FIFTH FIVE-YEAR REVIEW REPORT FOR
OSBORNE LANDFILL SUPERFUND SITE
MERCER COUNTY, PENNSYLVANIA

JUNE 2020

Prepared by

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

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Date

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LIST OF ABBREVIATIONS AND 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
COC	Contaminant of Concern
DCE	Dichloroethylene
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
FYR	Five-Year Review
IC	Institutional Control
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MSC	Medium Specific Concentration
µg/L	Microgram per Liter
NCP	National Contingency Plan
NPL	National Priorities List
OU	Operable Unit
O&M	Operation and Maintenance
PADEP	Pennsylvania Department of Environmental Protection
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PFAS	Per- and Polyfluoroalkyl Substances
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
TCE	Trichloroethene
UU/UE	Unlimited Use and Unrestricted Exposure
VOC	Volatile Organic Compound

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 fifth FYR for the Osborne Landfill Superfund site (the Site). The triggering action for this statutory review is the completion date of the previous FYR. 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 five operable units (OUs), but OU3 was a contingency remedy and was never implemented (Table 1). This FYR addresses all OUs except OU3.

Table 1: Site OU Designations[1]

OU	Designation
1	Solid Waste Landfill
2	Wetland Sediments
3	On-Site Water Table (OU1 Contingency remedy/not implemented)
4	Groundwater -Clarion Formation, to include mine voids
5	Groundwater -Homewood, Connoquenessing and Burgoon Aquifers

The EPA remedial project manager (RPM) led the FYR. Additional participants from EPA included the EPA community involvement coordinator (CIC), a human health risk assessor, a member of the Biological and Technical Assistance Group, a hydrogeologist and legal counsel. The Pennsylvania Department of Environmental Protection (PADEP) also participated in the review. Skeo provided EPA contractor support for this FYR. The potentially responsible party (PRP) was notified of the initiation of the FYR. The review began on June 25, 2019.

Site Background

The 15-acre Site is located in Pine Township, Mercer County, Pennsylvania, less than 1 mile east of Grove City (Figure 1). The Site currently includes a 12-acre capped landfill and an empty building that contained the former groundwater recovery and treatment system. The landfill, which was a former open pit coal strip mine in the 1940s, accepted wastes, including industrial wastes, from the 1950s until 1978. The Site is currently vacant and there are no current or projected land uses.

The area immediately around the Site is sparsely populated. Most of the residential homes near the Site are located along Enterprise Road, which is about a quarter mile north of the Site, or to the east along Diamond Road (Figure 1 and Figure 2). Woodlands are located north of the Site. Farmland is present to the east and southeast across the East Pine Street Extension. A federally protected wetland is located southwest of the Site. A large off-site pond exists adjacent to the wetland, directly west of the Site. There is another wetland south of the Site, on both sides of the East Pine Street Extension.

[1] Up until 2014, some site documents including FYR Reports and sampling plans incorrectly referenced the Site OUs. This FYR uses the corrected OU references.

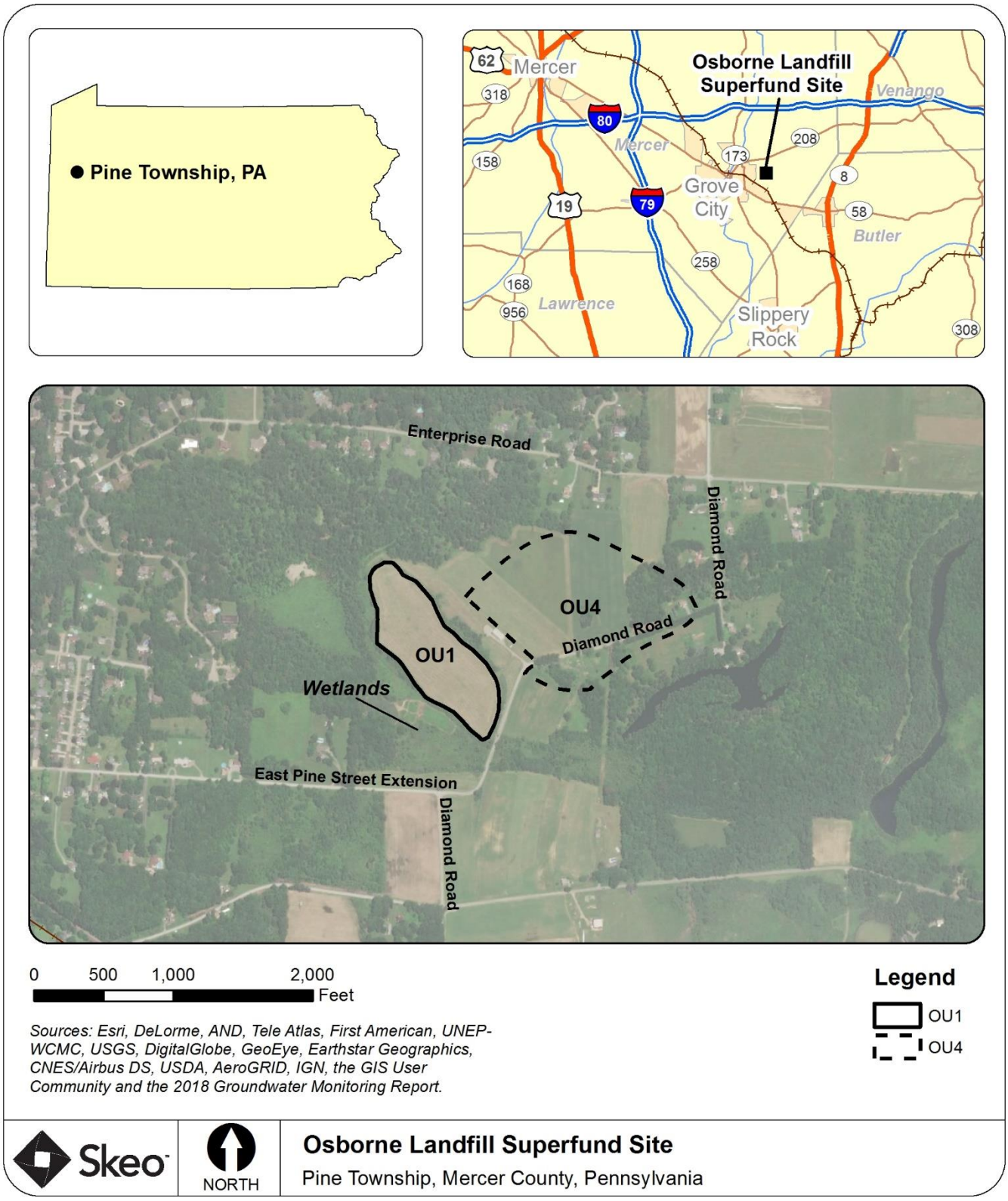
The aquifers under the Site, exclusive of unconsolidated materials, are the Clarion Aquifer (includes the Clarion sandstone formation and Brookville Coal mine voids), the Homewood Sandstone, the upper and lower Connoquenessing Sandstone, and the Burgoon Sandstone. For the purpose of this FYR and the remedy at the Site, groundwater units under and adjacent to the Site are divided into two groups. The Clarion sandstone and mine voids are treated as a single unit. The Homewood, Connoquenessing and Burgoon Aquifers are treated as a single unit because they are under the base of the landfill. Groundwater flow is generally to the east-northeast. In the past, homes near the Site used private wells in the Clarion Aquifer or mine voids for potable and non-potable water supplies. In 1994, after sampling found high levels of contaminants in a residential well, residents living within 150 feet of the Site were connected to the public water system.[2] Refer to Appendix A for additional resources and to Appendix B for the Site's chronology of events.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Osborne Landfill		
EPA ID: PAD980712673		
Region: 3	**State:** PA	**City/County:** Grove City / Mercer
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the Site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name: Nick Tymchenko, with additional support provided by Skeo		
Author affiliation: EPA Region 3		
Review period: 6/25/2019 – 3/4/2020		
Date of site inspection: 7/17/2019		
Type of review: Statutory		
Review number: 5		
Triggering action date: 8/28/2015		
Due date *(five years after triggering action date)*: 8/28/2020		

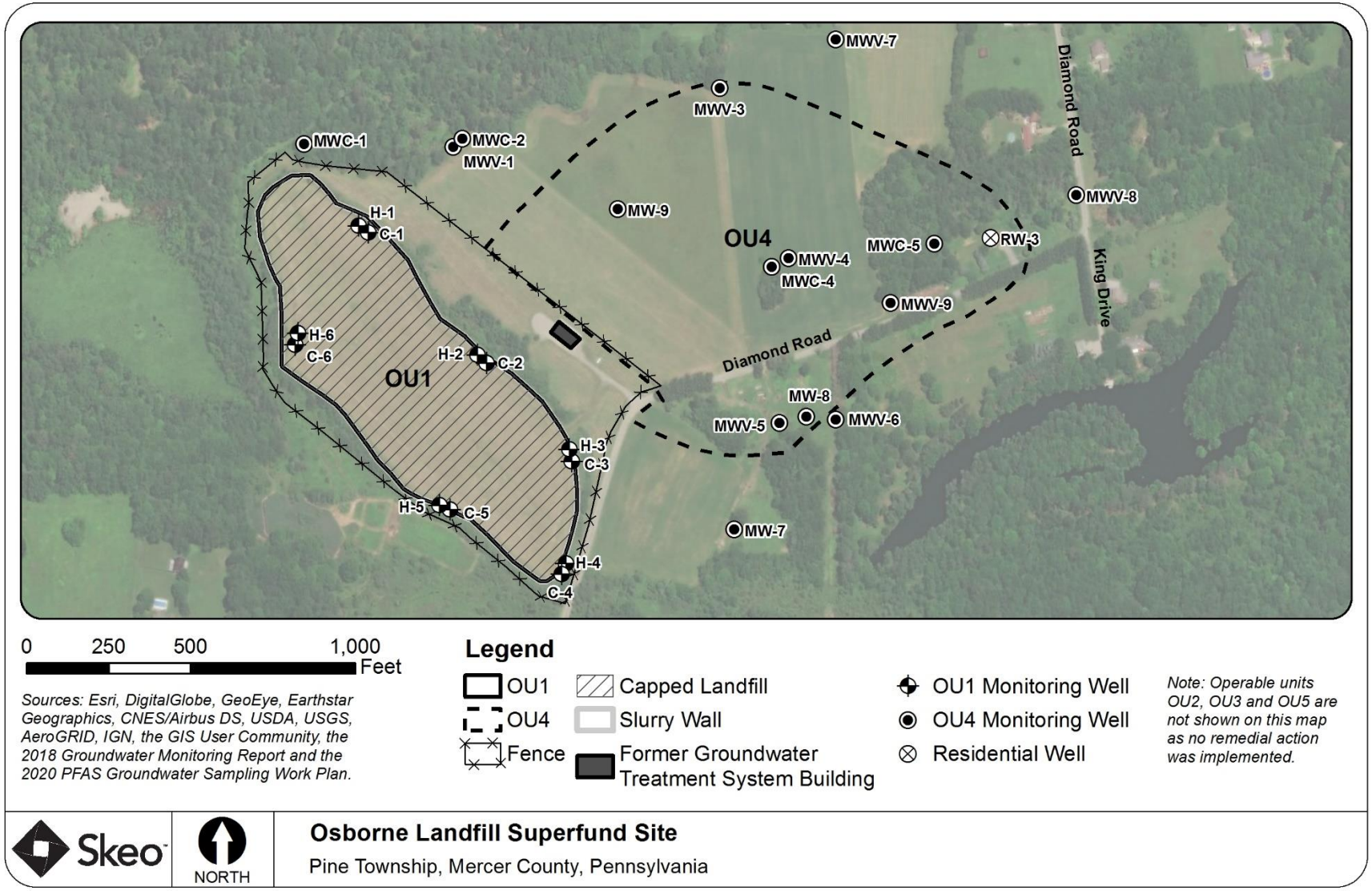
[2] One resident refused the connection to public water; this well was sampled several times and contaminants were not detected.

Figure 1: Site Location 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

After the abandonment of the open pit coal strip mine, groundwater filled the pit, forming a large pond. Throughout the period from the late 1950s to 1978, contaminated spent foundry sand and other industrial and municipal wastes (e.g., wood, plastic, scrap metal and debris) were disposed of in the strip mine pond. Waste disposal gradually displaced the water in the strip mine pond, but three ponds remained. In 1978, Pennsylvania Department of Environmental Resources, now known as PADEP, cited the site property owner for operating a non-permitted landfill and ordered the owner to close the landfill.

In 1983, EPA identified Cameron International Corporation (Cameron), formerly Cooper Industries, Inc. and Cooper Cameron, as a PRP. Cameron mostly disposed of foundry sand in the landfill, but also deposited other hazardous substances.[3]

Following closure of the landfill, PADEP found high concentrations of oils and phenyls in the on-site pond water as well as over 600 drums, some of which were leaking. In a January 1983 letter, EPA directed Cameron and other PRPs to take immediate actions at the Site. Cameron fenced the Site, posted warnings to restrict access, and removed and disposed of the drums off site. In September 1983, EPA finalized the Site's listing on the Superfund program's National Priorities List (NPL).

