THIRD FIVE-YEAR REVIEW REPORT FOR BERKLEY PRODUCTS COMPANY DUMP SUPERFUND SITE LANCASTER COUNTY, PENNSYLVANIA

September 2015

Prepared By:
United States Environmental Protection Agency
Region 3
Philadelphia, Pennsylvania

Cecil Rodrigues
Cecil Rodrigues, Director
Hazardous Site Cleanup Division
U.S. EPA, Region III

9/23/2015
Date

TABLE OF CONTENTS

Tables

Figures

LIST OF ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
COPC	Chemical of Potential Concern
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five-Year Review
IC	Institutional Control
GMUC	Groundwater Migration Under Control
HEUC	Human Exposure Under Control
LEL	Lower Explosive Limit
Lipton	Lipton Paint Company
MCL	Maximum Contaminant Level
MSC	Medium-specific Concentration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PADEP	Pennsylvania Department of Environmental Protection
PADER	Pennsylvania Department of Environmental Resources
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethylene
PRP	Potentially Responsible Party
RA	Remedial Action
RAC	Remedial Action Contractor
RAO	Remedial Action Objective
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
SVOC	Semi-volatile Organic Compound
SWRAU	Sitewide Ready for Anticipated Use
TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene
URS	URS Corporation
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

The Berkley Products Company Dump Superfund site (the Site) is located in West Cocalico Township, Lancaster County, Pennsylvania. The Site is a landfill that received municipal and industrial wastes. The Site covers about 8 acres within a 21-acre tract of residential property. Landfill waste contaminated soil and groundwater with organic and inorganic chemicals, including 1,4-dioxane.

The United States Environmental Protection Agency (EPA) selected the remedy in a 1996 Record of Decision (ROD) and updated it in a 1999 Explanation of Significant Differences (ESD). Cleanup included waste consolidation, grading, installation of a cover system, excavation and off-site disposal of wastes exceeding the cover system's capacity, security fencing, erosion control measures, and institutional controls to restrict well installation and monitoring. EPA deleted the Site from the National Priorities List (NPL) in March 2007. The triggering action for this five-year review (FYR) was the signing of the previous FYR on September 27, 2010.

A protectiveness determination of the remedy at the Site cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions:

- Define the extent of 1,4-dioxane and metal contamination in groundwater. Determine if site groundwater discharges to Cocalico Creek or migrates beyond the creek to downgradient receptors at unacceptable levels. Upon completion of the groundwater investigation, determine the appropriate remedial action. Continue to monitor residential wells to ensure residents remain protected.

It is expected that these actions will take approximately one year to complete, at which time a protectiveness determination will be made.

Government Performance and Results Act (GPRA) Measure Review

As part of this FYR, the GPRA Measures have also been reviewed. The GPRA Measures and their status are provided as follows:

<u>Environmental Indicators</u>
Human Health: Current Human Exposure Under Control (HEUC)
Groundwater Migration: Insufficient Data to Determine Groundwater Migration Status (GMID)

<u>Sitewide Ready for Anticipated Use (SWRAU)</u>
The Site achieved the SWRAU Measure on September 11, 2009.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Berkley Products Company Dump		
EPA ID: PAD980538649		
Region: 3	**State:** PA	**City/County:** West Cocalico Township/Lancaster County
SITE STATUS		
NPL Status: Deleted		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA **If "Other Federal Agency" selected above, enter Agency name:** Click here to enter text.		
Author name: Roy Schrock, with additional support provided by Skeo Solutions		
Author affiliation: EPA Region 3		
Review period: March 2015 – September 2015		
Date of site inspection: March 31, 2015		
Type of review: Statutory		
Review number: 3		
Triggering action date: September 27, 2010		
Due date *(five years after triggering action date)*: September 27, 2015		

FIVE-YEAR REVIEW SUMMARY FORM (CONTINUED)

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
None

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU1	**Issue Category: Remedy Performance**			
	Issue: The extent of 1,4-dioxane and metal contamination in groundwater is not defined.			
	Recommendation: Define the extent of 1,4-dioxane and metal contamination in groundwater. Determine if site groundwater discharges to Cocalico Creek or migrates beyond the creek to downgradient receptors at unacceptable levels. If groundwater migrates beneath the creek, sample residential wells on the eastern side of Cocalico Creek for 1,4-dioxane and mitigate risks, if necessary. Upon completion of the groundwater investigation determine the appropriate remedial action. Continue to monitor residential wells to ensure residents remain protected.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
Yes	Yes	EPA/State	EPA/State	09/27/2016

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU1	**Issue Category: Institutional Controls**			
	Issue: Institutional controls were not found for the portion of the landfill that may be located on parcel 0908171400000.			
	Recommendation: Conduct additional research and a land survey to determine if the landfill limits are located within parcel 0908171400000. If the landfill is partially located on this parcel, implement additional institutional controls to maintain the integrity of the remedy and restrict exposure on this parcel.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	09/27/2016

Protectiveness Statement(s)		
Operable Unit: OU1	*Protectiveness Determination:* Protectiveness Deferred	*Addendum Due Date (if applicable):* 09/27/2016

Protectiveness Statement:
A protectiveness determination of the remedy at the Berkley Products Dump Superfund Site cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions. Define the extent of 1,4-dioxane and metal

contamination in groundwater. Determine if site groundwater discharges to Cocalico Creek or migrates beyond the creek to downgradient receptors at unacceptable levels. Upon completion of the groundwater investigation, determine the appropriate remedial action. Continue to monitor residential wells to ensure residents remain protected. It is expected that these actions will take approximately one year to complete, at which time a protectiveness determination will be made.

Third Five-Year Review Report
for
Berkley Products Company Dump Superfund Site

1.0 Introduction

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy will continue to be protective of human health and the environment. FYR reports document FYR methods, findings and conclusions. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The United States Environmental Protection Agency (EPA) prepares FYRs pursuant to Section 121 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Section 121 of CERCLA states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

EPA interpreted this requirement further in the NCP, 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.

EPA Region 3, with contractor support from Skeo Solutions, conducted the FYR and prepared this report regarding the remedy implemented at the Berkley Products Company Dump Superfund site (the Site) in West Cocalico Township, Lancaster County, Pennsylvania. EPA conducted this FYR from March to September 2015. EPA is the lead agency for developing and implementing the remedy for the federal and state-financed cleanup at the Site. The Pennsylvania Department of Environmental Protection (PADEP) as the support agency representing the Commonwealth of Pennsylvania has reviewed all supporting documentation and provided input to EPA during the FYR process.

This is the third FYR for the Site. The triggering action for this statutory review is the previous FYR. The FYR is required because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure. The Site consists of one operable unit (OU).

2.0 Site Chronology

Table 1 lists the dates of important events for the Site.

Table 1: Chronology of Site Events

Event	Date
The Pennsylvania Department of Environmental Resources (PADER) discovered contamination at the Site	June 1, 1981
EPA completed the preliminary assessment	March 1, 1984
EPA completed the site investigation	March 5, 1986
EPA proposed the Site to the National Priorities List (NPL)	June 24, 1988
EPA listed the Site on the NPL	March 31, 1989
EPA began the remedial investigation and feasibility study (RI/FS)	March 12, 1990
EPA completed a removal action	May 9, 1992
EPA completed the RI/FS; EPA issued the Record of Decision (ROD)	June 28, 1996
EPA's Remedial Action Contractor (RAC) began the remedial design	September 11, 1996
EPA issued an Explanation of Significant Differences (ESD)	August 20, 1999
EPA's contractor started the remedial design	September 30, 1999
EPA's contractor completed the remedial design	January 7, 2000
EPA's contractor started remedial action construction	May 24, 2000
EPA issued the Preliminary Close-out Report	September 19, 2001
EPA's contractor completed the remedial action	September 27, 2002
EPA transferred operation and maintenance (O&M) responsibilities to PADEP	Early 2003
EPA issued the first FYR	August 17, 2005
EPA issued the Close-out Report	September 20, 2006
EPA deleted the Site from the NPL	March 19, 2007
EPA issued the second FYR	September 27, 2010
EPA began sampling groundwater and residential well water for 1,4-dioxane in addition to other site contaminants of concern (COCs)	Fall 2010
PADEP's contractor completed upgrades to two sedimentation basins damaged from Hurricane Lee	Summer 2012

3.0 Background

3.1 Physical Characteristics

The Site is a former landfill located one and a half miles northeast of Denver, Pennsylvania, in West Cocalico Township, Lancaster County (Figure 1). Also known as Schoeneck Landfill, the Site occupies about 8 acres, on the crest of a hill, within a larger tract of about 21 acres. The Site is located in a densely-wooded residential area.

The capped former landfill is covered with soil and surface vegetation. Surface water management features include drainage channels, terraces, rip-rap-lined drainage channels leading to two separate sedimentation basins and a storm water catch basin along Swamp Bridge Road (Figure 2).

