the frequency of NPDES sampling events from twice per month to once per month.

8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site?

None at this time.

9. Do you consent to have your name included along with your responses to this questionnaire in the FYR Report?

Yes.

Crossley Farm Superfund Site**Five-Year Review Interview Form****Site Name:** Crossley Farm**EPA ID No.:** PAD981740061**Interviewer Name:** Johnny Zimmerman-Ward**Affiliation:** Skeo**Subject Name:** Kevin Kilmartin**Affiliation:** Tetra Tech**Subject Contact Information:** 610-382-1173**Time:** N/A**Date:** 12/17/2018**Interview Location:** N/A**Interview Format (circle one):** In Person

Phone

Mail

Other: Email

Interview Category: O&M Contractor (OU3)

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

Steady progress being made for OU3.

2. What is your assessment of the current performance of the remedy in place at the Site?

Testing performed in late 2018 indicates remedy is operating and functioning well.

3. What are the findings from the monitoring data? What are the key trends in contaminant levels that are being documented over time at the Site?

N/A for OU3.

4. Is there a continuous on-site O&M presence? If so, please describe staff responsibilities and activities. Alternatively, please describe staff responsibilities and the frequency of site inspections and activities if there is not a continuous on-site O&M presence.

No O&M presence other than responding to specific problems. Routine O&M handled by PADEP.

5. Have there been any significant changes in site O&M requirements, maintenance schedules or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

No changes.

6. Have there been unexpected O&M difficulties or costs at the Site since start-up or in the last five years? If so, please provide details.

Some residents constantly switching systems off and on has resulted in unexpected wear to blower fans.

7. Have there been opportunities to optimize O&M activities or sampling efforts? Please describe changes and any resulting or desired cost savings or improved efficiencies.

No.

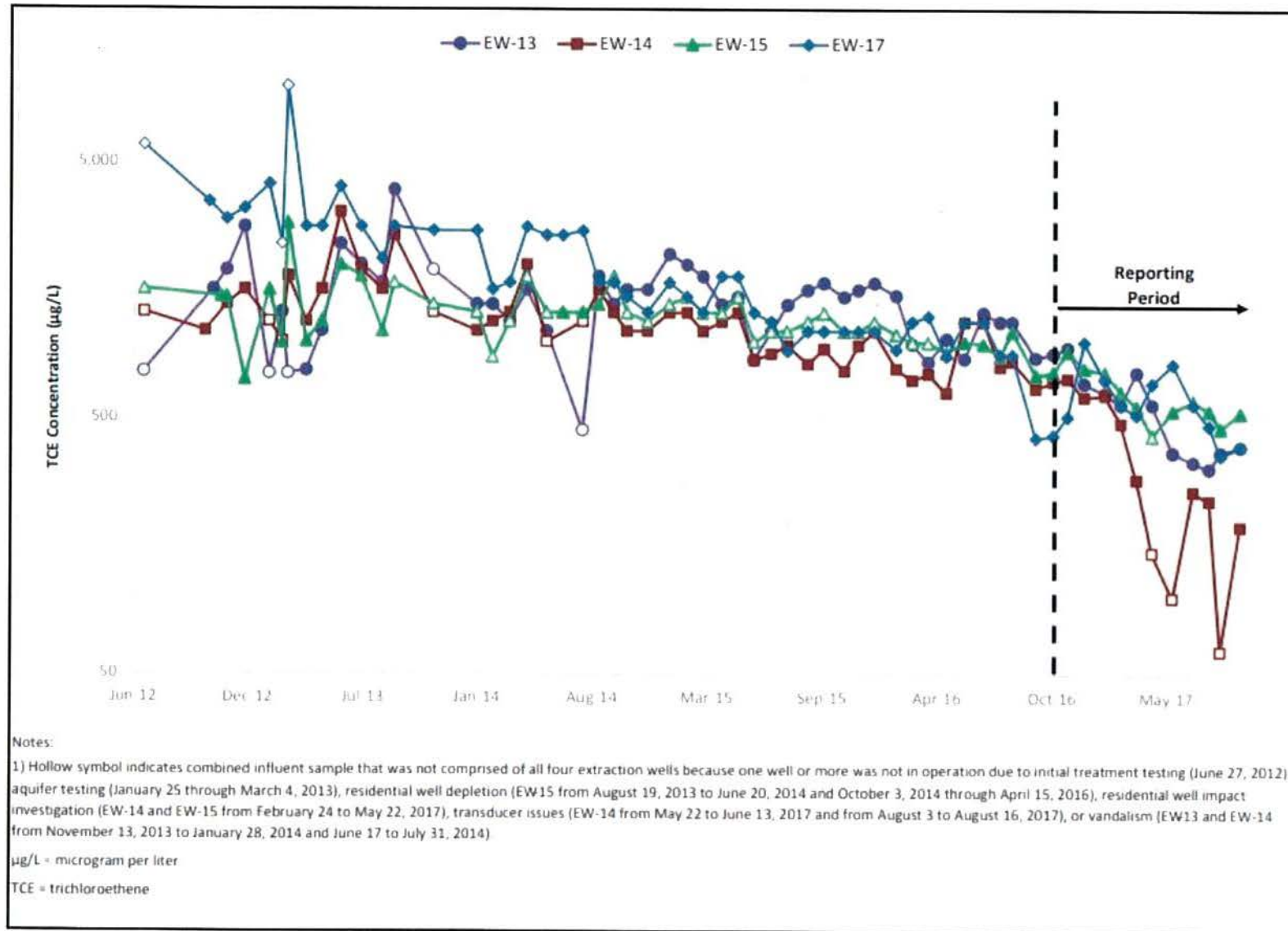
8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site?

Not at this time.