EPA completed the remedial investigation/feasibility study (RI/FS) in 1989. The RI/FS verified the presence of polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), heavy metals and chlorinated hydrocarbons above EPA remedial action levels in fill material at the Site. The contaminants of concern in the fill material, sediments and groundwater were PCB-1254, benzo(a)pyrene, dibenzo(a,h)anthracene, chromium, lead and nickel. Vinyl chloride and trichloroethene was also found in groundwater at concentrations greater than maximum contaminant levels (MCLs). The Human Health Risk Assessment identified risks above EPA's acceptable risk range through exposure routes of direct contact with contaminated fill material and residential use of contaminated groundwater, including ingestion and showering. The on-site pond sediment and off-site wetland sediments contained PCBs, polycyclic aromatic hydrocarbons and metals, however contamination was minimal. In the subsequent focused RI, bioaccumulation studies indicated that the low level of contamination in the wetland did not have an impact on the environment.

Response Actions

EPA issued the first Record of Decision (ROD) in September 1990. The 1990 ROD selected the remedy for OU1, OU3 and OU4. The OU3 remedy was a contingency remedy for OU1 and was not implemented. During the design phase for the groundwater recovery and treatment system for OU4, field work indicated that it would not be possible to remediate the Clarion Aquifer in accordance with the 1990 ROD. In 1997, EPA issued a second ROD that selected the final remedy for all site groundwater (OUs 4 and 5) and the wetlands southwest of the Site (OU2). The remedial goals and the selected remedy components from the 1990 and 1997 RODs are shown in Table 2.

[3] General Electric Corporation, also identified as a PRP, disposed of materials containing hazardous substances at the Site between approximately May 1972 and December 1978. General Electric contributed a cash settlement to reimburse EPA for past costs.

Table 2: Remedial Goals and Selected Remedies

OU	OU Description	Remedial Goals*	Selected Remedy (Decision Document)
1	Solid waste landfill	• Remove the threat to groundwater from leaching of the fill material. • Prevent dermal contact with PCB-contaminated foundry sand. • Eliminate overland transport of foundry sand to the wetland area.	1990 ROD: • Clay landfill cap, on-site drainage and erosion control. • Slurry wall around perimeter of fill area. • Extraction wells to remove leachate from the fill and maintain inward gradient, leachate treated with iron and manganese and injected into mine voids. • Institutional controls and groundwater monitoring.
2	Wetland sediments	• Reduce or eliminate potential risks to human health or the environment from exposure to contaminants associated with wetland sediments and all groundwater at the Site.	1997 ROD • Additional studies showed that wetlands to the southwest of the landfill had not been impacted and EPA determined no action was required.
3	On-site water table	• Eliminate source of on-site water table contamination. • Eliminate potential migration of groundwater contamination.	1990 ROD • OU3 is a contingency remedy • No additional action was required pending effective implementation of the slurry wall.
4	Groundwater - Clarion Formation	• Reduce human health risks associated with future use of groundwater. • Reduce or eliminate potential risks to human health or the environment from exposure to contaminants associated with wetland sediments and all groundwater at the Site.	1990 ROD • Construction of extraction wells and groundwater pumping and air stripping for COCs, injection into mine pool and groundwater monitoring. • Institutional controls restricting any new wells within one half mile of the Site. 1997 ROD • Remedy modified to monitored natural attenuation. • Periodic residential well sampling.
5	Groundwater - Homewood, Connoquenessing and Burgoon Aquifers	• Reduce or eliminate potential risks to human health or the environment from exposure to contaminants associated with wetland sediments and all groundwater at the Site.	1997 ROD • Semiannual volatile organic compound (VOC) monitoring of the Homewood, Connoquenessing and Burgoon Aquifers for three years to verify contamination was not migrating toward public water system wells.
Notes: * = Remedial action objectives were not specified in the RODs, however the goals of the remedial actions were provided.			

EPA issued two Explanations of Significant Differences (ESDs) in 1998 to modify and clarify the institutional controls for OU1, remove the requirement for groundwater institutional controls and clarify the groundwater monitoring program for OU4.[4] EPA issued a third ESD in 2004 to clarify the cleanup goals for groundwater (Table 3). The 2004 ESD clarified the performance standards for the groundwater from background levels to

[4] EPA no longer considered restrictions on any new wells within one half mile of the Site to be necessary based on the limited extent of groundwater contamination in the Clarion Aquifer.

MCLs and non-zero maximum contaminant level goals (MCLGs) and Pennsylvania Land Recycling Program, Act 2, Chapter 250 Medium Specific Concentrations for Inorganic Regulated Substances in Groundwater (Table 3).

Table 3: 2004 ESD Cleanup Goals for Groundwater[a]

Groundwater Contaminant of Concern (COC)	Cleanup Goal (µg/L)
Arsenic	10[b]
Beryllium	4
Benzene	5
Benz(a)pyrene	0.2
Chromium	100
Cis-1,2-dichloroethylene (DCE)	70
Nickel[c]	100
Lead[c]	5
PCBs	0.5
Trichloroethene (TCE)	5
Vinyl Chloride	2

Notes:
a. Cleanup goals are based on MCLs unless otherwise noted.
b. The 2004 ESD indicated an arsenic cleanup goal of 50 µg/L until January 22, 2006, after which it would change to 10 µg/L.
c. Cleanup goals for nickel and lead are based on the Pennsylvania Land Recycling Program, Act 2, Chapter 250 Medium Specific Concentrations for Inorganic Regulated Substances in Groundwater.
µg/L = micrograms per liter

Status of Implementation

OU1 – Solid Waste Landfill (Slurry Wall Installation and Groundwater Extraction)
Cameron conducted the remedial design and remedial action work under a Unilateral Administrative Order signed in March 1991. On-site construction began in August 1995 and was completed in September 1997. Cameron graded the Site, filled on-site ponds, installed a slurry wall around the landfill, and completed a geo-composite impermeable cap and soil cover (Figure 2). Cameron also constructed a mitigation wetland to expand the wetlands west of the Site to replace wetlands damaged during cap installation. A stream that previously drained into one of the leachate ponds was also routed around the capped landfill so that it could empty into the mitigation wetland.

The leachate treatment system was built when the slurry wall and cap were installed. From 1997 through early 2004, groundwater was extracted inside the slurry wall and processed at the on-site treatment plant before discharge to injection wells in mine voids. Treatment consisted of green sand filtration, permanganate addition and air stripping. Performance standards for the leachate collection and treatment system were met in 2004 and the system was shut down with EPA approval. The PRPs performed a rebound test, which indicated that the containment system is working and contaminants of concern (COCs) are not migrating off site. Based on these findings, the leachate extraction and treatment system has remained off. Based on historical and prevailing groundwater conditions and EPA approval, the leachate treatment system is no longer necessary and Schlumberger Holdings Corporation (formerly Cameron) voluntarily decommissioned the inactive treatment

system in December 2017.[5] Cap inspections and groundwater sampling in OU1 are required to monitor the effectiveness of the remedy because waste remains in place. Current groundwater monitoring data for OU1 wells are included in the Data Review section of this FYR.

The containment system is designed to prevent the migration of contamination into the aquifers that are used to supply drinking water to area residents. A series of performance wells surrounds the containment area to verify integrity of the slurry wall. A public water line serves residences near the Site. The water line, installed in 1994, extends along Enterprise Road (north of the Site) to Diamond Road (east of the Site) and south and west along Diamond Road. Pine Township Ordinance No 5 1982 Rules and Regulations Governing the Furnishing of Water Services requires all property owners to connect to the public water supply unless they are more than 150 feet from the service line.

In June 1999, Cameron bought the 22-acre parcel that contains the 12-acre landfill. Cameron has complied with institutional control requirements, which include prohibitions on the use or disturbance of groundwater until cleanup levels are achieved and prohibitions on new wells within the landfill property. A fence around the former landfill area restricts access and a deed restriction restricts the use of the property (no residential, commercial or industrial use; no use or activity that interferes with the effectiveness of the environmental response activities undertaken at the Site; no excavation activities).

OU2 – Wetland Sediments
Per the 1997 ROD, no remedial action was required for wetland sediments.

OU3 – On-Site Water Table
Per the 1990 ROD, no additional action was required for the on-site water table pending effective implementation of the slurry wall (OU1, see above). This contingency remedy was not implemented.

OU4 and OU5 – Groundwater in the Clarion Formation and Homewood, Connoquenessing and Burgoon Aquifers
During the design phase for the 1990 ROD requirements, it became apparent that the Clarion Aquifer was fractured and an extraction well placed in the aquifer would preferentially draw mine void water upward. As a result, each well would have a very limited lateral capture zone and numerous extraction wells would be needed to implement the remedy. EPA also determined that an extraction well would likely draw contaminated mine water into the Clarion Aquifer, which is used as a drinking water aquifer. Therefore, as documented in the 1997 ROD, EPA modified the remedy for the Clarion Aquifer (OU4) to monitored natural attenuation. The remedy for OU4 states that monitoring will continue for five years after MCLs are reached.

Due to persistent low-level vinyl chloride concentrations in exceedance of the cleanup goal in OU4 mine void wells and OU1 performance well C-2, the PRP implemented an optimization project between March 2010 and February 2012 to extract groundwater from the mine void, treat the water at the on-site treatment plant, and re-inject the treated water into the mine void. During system operation, approximately 56.1 million gallons of water were extracted, treated and re-injected into the mine void. Vinyl chloride concentrations were reduced at all monitoring points, but concentrations in some wells continued to fluctuate above the MCL prior to 2018. Since 2018, there have been no exceedances of the groundwater cleanup goals or MCLs. Based on the declining concentrations, the PRP requested and EPA and PADEP approved a reduction in the monitoring schedule in August of 2019. Current groundwater monitoring data for OU4 are included in the Data Review section of this FYR Report.

As part of the Focused RI/FS for OU4, seven residential wells were sampled from 1993 through 1994. Only one contaminated residential well, RW-3, was identified during investigations; this residence is connected to the public water supply. Vinyl chloride was the only contaminant that exceeded risk-based screening levels in RW-3.

[5] Schlumberger Holdings Corporation merged with Cameron International Corporation in April 2016 and has assumed management responsibilities for the Site.

Cameron sampled RW-3 in 2015 and vinyl chloride concentrations slightly exceeded the MCL with a concentration of 2.5 µg/L. Attempts to access the residence associated with RW-3 during this FYR period have been unsuccessful. This well is not used for drinking water and the residence is connected to the public water supply. The 1997 ROD required Cameron to sample residential wells for properties not connected to a public water system until MCLs were reached. One resident did not connect to the public water supply and currently uses a spring. Cameron also continued to sample five residential wells used for non-potable purposes for residents who had connected to the water system. Other than RW-3, all samples from residential wells, and the spring, have been below detection levels. This sampling was discontinued in 2013.

In 2002, three years of monitoring were completed in the Homewood, Connoquenessing and Burgoon Aquifers (OU5). The monitoring results verified that contamination was not migrating from the Site toward community wells, fulfilling the remedial action requirements and meeting the RAOs.

Institutional Control (IC) Review

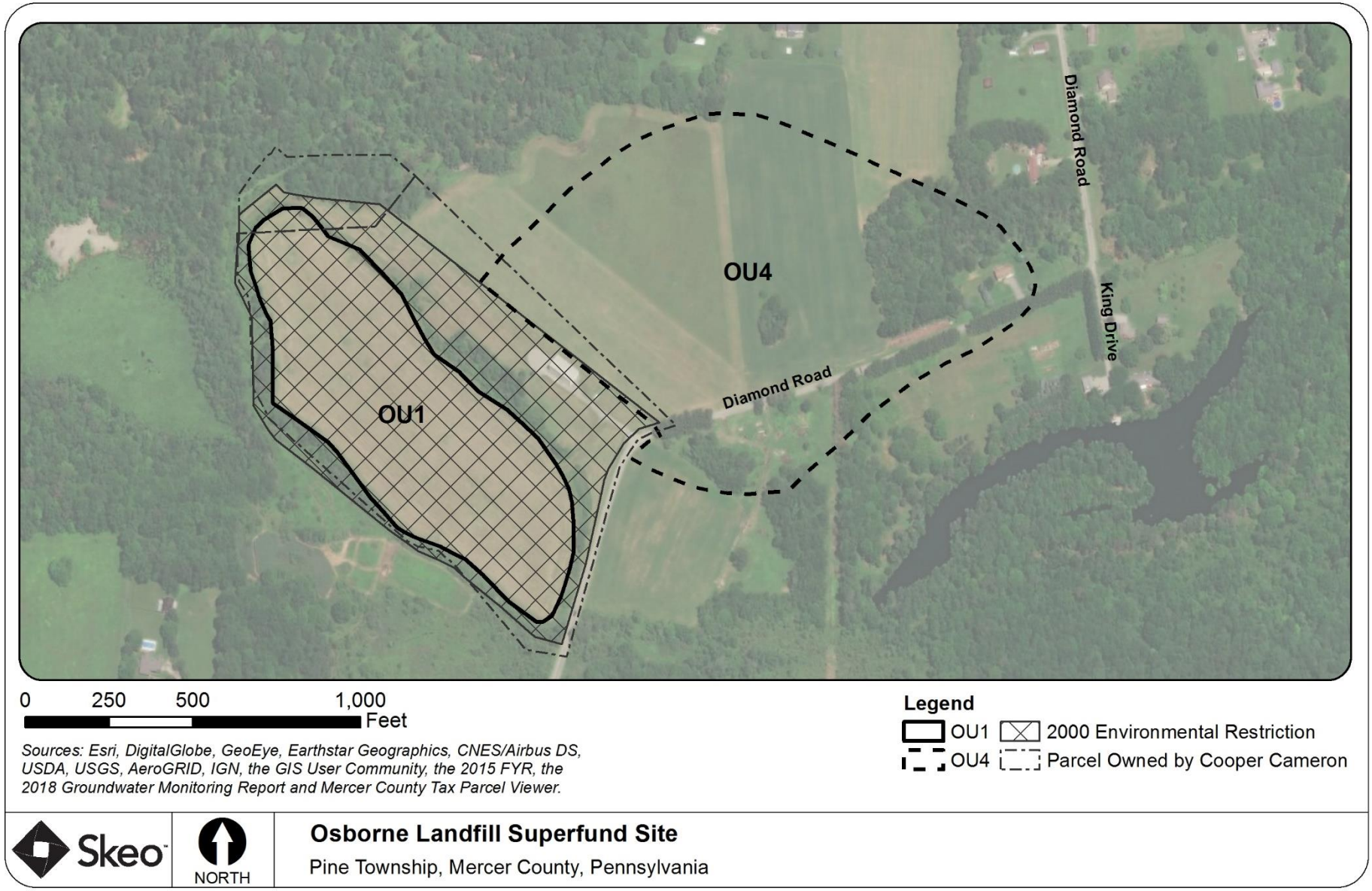
The 1990 ROD required institutional controls for OU1 and OU4. In the 1998 ESD, EPA revised and clarified the institutional controls. The 1998 ESD indicated that a deed restriction and groundwater use restrictions are required on the OU1 parcel only and that groundwater use restrictions are not necessary for OU4 since contamination is confined to the OU1 area. Only one residential well that was not abandoned, RW-3, was above the cleanup level for vinyl chloride in 2015 when it was last sampled. The residence is connected to public water (Table 4, Figure 3).