Bedrock beneath the Site is composed of interbedded units of sedimentary rock including conglomerate, sandstone, siltstone and shale. A near-vertical igneous diabase dike intrusion is present at the Site, trending north-northeast at the western limit of the landfill.

The Site is about 1,000 feet west of Cocalico Creek, a perennial stream. The 1996 Record of Decision (ROD) reported that groundwater flow at the Site is generally to the east and northeast toward Cocalico Creek; however, recent monitoring data from an expanded conventional well network where the data was used to establish new groundwater flow figures which indicate that groundwater flows to the southeast (2014 Annual Progress Report). New groundwater flow maps are provided in Data Review Section 6.4. The headwaters of Cocalico Creek are in the valley south of South Mountain near Blue Lake. Seasonally, wet springs immediately north of the Site discharge into Cocalico Creek.

3.2 Land and Resource Use

The Site includes an 8-acre inactive capped landfill, within a larger privately-owned parcel. A residence is located on the larger parcel, west and hydraulically upgradient of the former landfill. This residence is accessed from Wollups Hill Road. A small portion of the landfill is located on an adjacent residential property to the south.

Land use near the Site is primarily rural residential. Residents near the Site obtain their water supplies from private wells. Residential well locations are shown in Figure 3. Land use at and near the Site is not expected to change.

There is a supplementary public water intake on Cocalico Creek about 2 miles downstream of the Site that serves an estimated 2,000 people.

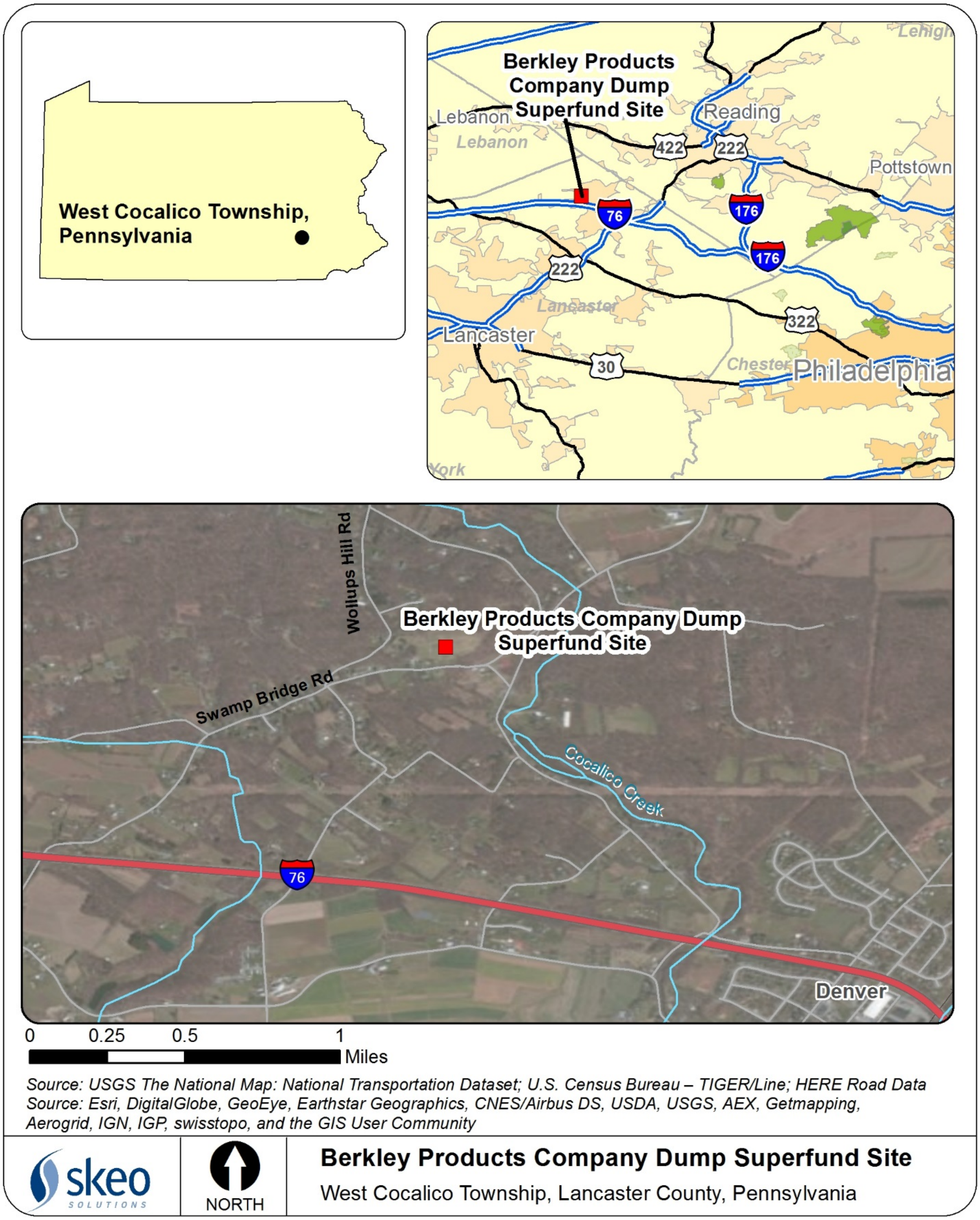
3.3 History of Contamination

A municipal waste landfill operated at the Site from about 1930 until 1965. In 1965, the Lipton Paint Company (Lipton), a subsidiary of Berkley Products Company, purchased the property. The landfill continued to receive domestic trash and paint wastes from Berkley Products Company until 1970, when Lipton closed the landfill.

Reports estimate that the landfill received 650 to 40,000 gallons of paint wastes between 1965 and 1970. During the landfill’s final years of operation, operators dumped household trash to the south of the access road, toward the hillside, and paint wastes in the northern part of the landfill.

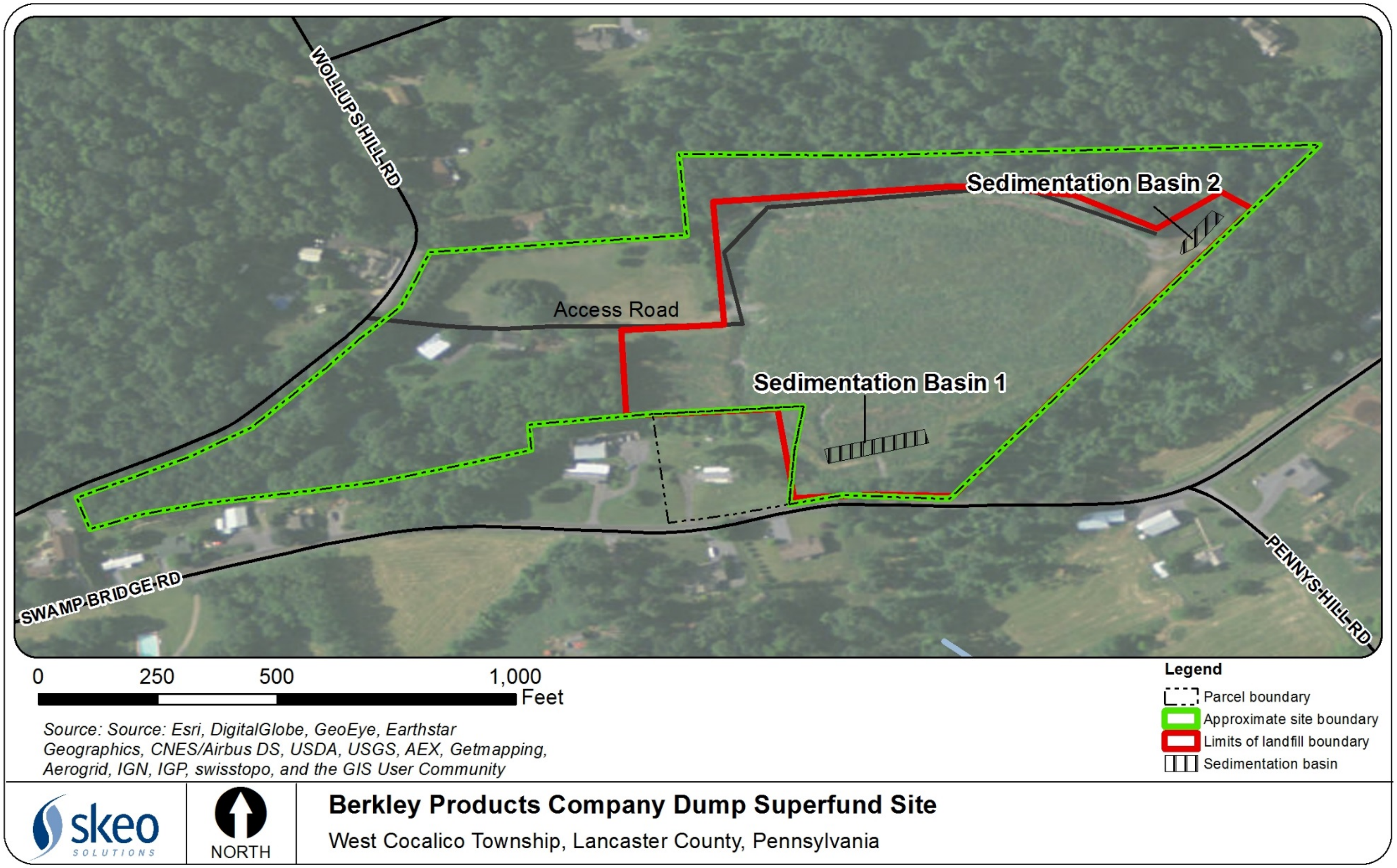
In September 1970, Lipton ceased operations, covered the landfill with soil, and sold the property to private owners. The Site remains part of a residential parcel.