9. Do you consent to have your name included along with your responses to this questionnaire in the FYR Report? Yes.

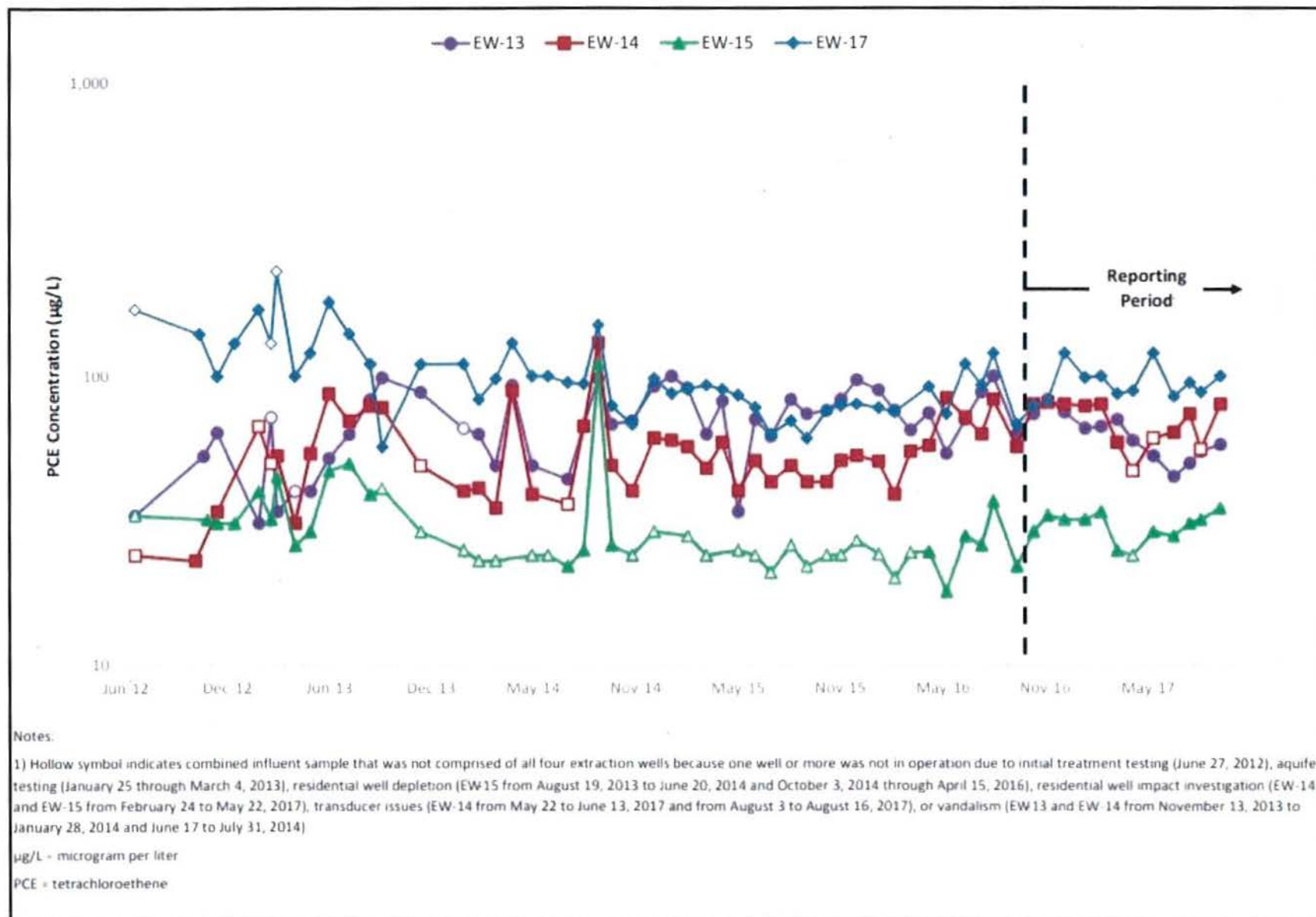
APPENDIX G – DATA REVIEW DOCUMENTATION

Figure G-1: OU2 – TCE Concentrations in Extraction Wells



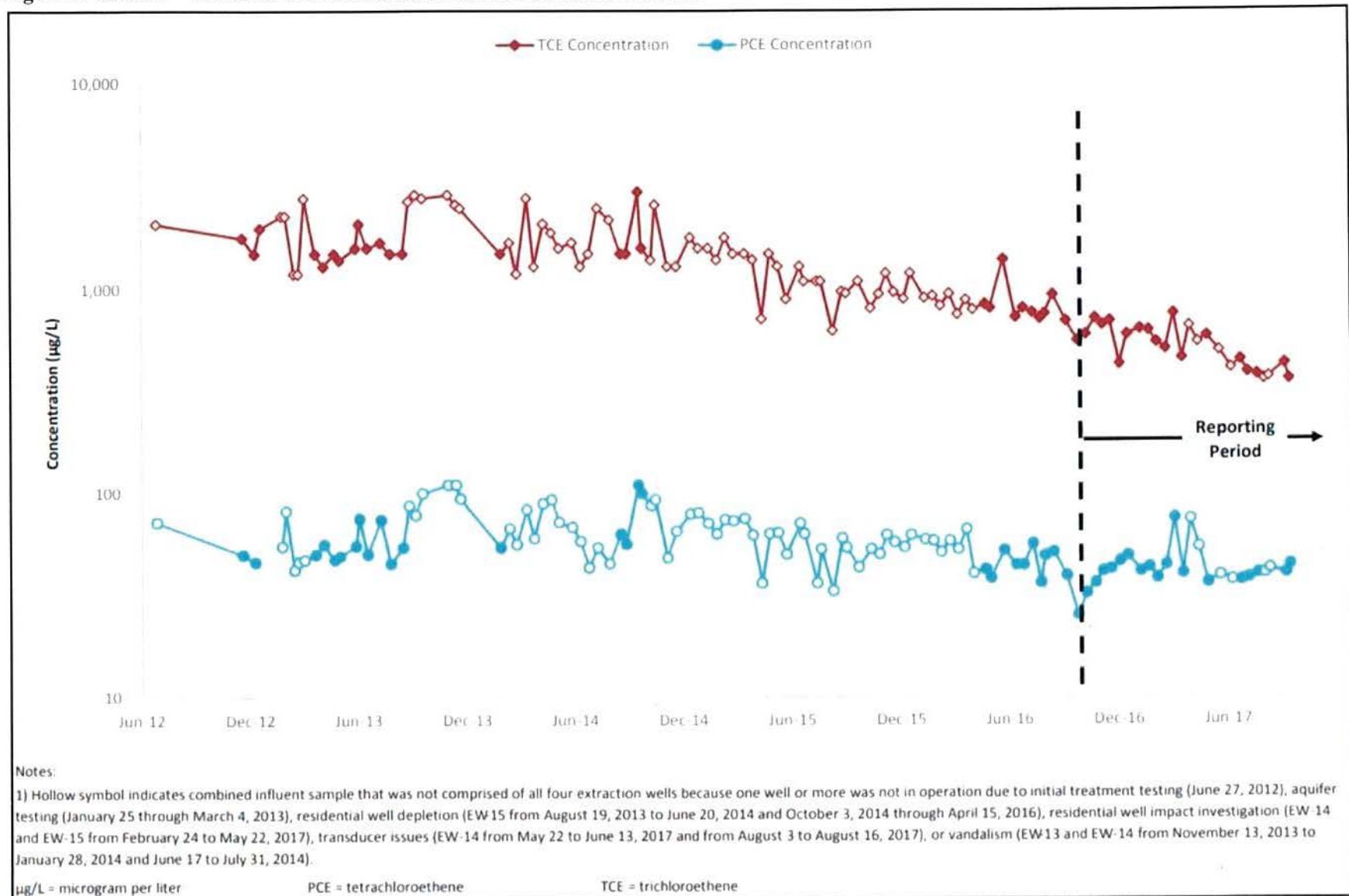
Source: Fiscal Year 2017, Annual Operations and Maintenance Report, Crossley Farm Superfund Site, Operable Unit 2. Prepared by CDM Smith for EPA. August 2018.