The OU1 institutional control consists of a deed restriction that protects the integrity of the cap and ancillary aspects such as drainage features. Areas outside the capped area but inside the fenced area may be used after all performance standards are met. The deed restriction also prohibits groundwater use on the OU1 parcel.

Table 4: 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)
Capped landfill	Yes	Yes	OU1	Restrict the use of 12-acre landfill property and prohibit excavation activities	Deed Restriction, March 2000
Groundwater	Yes	Yes	OU1	Restrict the use of groundwater under the 12-acre cap	Deed Restriction, March 2000
	No	No	OU4	Prohibit well use if residence is within 150 feet of public water	Pine Township Ordinance No 5 1982 Rules and Regulations Governing the Furnishing of Water Services

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)

The PRP contractor performs O&M on the Site in accordance with the EPA-approved 2019 O&M Plan. Landfill cap inspections are performed semiannually to correspond with groundwater monitoring events. The landfill cap is mowed monthly from May to October and the perimeter fence is sprayed with weed control agent quarterly. The landfill cap, slopes and vegetation, access road, drainage structures, perimeter fencing, signage and monitoring wells were inspected during the semiannual and annual groundwater monitoring events. The cap appeared to be in good condition and no major deficiencies were noted. The 2019 Annual Progress Report described minor deficiencies such as animal burrows and low spots, and indicated that they would be corrected in July 2020.

The PRP contractor updated the Site's Uniform Federal Policy Quality Assurance Project Plan (QAPP) in 2018. EPA reviewed and approved the Site-Specific QAPP on March 14, 2019.

The PRP requested and EPA approved 38 wells for abandonment during this FYR period, 12 of these wells have been abandoned, to date. These wells are no longer necessary to determine the protectiveness of the Site or were used as extraction wells for OU1. EPA requested additional sampling be conducted for Per- and Polyfluoroalkyl Substances (PFAS) (see Question B for additional details). Well abandonment will continue after PFAS sampling is complete.

III. PROGRESS SINCE THE PREVIOUS REVIEW

This section includes the protectiveness determinations and statements from the previous FYR as well as the recommendations from the previous FYR and the status of those recommendations.

Table 5: Protectiveness Determinations/Statements from the 2015 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The solid waste fill material remedy currently protects human health and the environment. Performance standards for the landfill leachate collection and treatment system have been met, the landfill cap and slurry wall is functioning as intended. Continued ground water monitoring verifies integrity of the remedy is being maintained and Institutional Controls (ICs) in place for OU1 include all necessary ICs for the entire Site. ICs prevent disturbance of the cap and requires all property owners in the vicinity of the Site to connect to the public water system.
2	Protective	The wetland currently protects human health and the environment. The 1997 ROD determined the southwest wetland were not impacted by Site contaminants.
4	Protective	The remedy for the Clarion Formation currently protects human health and the environment because performance standards in the Clarion Aquifer have been met and analytical results indicate the performance standards have been achieved for all but two mine void wells and one residential well. Vapor intrusion was ruled out as a concern for the Site given the current conditions.
5	Protective	The remedy for groundwater in the Homewood, Connoquenessing and Burgoon Aquifers (OU5) is protective because groundwater monitoring, completed in 2002, determined Site related contamination was not migrating to these aquifers.
Sitewide	Protective	The remedy at the Site is protective of human health and the environment.

There were no issues and recommendations in the previous FYR.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Community Involvement and Site Interviews

A public notice was made available by a newspaper posting in the Allied News on March 25, 2020 (Appendix C). It stated that the FYR was underway and invited the public to submit any comments to EPA. The results of the review and the report will be made available at the Site's information repository, Grove City Library, located at 125 West Main Street, Grove City, Pennsylvania.

During the FYR process, EPA interviewed a resident who owns a portion of the Site and a Pine Township supervisor. No concerns related to remedy protectiveness were raised. The resident appreciates the new entrance sign. He also inquired about the potential to reuse the former water treatment plant building, the capped landfill and the power lines that provided electrical power to the extraction wells located on their property. The resident expressed some concern on the impact on property values in the area around the Site. EPA also spoke with one of the Pine Township supervisors. There were no issues or community concerns related to the site. The township supervisor emphasized that the site has been inactive for several years. The township is aware of the site and would like to receive periodic updates as required. The interview forms are provided in Appendix D.

Data Review

The PRP contractor collected groundwater samples semiannually and annually from OUs 1 and 4 during this FYR period. Samples are analyzed for Target Compound List volatile organic compounds (VOCs). Metals are not currently monitored in accordance with the current Sampling and Analysis plans, however, in November 2019 metals were analyzed in the groundwater monitoring wells including those scheduled for abandonment.

The monitoring program for OU1 and OU4 is conducted in accordance with the Groundwater Monitoring Well Sampling Schedule identified in the 2019 O&M Plan Groundwater Sampling Plan and consists of the following:

- OU1
    - Annual sampling event: Clarion Aquifer Performance wells C-1 through C-6 and Homewood Aquifer Performance wells H-1 through H-6.
    - Semiannual sampling event: Performance well C-2.
- OU4
    - Annual sampling event: Monitoring mine void wells MWV-1, MWV-3, MWV-4, MWV-5, MWV-6, MWV-7, MWV-8, MWV-9, MWC-2, and Clarion Aquifer monitoring wells MWC-4, MW-7, MW-8 and MW-9.
    - Semiannual sampling event: Monitoring well MWV-5.
    - Other sampling: The Groundwater Sampling Plan requires sampling of the residential well RW-3 on an annual basis if accessible. The well was last sampled in 2015. Frequent attempts have been made to contact the owner for access; attempts have been denied or unanswered.

All monitored wells are shown in Figure 2. There are no COCs above cleanup goals in OU1 performance wells. Vinyl chloride was above the cleanup goal in one OU4 well during this FYR period, however concentrations fell below the MCL in 2018 and remained below the MCL through 2019. All groundwater monitoring results for OU1 and OU4 during this FYR period are provided in Appendix G. Vinyl chloride has not been detected at a level equal to or above the MCL in samples collected at the OU1 Clarion aquifer wells since 2003.

Groundwater monitoring results show that contaminant concentrations during this FYR period were below MCLs for all COCs except vinyl chloride in one well (MWV-5).

There were no inorganic concentrations above cleanup goals in any well with the exception of total lead in OU4 well MWV-8. The PRP attributed this slight exceedance for total lead to increased turbidity in the sample. The results indicated that metals concentrations remain below cleanup goals and additional metals sampling is not currently planned.

OU1 – Solid Waste Landfill

During this FYR period, no OU1 wells had COC concentrations above cleanup goals. Vinyl chloride and cis-1,2-dichloroethylene (DCE) were regularly detected in a single well, C-2. The maximum detected concentrations for C-2 from 2015 through 2019 for cis-1,2-DCE and vinyl chloride are shown in Table 6. For both COCs, concentrations have declined during this FYR period.

Table 6: OU1 Maximum Annual Detections at C-2, 2015-2019

COC	Cleanup Goal	2015	2016	2017	2018	2019
cis-1,2-DCE	70	0.56	ND	0.61	0.44 J	0.35 J
Vinyl Chloride	2	1.9	1.4	1.9	0.86	0.37 J
Notes: All results are reported in micrograms per liter (µg/L) J = Estimated value ND = Not detected above the laboratory method detection limit						

No OU1 wells had inorganic COC concentrations above cleanups goals in the November 2019 sampling event. Arsenic was detected in five out of twelve OU1 wells with a maximum concentration of 5.5 µg/L (total arsenic, well H-4) (Appendix G). A similar concentration was observed at C-2 for total arsenic (5.1 µg/L). Both maximum concentrations are below the MCL of 10 µg/L. Total and dissolved nickel, total chromium and total lead were also detected, although well below the cleanup goals.

OU4 – Groundwater, Clarion Formation

During this FYR period, vinyl chloride and cis-1,2-DCE were detected in mine void wells MWV-3, MWV-4 and MWV-5.

MWV-5 is the only OU4 well with an exceedance during this FYR period. In 2015, 2016 and 2017, vinyl chloride slightly exceeded the cleanup goal at MWV-5, but since 2018, all detections were below the cleanup goal. The maximum annual detected concentrations of vinyl chloride and cis-1,2-DCE at MWV-5 are shown in Table 7.

Table 7: OU4 Maximum Annual Detections at MWV-5, 2015-2019

COC	Cleanup Goal	2015	2016	2017	2018	2019
cis-1,2-DCE	70	0.97	0.83	1.1	0.82	0.96
Vinyl Chloride	2	**2.7**	**2.9**	**3.1**	1.6	1.4
Notes: All results are reported in micrograms per liter (µg/L) J = Estimated value ND = Not detected above the laboratory method detection limit **Bold** = Exceeds cleanup goal						

In 2015, vinyl chloride was 2.5 micrograms per liter (µg/L) at the residential well, RW-3 and cis-1,2-dichloroethene was detected at a concentration of 0.6 ug/l. RW-3 has not been sampled since 2015 because access to the property has not been granted. This well is not used for drinking water and the residence is connected to the public water supply.

With the exception of MWV-8, no OU4 wells had inorganic COC concentrations above cleanups goals in the November 2019 sampling event. OU4 mine void well MWV-8 is scheduled for abandonment. Total lead was detected at 5.9 µg/L, slightly above the PADEP Medium Specific Concentrations (MSC) of 5 µg/L, however, dissolved lead was not detected. The PRP attributed this slight exceedance for total lead to increased turbidity in the sample.

Arsenic was detected in five out of fourteen OU4 wells with a maximum concentration of 5 µg/L (total arsenic, MWV-4) which is below the current MCL of 10 µg/L (Appendix G). Total and dissolved nickel and total chromium were also detected, although well below the cleanup goals.

Site Inspection

The site inspection took place on July 17, 2019. Participants included the EPA RPM, PADEP representative, Skeo (EPA contractor support), and the PRP and PRP contractor. The purpose of the inspection was to assess the protectiveness of the remedy. Site inspection participants participated in a pre-inspection meeting to review the status of the remedial actions and monitoring that has occurred at the Site.

Following the meeting, site inspection participants observed the fenced and gated site area, which includes the former water treatment plant building. The cap on the landfill was in good condition and had been recently mowed. Site inspection participants observed some low areas on the cap. The PRP indicated that additional fill soil will be added this summer to address these areas. The drainage swales around the cap are overgrown with shrubs and trees, although flow off the cap and through the drainage pipes was not impeded. The mitigation wetland was in good condition. Several wells were observed to be locked, marked and well maintained. The fence surrounding the capped landfill was generally in good condition, but there were several areas, especially along Diamond Road, that had significant vegetation growth against the fence.

Following the site inspection, EPA support contractor Skeo visited the site repository at the Grove City Library. The library staff were unaware of the Site and were not able to locate site documents. EPA will contact the library to re-establish the repository. The inspection checklist and the photos are included in Appendices E and F, respectively.

V. TECHNICAL ASSESSMENT

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

The remedial actions conducted across the Site continue to function as designed. The slurry wall and cap system continue to contain contamination. Performance standards for the leachate/groundwater treatment system were met in 2004. Groundwater monitoring shows that contaminant concentrations during this FYR period were below MCLs for all organic COCs except vinyl chloride in one well prior to 2018 (MWV-5) and all inorganic COCs except total lead in one well (MWV-8). As of 2018, natural attenuation has reduced organic COC concentrations below cleanup goals in all OU1 and OU4 wells. The metals sampling event indicate that metals remain below cleanup goals and the single exceedance was attributed to elevated turbidity in the sample. The PRP updated the monitoring program to reduce sampling frequency from annual to biennial for OU4 wells MWV-3, 4 and 5. All remaining wells will be monitored once every five years. EPA and PADEP approved this reduced monitoring program.

Institutional controls are in place to prevent exposure to contaminated groundwater and the landfill and to protect the integrity of the remedy. Fencing and signage are in place to prevent access to the OU1 property. The landfill cap is well maintained and functioning.

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

The decision documents did not specify RAOs, however the remedial goals used at the time of the remedy selection are still valid. Some exposure assumptions have changed, but would not negatively impact the protectiveness of the remedy because air stripper emission have ceased so this potential exposure route is no longer relevant. There is the potential at the Site for vapor intrusion of VOCs into enclosed structures. One residential well, RW-3 has concentrations of vinyl chloride above the MCL. However, based on current conditions and the 2015 vinyl chloride concentration in groundwater, vapor intrusion is not a concern. There are no other structures of concern beyond the residence associated with RW-3.