Figure 1: Site Location Map



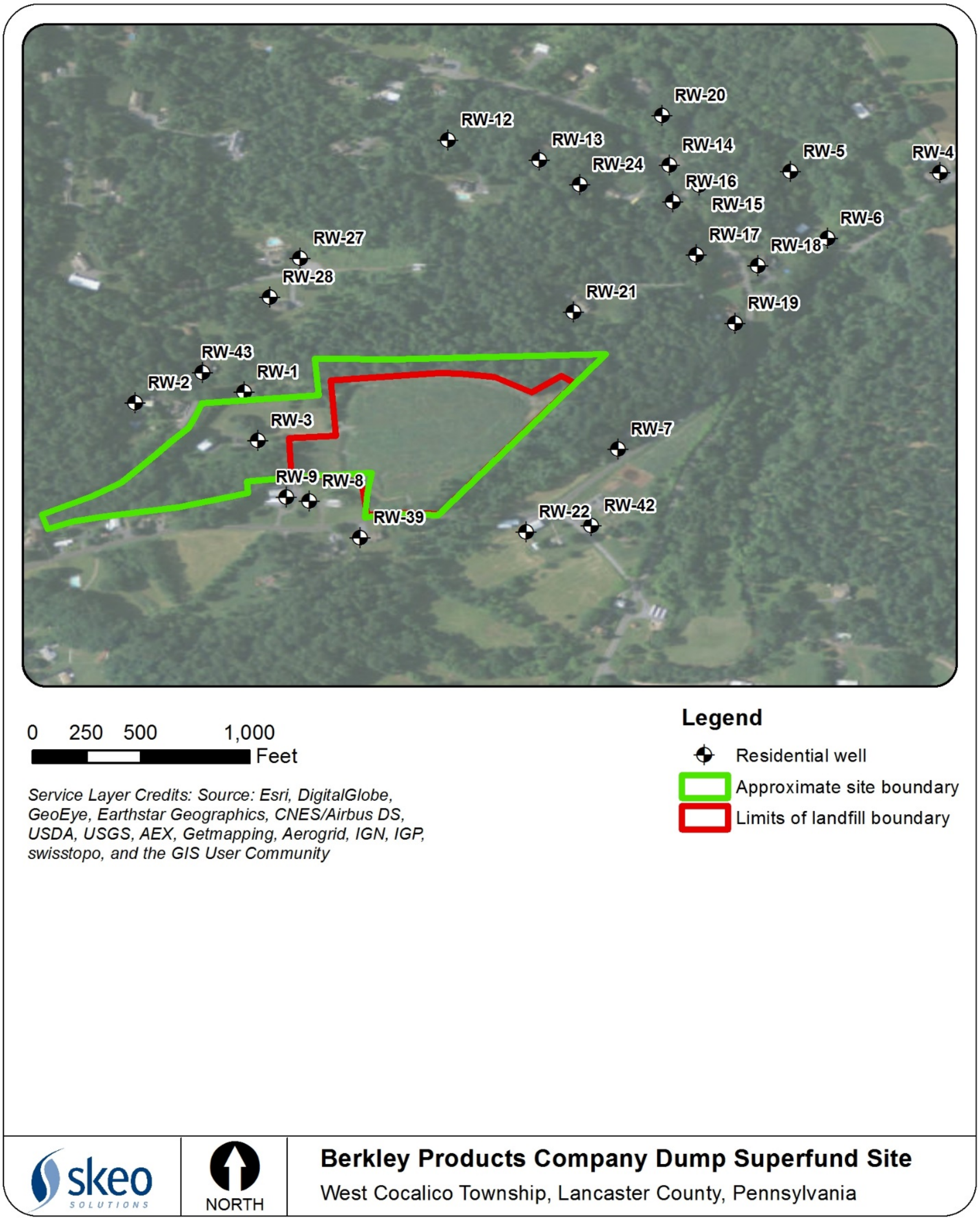
Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

Figure 2: Detailed Site Map



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 3. Residential Well Locations



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.

3.4 Initial Response

The Pennsylvania Department of Environmental Resources (PADER), now known as PADEP, began its investigation of the Site in 1984 with preparation of a Potential Hazardous Waste Site Identification form. In March 1984, EPA completed a preliminary assessment and scheduled the Site for further investigation under CERCLA. In July 1984, EPA collected field samples as part of a site investigation. Based on the results of the site investigation, EPA proposed the Site for listing on the National Priorities List (NPL) in June 1988 and finalized the listing in March 1989.

EPA initiated the remedial investigation and feasibility study (RI/FS) in 1990. During the field investigation, EPA discovered buried drums containing polychlorinated biphenyls (PCBs), flammable liquids, solids and paint solvents. In 1991, EPA removed 59 drums from the northeastern portion of the Site and seven drums from the southern slope of the landfill. EPA completed the removal actions by May 1992 and finalized the Site's RI/FS in June 1996.

3.5 Basis for Taking Action

The RI identified organic and inorganic chemicals in the media sampled, including the following chemicals of potential concern (COPC):

Table 2: Site COPCs

Media	COPC[a]
Surface Soil	Aluminum, arsenic, beryllium, chromium, manganese, benzo(a)pyrene, dibenz(a,h)anthracene, dieldrin, Aroclor 1254
Subsurface Soil[b]	acetone, 2-butanone, trichloroethylene (TCE), 1,1,2-trichloroethane, benzene, 4-methyl-2-pentanone, tetrachloroethylene (PCE), toluene, ethylbenzene, xylenes, bis-2-ethylhexyl phthalate, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dieldrin, endrin, Aroclor 1254, aldrin, Aroclor 1248, dibenz(a,h)anthracene, aluminum, arsenic, beryllium, cadmium, chromium, lead, manganese, nickel, vanadium
Spring Sediment	aluminum, arsenic, beryllium, manganese
Leachate Sediment	arsenic, beryllium, chromium
Groundwater	arsenic, barium, beryllium, chromium, lead, manganese, nickel, methylene chloride, chloroform, TCE, benzene, PCE, toluene, ethylbenzene, 1,2-dichloroethane, 1,1,2-trichloroethane, 4-methyl-2-pentanone, xylenes, bis(2-ethylhexyl)phthalate, 1,4-dichlorobenzene, beta-hexachlorocyclohexane, vinyl chloride, carbon disulfide, 1,2-dichloroethene, gamma-hexachlorocyclohexane, heptachlor epoxide, 2-butanone, dieldrin
a – COPCs as listed in Tables 5-26 through 5-29 of the 1995 RI b – Subsurface soil COPCs as listed in the tables on pages 5-5 through 5-9 of the RI	

A 1995 Baseline Risk Assessment identified unacceptable cancer and non-cancer risks to human health through direct contact with soil and landfill materials and potable use of site groundwater. For exposure to soil, beryllium was the primary contributor of cancer risk under a residential use scenario; beryllium and arsenic were the primary contributors of cancer risk under a recreational use scenario. For groundwater, the major contributors of cancer risk were arsenic, beryllium, methylene chloride and vinyl chloride. The major contributors of non-cancer risks were arsenic, barium, manganese, toluene, nickel and benzene. An ecological risk assessment found that contaminated soil posed potential threat to vegetation, resident insects, and foraging and burrowing animals.

4.0 Remedial Actions

In accordance with CERCLA and the NCP, the overriding goals for any remedial action are protection of human health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs). A number of remedial alternatives were considered for the Site, and final selection was made based on an evaluation of each alternative against nine evaluation criteria that are specified in Section 300.430(e)(9)(iii) of the NCP.

4.1 Remedy Selection

EPA selected the Site's remedy in the June 1996 ROD. The ROD defined the following remedial action objectives (RAOs) for the Site:

- Prevent unacceptable human exposure and minimize the exposure of ecological receptors to contaminated soil and landfill materials.
- Minimize potential exposure to contaminants in landfill leachate, gas and groundwater.
- Minimize contaminant migration from the landfill to the environment.

The Site's remedy included the following major components:

- Pre-design investigations.
- Site preparation and consolidation of landfill wastes.
- Site grading.
- Installation of a cover system, to include a subgrade, a gas vent system, barrier layers, a drainage layer and a vegetated top layer.
- Security fencing.
- Erosion control measures.
- Institutional controls (ICs) to restrict new well installation in the contaminated zone and prevent damage of or intrusion into the cover system.
- Groundwater, surface runoff, leachate spring, seep and residential well monitoring.