Figure G-2: OU2 – PCE Concentrations in Extraction Wells



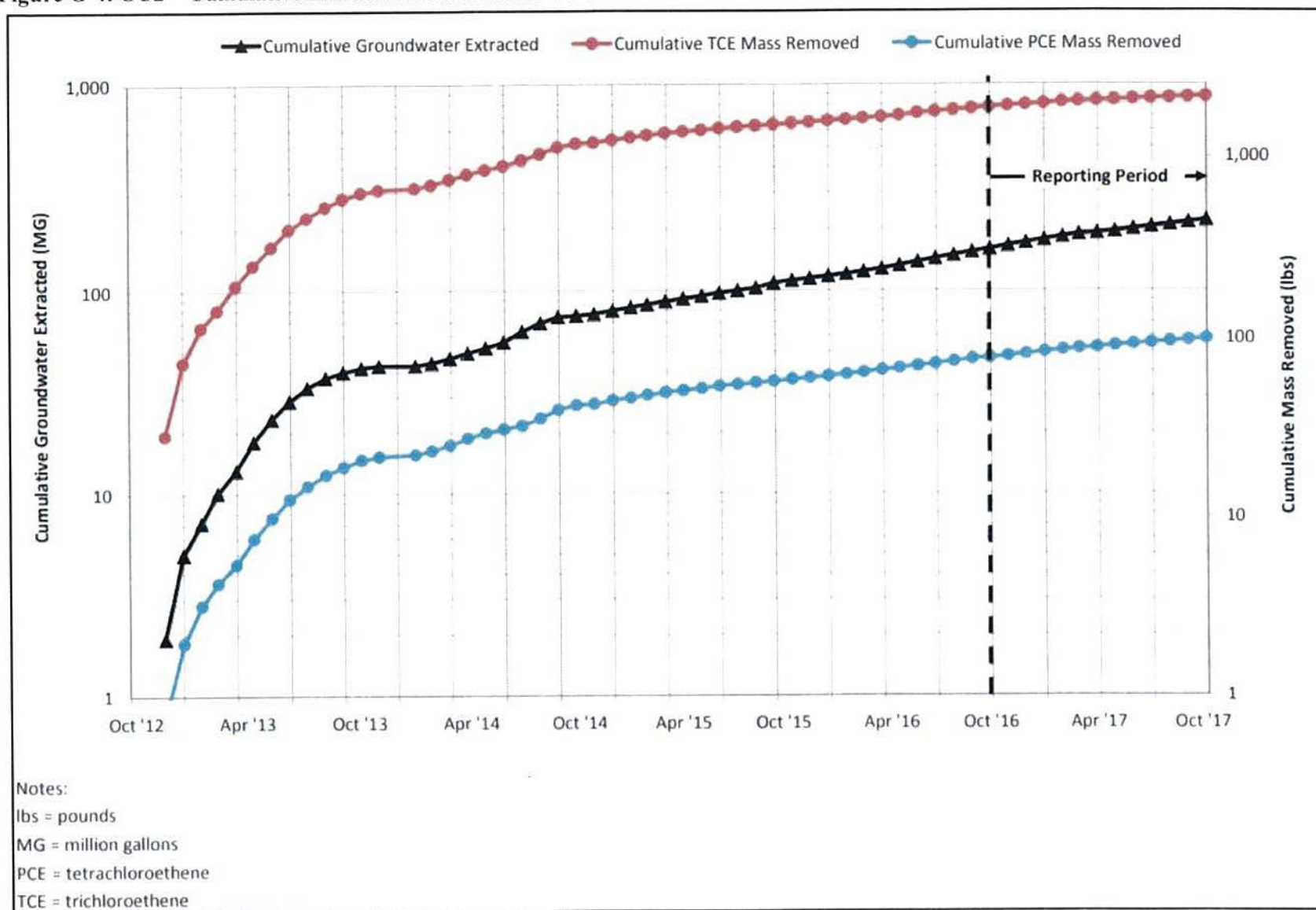
Source: Fiscal Year 2017, Annual Operations and Maintenance Report, Crossley Farm Superfund Site, Operable Unit 2. Prepared by CDM Smith for EPA. August 2018.

Figure G-3: OU2 – TCE and PCE Concentrations in Combined Influent



Source: Fiscal Year 2017, Annual Operations and Maintenance Report, Crossley Farm Superfund Site, Operable Unit 2. Prepared by CDM Smith for EPA. August 2018.

Figure G-4: OU2 – Cumulative Extracted Groundwater Volume and Estimated TCE and PCE Mass Removal



Source: Fiscal Year 2017, Annual Operations and Maintenance Report, Crossley Farm Superfund Site, Operable Unit 2. Prepared by CDM Smith for EPA. August 2018.

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Figure 3-5
TCE Plume Extent

G-5

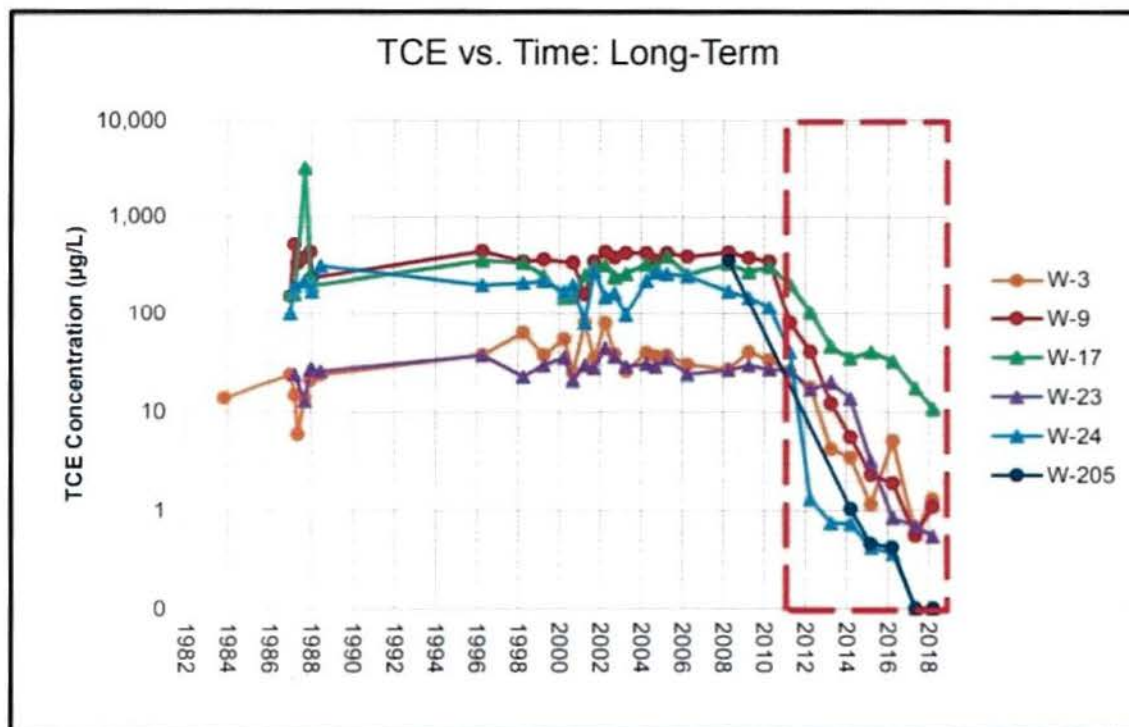
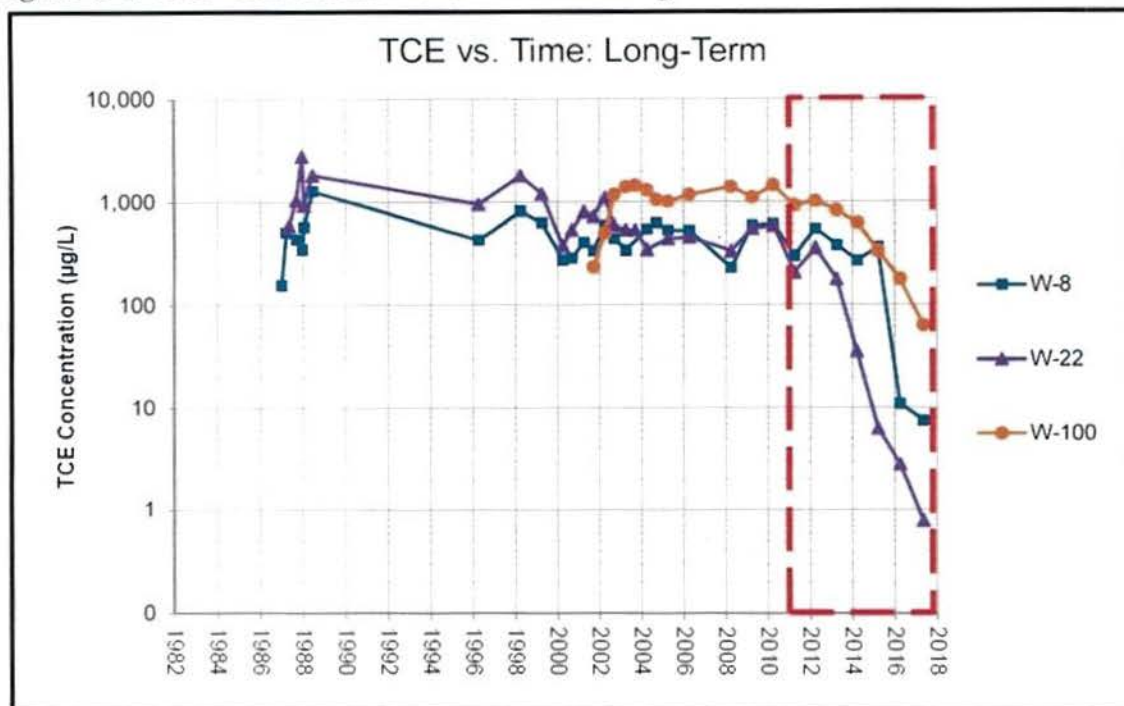
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Figure 3-6
PCE Plume Extent