Groundwater applicable or relevant and appropriate requirements (ARARs) are MCLs or PADEP MSC. The 2004 ESD also stated that non-zero MCLGs would be achieved. With the exception of arsenic, none of the ARARs have changed. The arsenic ARAR was changed from 50 to 10 µg/L in 2006, which was anticipated in the 2004 ESD and does not impact the remedy effectiveness. Metals are not currently monitored in accordance with the current sampling and analysis plans, but metals were analyzed in groundwater monitoring wells in November 2019. Results were compared to the current ARARs including the updated ARAR for arsenic. The ROD/ESD standards would exceed the NCP target risks in combination, if every COC were present at its goal, but in reality, the measured concentrations are below the goals and below levels of risk concern. VOCs in particular have declined to trace levels.

MWC-5 was installed in the Clarion Aquifer near the resident's property line and analytical results in 2010 indicated non-detectable concentrations of vinyl chloride. Since then, the well has been dry during attempts to resample. The resident did not allow PRP representative access to the property in 2014 for well sampling, but allowed the PRP to sample the unused residential well (RW-3) on March 23, 2015. The RW-3 concentration of vinyl chloride was 2.5 µg/L. This was the last sampling event at RW-3. The PRP is working on gaining access from the property owner to abandon the non-potable well.

Waste acids (approximately 32,500 gallons) from plating and cleaning tanks was deposited at the Site when the landfill was operating. Due to these disposal activities, EPA requested that Cameron sample for PFAS at select wells on Site. Cameron prepared a Sampling and Analysis Plan and Quality Assurance Project Plan dated February 5, 2020. EPA has approved both plans. Sampling will be implemented during the next FYR period.

A full evaluation of information used in support of answering Question B is provided in Appendix I.

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

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the FYR:
OUs 2 and 5
Issues and Recommendations Identified in the FYR:

OU(s): 1, 4	**Issue Category: Monitoring**

	Issue: Waste acids (approximately 32,500 gallons) from plating and cleaning tanks was deposited at the Site. Due to these disposal activities, EPA requested the PRP sample for PFAS at select wells on Site.			
	Recommendation: Complete groundwater sampling and analysis for PFAS according to EPA approved workplan.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	6/30/2021

OTHER FINDINGS

Several additional recommendations were identified during the FYR. These recommendations do not affect current and/or future protectiveness.

- Update the site information repository.
- During the site inspection, excessive vegetation and large trees were resting on the fence along Diamond Road. The PRP should consider removing vegetation to maintain the integrity of the fence.
- The unused residential well RW-3 has not been sampled since 2015. Vinyl chloride concentrations have historically been slightly above the MCL at this well. If possible, resample this well to confirm whether concentrations have met the RAOs. This residence has also been of interest for vapor intrusion. If access is obtained, EPA may attempt to confirm the indications from screening models that vapor intrusion is not of concern.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
Operable Unit: 1	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The solid waste fill material (OU1) remedy currently protects human health and the environment. Performance standards for the landfill leachate collection and treatment system have been met and the landfill cap and slurry wall are functioning as intended. Institutional controls are in place and continued groundwater monitoring verifies that integrity of the remedy is being maintained. In order for the remedy to be protective in the long term, the PRP should complete groundwater sampling and analysis for PFAS according to EPA approved workplan.	

Protectiveness Statement(s)	
Operable Unit: 2	*Protectiveness Determination:* Protective
Protectiveness Statement: The wetland (OU2) remedy protects human health and the environment. The 1997 ROD determined the southwest wetlands were not impacted by site contaminants and no remedial action was required.	

Protectiveness Statement(s)

Operable Unit:	*Protectiveness Determination:*
4	Short-term Protective

Protectiveness Statement:
The remedy for the Clarion Aquifer (OU4) currently protects human health and the environment because analytical results indicate the performance standards have been achieved for monitoring wells. In order for the remedy to be protective in the long term, the PRP should complete groundwater sampling and analysis for PFAS according to EPA approved workplan.

Protectiveness Statement(s)

Operable Unit:	*Protectiveness Determination:*
5	Protective

Protectiveness Statement:
The remedy for groundwater in the Homewood, Connoquenessing and Burgoon Aquifers (OU5) is protective because groundwater monitoring, completed in 2002, determined site-related contamination was not migrating to these aquifers.

Sitewide Protectiveness Statement

Protectiveness Determination:
Short-term Protective

Protectiveness Statement:
The site remedy currently protects human health and the environment. The landfill cap and slurry wall are functioning as intended. Performance standards for the landfill leachate collection and treatment system have been met. Groundwater monitoring indicates that performance standards have largely been met. Institutional controls are in place to prevent use of impacted groundwater and protect the integrity of the remedy. In order for the remedy to be protective in the long term, the PRP should complete groundwater sampling and analysis for PFAS according to EPA approved workplan.

VIII. NEXT REVIEW

The next FYR Report for Osborne Landfill Superfund site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

2015 Annual Groundwater Monitoring Report, Operable Unit 1 and Operable Unit 4, Osborne Landfill Superfund Site, Pine Township, Mercer County, Pennsylvania. Prepared by: Civil & Environmental Consultants, Inc. January 11, 2016.

2016 Annual Groundwater Monitoring Report, Osborne Landfill Superfund Site. Prepared by Bureau Veritas North America, Inc. February 16, 2017.

2017 Annual Groundwater Monitoring Report, Osborne Landfill Superfund Site. Prepared by Bureau Veritas North America, Inc. February 16, 2018.

2018 Annual Groundwater Monitoring Report, Osborne Landfill Superfund Site. Prepared by CH2M Hill Engineers, Inc. March 27, 2019.

2019 Biennial and Once-Every-Five-Year Groundwater Monitoring Data for Osborne Landfill Superfund Site, Grove City, Pennsylvania. Prepared by Cameron. February 3, 2020.

Explanation of Significant Differences: Osborne Landfill OU1. U.S. Environmental Protection Agency Region 3. August 24, 1998.

Explanation of Significant Differences: Osborne Landfill OU2. U.S. Environmental Protection Agency Region 3. August 24, 1998.

Explanation of Significant Differences: Osborne Landfill OU1. U.S. Environmental Protection Agency Region 3. June 29, 2004.

Fourth Five-Year Review Report for Osborne Landfill Superfund Site, Mercer County, Pennsylvania. U.S. Environmental Protection Agency Region 3. September 28, 2015.

Groundwater Sampling Plan Operable Unit 1 and Operable Unit 4. Osborne Landfill Superfund Site, Pine Township, Mercer County, Pennsylvania. Prepared for Cameron by Civil & Environmental Consultants, Inc. February 17, 2014.

Leachate Treatment System Decommissioning, Osborne Landfill. Prepared by Prepared by Bureau Veritas North America, Inc. March 8, 2018.

Optimization Project Final Report. Osborne Landfill Superfund Site. Operable Unit 2, Grove City, Pennsylvania. Prepared for Cameron by Civil & Environmental Consultants, Inc. February 27, 2013.

Record of Decision: Osborne Landfill OU1. U.S. Environmental Protection Agency Region 3. September 28, 1990.

Record of Decision: Osborne Landfill OU2. U.S. Environmental Protection Agency Region 3. December 30, 1997.

Second Five-Year Review Report Osborne Landfill Superfund Site. Pine Township, Mercer County, Pennsylvania. U.S. Environmental Protection Agency Region 3. September 8, 2005.

Site-Specific Plan for Annual and Semiannual Well Monitoring, Osborne Landfill Superfund Site, Pine Township, Mercer County, Pennsylvania. Prepared by CH2M Engineers, Inc. July 2018.

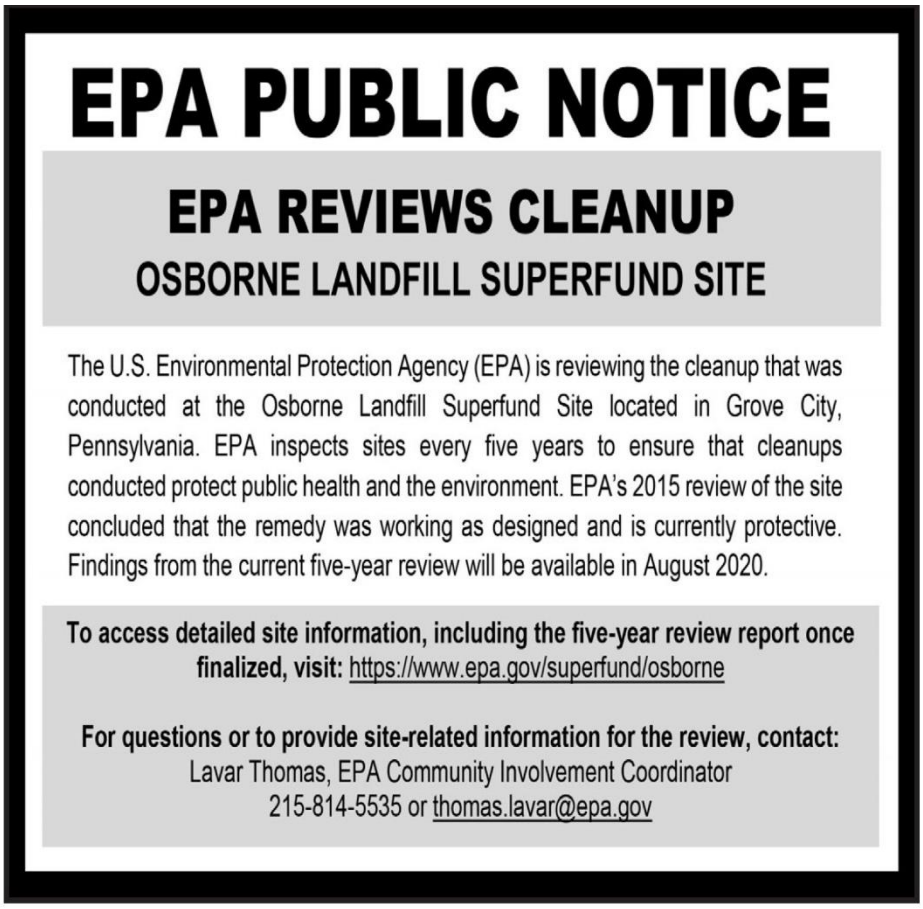
Third Five-Year Review Report Osborne Landfill Superfund Site. Pine Township, Mercer County, Pennsylvania. U.S. Environmental Protection Agency Region 3. September 8, 2010.

APPENDIX B – SITE CHRONOLOGY

Table B-1: Site Chronology

Event	Date
PADEP ordered the property owner to close the site landfill for not having a permit to accept wastes	April 7, 1978
EPA began assessing site conditions	Early 1980s
Cameron voluntarily installed a security fence around the Site and removed and disposed of 83 filled drums, 460 empty drums and 45 cubic yards of soil	1983
EPA listed the Site on the NPL	September 8, 1983
Cameron conducted an RI under a Consent Order and Agreement with PADEP, but did not comply with all required conditions	September 23, 1983, to about June 1984
EPA took over and completed site investigations	October 22, 1987
EPA completed the Site's RI/FS and remedial action reports	August 1989
EPA issued 1990 ROD for OU1, OU3 and OU4	September 28, 1990
EPA issued a Unilateral Administrative Order to Cameron to perform the remedial design/remedial action for the 1990 ROD	March 29, 1991
EPA entered into an Administrative Order on Consent with Cameron to conduct a focused RI, FS and remedial action for the 1997 ROD	October 9, 1992
Cameron extended a public water line to residents near the Site	1994
On-site construction began for landfill cap	August 5, 1995
Cameron began operating the leachate system	1996
EPA issued ROD to address all site groundwater and wetlands	December 30, 1997
EPA's first ESD modified the measurement of the inward hydraulic gradient and some institutional controls EPA's second ESD modified several groundwater monitoring well locations	August 24, 1998
EPA signed the Site's Preliminary Closeout Report	September 21, 1998
Cameron began sampling for monitored natural attenuation (1997 ROD)	Spring 1999
EPA completed the Site's first FYR	July 28, 2000
Cameron shut down the groundwater treatment system in accordance with an extraction well rebound test approved by EPA	February 2004
EPA's third ESD modified cleanup standards for the OU1 and OU4 groundwater portion of the selected remedy	June 29, 2004
Cameron completed rebound testing	September 2005
EPA completed the Site's second FYR	September 8, 2005
Cameron submitted an optimization project plan	June 30, 2009
Cameron revised the optimization project plan in accordance with EPA comments	September 2009
Cameron submitted an optimization project plan memorandum to present preliminary activity results and proposed modifications	January 4, 2010
Cameron initiated the optimization project plan	March 25, 2010
Cameron drilled a new well in the Clarion Aquifer and sampled to assess vapor intrusion	April 2010
EPA completed the Site's third FYR	September 8, 2010
Cameron completed the optimization project	February 1, 2012
EPA complete the Site's fourth FYR	August 28, 2015
Schlumberger Holdings Corporation merged with Cameron International Corporation	April 2016

APPENDIX C – PRESS NOTICE



EPA PUBLIC NOTICE

EPA REVIEWS CLEANUP

OSBORNE LANDFILL SUPERFUND SITE

The U.S. Environmental Protection Agency (EPA) is reviewing the cleanup that was conducted at the Osborne Landfill Superfund Site located in Grove City, Pennsylvania. EPA inspects sites every five years to ensure that cleanups conducted protect public health and the environment. EPA's 2015 review of the site concluded that the remedy was working as designed and is currently protective. Findings from the current five-year review will be available in August 2020.