The ROD did not select any groundwater remedy and did not identify numeric cleanup goals for the Site because EPA waived attainment of MCLs in the ROD for the Site's remedy. Details for this waiver are described below in the ARARs section.

EPA modified the remedy in an Explanation of Significant Differences (ESD), issued on August 20, 1999. The ROD anticipated that the bulk of the consolidated wastes at the Site would be incorporated into the on-site landfill and capped in place. During design of the cap, EPA determined the volume of waste to be consolidated would exceed the capacity of the cap. Therefore the Explanation of Significant Differences (ESD) required excavation, characterization and off-site disposal of the excess waste materials. The landfill could then be capped as described in the ROD.

4.2 Remedy Implementation

Remedial design began in September 1996. The remedial design included installation and sampling of nine Westbay® multi-port wells (MW-6 through MW-14) as well as additional subsurface investigation to determine the extent and volume of wastes to be consolidated in the landfill. EPA approved the final remedial design in January 2000.

The remedial action began in September 1999. On-site construction presence started in May 2000, with mobilization, surveying, and clearing and grubbing activities. Installation of temporary security fencing deterred trespassing during construction. Wastes were consolidated under a cap designed to cover 103,000 cubic yards. About 30,000 cubic yards of excess waste, primarily from the steep southern slopes of the Site, were excavated and transported off site for disposal. During construction of the cap, EPA and PADEP decided not to extend the casing for well clusters MW-2, MW-3 and MW-4 through the cover. These well clusters were decommissioned and remain under the landfill cover.

During the remedial action, as the landscape was changed from a rough, forested hillside to a smooth, denuded slope, thunderstorms overwhelmed the standard erosion controls, flooding the surrounding properties. EPA revised the design of the Site's southern slope to minimize effects of the storms and installed additional erosion control matting across most areas of the Site. A new storm water management system was installed in the township road directly south of the Site to capture and direct the excess storm flow, and repairs were made to the damaged neighboring properties. Gates were installed at entry points to the Site to prevent vehicular access. EPA determined permanent perimeter fencing to be unnecessary due to the inaccessible nature of the Site. Construction activity was virtually continuous until the final vegetative layer was placed and seeded; seeding finished in August 2001.

EPA completed the first round of groundwater monitoring in October 2002. During this sampling event, EPA and PADEP discontinued regular surface runoff and spring sampling because no contaminants were detected in the seeps and creek north of the landfill and upgradient from the Site. EPA and PADEP also discontinued leachate seep sampling from the landfill because the landfill cover eliminated the seep. After the first sampling event, EPA turned over operation and maintenance (O&M) responsibilities to PADEP. EPA deleted the Site from the NPL in March 2007.

In October 23, 2013, PADEP filed an environmental covenant for the Site with the Lancaster County Recorder of Deeds. Section 6.3 presents additional information on institutional controls at the Site.

4.3 Operation and Maintenance

EPA transferred O&M responsibilities to PADEP because there was no viable responsible party for the Site. PADEP contracted with URS Corporation (URS) to perform post-closure O&M. Post-closure O&M includes maintenance of the cap system, maintenance of surface water controls, maintenance of groundwater monitoring wells, sampling and analysis of groundwater, maintenance of the gas collection and venting system and maintenance of the access road. URS currently conducts site inspections, gas monitoring, groundwater monitoring and mowing on an annual basis. The ROD originally called for quarterly groundwater monitoring and semi-annual residential well sampling, but PADEP reduced the frequency of these activities in 2008 with EPA approval. In a future decision document, the schedule for sampling events and analytical requirements should be made through the Annual Work Plan with PADEP and EPA approval. Surface water sampling also occurred in 2010 and 2011, at the request of PADEP. The specific wells sampled and analyses performed vary based on analytical results and PADEP or EPA recommendations. In June 2014, PADEP began collecting quarterly samples from select residential wells for 1,4-dioxane analysis.

During several of the annual inspections, URS identified brush overgrowth areas that limited vehicular access to monitoring wells. Periodic clearing of overgrown vegetation occurs at the Site to allow access to wells and to remove deep root vegetation from the landfill cap. Rodent burrows are also addressed as needed.

During the 2011 annual inspection, URS identified damage to the emergency spillway and discharge channel of sedimentation basin 2 following Hurricane Lee. During additional assessment in November 2011, it was also determined that the berm of sedimentation basin 1 was not level and the principal spillway was estimated to be at a higher elevation than the emergency spillway. URS completed upgrades to both sedimentation basins in 2012 to address the issues.

5.0 Progress Since the Last Five-Year Review

The protectiveness statement from the 2010 FYR for the Site stated the following:

The Site's remedy is protective of human health and the environment in the short-term because the remedial action as outlined in the ROD and ESD was implemented and all immediate threats at the site have been addressed.

Long-term protectiveness of the remedial action will continue to be verified by obtaining additional groundwater samples to fully evaluate the groundwater conditions at the Site and any potential impact to the downgradient areas.

Current data indicate that two downgradient monitoring wells display low levels of VOC contamination below MCLs which are expected to continue to diminish. Several other monitoring wells have low levels of metals. Two compounds are currently above MCLs. Barium is a Site-related compound and the concentrations in monitoring wells are decreasing over time. Mercury is not a Site-related compound based on the 1996 Record of Decision.

Residential wells show occasional metals concentrations exceeding RSLs. However, these results are unfiltered analyses and it is expected these concentrations will be reduced when filtered. In 2006, residential groundwater data showed no organic contamination.

The 2010 FYR included three issues and recommendations. This report summarizes each recommendation and its current status below.

Table 4: Progress on Recommendations from the 2010 FYR

Recommendations	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
PADEP should perform the analysis required by the 1996 ROD on residential wells.	PADEP	09/30/11	Complete. PADEP contractors sampled residential wells for VOCs semi-volatile organic compounds (SVOCs), and total and dissolved metals during the 2010 annual sampling event. In addition to these analyses, the ROD also required pesticide and PCB analyses, but these analyses were not performed on residential well samples in 2010. However, these analyses were performed for site groundwater monitoring wells during the 2010 sampling event. There were no detections of PCBs or pesticides in site groundwater monitoring wells; therefore, sampling residential wells for these parameters was deemed unnecessary.	10/01/10
A comprehensive comparison to background should be performed to determine if observed metals are related to the Site. Future inorganic analyses should be performed on filtered samples.	PADEP	09/30/11	Complete. The 2011 Annual Progress Report presented an evaluation of metals data. Most metals were attributed to background or piping. EPA, PADEP and URS agreed in an August 2012 meeting to limit future residential sampling events to include the analysis of VOCs only, as the 2011 metals evaluation verified that metals concentrations, particularly iron and lead, were not landfill-related.	04/01/12
Develop a current groundwater flow figure to assist with evaluation of groundwater conditions.	PADEP	09/30/11	Complete. The 2010 Annual Progress Report presented figures with the inferred groundwater flow direction; however, it also noted problems with collecting potentiometric surface data from the Westbay® multi-port wells and lack of data from a sufficient number of conventional monitoring wells to provide defensible data. To address uncertainties in groundwater flow, URS installed two conventional well clusters in October 2012 (MW-15 and MW-16), each containing three individual monitoring wells targeting shallow (S), intermediate (I) and deep (D) hydrogeologic zones (six total new wells). Data from these wells were used to develop groundwater flow figures.	05/01/11

6.0 Five-Year Review Process

6.1 Administrative Components

EPA Region 3 initiated the FYR in March 2015 and scheduled its completion for September 2015. EPA remedial project manager (RPM) Roy Schrock led the EPA site review team, which also included EPA community involvement coordinator (CIC) Gina Soscia and contractor support provided to EPA by Skeo Solutions. In March 2015, EPA held a scoping call with the review team to discuss the Site and items of interest as they related to the protectiveness of the remedy currently in place. The review schedule established consisted of the following activities:

- Community notification
- Document review
- Data collection and review
- Site inspection
- Local interviews
- FYR report development and review

6.2 Community Involvement

In June 25, 2015, EPA published a public notice in the Lancaster Intelligencer newspaper announcing the commencement of the FYR process for the Site, providing contact information for Gina Soscia and inviting community participation.

EPA will make the final FYR Report available to the public. EPA will place copies of the document in the designated site repository: West Cocalico Township office, located at 156B West Main Street, Reinholds, Pennsylvania.

6.3 Document Review

This FYR included a review of relevant, site-related documents, including the ROD, ESD, prior FYR reports, Annual Progress reports and recent monitoring data. Appendix A presents a complete list of the documents reviewed.