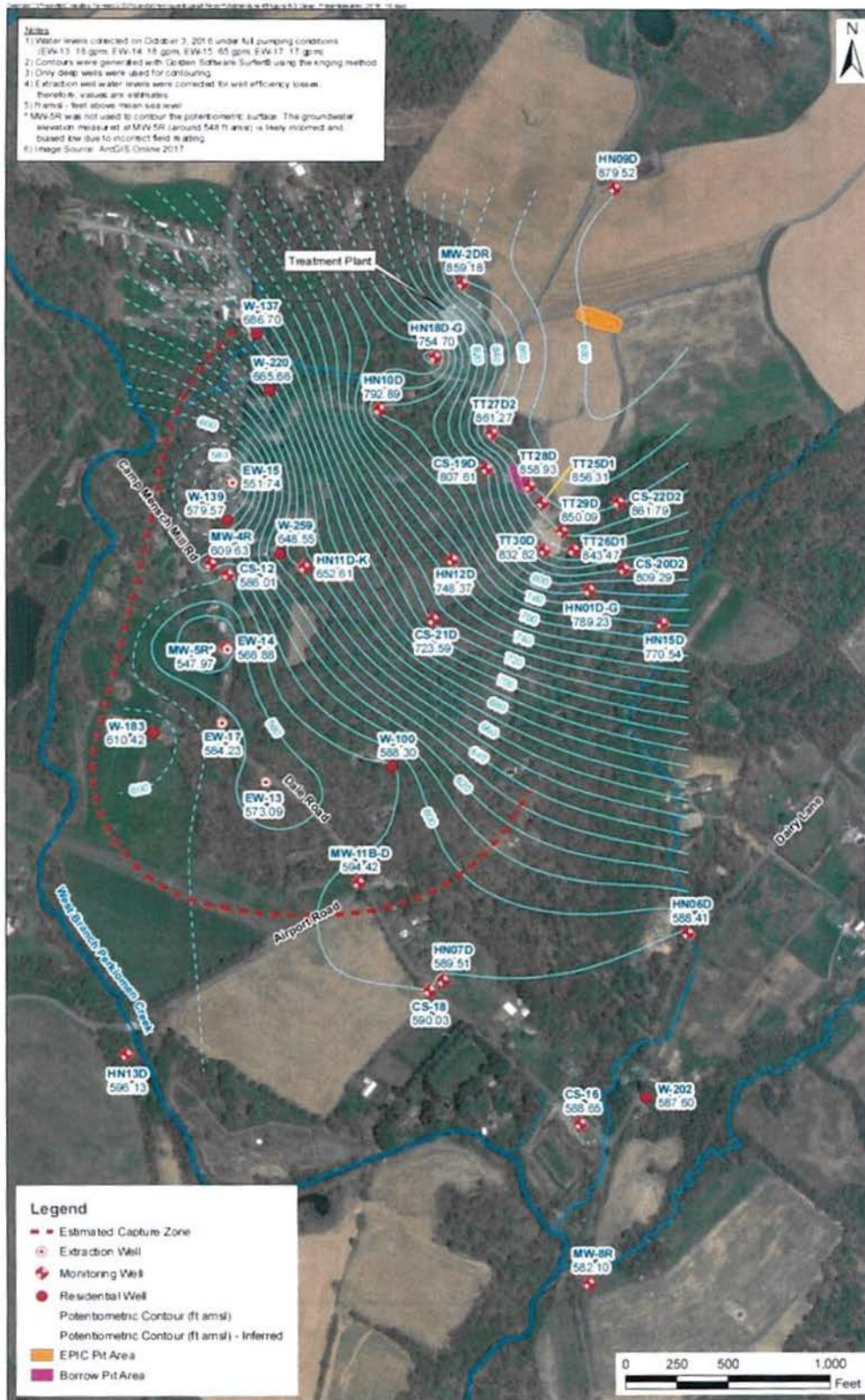
G-6

Figure G-7: OU2 – Residential Wells with Decreasing TCE Concentrations



Source: Fiscal Year 2017, Annual Operations and Maintenance Report, Crossley Farm Superfund Site, Operable Unit 2. Prepared by CDM Smith for EPA. August 2018.

Source: Fiscal Year 2017, Annual Operations and Maintenance Report, Crossley Farm Superfund Site, Operable Unit 2. Prepared by CDM Smith for EPA. August 2018.



**CDM
Smith**

Crossley Farm Superfund Site
Berks County, Pennsylvania

Figure 3-2
Potentiometric Surface
Deep Groundwater, October 2016

Notes

- 1) Water levels collected on March 27, 2017 under pump-and-treat conditions.
- 2) W-13 20 gpm, EW-14 0 gpm, EW-15 0 gpm, EW-17 26 gpm.
- 3) Contours were generated with Golden Software Surfer® using the kriging method.
- 4) Only deep wells were used for contouring.
- 5) Extration well water levels were corrected for well efficiency losses. Therefore, values are estimates.
- 6) Elevation - feet above mean sea level.
- 7) Image Source: ArcGIS Online 2017.