To access detailed site information, including the five-year review report once finalized, visit: https://www.epa.gov/superfund/osborne

For questions or to provide site-related information for the review, contact:
Lavar Thomas, EPA Community Involvement Coordinator
215-814-5535 or thomas.lavar@epa.gov

APPENDIX D – INTERVIEW FORMS

Osborne Landfill SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Osborne Landfill	
EPA ID: PAD980712673	
Interviewer name: Nick Tymchenko	**Interviewer affiliation: EPA**
Subject name: Resident	**Subject affiliation:**
Subject contact information:	
Interview date: 7-17-2019	**Interview time: 11:30 A.M.**
Interview location: Site	
Interview format (circle one): In Person Phone Mail Email Other:	
Interview category: Resident	

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?
   Yes, the resident is aware of what has been published about the Site but did not grow up here. Family grew up here and have some history with the Site.

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?
   Resident appreciates the new sign on the front gate and feels the new contractor is doing a better job of keeping them informed. Resident inquired about reuse of the former water treatment plant, the capped landfill and the power to the injection/extraction wells located on their property.

3. What have been the effects of this Site on the surrounding community, if any?
   Resident expressed some concerns and questions about the impact on the property values in the area around the Site and whether every property sold would be made aware of the Site. Resident asked some questions about the access agreement he has with the PRP and contractor.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?
   No.

5. Has EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can EPA best provide site-related information in the future?
   To the resident's knowledge, there has been no ongoing conversation with EPA. Emails or some communication through the township could help but not sure the best way for EPA to provide information in the future. Resident prefers calls instead of email.

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used?
   No drinking water well on property located adjacent to the Site, other property in the area uses spring water.

7. Do you have any comments, suggestions or recommendations regarding any aspects of the project?
   Resident would appreciate open communication.

Osborne Landfill SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Osborne Landfill	
EPA ID: PAD980712673	
Interviewer name: Lavar Thomas	**Interviewer affiliation: EPA**
Subject name: Jeanine Thompson	**Subject affiliation: Pine Township Supervisor**
Subject contact information: 724-458-7229 (Township office)	
Interview date: 4-27-2020	**Interview time: 11:30 A.M.**
Interview location:	
Interview format (circle one): In Person **Phone** Mail Email Other:	
Interview category: Local Government	

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?
   Aware of the site for many years. There has been no site activity. The site has been closed for 10 or more years.

2. 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.
   There have been no site communications in the past five years.

3. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?
   There is a fence surrounding the site and has not heard of any problems with unusual activities.

4. Do you feel well informed about activities and progress at the Site?
   Yea, occasionally there are updates in the paper about the site.

5. Do you have any comments, suggestions or recommendations regarding the project?
   No questions

APPENDIX E – SITE INSPECTION CHECKLIST

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Osborne Landfill	**Date of Inspection:** July 17, 2019
Location and Region: Grove City, PA 3	**EPA ID: PAD980712673**
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature:** Cloudy, 75 degrees Fahrenheit

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other: _____
- ☒ Monitored natural attenuation
- ☒ Groundwater containment
- ☒ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

1. **O&M Site Manager** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____
   Problems, suggestions ☐ Report attached: _____

2. **O&M Staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____
   Problems/suggestions ☐ Report attached: _____

3. **Local Regulatory Authorities and Response Agencies** (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices). Fill in all that apply.

   Agency _____
   Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency _____
   Contact _____Name _____ (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached:_____

   Agency _____
   Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached:_____

   Agency _____
   Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency _____
   Contact _____ _____ _____ _____

	Name	Title	Date	Phone No.	
	Problems/suggestions ☐ Report attached:_____				
4.	**Other Interviews** (optional) ☐ Report attached: _____				
Resident					
	III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)				
1.	**O&M Documents**				
	☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A	
	☒ As-built drawings	☐ Readily available	☐ Up to date	☐ N/A	
	☒ Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A	
	Remarks: _____				
2.	**Site-Specific Health and Safety Plan**	☒ Readily available	☒ Up to date	☐ N/A	
	☒ Contingency plan/emergency response plan	☒ Readily available	☒ Up to date	☐ N/A	
	Remarks: _____				
3.	**O&M and OSHA Training Records**	☒ Readily available	☒ Up to date	☐ N/A	
	Remarks: _____				
4.	**Permits and Service Agreements**				
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A	
	☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A	
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A	
	☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks: _____				
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks: _____				
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks: _____				
7.	**Groundwater Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A	
	Remarks: _____				
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks: _____				
9.	**Discharge Compliance Records**				
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A	
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks: _____				
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A	

Remarks: _____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for state

☐ PRP in-house ☒ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☐ _____

2. **O&M Cost Records**

☒ Readily available ☒ Up to date

☐ Funding mechanism/agreement in place ☐ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs during Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks: _____

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: Signs present along fence and at entrance gate.

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive by): Self-reporting

Frequency: Semi-annual

Responsible party/agency: PRP

Contact _____ _____ _____ _____

Name Title Date Phone no.

Reporting is up to date ☐ Yes ☐ No ☒ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks: _____

D. General

1. **Vandalism/Trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks: _____

2. **Land Use Changes On Site** ☒ N/A

Remarks: _____

3. **Land Use Changes Off Site** ☒ N/A

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads Damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (low spots) ☐ Location shown on site map ☒ Settlement not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident

Lengths: _____ Widths: _____ Depths: _____

Remarks: _____

3.	**Erosion**	☐ Location shown on site map	☒ Erosion not evident
	Area extent: _____		Depth: _____
	Remarks: _____		
4.	**Holes**	☐ Location shown on site map	☒ Holes not evident
	Area extent: _____		Depth: _____
	Remarks: _____		
5.	**Vegetative Cover**	☒ Grass	☒ Cover properly established
	☐ No signs of stress	☐ Trees/shrubs (indicate size and locations on a diagram)	
	Remarks: _____		
6.	**Alternative Cover** (e.g., armored rock, concrete)		☒ N/A
	Remarks: _____		
7.	**Bulges**	☐ Location shown on site map	☒ Bulges not evident
	Area extent: _____		Height: _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☒ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Area extent: _____
	☐ Ponding	☐ Location shown on site map	Area extent: _____
	☐ Seeps	☐ Location shown on site map	Area extent: _____
	☐ Soft subgrade	☐ Location shown on site map	Area extent: _____
	Remarks: Very minor puddles located in grass on cap and along road adjacent to the cap due to a rain event immediately prior to the inspection. PRP indicated some areas collect water on the cap and along the road adjacent to the cap and they will be filled with soil this summer.		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☒ No evidence of slope instability		
	Area extent: _____		
	Remarks: _____		
B. Benches		☐ Applicable	☒ 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**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
2.	**Bench Breached**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
3.	**Bench Overtopped**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
C. Letdown Channels		☐ Applicable	☒ 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) ☐ Location shown on site map ☐ No evidence of settlement
   Area extent: _____ Depth: _____
   Remarks: _____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
   Material type:_____ Area extent: _____
   Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
   Area extent: _____ Depth: _____
   Remarks: _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
   Area extent: _____ Depth: _____
   Remarks: _____

5. **Obstructions** Type: _____ ☐ No obstructions
   ☐ Location shown on site map Area extent: _____
   Size: _____
   Remarks: _____

6. **Excessive Vegetative Growth** Type: _____
   ☐ No evidence of excessive growth
   ☐ Vegetation in channels does not obstruct flow
   ☐ Location shown on site map Area extent: _____
   Remarks: _____

D. Cover Penetrations ☒ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A
   Remarks: _____

2. **Gas Monitoring Probes**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A
   Remarks: _____

3. **Monitoring Wells** (within surface area of landfill)
   ☒ Properly secured/locked ☐ Functioning ☒ Routinely sampled ☒ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A
   Remarks: _____

4. **Extraction Wells Leachate**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks: Inactive, extraction stopped in 2004.

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A

Remarks: _____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs maintenance

Remarks: _____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs maintenance ☐ N/A

Remarks: _____

F. Cover Drainage Layer ☒ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☒ Functioning ☐ N/A

Remarks: _____

2. **Outlet Rock Inspected** ☒ Functioning ☐ N/A

Remarks: _____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Area extent: _____ Depth: _____ ☐ N/A

☐ Siltation not evident

Remarks: _____

2. **Erosion** Area extent: _____ Depth: _____

☐ Erosion not evident

Remarks: _____

3. **Outlet Works** ☐ Functioning ☐ N/A

Remarks: _____

4. **Dam** ☐ Functioning ☐ N/A

Remarks: _____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement: _____ Vertical displacement: _____

Rotational displacement: _____

Remarks: _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks: _____

I. Perimeter Ditches/Off-Site Discharge ☒ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☒ Siltation not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A

☒ Vegetation does not impede flow

Area extent: Entire length of perimeter ditches Type: Shrubs, small trees

Remarks: Some clearing of the larger trees may be needed to prevent future impedence of drainage.

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Area extent: _____ Depth: _____

Remarks: _____

4. **Discharge Structure** ☐ Functioning ☒ N/A

Remarks: _____

VIII. VERTICAL BARRIER WALLS ☒ Applicable ☐ N/A

1. **Settlement** ☐ Location shown on site map ☒ Settlement not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Performance Monitoring** Type of monitoring: Groundwater monitoring

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing and Electrical**

☐ Good condition ☐ All required wells properly operating ☐ Needs maintenance ☐ N/A

Remarks: _____

2. **Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

B. Surface Water Collection Structures, Pumps and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps and Electrical**

☐ Good condition ☐ Needs maintenance

Remarks: _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

☐ Additive (e.g., chelation agent, flocculent): _____

☐ Others: _____

☐ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually: _____

☐ Quantity of surface water treated annually: _____

Remarks: _____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs maintenance

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks: _____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☒ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☒ Properly secured/locked ☒ Functioning ☐ Routinely sampled ☒ Good condition

☐ All required wells located ☐ Needs maintenance ☐ 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.

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).

The remedy is designed to contain waste present on site and to reduce concentrations of contamination in groundwater. The remedy is functioning as designed.

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.

O&M activities appear to be adequate, no issues affecting protectiveness were noted.

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.

No issues observed.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

PRP requested a reduction in monitoring activities at the Site. EPA and PADEP approved the monitoring program at the request of the PRP.

APPENDIX F – SITE INSPECTION PHOTOS

Entrance gate and signage

Former groundwater treatment plant building

Capped landfill, looking south

Mitigation wetland located southwest of the capped landfill

Drainage swale with monitoring well cluster in background

Well MWV-5, located on neighboring property

Agricultural field located east of the capped landfill, south of Diamond Road

Fence along Diamond Road with excess vegetation along southeast border

APPENDIX G – GROUNDWATER DATA TABLES 2014-2019[6]

Appendix D. Historical Groundwater Detection Data Summary Table
(2014 – 2018)
2018 Annual Groundwater Monitoring Report
Osborne Landfill Superfund Site, Grove City, Pennsylvania

			Well ID	C1	C1	C1	C1	C1	C2	C2	C2	C2
			Sample ID	GW-C1-11102014	GW-C1-11112015	GW-C1-11152016	GW-PWC-1-11272017	GW-C1-11272018	GW-C2-06132014	GW-C2-11102014	GW-C2-06052015	GW-C2-11112015
			Operable Unit	OU1	OU1	OU1	OU1	OU1	OU1	OU1	OU1	OU1
			Date Collected	11/10/2014	11/11/2015	11/15/2016	11/27/2017	11/27/2018	6/13/2014	11/10/2014	6/5/2015	11/11/2015
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**	Source area	Source area	Source area	Source area	Source area	Source area	Source area	Source area	Source area
1,1-Dichloroethane	75-34-3		31	< 0.5	< 0.5	< 0.50	< 0.50	**0.18 J**	< 0.5	< 0.5	< 0.5	< 0.5
Benzene	71-43-2	5	5	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.5	< 0.5
Bromomethane	74-83-9		10	< 1	< 1	< 0.50	< 0.50	< 0.14	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	156-59-2	70	70	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14	**0.63**	**0.72**	**0.46**	**0.56**
Toluene	108-88-3	1000	1000	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	79-01-6	5	5	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.5	< 0.5
Vinyl Chloride	75-01-4	2	2	< 0.5	< 0.5	< 0.50	< 0.50	< 0.25	**1.3**	**2.2**	< 0.5	**1.9**
Xylenes, Total	1330-20-7	10000	10000	< 0.5	< 0.5	--	< 0.50	< 0.32	< 0.5	< 0.5	< 0.5	< 0.5

			Well ID	C2	C2	C2	C2	C2	C2	C3	C3	C3
			Sample ID	GW-C2-06302016	GW-C2-11152016	GW-C2-06282017	GW-PWC-2-11272017	GW-C2-060718	GW-C2-11272018	GW-C3-11102014	GW-C3-11102015	GW-C3-11152016
			Operable Unit	OU1	OU1	OU1	OU1	OU1	OU1	OU1	OU1	OU1
			Date Collected	6/30/2016	11/15/2016	6/28/2017	11/27/2017	6/7/2018	11/27/2018	11/10/2014	11/10/2015	11/16/2016
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**	Source area	Source area	Source area	Source area	Source area	Source area	Source area	Source area	Source area
1,1-Dichloroethane	75-34-3		31	< 0.50	< 0.50	< 0.50	< 0.50	< 0.14	< 0.14	< 0.5	< 0.5	< 0.50
Benzene	71-43-2	5	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.11	< 0.11	< 0.5	< 0.5	< 0.50
Bromomethane	74-83-9		10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.14	< 0.14	< 1	< 1	< 0.50
cis-1,2-Dichloroethene	156-59-2	70	70	< 0.50	< 0.50	< 0.50	**0.61**	**0.37 J**	**0.44 J**	< 0.5	< 0.5	< 0.50
Toluene	108-88-3	1000	1000	< 0.50	< 0.50	< 0.50	< 0.50	< 0.11	< 0.11	< 0.5	< 0.5	< 0.50
Trichloroethylene	79-01-6	5	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.11	**0.17 J**	< 0.5	< 0.5	< 0.50
Vinyl Chloride	75-01-4	2	2	< 0.50	**1.4**	**0.55**	**1.9**	**0.35 J**	**0.86**	< 0.5	< 0.5	< 0.50
Xylenes, Total	1330-20-7	10000	10000	--	--	--	< 0.50	< 0.32	< 0.32	< 0.5	< 0.5	--