<u>ARARs Review</u>

Groundwater ARARs
The 1996 ROD identified MCLs established under the Safe Drinking Water Act as contaminant-specific ARARs for groundwater. However, in the ROD, EPA waived attainment of MCLs for the Site's remedy for the following reasons:

- *The residential wells around the Site are not contaminated with site-related contamination. This is because the rock strata are naturally aligned to direct any leaching contamination downward at such a steep angle that any potentially-contaminated groundwater is rapidly removed from surface availability.*
- *The capping of the landfilled area will eliminate or severely reduce infiltration of rainfall, which is the main driving force behind the production of leachate and migration of contaminants.*
- *The monitoring program as envisioned would install new wells that will further characterize the aquifer beyond the perimeter of the Site and monitor concentrations of any site-related contamination in the groundwater. These wells will also indicate the effectiveness of the cap in reducing the migration of contaminants.*

• *Because hazardous substances remain on site, reviews of the remedy will be conducted at least every five years. These FYRs will use the information gathered in the monitoring program to confirm that no resident is subject to unacceptable site-related risks and ensure that the remedy remains protective of human health and the environment. FYRs can also trigger further response actions if unacceptable risks are discovered.*

Soil, Surface Water and Sediment ARARs
Site decision documents did not identify any chemical-specific soil, surface water or sediment ARARs.

Institutional Control Review

On April 8, 2015, Skeo Solutions staff searched public records on the Lancaster County Recorder of Deeds website (http://www.lancasterdeeds.com/) and found deed information pertaining to the Site (Table 5). Based on review of property boundaries from the Lancaster County parcel viewer (LanCo View) and the landfill boundary limit from a June 2003 site survey (as presented in Figure 3 of the 2010 FYR), the landfill may be located within two parcels. Additional research is needed to confirm more definitive property boundaries in relation to the landfill limits.

Table 5: Deed Document from Lancaster County Recorder of Deeds

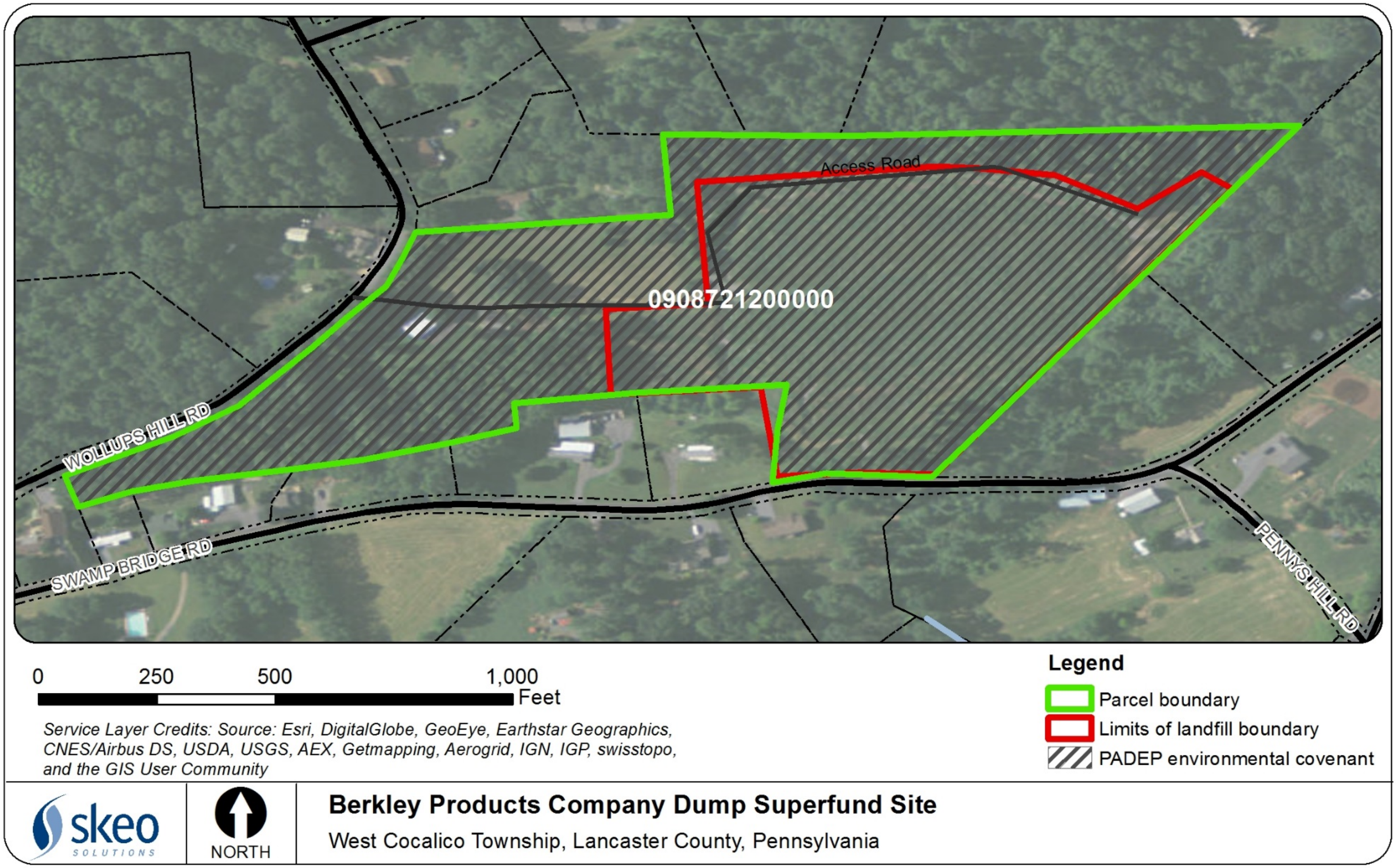
Date	Type of Document	Description	Instrument #	Book #	Page #	Parcel #
2/14/1992	Deed	Transfer of two tracts of land, totaling about 21 acres, to private owners. Lipton Paint & Varnish Co., Inc. is identified as a former property owner, but the deed does not identify the property as a former landfill.	3600184	3381	00246	0908721200000
9/9/1987	Deed	Transfer of about 1.1 acres of land to private owners.	3301066	2225	00225	0908171400000

During the deed search, Skeo Solutions staff also located the environmental covenant for the Site, recorded on October 23, 2013. PADEP executed the environmental covenant pursuant to the Pennsylvania Uniform Environmental Covenants Act , Act No. 68 of 2007, 27 PA C.S., Sections 6501 to 6517. The environmental covenant addresses the entire landfill, but only specifies parcel 0908721200000 as the parcel of interest. No institutional controls were found for parcel 0908171400000. Figure 4 identifies the boundaries of the environmental covenant. Additional institutional controls to address parcel 0908171400000 may be needed, pending the outcome of additional review or survey of property boundaries and clarification of landfill limits. Table 6 lists the institutional controls associated with areas of interest at the Site. Table 6 lists the institutional controls associated with areas of interest at the Site.

Table 6: IC Summary Table

Media	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel	IC Objective	Instrument in Place	Notes
Soil and Ground-water	Yes	Yes	0908721200000, 0908171400000	Prohibit drilling of wells on the landfill property, prohibit use of groundwater at and under the property for any purpose, and prohibit excavation of soil and construction of buildings or structures on the landfill property.	Environmental Covenant, Instrument # 6112018, Lancaster County Recorder of Deeds	Addresses parcel 0908721200000 only. No ICs were identified for the portion of the landfill that may be located on parcel 0908171400000.

Figure 4: Institutional Control Base 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.

6.4 Data Review

This data review incorporates groundwater, residential well, surface water/spring and landfill gas monitoring data originally presented in the 2010 through 2014 Annual Progress Reports, prepared by URS. During the FYR evaluation period, the most prevalent organic compound detected above evaluation criteria in groundwater was 1,4-dioxane, which was detected in multiple site monitoring wells and one residential well. Additional VOCs and metals exceeded evaluation criteria in select wells. Surface water and spring data showed no exceedances of surface water evaluation criteria. Methane has not exceeded its lower explosive limit (LEL) of 5 percent in landfill gas monitoring.

<u>Groundwater Monitoring Data</u>

URS sampled groundwater annually during the FYR period. During the 2010 and 2011 sampling events, sampling occurred at conventional well clusters MW-1 and MW-5 and at multiport wells for VOCs, SVOCs, total and dissolved metals, chloride, pesticides and PCBs. Sampling in 2010 and 2011 included a full suite of analyses in response to a recommendation in the 2010 FYR. In 2012, to address uncertainties with groundwater flow direction and evaluate groundwater contamination, URS installed two additional conventional monitoring well clusters (MW-15 and MW-16). Each cluster contained three individual monitoring wells targeting shallow (S), intermediate (I) and deep (D) hydrogeologic zones, for a total of six new wells. Figures 5 and 6 display the groundwater patterns. Now that 1,4-dioxane has been detected at numerous wells, it is recommended that new groundwater concentration maps should be generated in the investigation to define the extent of contamination

During annual sampling events in 2012 through 2014, URS monitored potentiometric surface and sampled only the conventional monitoring wells in clusters MW-1, MW-5, MW-15 and MW-16 for VOCs, metals and indicator parameters. SVOCs, pesticides and PCBs were removed from the analytical suite because these constituents were not detected during sampling in 2010 and 2011. Attachment B-1, in Appendix B, includes a summary of results from the most recent sitewide sampling event in June 2014.