Legend

- Extraction Well
- Monitoring Well
- Residential Well
- Estimated Capture Zone
- Potentiometric Contour (ft amsl)
- Potentiometric Contour (ft amsl) - Inferred
- EPIC Pit Area
- Borrow Pit Area

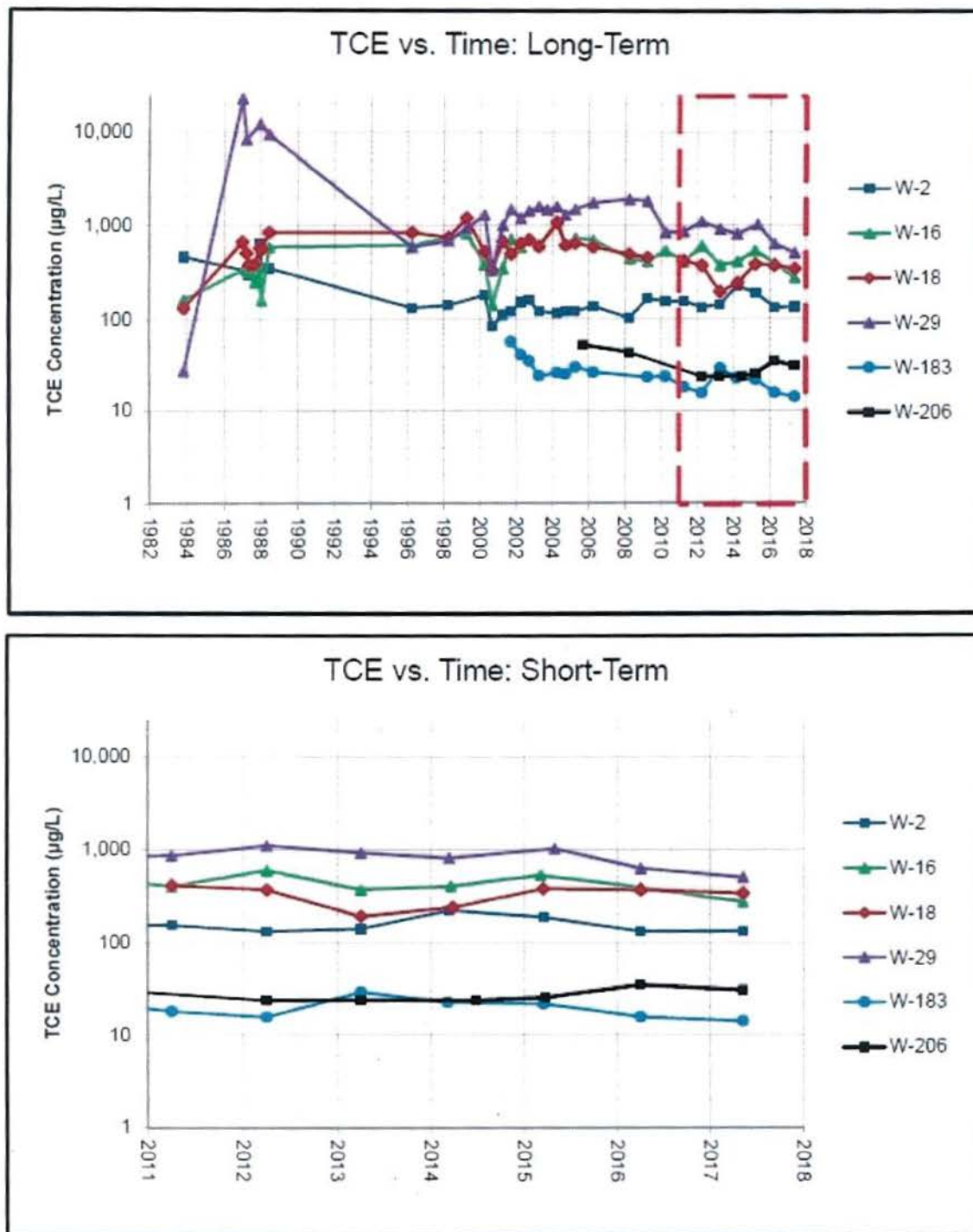
0 250 500 1,000 Feet

**CDM
Smith**

Figure 3-3
Potentiometric Surface
Deep Groundwater, March 2017

G-9

Figure G-10: OU2 – Residential Wells with Steady TCE Concentrations



Notes:

µg/L = micrograms per liter

TCE = trichloroethene

Source: Fiscal Year 2017, Annual Operations and Maintenance Report, Crossley Farm Superfund Site, Operable Unit 2. Prepared by CDM Smith for EPA. August 2018.

Table G-11: OU3 – Historical Vacuum Measurements

Residence (W-)	Vacuum Mo/Yr	VVP Vacuum (inches of water)							TOTAL Vacuum at U-Tube (inches of water)	Comments
		VVP-1	VVP-2	VVP-3	VVP-4	VVP-5	VVP-6	VVP-7		
2	6/2014	0.0136	0.0784							
	4/2015	0.0637	0.0698						0.1; 0.4	
	3/2019	0	0.053						0 - both tubes	water seeps
5	7/2014	0.0111	0.0682	0.0201	0.0289	0.0055				
	2/2015	0.0103	0.0386	0.0102	0.016	0.0017			1; 1; 1; 0.1; 0.1	
	11/2018	NA(5)	0.059	0.087	NA(5)	0.047			0.1; 0.1; 1.5	
9	12/2014	0.0239	0.0095	0.0035						
	2/2015	0.018	0.0071	0.0015					0.25	
	11/2018	0.035	0.013	0.002					0.0	U-Tube broken
16	2/2015	0.0012	0.0035	0.0545	0.0027					
	2/2015	NA(1)	0.0276	0.0015	0.008				0.65	
	12/2018	NA(1)	0.023	NA(3)	NA(3)				NA	U-Tube not found; PADEP follow-up
17	4/2014	0.0079	0.0062							
	4/2015	0.0073	0.0053						1.8	
	11/2018	0.004	0.007						1.8	
18	6/2014	0.0163	0.0055	0.1583	0.1655					
	4/2015	0.0112	0.0048	0.0868	0.1003				0.4; 0.35; 0.20	
	11/2018	0.01	0.002	0.3	0.3				0.2; 0.8; 0.2	
19	5/2014	0.0612	0.0217	0.009	0.0085	0.0302	0.0132			
	2/2015	0.0385	NA(2)	NA(3)	NA(3)	0.0860 (4)	NA(5)		0.7; 0.3; 0.4	
	11/2018	0.009	0.022	0.012	0.014	NA(5)	NA(5)		1.0; 0.3	
20	11/2014	0.03	0.008	0.004	0.007	0.02				
	2/2015	0.1043	0.0651	0.0125	0.0101	0.0206			0.25; 0.25	Sump full of water 3/2019
	3/2019	0.019	NA	NA	NA	NA			NA	No U-Tube reading; PADEP follow-up
22	5/2014	0.0303	0.0062	0.0081	0.0352					
	2/2015	0.0184	0.0047	NA(2)	0.0277				1.4	
	3/2019	0.004	NA	0.012	0.042				NA	U-Tube not found; PADEP follow-up
24 (main)	9/2014	0.0245	0.276	0.652	0.0031					
	2/2015	0.005	1.05	0.7808	0.004				1.6; 1.0	
	11/2018	0.003	NA(5)	NA(5)	NA(5)				2.1	vacuum in sump = 0.6
29	4/2014	0.3115	0.0165	0.194						
									NA	
	12/2018	NA(5)	0.009	0.092					0.6	
35	5/2014	0.0111	0.0135	0.0118	0.006	0.0296				
	2/2015	0.0047	0.0024	0.0154	0.0017	0.0233			3.6; 3.5; 3.6	
	3/2019	0.001	0	0.001	0	NA(1)			3.5; 3.6; 3.7	