			Well ID	C3	C3	C4	C4	C4	C4	C4	C5	C5
			Sample ID	GW-PWC-3-11272017	GW-C3-11202018	GW-C4-11102014	GW-C4-11102015	GW-C4-11152016	GW-PWC-4-11282017	GW-C4-11202018	GW-C5-11102014	GW-C5-11102015
			Operable Unit	OU1	OU1	OU1	OU1	OU1	OU1	OU1	OU1	OU1
			Date Collected	11/27/2017	11/20/2018	11/10/2014	11/10/2015	11/16/2016	11/28/2017	11/20/2018	11/10/2014	11/10/2015
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**	Source area	Source area	Source area	Source area	Source area	Source area	Source area	Source area	Source area
1,1-Dichloroethane	75-34-3		31	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5
Benzene	71-43-2	5	5	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5
Bromomethane	74-83-9		10	< 0.50	< 0.14 *	< 1	< 1	< 0.50	< 0.50	< 0.14 *	< 1	< 1
cis-1,2-Dichloroethene	156-59-2	70	70	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5
Toluene	108-88-3	1000	1000	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5
Trichloroethylene	79-01-6	5	5	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5
Vinyl Chloride	75-01-4	2	2	< 0.50	< 0.25	< 0.5	< 0.5	< 0.50	< 0.50	< 0.25	< 0.5	< 0.5
Xylenes, Total	1330-20-7	10000	10000	< 0.50	< 0.32	< 0.5	< 0.5	--	< 0.50	< 0.32	< 0.5	< 0.5

[6] 2014 to 2018 Data Source: 2018 Annual Groundwater Monitoring Report
June 2019 Data Source: 2019 Semiannual Groundwater Monitoring Data
November 2019 Data Source: 2019 Biennial and Once-Every-Five-Year Groundwater Monitoring Data

Appendix D. Historical Groundwater Detection Data Summary Table
(2014 – 2018)
2018 Annual Groundwater Monitoring Report
Osborne Landfill Superfund Site, Grove City, Pennsylvania

			Well ID	MW-7	MW-7	MW-7	MW-7	MW-8	MW-8	MW-8	MW-8	MW-8
			Sample ID	GW-MW-7-11122015	GW-MW-7-11162016	GW-MW-7-11282017	GW-MW7-11292018	GW-MW-8-11112014	GW-MW-8-11122015	GW-MW-8-11162016	GW-MW-8-11282017	GW-MW8-11292018
			Operable Unit	OU4	OU4	OU4	OU4	OU4	OU4	OU4	OU4	OU4
			Date Collected	11/12/2015	11/16/2016	11/28/2017	11/29/2018	11/11/2014	11/12/2015	11/16/2016	11/28/2017	11/29/2018
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient
1,1-Dichloroethane	75-34-3		31	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14
Benzene	71-43-2	5	5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11
Bromomethane	74-83-9		10	< 1	< 0.50	< 0.50	< 0.14	< 1	< 1	< 0.50	< 0.50	< 0.14
cis-1,2-Dichloroethene	156-59-2	70	70	< 0.5	< 0.50	< 0.50	**0.14 J**	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14
Toluene	108-88-3	1000	1000	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11
Trichloroethylene	79-01-6	5	5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11
Vinyl Chloride	75-01-4	2	2	< 0.5	< 0.50	< 0.50	< 0.25	< 0.5	< 0.5	< 0.50	< 0.50	< 0.25
Xylenes, Total	1330-20-7	10000	10000	< 0.5	--	< 0.50	< 0.32	< 0.5	< 0.5	--	< 0.50	< 0.32

			Well ID	MW-9	MW-9	MWC-2	MWC-2	MWC-2	MWC-2	MWV-1	MWV-1	MWV-1
			Sample ID	GW-MW-9-11162016	GW-MW-9-11282017	GW-MWC-2-11112014	GW-MWC-2-11172016	GW-MWC-2-11292017	GW-MWC2-11282018	GW-MWV-1-11112014	GW-MWV-1-11112015	GW-MWV-1-11172016
			Operable Unit	OU4	OU4	OU4	OU4	OU4	OU4	OU4	OU4	OU4
			Date Collected	11/17/2016	11/28/2017	11/11/2014	11/17/2016	11/29/2017	11/28/2018	11/11/2014	11/11/2015	11/17/2016
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient
1,1-Dichloroethane	75-34-3		31	< 0.50	< 0.50	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50
Benzene	71-43-2	5	5	< 0.50	< 0.50	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50
Bromomethane	74-83-9		10	< 0.50	< 0.50	< 1	< 0.50	< 0.50	< 0.14	< 1	< 1	< 0.50
cis-1,2-Dichloroethene	156-59-2	70	70	< 0.50	< 0.50	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50
Toluene	108-88-3	1000	1000	< 0.50	< 0.50	**0.24 J**	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50
Trichloroethylene	79-01-6	5	5	< 0.50	< 0.50	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50
Vinyl Chloride	75-01-4	2	2	< 0.50	< 0.50	< 0.5	< 0.50	< 0.50	< 0.25	< 0.5	< 0.5	< 0.50
Xylenes, Total	1330-20-7	10000	10000	--	< 0.50	< 0.5	--	< 0.50	< 0.32	< 0.5	< 0.5	--

			Well ID	MWV-1	MWV-1	MWV-3	MWV-3	MWV-3	MWV-3	MWV-3	MWV-6	MWV-6
			Sample ID	GW-MWV-1-11292017	GW-MWV1-11282018	GW-MWV-3-11112014	GW-MWV-3-11112015	GW-MWV-3-11182016	GW-MWV-3-11292017	GW-MWV3-11282018	GW-MWV-6-11112014	GW-MWV-6-11122015
			Operable Unit	OU4	OU4	OU4	OU4	OU4	OU4	OU4	OU4	OU4
			Date Collected	11/29/2017	11/28/2018	11/11/2014	11/11/2015	11/18/2016	11/29/2017	11/28/2018	11/11/2014	11/12/2015
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient
1,1-Dichloroethane	75-34-3		31	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5
Benzene	71-43-2	5	5	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5
Bromomethane	74-83-9		10	< 0.50	< 0.14	< 1	< 1	< 0.50	< 0.50	< 0.14	< 1	< 1
cis-1,2-Dichloroethene	156-59-2	70	70	< 0.50	< 0.14	< 0.5	**0.46 J**	< 0.50	< 0.50	**0.22 J**	< 0.5	< 0.5
Toluene	108-88-3	1000	1000	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5
Trichloroethylene	79-01-6	5	5	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5
Vinyl Chloride	75-01-4	2	2	< 0.50	< 0.25	< 0.5	**1.1**	**0.57**	< 0.50	**0.39 J**	< 0.5	< 0.5
Xylenes, Total	1330-20-7	10000	10000	< 0.50	< 0.32	< 0.5	< 0.5	--	< 0.50	< 0.32	< 0.5	< 0.5

Appendix D. Historical Groundwater Detection Data Summary Table
(2014 – 2018)
2018 Annual Groundwater Monitoring Report
Osborne Landfill Superfund Site, Grove City, Pennsylvania

			Well ID	MWV-6	MWV-6	MWV-6	MWV-7	MWV-7	MWV-7	MWV-7	MWV-7	MWV-8
			Sample ID	GW-MWV-6-11162016	GW-MWV-6-11282017	GW-MWV6-11292018	GW-MWV-7-11112014	GW-MWV-7-11122015	GW-MWV-7-11182016	GW-MWV-7-11292017	GW-MWV7-11282018	GW-MWV-8-11122014
			Operable Unit	OU4	OU4	OU4	OU4	OU4	OU4	OU4	OU4	OU4
			Date Collected	11/16/2016	11/28/2017	11/29/2018	11/11/2014	11/12/2015	11/18/2016	11/29/2017	11/28/2018	11/12/2014
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Crossgradient
1,1-Dichloroethane	75-34-3		31	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5
Benzene	71-43-2	5	5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5
Bromomethane	74-83-9		10	< 0.50	< 0.50	< 0.14	< 1	< 1	< 0.50	< 0.50	< 0.14	< 1
cis-1,2-Dichloroethene	156-59-2	70	70	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5
Toluene	108-88-3	1000	1000	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5
Trichloroethylene	79-01-6	5	5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5
Vinyl Chloride	75-01-4	2	2	< 0.50	< 0.50	< 0.25	< 0.5	< 0.5	< 0.50	< 0.50	< 0.25	< 0.5
Xylenes, Total	1330-20-7	10000	10000	--	< 0.50	< 0.32	< 0.5	< 0.5	--	< 0.50	< 0.32	< 0.5

			Well ID	MWV-8	MWV-8	MWV-8	MWV-8	MWV-9	MWV-9	MWV-9	MWV-9	MWV-9
			Sample ID	GW-MWV-8-11122015	GW-MWV-8-11182016	GW-MWV-8-11292017	GW-MWV8-11292018	GW-MWV-9-11112014	GW-MWV-9-11122015	GW-MWV-9-11172016	GW-MWV-9-11292017	GW-MWV9-11292018
			Operable Unit	OU4	OU4	OU4	OU4	OU4	OU4	OU4	OU4	OU4
			Date Collected	11/12/2015	11/18/2016	11/29/2017	11/29/2018	11/11/2014	11/12/2015	11/17/2016	11/29/2017	11/29/2018
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**	Crossgradient	Crossgradient	Crossgradient	Crossgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
1,1-Dichloroethane	75-34-3		31	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14
Benzene	71-43-2	5	5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11
Bromomethane	74-83-9		10	**0.45 J**	< 0.50	< 0.50	< 0.14	< 1	< 1	< 0.50	< 0.50	< 0.14
cis-1,2-Dichloroethene	156-59-2	70	70	< 0.5	< 0.50	< 0.50	< 0.14	**0.41 J**	< 0.5	< 0.50	< 0.50	< 0.14
Toluene	108-88-3	1000	1000	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11
Trichloroethylene	79-01-6	5	5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11
Vinyl Chloride	75-01-4	2	2	< 0.5	< 0.50	< 0.50	< 0.25	**2**	< 0.5	< 0.50	< 0.50	< 0.25
Xylenes, Total	1330-20-7	10000	10000	< 0.5	--	< 0.50	< 0.32	< 0.5	< 0.5	--	< 0.50	< 0.32

			Well ID	RW-3	MW-9	MW-9	MWC-4	MWC-4	MWC-4	MWC-4	MWC-4	MWV-4
			Sample ID	GW-RW-3-03232015	GW-MW-9-11112014	GW-MW9-11282018	GW-MWC-4-11112014	GW-MWC-4-11112015	GW-MWC-4-11172016	GW-MWC-4-11292017	GW-MWC4-11292018	GW-MWV-4-11112014
			Operable Unit	Residential	OU4	OU4	OU4	OU4	OU4	OU4	OU4	OU4
			Date Collected	3/23/2015	11/11/2014	11/28/2018	11/11/2014	11/11/2015	11/17/2016	11/29/2017	11/29/2018	11/11/2014
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**	Downgradient	Midgradient	Midgradient	Midgradient	Midgradient	Midgradient	Midgradient	Midgradient	Midgradient
1,1-Dichloroethane	75-34-3		31	< 0.5	< 0.5	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5
Benzene	71-43-2	5	5	< 0.5	**0.95**	< 0.11	**0.59**	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5
Bromomethane	74-83-9		10	< 1	< 1	< 0.14	< 1	< 1	< 0.50	< 0.50	< 0.14	< 1
cis-1,2-Dichloroethene	156-59-2	70	70	**0.6**	< 0.5	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14	**0.4 J**
Toluene	108-88-3	1000	1000	< 0.5	< 0.5	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5
Trichloroethylene	79-01-6	5	5	< 0.5	< 0.5	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5
Vinyl Chloride	75-01-4	2	2	**2.5**	< 0.5	< 0.25	< 0.5	< 0.5	< 0.50	< 0.50	< 0.25	**1.2**
Xylenes, Total	1330-20-7	10000	10000	< 0.5	< 0.5	< 0.32	< 0.5	< 0.5	--	< 0.50	< 0.32	< 0.5