The ROD did not establish numeric cleanup goals for site groundwater. In the 1996 ROD, EPA waived attainment of MCLs for the Site's remedy. To evaluate the data, URS compares the groundwater sampling results to the Pennsylvania Act 2 Media-specific Concentration (MSC) screening criteria (Act 2 MSCs) and the federal MCLs (both of which are referred to as evaluation criteria in the following discussion). During the FYR evaluation period, the most prevalent organic compound detected above evaluation criteria was 1,4-dioxane. Benzene, tetrahydrofuran, trichloroethylene (TCE) and dichloromethane sporadically exceeded evaluation criteria at a few sampling locations. Since 2013, 1,4-dioxane has been the only VOC detected above evaluation criteria in site monitoring wells. The Act 2 MSC for 1,4-dioxane is 6.4 micrograms per liter (µg/L); an MCL for 1,4-dioxane has not been established, but the EPA tapwater Regional Screening Level (RSL) is 0.78 µg/L, based on a cancer risk of 1×10^{-6}.

Data for 1,4-dioxane from conventional site monitoring wells are summarized in Table 7. All wells with exceedances of the Act 2 MSC or the EPA RSL, except for MW-1I, are located east and downgradient of the Site (Figure 7). MW-1I, which is part of the MW 1 cluster, is in a presumed upgradient direction from the Site. The source of 1,4-dioxane (about 2 μg/L) in this well is unknown.