Residence (W-)	Vacuum Mo/Yr	VVP Vacuum (inches of water)							TOTAL Vacuum at U-Tube (inches of water)	Comments
		VVP-1	VVP-2	VVP-3	VVP-4	VVP-5	VVP-6	VVP-7		
40	4/2014	0.0419	0.0118	0.0202	0.0184					
									NA	
	3/2019	0.019	0.003	0.012	NA(1)				1.0	
59	4/2014	0.205	0.0692							
	2/2015	0.1088	0.0346						0.4; 0.4	
	11/2018	0.253	0.038						0.6	Fan noisy; needs inspection
113	6/2014	0.061	0.0037	0.031	0.0053	0.0071	0.227			
	4/2015	0.0159	0.0039	0.0662	0.0029	0.0047	0.0852		0.25; 0.3; 0.3; 0.15	2019: Apt. fan not working
	11/2018	0.023	NA(6)	0.017	0.019	0.001	0.072		0.0(7)	House fan running, no U-Tube reading
115	6/2014	0.338	0.334	0.1466	1.25					
	2/2015	0.0303	0.9734	0.0334	0.13				7; 7; 7; 0.5	
	11/2018	0.003	0.004	0.027	0.004				0.6	Recheck if all 3 fans running
120	4/2014	0.0768	0.0322	0.0157	0.066	0.0326				
	2/2015	0.1387	0.0576	0.0079	0.085	0.1852			3.7; 3.6; 3.8; 3.6; 3.9	
	3/2019	NA(8)	0.003	0.002	0.005	NA (8)			4.1	
124	4/2014	0.0058	0.0058	0.0203	0.406	0.0217	0.0127	0.0047		
	4/2015	0.0055	0.0037	0.0153	0.0216	0.0186	0.0191	0.0028	0.5; 0.5; 3	
	11/2018	NA(6)	NA(6)	0.012	0.021	0.002	0.549	0.005	NA	Fan for garage not working
183	6/2014	0.007	0.0095	0.065	0.0662	0.0051				
	4/2015	0.0041	0.004	0.0355	0.0355	0.0035			1.5	Owner reports fan not working

NA Footnotes:

- (1) = Covered by restored flooring
- (2) = Collapsed
- (3) = Temporary point now abandoned
- (4) = Partially collapsed
- (5) = Could not find
- (6) = Vacuum Fan Inoperable
- (7) = Manometer appears to be Inoperable
- (8) = Inaccessible due to furniture, appliances, etc.

	Agency _____				
	Contact _____				
	Name	Title	Date	Phone No.	
	Problems/suggestions <input type="checkbox"/> Report attached: _____				
4.	Other Interviews (optional) <input type="checkbox"/> Report attached: _____				
III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)					
1.	O&M Documents <input checked="" type="checkbox"/> O&M manual <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A <input checked="" type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Maintenance logs <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks: _____				
2.	Site-Specific Health and Safety Plan <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks: _____				
3.	O&M and OSHA Training Records <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks: _____				
4.	Permits and Service Agreements <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Effluent discharge <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> Other permits: _____ <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks: <u>Treated groundwater is discharged via a NPDES equivalency permit</u>				
5.	Gas Generation Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks: _____				
6.	Settlement Monument Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks: _____				
7.	Groundwater Monitoring Records <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks: _____				
8.	Leachate Extraction Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks: _____				
9.	Discharge Compliance Records <input type="checkbox"/> Air <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Water (effluent) <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks: _____				

10.	Daily Access/Security Logs	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks: _____				
IV. O&M COSTS				
1.	O&M Organization			
	<input type="checkbox"/> State in-house	<input checked="" type="checkbox"/> Contractor for state – OU1 and OU3		
	<input type="checkbox"/> PRP in-house	<input type="checkbox"/> Contractor for PRP		
	<input type="checkbox"/> Federal facility in-house	<input type="checkbox"/> Contractor for Federal facility		
	<input checked="" type="checkbox"/> EPA contractor - OU2			
2.	O&M Cost Records			
	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date		
	<input type="checkbox"/> Funding mechanism/agreement in place	<input type="checkbox"/> Unavailable		
	Original O&M cost estimate: _____ <input type="checkbox"/> Breakdown attached			
	Total O&M cost for FYR period: <u>\$800,000</u>			
3.	Unanticipated or Unusually High O&M Costs during Review Period			
	Describe costs and reasons: <u>Additional costs were incurred to address upgrades to the ventilation system in the GWTS building.</u>			
V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A				
A. Fencing				
1.	Fencing Damaged	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Gates secured	<input checked="" type="checkbox"/> N/A
Remarks: _____				
B. Other Access Restrictions				
1.	Signs and Other Security Measures	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A	
Remarks: _____				
C. Institutional Controls (ICs)				
1.	Implementation and Enforcement			
	Site conditions imply ICs not properly implemented		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by): <u>site visits</u>			
	Frequency: <u>During regular sampling events</u>			
	Responsible party/agency: <u>EPA/PADEP</u>			
	Contact	<u>Larry B. Smith</u>	<u>PADEP</u>	<u>717-705-4842</u>
	Name	Affiliation	Date	Phone no.
	Reporting is up to date		<input type="checkbox"/> Yes	<input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
	Reports are verified by the lead agency		<input type="checkbox"/> Yes	<input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Violations have been reported		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached			

2.	Adequacy*	<input checked="" type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
Remarks: _____				
D. General				
1.	Vandalism/Trespassing	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
Remarks: _____				
2.	Land Use Changes On Site	<input type="checkbox"/> N/A		
Remarks: <u>None</u>				
3.	Land Use Changes Off Site	<input type="checkbox"/> N/A		
Remarks: <u>None</u>				
VI. GENERAL SITE CONDITIONS				
A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A				
1.	Roads Damaged	<input checked="" type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
Remarks: _____				
B. Other Site Conditions				
Remarks: _____				
VII. LANDFILL COVERS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A				
A. Landfill Surface				
1.	Settlement (low spots)	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident	
Area extent: _____		Depth: _____		
Remarks: _____				
2.	Cracks	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Cracking not evident	
Lengths: _____		Widths: _____	Depths: _____	
Remarks: _____				
3.	Erosion	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident	
Area extent: _____		Depth: _____		
Remarks: _____				
4.	Holes	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Holes not evident	
Area extent: _____		Depth: _____		
Remarks: _____				
5.	Vegetative Cover	<input type="checkbox"/> Grass	<input type="checkbox"/> Cover properly established	
<input type="checkbox"/> No signs of stress		<input type="checkbox"/> Trees/shrubs (indicate size and locations on a diagram)		
Remarks: _____				
6.	Alternative Cover (e.g., armored rock, concrete)			<input type="checkbox"/> N/A
Remarks: _____				
7.	Bulges	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Bulges not evident	
Area extent: _____		Height: _____		

Remarks: _____			
8.	Wet Areas/Water Damage <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map	Area extent: _____ Area extent: _____ Area extent: _____ Area extent: _____
Remarks: _____			
9.	Slope Instability <input type="checkbox"/> No evidence of slope instability	<input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map	Area extent: _____ Remarks: _____
B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	Flows Bypass Bench Remarks: _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay	
2.	Bench Breached Remarks: _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay	
3.	Bench Overtopped Remarks: _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay	
C. Letdown Channels <input type="checkbox"/> Applicable <input type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	Settlement (Low spots) Area extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement Depth: _____
2.	Material Degradation Material type: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation Area extent: _____
3.	Erosion Area extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion Depth: _____
4.	Undercutting Area extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting Depth: _____