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			Well ID	MWV-4	MWV-4	MWV-4	MWV-4	MWV-5	MWV-5	MWV-5	MWV-5	MWV-5
			Sample ID	GW-MWV-4-11112015	GW-MWV-4-11172016	GW-MWV-4-11292017	GW-MWV4-11292018	GW-MWV-5-06132014	GW-MWV-5-11122014	GW-MWV-5-06052015	GW-MWV-5-11122015	GW-MWV-5-06302016
			Operable Unit	OU4	OU4	OU4	OU4	OU4	OU4	OU4	OU4	OU4
			Date Collected	11/11/2015	11/17/2016	11/29/2017	11/29/2018	6/13/2014	11/12/2014	6/5/2015	11/12/2015	6/30/2016
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**	Midgradient	Midgradient	Midgradient	Midgradient	Midgradient	Midgradient	Midgradient	Midgradient	Midgradient
1,1-Dichloroethane	75-34-3		31	< 0.5	< 0.50	< 0.50	**0.21 J**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.50
Benzene	71-43-2	5	5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.5	< 0.5	< 0.50
Bromomethane	74-83-9		10	< 1	< 0.50	< 0.50	< 0.14	< 1	< 1	< 1	< 1	< 0.50
cis-1,2-Dichloroethene	156-59-2	70	70	< 0.5	< 0.50	< 0.50	**0.4 J**	**0.68**	**1.2**	**0.64**	**0.97**	**0.69**
Toluene	108-88-3	1000	1000	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	**1.5**	< 0.5	< 0.5	< 0.50
Trichloroethylene	79-01-6	5	5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.5	< 0.5	< 0.50
Vinyl Chloride	75-01-4	2	2	**0.79**	**1.1**	**0.92**	**1.2**	**1.2**	**5.6**	< 0.5	**2.7**	**2.5**
Xylenes, Total	1330-20-7	10000	10000	< 0.5	--	< 0.50	< 0.32	< 0.5	< 0.5	< 0.5	< 0.5	--

			Well ID	MWV-5	MWV-5	MWV-5	MWV-5	MWV-5
			Sample ID	GW-MWV-5-11172016	GW-MWV-5-06282017	GW-MWV-5-11292017	GW-MWV-5-060718	GW-MWV5-11292018
			Operable Unit	OU4	OU4	OU4	OU4	OU4
			Date Collected	11/17/2016	6/28/2017	11/29/2017	6/7/2018	11/29/2018
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**	Midgradient	Midgradient	Midgradient	Midgradient	Midgradient
1,1-Dichloroethane	75-34-3		31	< 0.50	< 0.50	< 0.50	< 0.14	< 0.14
Benzene	71-43-2	5	5	< 0.50	< 0.50	< 0.50	< 0.11	< 0.11
Bromomethane	74-83-9		10	< 0.50	< 0.50	< 0.50	< 0.14	< 0.14
cis-1,2-Dichloroethene	156-59-2	70	70	**0.83**	< 0.50	**1.1**	**0.67**	**0.82**
Toluene	108-88-3	1000	1000	< 0.50	< 0.50	< 0.50	< 0.11	< 0.11
Trichloroethylene	79-01-6	5	5	< 0.50	< 0.50	< 0.50	< 0.11	< 0.11
Vinyl Chloride	75-01-4	2	2	**2.9**	< 0.50	**3.1**	**1.6**	**0.73**
Xylenes, Total	1330-20-7	10000	10000	--	--	< 0.50	< 0.32	< 0.32

			Well ID	C5	C5	C5	C6	C6	C6	H1	H1	H1
			Sample ID	GW-C5-11152016	GW-PWC-5-11282017	GW-C5-11202018	GW-C6-11102014	GW-C6-11102015	GW-C6-11272018	GW-H1-11102014	GW-H1-11112015	GW-H1-11152016
			Operable Unit	OU1	OU1	OU1	OU1	OU1	OU1	OU1	OU1	OU1
			Date Collected	11/16/2016	11/28/2017	11/20/2018	11/10/2014	11/10/2015	11/27/2018	11/10/2014	11/11/2015	11/15/2016
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**	Source area	Source area	Source area	Source area	Source area	Source area	Source area	Source area	Source area
1,1-Dichloroethane	75-34-3		31	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5	< 0.14	< 0.5	< 0.5	< 0.50
Benzene	71-43-2	5	5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.11	< 0.5	< 0.5	< 0.50
Bromomethane	74-83-9		10	< 0.50	< 0.50	< 0.14 *	< 1	< 1	< 0.14	< 1	< 1	< 0.50
cis-1,2-Dichloroethene	156-59-2	70	70	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5	< 0.14	< 0.5	< 0.5	< 0.50
Toluene	108-88-3	1000	1000	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.11	< 0.5	< 0.5	< 0.50
Trichloroethylene	79-01-6	5	5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.11	< 0.5	< 0.5	< 0.50
Vinyl Chloride	75-01-4	2	2	< 0.50	< 0.50	< 0.25	< 0.5	< 0.5	< 0.25	< 0.5	< 0.5	< 0.50
Xylenes, Total	1330-20-7	10000	10000	--	< 0.50	< 0.32	< 0.5	< 0.5	< 0.32	< 0.5	< 0.5	--

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Osborne Landfill Superfund Site, Grove City, Pennsylvania

			Well ID	H1	H1	H2	H2	H2	H2	H2	H3	H3
			Sample ID	GW-PWH-1-11272017	GW-H1-11272018	GW-H2-11102014	GW-H2-11112015	GW-H2-11152016	GW-PWH-2-11272017	GW-H2-11272018	GW-H3-11102014	GW-H3-11102015
			Operable Unit	OU1	OU1	OU1	OU1	OU1	OU1	OU1	OU1	OU1
			Date Collected	11/27/2017	11/27/2018	11/10/2014	11/11/2015	11/15/2016	11/27/2017	11/27/2018	11/10/2014	11/10/2015
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**	Source area	Source area	Source area	Source area	Source area	Source area	Source area	Source area	Source area
1,1-Dichloroethane	75-34-3		31	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5
Benzene	71-43-2	5	5	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5
Bromomethane	74-83-9		10	< 0.50	< 0.14	< 1	< 1	< 0.50	< 0.50	< 0.14	< 1	< 1
cis-1,2-Dichloroethene	156-59-2	70	70	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5
Toluene	108-88-3	1000	1000	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5
Trichloroethylene	79-01-6	5	5	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5
Vinyl Chloride	75-01-4	2	2	< 0.50	< 0.25	< 0.5	< 0.5	< 0.50	< 0.50	< 0.25	< 0.5	< 0.5
Xylenes, Total	1330-20-7	10000	10000	< 0.50	< 0.32	< 0.5	< 0.5	--	< 0.50	< 0.32	< 0.5	< 0.5

			Well ID	H3	H3	H3	H4	H4	H4	H4	H4	H5
			Sample ID	GW-H3-11162016	GW-PWH-3-11272017	GW-H3-11202018	GW-H4-11102014	GW-H4-11102015	GW-H4-11162016	GW-PWH-4-11272017	GW-H4-11202018	GW-H5-11102014
			Operable Unit	OU1	OU1	OU1	OU1	OU1	OU1	OU1	OU1	OU1
			Date Collected	11/16/2016	11/27/2017	11/20/2018	11/10/2014	11/10/2015	11/16/2016	11/27/2017	11/20/2018	11/10/2014
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**	Source area	Source area	Source area	Source area	Source area	Source area	Source area	Source area	Source area
1,1-Dichloroethane	75-34-3		31	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5
Benzene	71-43-2	5	5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5
Bromomethane	74-83-9		10	< 0.50	< 0.50	< 0.14 *	< 1	< 1	< 0.50	< 0.50	< 0.14 *	< 1
cis-1,2-Dichloroethene	156-59-2	70	70	< 0.50	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5
Toluene	108-88-3	1000	1000	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5
Trichloroethylene	79-01-6	5	5	< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5
Vinyl Chloride	75-01-4	2	2	< 0.50	< 0.50	< 0.25	< 0.5	< 0.5	< 0.50	< 0.50	< 0.25	< 0.5
Xylenes, Total	1330-20-7	10000	10000	--	< 0.50	< 0.32	< 0.5	**10000 ***	--	< 0.50	< 0.32	< 0.5

Appendix D. Historical Groundwater Detection Data Summary Table
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Osborne Landfill Superfund Site, Grove City, Pennsylvania

				Well ID	H5	H5	H5	H6	H6	H6	H6	H6	MW-7
				Sample ID	GW-H5-11162016	GW-PWH-5-11282017	GW-H5-11202018	GW-H6-11102014	GW-H6-11102015	GW-H6-11152016	GW-PWH-6-11282017	GW-H6-11272018	GW-MW-7-11112014
				Operable Unit	OU1	OU1	OU1	OU1	OU1	OU1	OU1	OU1	OU4
				Date Collected	11/16/2016	11/28/2017	11/20/2018	11/10/2014	11/10/2015	11/15/2016	11/28/2017	11/27/2018	11/11/2014
				Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte	**CAS**	**MCL**	**MSC**		Source area	Source area	Source area	Source area	Source area	Source area	Source area	Source area	Crossgradient
1,1-Dichloroethane	75-34-3		31		< 0.50	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5
Benzene	71-43-2	5	5		< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5
Bromomethane	74-83-9		10		< 0.50	< 0.50	< 0.14 *	< 1	< 1	< 0.50	< 0.50	< 0.14	< 1
cis-1,2-Dichloroethene	156-59-2	70	70		< 0.50	< 0.50	< 0.14	< 0.5	< 0.5	< 0.50	< 0.50	< 0.14	< 0.5
Toluene	108-88-3	1000	1000		< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5
Trichloroethylene	79-01-6	5	5		< 0.50	< 0.50	< 0.11	< 0.5	< 0.5	< 0.50	< 0.50	< 0.11	< 0.5
Vinyl Chloride	75-01-4	2	2		< 0.50	< 0.50	< 0.25	< 0.5	< 0.5	< 0.50	< 0.50	< 0.25	< 0.5
Xylenes, Total	1330-20-7	10000	10000		--	< 0.50	< 0.32	< 0.5	< 0.5	--	< 0.50	< 0.32	< 0.5

Notes:
Only monitoring wells with detected constituents are shown.
Bold values indicate a detected concentration.
Bold and shaded values exceed MCL or MSC.
* Detection of total xylenes at GW-H4-11102015 is likely a laboratory outlier.
Laboratory quality control data are not included.
< = nondetect result less than the SDL
-- = not analyzed
CAS = chemical abstracts service
ID = identification
J = estimated result
MCL = maximum contaminant level
MSC = Pennnsylvania Act 2 Medium Specfic Concentration
µg/L = microgram per liter
OU = Operable unit

Table 1. Analytical Results
Osborne Landfill Superfund Site
Grove City, Pennsylvania

Sample Identification (OU)	Sample Date	cis-1,2-Dichloroethene	Vinyl Chloride	Remaining VOCs
		Concentrations in µg/L (ppb)		
C-2 (OU1)	6/11/2019	**0.35 J**	**0.37 J**	ND
MWV-5 (OU4)	6/12/2019	**0.48 J**	< 0.25	ND
MWC-5 (OU4)	NS	NS	NS	NS
MCL		70	2	Various

Bold values indicate detected concentrations.
< = Constituent was not detected above method detection limit shown.
J = Estimated: The analyte was positively identified; the quantitation is an estimation because of discrepancies in meeting certain analyte-specific quality control criteria.
"Remaining VOC's" include a summation of remaining constituents included in USEPA Method 524.2.
µg/L = micrograms per liter
MCL = USEPA Maximum Contaminant Level
ND = the included VOC analytes were less than their respective laboratory detection limits
NS = not sampled due to dry well
OU = operable unit
ppb = parts per billion
VOCs = volatile organic compounds

Table 1. Volatile Organic Compound Detections in Groundwater - November 2019

2019 Biennial and Once-Every-Five-Year Groundwater Monitoring Data

Osborne Landfill Superfund Site, Grove City, Pennsylvania

		Constituents	Trichloroethene	cis-1,2-Dichloroethene	1,1-Dichloroethane	Vinyl Chloride	Toluene
		MCL/MSC	5	70	31[a]	2	1000
Well ID	Well Status	Date					
C-1	Current Network	11/06/2019	< 0.11	< 0.14	< 0.14	< 0.25	< 0.11
C-2	Current Network	11/06/2019	< 0.11	**0.38 J**	< 0.14	**0.74**	< 0.11
C-3	Current Network	11/04/2019	< 0.11	< 0.14	< 0.14	< 0.25	< 0.11
C-4	Current Network	11/05/2019	< 0.11	< 0.14	< 0.14	< 0.25	**0.12 J**
C-5	Current Network	11/05/2019	< 0.11	< 0.14	< 0.14	< 0.25	< 0.11
C-6	Current Network	11/05/2019	< 0.11	< 0.14	< 0.14	< 0.25	< 0.11
H-1	Current Network	11/06/2019	< 0.11	< 0.14	< 0.14	< 0.25	< 0.11
H-2	Current Network	11/06/2019	< 0.11	**0.14 J**	< 0.14	< 0.25	< 0.11
H-3	Current Network	11/04/2019	< 0.11	< 0.14	< 0.14	< 0.25	< 0.11
H-4	Current Network	11/05/2019	< 0.11	< 0.14	< 0.14	< 0.25	< 0.11
H-5	Current Network	11/05/2019	< 0.11	< 0.14	< 0.14	< 0.25	< 0.11
H-6	Current Network	11/05/2019	< 0.11	< 0.14	< 0.14	< 0.25	< 0.11
MWV-3	Current Network	11/05/2019	< 0.11	**0.35 J**	< 0.14	**0.49 J**	**0.2 J**
MWV-4	Current Network	11/06/2019	< 0.11	**0.41 J**	**0.17 J**	**0.67**	< 0.11
MWV-5	Current Network	11/05/2019	< 0.11	**0.96**	< 0.14	**1.4**	< 0.11
MWV-7	Current Network	11/05/2019	< 0.11	< 0.14	< 0.14	< 0.25	< 0.11
RW-3	Current Network	11/04/2019	NS	NS	NS	NS	NS

Notes:

[a]1,1-dichloroethane value is based on MSC.