Figure 5. Shallow Groundwater Contours

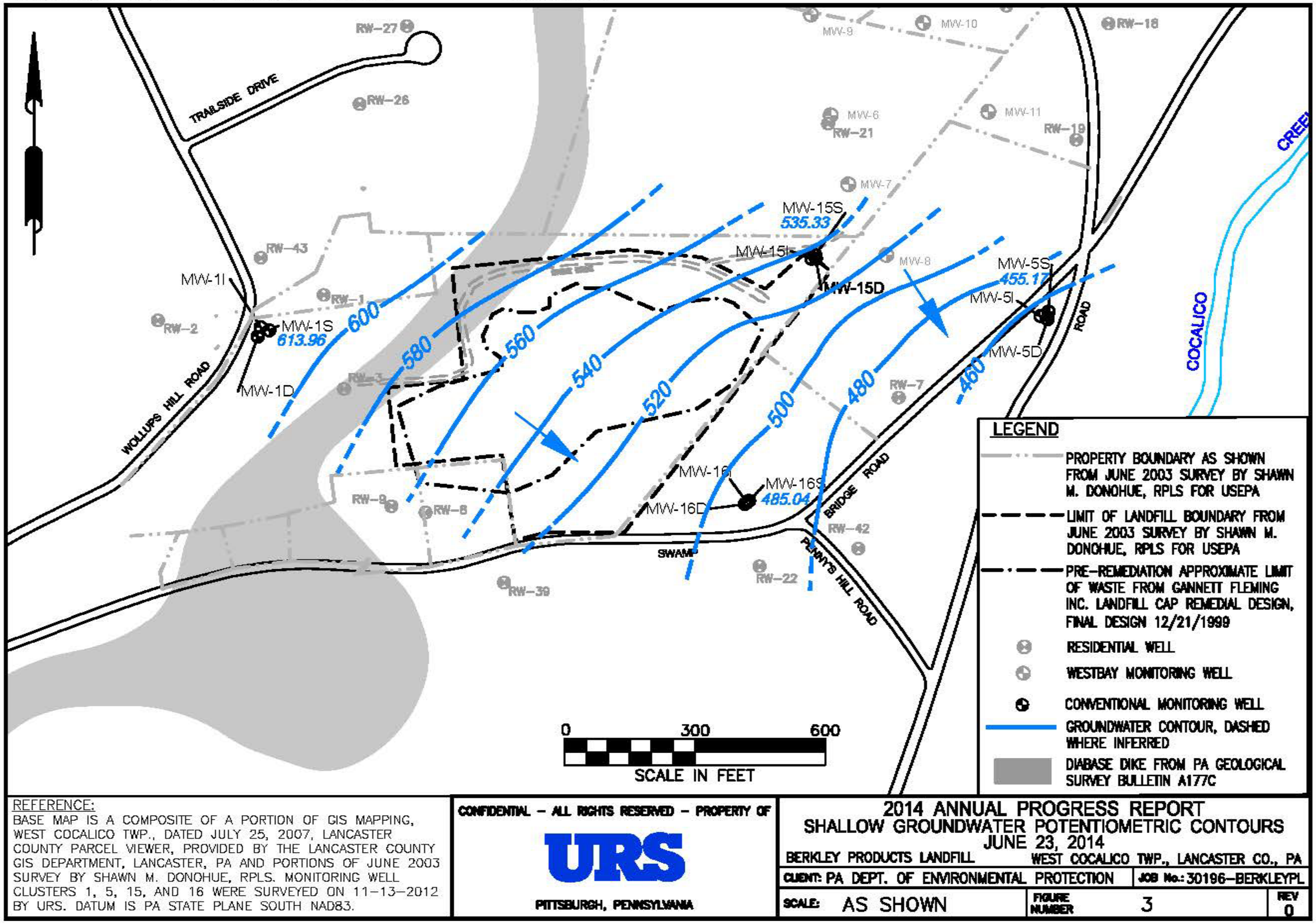


Figure 6. Intermediate Groundwater Contours

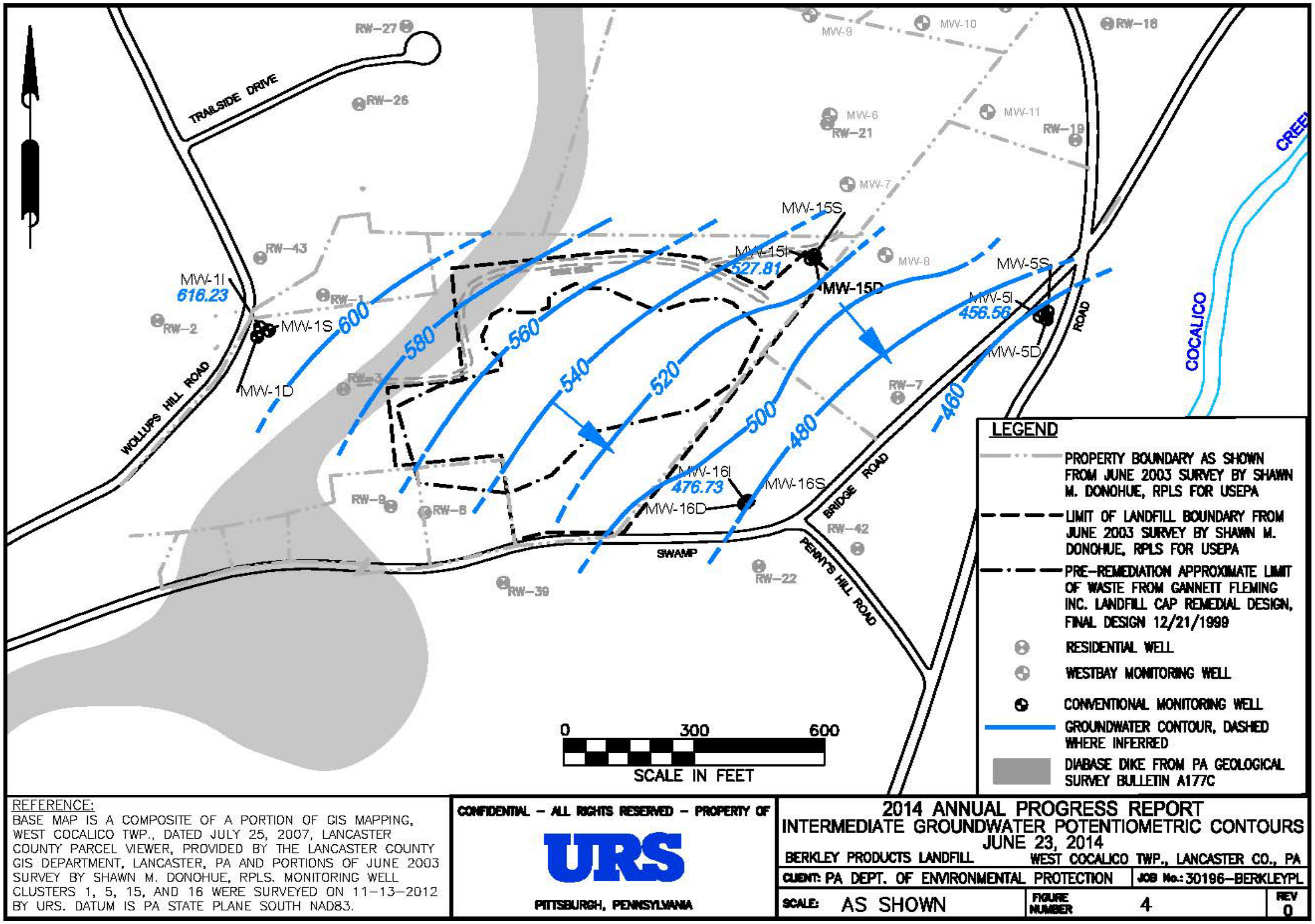
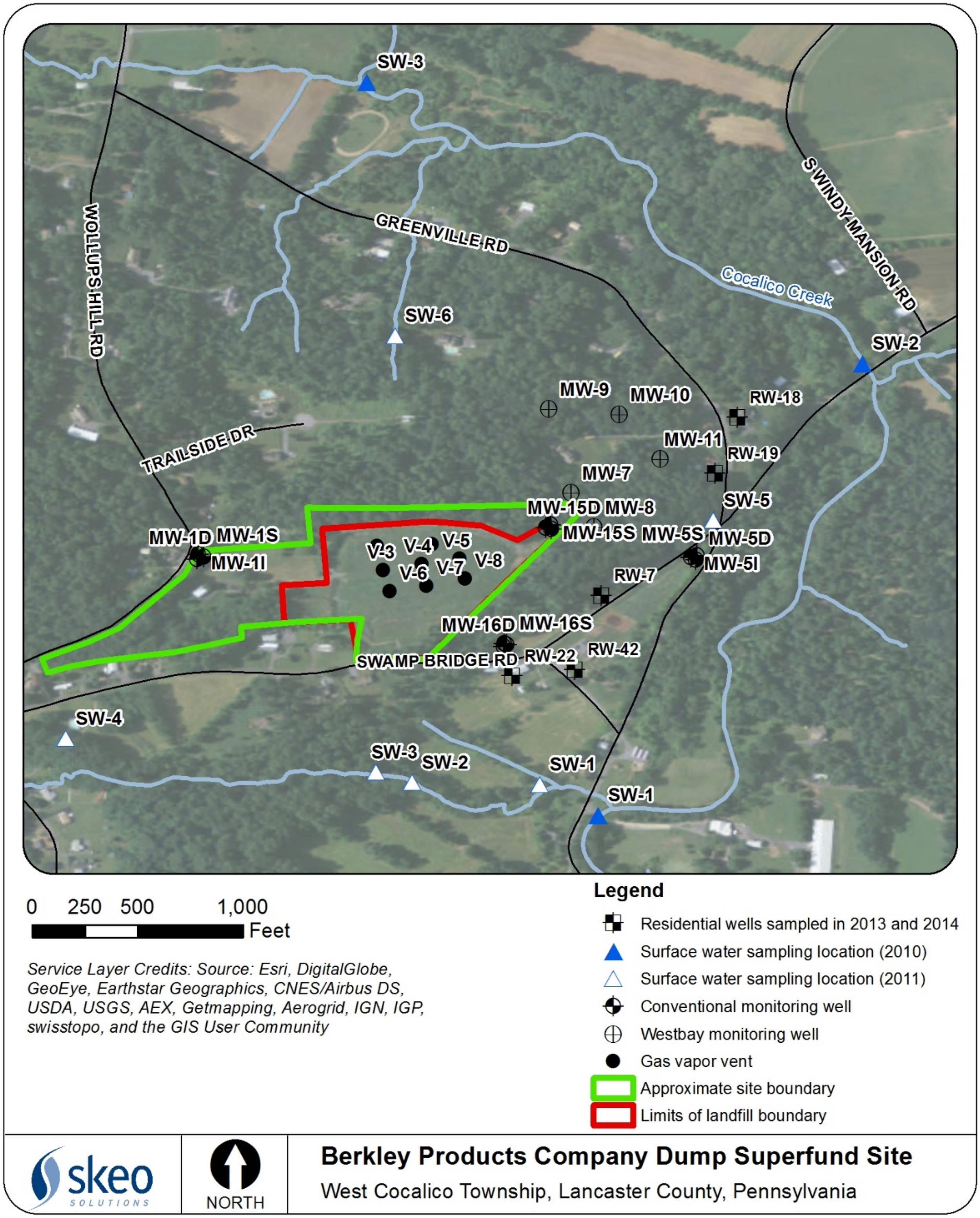


Figure 7: Monitoring Locations



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.

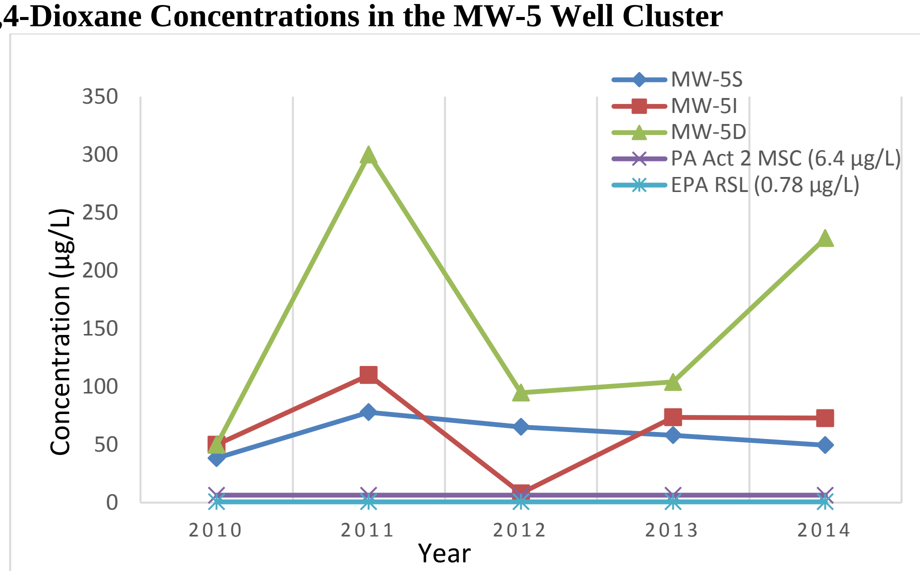
Table 7: 1,4-Dioxane Concentrations (µg/L) in Site Monitoring Wells, 2010-2014

Sampling Location[a]	1,4-Dioxane Concentrations (µg/L) by Year					Evaluation Criteria (µg/L)	
	2010	2011	2012	2013	2014	PA Act 2 MSC[b]	EPA Tapwater RSL[c]
MW-1S	50U	0.5U	2.5U	2.5U	2.5U	6.4	0.78
MW-1I	50U	**2.7**	2.5U	**3.02**	**2.06J**		
MW-1D	50U	0.5U	2.5U	2.5U	2.5U		
MW-5S	***38.4***	***78***	***65.2***	***58.1***	***49.6***		
MW-5I	50U	***110***	***8.1***	***73.5***	***72.9***		
MW-5D	50U	***300***	***94.8***	***104***	***228***		
MW-15S	NS[d]	NS	2.5U	2.5U	2.5U		
MW-15I	NS	NS	***10.6***	***12.3***	***17***		
MW-15D	NS	NS	***77***	***64***	***46.4***		
MW-16S	NS	NS	2.5U	2.5U	2.5U		
MW-16I	NS	NS	2.5U	2.5U	2.5U		
MW-16D	NS	NS	2.5U	2.5U	2.5U		

a) Sampling locations include conventional well locations only
b) PA Act 2 Appendix A - MSCs in Groundwater (Updated 2010)
c) EPA Region 3 RSLs for Tapwater (January 2015) with target hazard quotient of 0.1 and cancer risk of 1 x 10^{-6}
d) NS – Not Sampled
e) Bold result denotes an exceedance of a EPA RSL; Bold and italicized result denotes an exceedance of PA Act 2 MSC and RSL
f) J – Estimated value
g) U – Undetected at the stated detection limit

Groundwater from well clusters MW-5 and MW-15 consistently contained 1,4-dioxane above the Act 2 MSC and EPA RSL. The MW-5 cluster reports the highest concentrations of 1,4-dioxane, with concentrations generally increasing with depth (Table 7). Concentrations of 1,4-dioxane in the MW-5 cluster have fluctuated with no significant trends over the FYR period (Figure 8).

Figure 8: 1,4-Dioxane Concentrations in the MW-5 Well Cluster



Note: 1,4-Dioxane was not detected in MW-5I or MW-5D in 2010; the detection limit (50 µg/L) is used in the above graph.

Total and/or dissolved metals, including aluminum, arsenic, barium, beryllium, chromium, cobalt iron, lead, manganese, mercury, nickel and vanadium, have also exceeded either the Act 2 MSC or the federal MCL at one or more conventional well locations. Aluminum, iron and manganese are the most prevalent metals exceeding evaluation criteria at the conventional monitoring wells. The results are generally consistent with historical results, with the exception of total mercury at MW-5S and several metals at MW-15I. Concentrations of total mercury have increased slightly at MW-5S to a five-year maximum in 2014 (7.48 µg/L) compared to the Act 2 MSC and federal MCL of 2 µg/L (Table 8). At MW-15I, metal concentrations in 2014 were elevated compared to prior sampling results (Table 9). In 2014, several dissolved metals (aluminum, arsenic, barium, beryllium, chromium, cobalt, iron, lead, manganese, mercury, nickel and vanadium) exceeded their MCLs or Act 2 MSCs at MW-15I.