5.	Obstructions	Type: _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Area extent: _____	
	Size: _____		
	Remarks: _____		
6.	Excessive Vegetative Growth	Type: _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Area extent: _____	
	Remarks: _____		
D. Cover Penetrations <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	Gas Vents	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
	Remarks: _____		
2.	Gas Monitoring Probes	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
	Remarks: _____		
3.	Monitoring Wells (within surface area of landfill)		
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
	Remarks: _____		
4.	Extraction Wells Leachate		
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
	Remarks: _____		
5.	Settlement Monuments	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A
	Remarks: _____		
E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	Gas Treatment Facilities		
	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction	<input type="checkbox"/> Collection for reuse
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
	Remarks: _____		
2.	Gas Collection Wells, Manifolds and Piping		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
	Remarks: _____		

3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)			
<input type="checkbox"/> Good condition		<input type="checkbox"/> Needs maintenance	
		<input type="checkbox"/> N/A	
Remarks: _____			
F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A			
Remarks: _____			
2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A			
Remarks: _____			
G. Detention/Sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. Siltation Area extent: _____ Depth: _____ <input type="checkbox"/> N/A			
<input type="checkbox"/> Siltation not evident			
Remarks: _____			
2. Erosion Area extent: _____ Depth: _____			
<input type="checkbox"/> Erosion not evident			
Remarks: _____			
3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A			
Remarks: _____			
4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A			
Remarks: _____			
H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident			
Horizontal displacement: _____		Vertical displacement: _____	
Rotational displacement: _____			
Remarks: _____			
2. Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Degradation not evident			
Remarks: _____			
I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. Siltation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident			
Area extent: _____		Depth: _____	
Remarks: _____			
2. Vegetative Growth <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A			
<input type="checkbox"/> Vegetation does not impede flow			
Area extent: _____		Type: _____	
Remarks: _____			
3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident			
Area extent: _____		Depth: _____	

Remarks: _____			
4.	Discharge Structure	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: _____			
VIII. VERTICAL BARRIER WALLS		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Settlement	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
Area extent: _____		Depth: _____	
Remarks: _____			
2.	Performance Monitoring	Type of monitoring: _____	
<input type="checkbox"/> Performance not monitored			
Frequency: _____		<input type="checkbox"/> Evidence of breaching	
Head differential: _____			
Remarks: _____			
IX. GROUNDWATER/SURFACE WATER REMEDIES		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
A. Groundwater Extraction Wells, Pumps and Pipelines		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Pumps, Wellhead Plumbing and Electrical		
<input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A			
Remarks: _____			
2.	Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances		
<input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance			
Remarks: _____			
3.	Spare Parts and Equipment		
<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided			
Remarks: _____			
B. Surface Water Collection Structures, Pumps and Pipelines		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Collection Structures, Pumps and Electrical		
<input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance			
Remarks: _____			
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances		
<input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance			
Remarks: _____			
3.	Spare Parts and Equipment		
<input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided			
Remarks: _____			
C. Treatment System		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Treatment Train (check components that apply)		
<input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation			

	<input checked="" type="checkbox"/> Air stripping	<input checked="" type="checkbox"/> Carbon adsorbers
	<input checked="" type="checkbox"/> Filters: _____	
	<input type="checkbox"/> Additive (e.g., chelation agent, flocculent): _____	
	<input type="checkbox"/> Others: _____	
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance
	<input checked="" type="checkbox"/> Sampling ports properly marked and functional	
	<input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date	
	<input checked="" type="checkbox"/> Equipment properly identified	
	<input type="checkbox"/> Quantity of groundwater treated annually: _____	
	<input type="checkbox"/> Quantity of surface water treated annually: _____	
	Remarks: _____	
2.	Electrical Enclosures and Panels (properly rated and functional)	
	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Good condition
		<input type="checkbox"/> Needs maintenance
	Remarks: _____	
3.	Tanks, Vaults, Storage Vessels	
	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Good condition
		<input type="checkbox"/> Proper secondary containment
		<input type="checkbox"/> Needs maintenance
	Remarks: _____	
4.	Discharge Structure and Appurtenances	
	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Good condition
		<input type="checkbox"/> Needs maintenance
	Remarks: _____	
5.	Treatment Building(s)	
	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Good condition (esp. roof and doorways)
		<input type="checkbox"/> Needs repair
	<input checked="" type="checkbox"/> Chemicals and equipment properly stored	
	Remarks: _____	
6.	Monitoring Wells (pump and treatment remedy)	
	<input checked="" type="checkbox"/> Properly secured/locked	<input checked="" type="checkbox"/> Functioning
		<input checked="" type="checkbox"/> Routinely sampled
		<input checked="" type="checkbox"/> Good condition
	<input type="checkbox"/> All required wells located	<input type="checkbox"/> Needs maintenance
		<input type="checkbox"/> N/A
	Remarks: _____	
D. Monitoring Data		
1.	Monitoring Data	
	<input checked="" type="checkbox"/> Is routinely submitted on time	<input checked="" type="checkbox"/> Is of acceptable quality
2.	Monitoring Data Suggests:	
	<input checked="" type="checkbox"/> Groundwater plume is effectively contained	<input type="checkbox"/> Contaminant concentrations are declining
	Remarks: <u>Monitoring data are addressed in the</u> <u>data review section of the FYR.</u>	
E. Monitored Natural Attenuation		

1. Monitoring Wells (natural attenuation remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A Remarks: _____			
X. OTHER REMEDIES			
If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. <u>OU1 – POET Systems: The POET systems were not inspected as part of the FYR site inspection. PADEP regularly inspects the systems and conducts maintenance, as necessary.</u> <u>OU3 – Vapor Intrusion Mitigation Systems: The vapor intrusion mitigation systems were not inspected as part of the FYR site inspection. PADEP regularly inspects the systems and conducts maintenance, as necessary.</u>			
XI. OVERALL OBSERVATIONS			
A. Implementation of the Remedy			
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions). <u>The OU1 remedy is designed to prevent exposure to contaminated drinking water. POET systems installed at residences treat contaminated groundwater prior to potable use. PADEP conducts regular O&M of the treatment systems and samples residential wells. The OU2 remedy is designed to contain contamination at the Site and reduce contamination in the aquifer and surface water springs to MCLs or below. Groundwater extraction and treatment is ongoing. EPA is currently conducting additional investigations of the Hot Spot Area to determine possible additional remedial actions for this area. The OU3 remedy – installation of vapor intrusion mitigation systems at multiple residences – is also complete. PADEP conducts O&M of the mitigation systems.</u>			
B. Adequacy of O&M			
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. <u>O&M activities are adequate at this time.</u>			
C. Early Indicators of Potential Remedy Problems			
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. <u>None at this time.</u>			
D. Opportunities for Optimization			
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. <u>EPA will consider optimization opportunities as needed.</u>			

Site Inspection Participants:

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Larry Smith, PADEP

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James Romig, CDM (EPA contractor – OU2)

Steve Glazier, CDM (EPA contractor – OU2)

Kevin Kilmartin, Tetra Tech (EPA contractor – OU3)

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Jill Billus, Skeo (EPA FYR contractor)

APPENDIX I – SITE INSPECTION PHOTOS



Road and fields with groundwater treatment building in background



Groundwater treatment building



Interior of groundwater treatment building



Extraction well



Discharge area 1



Discharge area 2



Field and road on site



Looking toward Hot Spot Area (within tree line)



Groundwater monitoring well HN09I

APPENDIX J – ARARS REVIEW TABLES

Groundwater ARARs

The decision documents selecting interim remedies for site groundwater identify the MCLs established under the Safe Drinking Water Act as the contaminant-specific Applicable or Relevant and Appropriate Requirements (ARARs). The final remedy for sitewide groundwater has not yet been selected. The Site's final sitewide ROD will include consideration of a complete list of site-specific chemicals. Based on the ARARs established for the interim and limited remedies, there have been no changes to the MCLs for the COCs (Table J-1).