Concentrations are in µg/L.

Bold value indicates a detected concentration.

There were no exceedances of the MCL/MSCs in 2019.

µg/L = microgram per liter

< = Analyte was not detected at the specified RL, or this analyte was considered not detected due to associated blank contamination.

ID = identification

J = Analyte was present, but the reported value may not be accurate or precise (estimated).

MCL = USEPA maximum contaminant level

MSC = Pennsylvania Act 2 Medium-Specific Concentration

NS = not sampled due to no access

RL = reporting limit

USEPA= U.S. Environmental Protection Agency

Table 2. Total and Dissolved Metals Concentrations in Groundwater - November 2019

2019 Biennial and Once-Every-Five-Year Groundwater Monitoring Data

Osborne Landfill Superfund Site, Grove City, Pennsylvania

Constituents			Arsenic (total)	Arsenic (dissolved)	Beryllium (total)	Beryllium (dissolved)	Chromium (total)	Chromium (dissolved)	Nickel (total)	Nickel (dissolved)	Lead (total)	Lead (dissolved)
MCL/MSC			10	10	4	4	100	100	100[a]	100[a]	5[a]	5[a]
Well ID	Well Status	Date										
C-1	Current Network	11/06/2019	< 0.73	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	**3.9 J**	**3.7 J**	< 0.55	< 0.55
C-2	Current Network	11/06/2019	**5.1**	**3.1**	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55
C-3	Current Network	11/04/2019	< 0.73	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55
C-4	Current Network	11/05/2019	< 0.73	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55
C-5	Current Network	11/05/2019	**3.7**	**2.2**	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	**0.73 J**	< 0.55
C-6	Current Network	11/05/2019	**1.7 J**	**0.91 J**	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55
H-1	Current Network	11/06/2019	< 0.73	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55
H-2	Current Network	11/06/2019	**0.87 J**	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	**6.4**	**6**	< 0.55	< 0.55
H-3	Current Network	11/04/2019	< 0.73	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55
H-4	Current Network	11/05/2019	**5.5**	**2.7**	< 0.25	< 0.25	**2.5 J**	< 2.3	**2.7 J**	< 2.4	**2.4**	< 0.55
H-5	Current Network	11/05/2019	**0.76 J**	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	**0.64 J**	< 0.55
H-6	Current Network	11/05/2019	< 0.73	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55
MWV-3	Current Network	11/05/2019	**1.8 J**	**1.3 J**	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	**0.64 J**
MWV-4	Current Network	11/06/2019	**5**	**4.4**	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55
MWV-5	Current Network	11/05/2019	**1.2 J**	**0.83 J**	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55
MWV-7	Current Network	11/05/2019	< 0.73	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	**2.6 J**	< 2.4	< 0.55	< 0.55
RW-3	Current Network	11/04/2019	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-7	Abandonment Approved	11/05/2019	< 0.73	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55
MW-8	Abandonment Approved	11/05/2019	< 0.73	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55
MW-9	Abandonment Approved	11/05/2019	< 0.73	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	**9.2**	**7.4**	< 0.55	< 0.55
MWC-2	Abandonment Approved	11/04/2019	**1.2 J**	< 0.73	< 0.25	< 0.25	**5.2**	< 2.3	**6.3**	< 2.4	**2.7**	< 0.55
MWC-4	Abandonment Approved	11/06/2019	< 0.73	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55
MWV-1	Abandonment Approved	11/04/2019	< 0.73	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55
MWV-6	Abandonment Approved	11/05/2019	< 0.73	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55
MWV-8	Abandonment Approved	11/06/2019	**1.9 J**	**0.83 J**	< 0.25	< 0.25	**2.3 J**	< 2.3	**15**	**13**	**5.9**	< 0.55
MWV-9	Abandonment Approved	11/05/2019	< 0.73	< 0.73	< 0.25	< 0.25	< 2.3	< 2.3	< 2.4	< 2.4	< 0.55	< 0.55

Notes:

[a]Nickel and lead values are based on MSC.

Concentrations are in µg/L

Bold value indicates a detected concentration.

Bold and highlighted values exceed MCL or MSC.

µg/L = microgram per liter

< = Analyte was not detected at the specified RL, or this analyte was considered not detected due to associated blank contamination.

ID = identification

J = Analyte was present, but the reported value may not be accurate or precise (estimated).

MCL = maximum contaminant level

MSC = Pennsylvania Act 2 Medium-Specific Concentration

NS = not sampled due to no access

RL = reporting limit

USEPA= U.S. Environmental Protection Agency

APPENDIX H – DETAILED ARARS REVIEW TABLES

CERCLA Section 121(d)(1) requires that Superfund remedial actions attain "a degree of cleanup of hazardous substance, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment." The remedial action must achieve a level of cleanup that at least attains those requirements that are legally applicable or relevant and appropriate.

Groundwater ARARs
According to the 2004 ESD, cleanup goals for groundwater COCs in the 1990 ROD were based on federal MCLs and state standards established under the Pennsylvania Land Recycling Program, Act 2, Chapter 250 Medium Specific Concentrations for Inorganic Regulated Substances in Groundwater. The 2004 ESD revised the performance standards to MCLs. Since then, the only change in ARARs is that arsenic is more stringent (Table H-1), as anticipated in the ESD.

Table H-1: ARAR Review for Groundwater COCs

COCs	2004 ESD ARARs (µg/L)	Current ARARs[a] (µg/L)	ARARs Change
Arsenic	10[b]	10	None
Beryllium	4	4	None
Benzene	5	5	None
Benz(a)pyrene	0.2	0.2	None
Chromium	100	100	None
Cis-1,2-DCE	70	70	None
Nickel[c]	100	100	None
Lead[c]	5	5	None
PCBs	0.5	0.5	None
TCE	5	5	None
Vinyl Chloride	2	2	None

Notes:
a. Based on National Primary Drinking Water Regulations unless otherwise noted: https://www.epa.gov/sites/production/files/2016-06/documents/npwdr_complete_table.pdf (accessed 9/24/2019).
b. The 2004 ESD indicated that the arsenic cleanup goal was 50 µg/L until January 22, 2006, then changed to 10 µg/L.
c. PADEP Medium Specific Concentrations for Inorganic Regulated Substances in Groundwater (Residential Used Aquifer, total dissolved solids less than 2,500 µg/L): http://files.dep.state.pa.us/EnvironmentalCleanupBrownfields/LandRecyclingProgram/LandRecyclingProgramPortalFiles/SWHTables-2016/Table%202.pdf (accessed 9/24/2019).

APPENDIX I – EVALUATION OF INFORMATION IN SUPPORT OF ANSWERING QUESTION B

This appendix provides a summary of the evaluations conducted to determine whether the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of remedy selection remain valid.

Changes in Standards and TBCs

Have standards identified in the ROD been revised, and does this call into question the protectiveness of the remedy? Do newly promulgated standards call into question the protectiveness of the remedy? Have TBCs used in selecting cleanup levels at the Site changed, and could this affect the protectiveness of the remedy?

The 2004 ESD stated that MCLs and non-zero MCLGs would be achieved in groundwater. Specifically named (with goals in µg/L) were vinyl chloride (2), trichloroethene (TCE) (5), benzene (5), cis-1,2-DCE (70), benzo[a]pyrene (0.2), PCBs (0.5), beryllium (4), chromium (100), nickel (state, 100), lead (state, 5), and arsenic (50, changed to 10 in 2006). None of those numbers have changed, except for the anticipated arsenic change; 10 µg/L is now both final and effective.

EPA's review of the 2015 annual groundwater data found that VOC concentrations had declined to the point that the only chemical then exceeding regional screening levels or MCLs was vinyl chloride. By the time of the 2019 sampling, only three wells were monitored. MWC-5 was dry. Well C-2 had trace concentrations of cis-1,2-DCE and vinyl chloride; MWV-5 had a trace of vinyl chloride. All reported concentrations were below MCLs and below levels of risk concern.

2015 was the last year that residential well RW-3, which is no longer the source of potable water for the house, was sampled. At that time, its vinyl chloride concentration slightly exceeded the MCL; it was 2.5 µg/L, down from the 3.2 µg/L and 3.0 µg/L measured in April and June 2012, respectively. The resident subsequently refused access, but EPA hopes to resample to confirm whether RW-3 concentrations have met the MCL.

Changes in Toxicity and Other Contaminant Characteristics

Have toxicity factors for contaminants of concern at the site changed in a way that could affect the protectiveness of the remedy? Have other contaminant characteristics changed in a way that could affect the protectiveness of the remedy?

Toxicity factors have changed since the original risk assessment, as have risk assessment methods. For example, assessments of vinyl chloride, TCE, chromium, and benzo[a]pyrene now include an evaluation of mutagenicity, and the risk assessment guides for dermal and inhalation exposure have changed.

In 2015, EPA estimated that if chemicals were present at the ROD/ESD standards and MCLs, the combined risks would be unacceptable (i.e., outside the target range specified in the NCP). As part of this FYR, EPA revisited the 2015 evaluation of the cleanup goals. Only benzo[a]pyrene has had a change in toxicity factors since then (reference dose 3 x 10^{-4} mg/kg/day; cancer slope factor 1 per mg/kg/day; reference concentration 2E-6 mg/m^3; inhalation unit risk 6E-4 m^3/µg). The exposure factors are also the same as in the 2015 evaluation, except for slight adjustments in skin surface area in the latest update to the default exposure factors (child skin surface area 6,365 cm^2, adult skin surface area 19,652 cm^2). Otherwise, the same cleanup goals, physicochemical parameters, toxicity factors and exposure assumptions were used for vinyl chloride, cis-1,2-DCE, benzo[a]pyrene, TCE, PCBs, benzene, beryllium, chromium, arsenic and nickel as in the 2015 evaluation.

The ROD/ESD standards would still exceed the NCP targets in combination, largely due to the noncancer hazard index of cis-1,2-DCE, chromium and arsenic, and the cancer risks from vinyl chloride, benzo[a]pyrene, PCBs, chromium and arsenic. However, vinyl chloride is the only chemical that has actually exceeded the cleanup goal

in the past few years, and there were no exceedances in 2019. The 2019 data showed acceptable risk levels and compliance with MCLs, although only two wells were sampled. The 2018 sampling, which included a larger set of 26 wells, also showed VOCs had declined to trace levels, below the cleanup standards and below levels of risk concern.

Soils and sediments listed in the ROD have been excavated or capped, except for the off-site pond sediment. However, the sediment was determined not to be adversely impacted by the Site in the 1997 ROD.

Changes in Risk Assessment Methods

Have standardized risk assessment methodologies changed in a way that could affect the protectiveness of the remedy?

There have been significant changes in EPA's risk assessment guidance since the original risk assessment was performed. These include changes in basic methodology, dermal guidance, inhalation methodologies and exposure factors. Uncertainties involving the risks associated with final cleanup standards were described above.

Changes in Exposure Pathways

Has land use or expected land use on or near the Site changed? Have human health or ecological routes of exposure or receptors been newly identified or changed in a way that could affect the protectiveness of the remedy? Are there newly identified contaminants or contaminant sources? Are there unanticipated toxic byproducts of the remedy not previously addressed by the decision documents? Have physical site conditions or the understanding of these conditions changed in a way that could affect the protectiveness of the remedy?

Air stripper emissions have ceased; therefore, this potential source is no longer relevant.

Vapor intrusion is a potential concern. Modeling has been performed in previous years that suggested vapor intrusion impacts would be unlikely, but the uncertainty was high, especially given the fractured bedrock. Subslab and indoor air sampling would be more definitive, but the resident with greatest potential for vapor intrusion has refused access.

As stated in 2015, it was believed that clean water in the Clarion Aquifer might overlie the more contaminated mine void groundwater and thus help prevent vapor intrusion. However, well MWC-5 (the Clarion well nearest the residence) has been dry on many occasions and was dry again during the 2019 sampling, suggesting this aquifer is not continually present.

One favorable factor with respect to subsurface vapors is that groundwater VOC concentrations have been declining, including at the residential well of greatest concern. EPA may attempt to gain access to this house in the future if the building changes ownership.

EPA considered the possible presence of 1,4-dioxane, a solvent stabilizer sometimes found at sites with VOC contamination, especially in the presence of 1,1,1-trichloroethane, which was detected on a few sporadic occasions at low concentrations. There was no site information available regarding whether 1,4-dioxane had been used in the source materials. The EPA RPM concluded that sampling for 1,4-dioxane is not warranted.

The decision documents contain cleanup standards for arsenic, beryllium, chromium, lead and nickel. Sampling activities at OU1 do not include sampling for metals because inorganic RAOs were reached in 2004; a reconsideration in 2010 found sufficient justification not to resume metals sampling. Metals sampling was conducted at all wells in November 2019 and results indicated that metals concentrations remain below cleanup goals with the exception of a single MSC exceedance for total lead, which was attributed to high turbidity in the sample.

Expected Progress Toward Meeting RAOs

Is the remedy progressing as expected?

The ROD/ESD standards do not meet NCP targets in combination, but actual site concentrations are well below the cleanup goals and the NCP targets. Groundwater concentrations have continued to decline; there were no MCL exceedances or unacceptable risks in the 2018 or 2019 data. Metals met the RAOs in 2004.

Vinyl chloride concentrations in the residential still slightly exceeded the MCL the last time it was sampled (2015) and has not been available since that time. If possible, EPA may attempt to resample this well to confirm whether concentrations have met the RAOs. This residence has also been of interest for vapor intrusion. If access is obtained, EPA may attempt to confirm the indications from screening models that vapor intrusion is not of concern.