Table J-1: Comparison of Previous and Current ARARs for Groundwater COCs

COCs ^a	1997 OU1 ROD ARAR (µg/L)	2001 OU2 ROD ARAR (µg/L)	2008 OU2 ROD Amendment ARAR (µg/L)	2019 MCL ^b (µg/L)	ARAR Change
Carbon tetrachloride	NA	NA	5	5	None
1,2-Dichloroethane	NA	NA	5	5	None
1,1-Dichloroethylene	NA	NA	7	7	None
Cis-1,2-DCE	NA	70	70	70	None
Methylene chloride	5	NA	5	5	None
PCE	5	5	5	5	None
Trans-1,2-DCE	NA	NA	100	100	None
1,1,2-Trichloroethane	NA	NA	5	5	None
TCE	5	5	5	5	None
Vinyl chloride	NA	NA	2	2	None
Notes: a) COCs as identified in the 1997 OU1 ROD, the 2001 OU2 ROD and the 2008 OU2 ROD Amendment. b) Current EPA MCLs available at https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations , accessed 2/25/19. NA = not applicable; contaminant not listed as a COC in the decision document					

Soil ARARs

Site decision documents did not identify any soil ARARs.

Surface Water ARARs

The 2008 OU2 ROD Amendment identifies Pennsylvania water quality standards as surface water ARARs but does not specify the values in effect at that time. Treated effluent from the GWTS is subject to the requirements set forth in the NPDES permit equivalent, issued by PADEP. Table J-2 summarizes the effluent limitations and monitoring requirements for discharge specified in the NPDES permit equivalent.

Table J-2: NPDES Permit Equivalent Effluent Limitations

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (pounds per day)		Concentrations (milligrams per liter, mg/L)				Minimum Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Daily Maximum	Instantaneous Maximum		
Flow (million gallons per day)	Report	Report	XXX	XXX	XXX	XXX	Continuous	Measured
pH (standard units)	XXX	XXX	6.0	XXX	XXX	9.0	2 per month	Grab
Dissolved oxygen	XXX	XXX	Report	XXX	XXX	XXX	2 per month	Grab
Temperature (Degrees F)	XXX	XXX	XXX	XXX	Report	XXX	2 per month	I-S
Total suspended solids	XXX	XXX	XXX	Report	Report	XXX	2 per month	Grab
Total dissolved solids	XXX	XXX	XXX	1,000	2,000	2,500	2 per month	Grab
Carbon tetrachloride	XXX	XXX	XXX	0.0008	0.0012	0.0020	2 per month	Grab
Chloroform	XXX	XXX	XXX	0.0195	0.0304	0.0488	2 per month	Grab
1,2-Dichloroethane	XXX	XXX	XXX	0.0013	0.0020	0.0033	2 per month	Grab
1,1-Dichloroethylene	XXX	XXX	XXX	0.022	0.044	0.055	2 per month	Grab
PCE	XXX	XXX	XXX	0.0024	0.0037	0.0060	2 per month	Grab
1,1,2-Trichloroethane	XXX	XXX	XXX	0.0020	0.0031	0.0050	2 per month	Grab
TCE	XXX	XXX	XXX	0.0085	0.0133	0.0213	2 per month	Grab
Toluene	XXX	XXX	XXX	0.028	0.056	0.070	2 per month	Grab
Xylene	XXX	XXX	XXX	0.262	0.408	0.655	2 per month	Grab
Vinyl chloride	XXX	XXX	XXX	0.00009	0.00013	0.000225	2 per month	Grab
<p><i>Notes:</i> Source: NPDES Permit Equivalent, Appendix A of the Fiscal Year 2017 Annual Operations and Maintenance Report, dated August 2018. XXX = criterion not applicable for the parameter I-S = immersion stabilization</p>								

APPENDIX K – RISK SCREENING EVALUATION OF CONFIRMATION DATA COLLECTED FROM THE EPIC PIT AREA

Table K-1: May 2019 Residential RSLs and Maximum Post-Removal Soil Concentrations

Chemical	Residential Soil RSL ^a (mg/kg)	Maximum Concentration ^b (mg/kg)
Inorganics		
Aluminum	7,700	31,600 ^c
Antimony	3.1	2.9
Arsenic	0.68	7.1 ^c
Barium	1,500	127
Beryllium	16	3.1
Cadmium	7.1	0.89
Calcium	essential nutrient	1,200
Chromium	12,000 ^d	209
Cobalt	2.3	128 ^c
Copper	310	35.2
Iron	5,500	79,400 ^c
Lead	400	35.4
Magnesium	essential nutrient	10,800
Manganese	180	2,050 ^c
Mercury	1.1	ND
Nickel	150	29.5
Potassium	essential nutrient	1,450
Selenium	39	1.9
Silver	39	ND
Sodium	essential nutrient	199
Thallium	0.078	4.6 ^c
Vanadium	39	157 ^c
Zinc	2,300	143
Cyanide	2.3	1.4
Organics		
Acetone	6,100	0.1
Methylene chloride	35	0.007
1,2-DCE (total)	16 ^c	0.35
1,1,2-Trichloroethane	0.15	0.002
TCE	0.41	0.160
PCE	8.1	0.018
2-Butanone	2,700	0.021
4-Methyl-2-Pentanone	3,300	<0.012
Benzene	1.2	0.001
Xylene	58	0.002
Styrene	600	0.003

Notes:

- a) EPA's May 2019 RSL for soil based on a 1×10^{-6} cancer risk or noncancer hazard quotient of 0.1 (this table provides the more stringent value); RSLs available at <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>, accessed 5/21/19.
- b) Maximum detections for the organics were converted from $\mu\text{g}/\text{mg}$ to mg/kg in order to compare to RSLs. From Appendix D of the 2014 FYR Report.
- c) The Site's 2001 RI Report indicated that metals were not co-located with the hotspots of TCE and the even distribution of the metals across the Site suggests they are associated with natural background conditions.
- d) The RSL for trivalent chromium (chromium III) was used because chromium III predominates over hexavalent chromium (chromium VI) under natural conditions.

Chemical	Residential Soil RSL ^a (mg/kg)	Maximum Concentration ^b (mg/kg)
e) The RSL for cis-1,2-DCE is used because it more stringent than the RSL for trans-1,2-DCE. mg/kg = milligrams per kilogram ND = not detected <i>Bold italics</i> = concentration exceeds RSL		