Table 8: Total Mercury Concentration (µg/L) in Well 5S, 2010-2014

	2010	2011	2012	2013	2014
Mercury	5.97	0.96	0.2U	3.69	7.48
Notes: U = not detected, detection limit given					

Table 9: Dissolved Metal Concentrations (µg/L) in Well 15I, 2012-2014

	Act 2 MSC	MCL	2012	2013	2014
Aluminum	200	-	200U	200U	114,000
Arsenic	10	10	3U	3U	24.1
Barium	2,000	2,000	189	202	5,314
Beryllium	4	4	1U	1U	19
Chromium	100	100	50U	50U	382
Cobalt	11	-	50U	50U	202
Iron	300	-	20U	20U	170,000
Lead	5	15	1U	1U	180
Manganese	300	-	133	31	10,200
Mercury	2	2	0.25	0.2U	2.1
Nickel	100	-	50U	50U	529
Vanadium	260	-	20U	20U	356
Notes: U = not detected, detection limit given					

<u>Residential Well Monitoring</u>

URS sampled residential wells in 2010 (27 wells), 2011 (26 wells), 2013 (5 wells) and 2014 (5 wells) for site-related constituents. Beginning in 2013, samples were analyzed for VOCs and indicator parameters only and the number of residential wells sampled was reduced because site-related contamination had not been identified in the wells. EPA and PADEP also agreed to reduce metals analysis from the residential well parameter list after comparing a subset of metals (copper, iron, lead and zinc) that were above State standards in residential wells but were not detected at the same levels in the monitoring wells between the landfill and the residential wells. This metals evaluation was included in the 2011 Annual Progress Report. Going forward, EPA and PADEP will re-evaluate the metal concentrations in the residential wells. Figure 3 includes a comprehensive map of residential wells near the Site that were sampled in prior years. Appendix B includes a summary of results from the most recent annual sampling event in July 2014 for both the monitoring wells and the residential wells.

Residential well results were compared to Act 2 MSCs and EPA RSLs for tapwater, based on a cancer risk level of 1 x 10^{-6} and noncancer hazard index of 0.1. During the FYR period, 1,4-dioxane was the only VOC detected in residential wells above the EPA RSL of 0.78 µg/L; however, 1,4-dioxane was below the Act 2 MSC of 6.4 µg/L on all occasions. 1,4-Dioxane was only detected in one residential well which is located immediately downgradient of the Site. Table 10 summarizes 1,4-dioxane concentrations in the residential well since 2010, the first year 1,4-dioxane was included in sampling. Because 1,4-dioxane was detected in one well during the 2014 annual sampling event, PADEP and EPA added quarterly monitoring for VOCs, including 1,4-dioxane, at five downgradient residential wells.

Table 10: 1,4-Dioxane Concentrations (µg/L) in One Residential Well

1,4-Dioxane (µg/L)								
	2010	**2011**	**2012**	**2013**	**2014 (June)**	**2014 (December)**	**PA Act 2 MSC[a]**	**EPA Tapwater RSL[a]**
RW	50U	2.3	NS	2.5U	1.19J	1.95J	6.4	0.78

a) Results are compared to EPA Region 3 RSLs for Tapwater (January 2015) with a target hazard quotient of 0.1 and cancer risk of 1 x 10^{-6} and the PADEP Act 2 Appendix A - MSCs in Groundwater (Updated 2010).
b) U - Not detected at stated detection limit
c) J – estimated concentration
d) NS – Not Sampled

Total and dissolved metals, including copper, iron, lead, nickel and zinc, exceeded Pennsylvania Act 2 MSCs or tapwater RSLs, or both, at multiple residential wells when they were included in the analysis (2010 and 2011). Based on the 2011 metals evaluation, URS found that the elevated concentrations likely are not related to the landfill because monitoring wells between the landfill and the residential wells had lower concentrations for this subset of metals. Because mercury and other metals not included in the 2011 metals evaluation have been detected recently in site monitoring wells (MW-5S and MW-15I) at concentrations above evaluation criteria, sampling for select metals, such as arsenic, beryllium, chromium and mercury, in downgradient residential wells is recommended to determine current concentrations.

Surface Water Monitoring

Surface water sampling occurred at three surface water locations in 2010 and at four different surface water locations and two spring locations in 2011 (Figure 7 depicts sample locations). Surface water and spring analytical results were compared to the Water Quality Criteria for Toxic Substances, PA Code, Title 25, Chapter 16, Appendix A, Table 1. The value selected for screening was the lower value for either human health or fish and aquatic life criteria (continuous or maximum) levels. No exceedances of the screening criteria were reported for any of the surface water and spring samples collected in 2010 and 2011.

The locations at which surface water samples were collected in 2010 and 2011 differed, yet identical sample names were selected for both years (SW-1 through SW-3). In the future, EPA is requesting that PADEP contractors select distinct sample names for each location, without repeating those already used.

Landfill Gas Monitoring

Landfill gas monitoring occurred annually. The gas monitoring program included field monitoring of eight landfill gas vents (V-1 through V-8) and one ambient air location for methane, carbon dioxide and oxygen. Cumulative results are presented in Attachment B-2 of Appendix B. Landfill gas results are consistent with historical results with the exception of methane and carbon dioxide in gas vent V-3 in 2010. Methane was measured at 4.5 percent and carbon dioxide was measured at 6.5 percent. Methane and carbon dioxide returned to historical levels from 2011 through 2014. Detected methane was below the 100 percent LEL of 5 percent during all monitoring events.

6.5 Site Inspection

EPA performed the FYR site inspection on March 31, 2015. In attendance were Roy Schrock, EPA RPM; David Hrobuchak, PADEP; Frederic Coll, URS; and Ryan Burdge and Jill Billus, Skeo Solutions. For a full list of site inspection activities, see the Site Inspection Checklist in Appendix C. Site photographs are available in Appendix D.

Site inspection participants met at the West Cocalico Township municipal office. The group talked briefly about progress at the Site within the last five years, which included implementation of institutional controls, sampling for 1,4-dioxane in monitoring and residential wells and reconstruction of the sedimentation basins. Mr. Hrobuchak of PADEP informed the group that the residence at which 1,4-dioxane has been detected now has a water treatment system, installed by the owner which is capable of removing the 1-4 dioxane from the tap. The group also met with a representative of West Cocalico Township to obtain his impressions of the Site. The group also inquired about the availability of site documents because the West Cocalico Township municipal office, located at 156B West Main Street, Reinholds, Pennsylvania 17569, is the site repository. None of the prior FYRs for the Site was available at the site repository for review.

Site inspection participants first accessed the southern portion of the Site from Swamp Bridge Road and observed the upgrades to sedimentation pond 1 and the principal and emergency spillways. The site inspection team observed limited water in the sedimentation pond, which also appeared vegetated and in good condition. Mr. Frederic Coll of URS noted that there have not been any drainage or overflow problems since the upgrades were completed in 2012.

Site inspection participants then drove to the main access to the Site, which is via a residential driveway off of Wollups Hill Road. Participants walked the along the western, northern and eastern portions of the Site, primarily on the northern access road, and observed the landfill, rip-rap channels and sedimentation basins. The security and access to the Site were in good condition with no signs of vandalism. The landfill cap was vegetated with grasses and in good condition with no signs of erosion or deep root vegetation. Mr. Hrobuchak of PADEP indicated that the landfill grasses had last been mowed in late summer. He also noted that signs of burrowing animals such as groundhogs are periodically observed during inspections; the burrows are repaired and animals removed as needed. During the site inspection, no animal burrows were observed.

Site inspection participants observed the repairs at sedimentation pond 2. The pond was vegetated and in good condition. URS staff pointed out various monitoring wells at the Site. The wells were secured with locks and not accessible during the inspection. The gas vents on the landfill were also in good condition and there were no visible signs of gas emissions or leachate drainage to the vegetation.

Site inspection participants also drove by several properties at which residential well samples are periodically collected. The team also observed West Cocalico Creek near Penny's Hill Road.

6.6 Interviews

The FYR process included interviews with parties affected by the Site. The purpose was to document the perceived status of the Site and any perceived problems or successes with the phases of the remedy implemented to date. On March 31, 2015, EPA and PADEP met with a representative of West Cocalico Township at the township building. EPA discussed the FYR process and purpose of the review. The West Cocalico Township representative was aware of the Site and recent drainage issues, but knew that they had been corrected. He had no issues of concern with the Site and was pleased EPA and PADEP were keeping the Township informed.

EPA plans to send site decision documents and FYRs to the site repository at the West Cocalico Township municipal office, located at 156B West Main Street, Reinholds, Pennsylvania 17569.

7.0 Technical Assessment

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

The remedy is functioning as intended by the decision documents with some exceptions. The landfill cap prevents direct exposure to contaminated soil and landfill materials and helps to limit the potential for migration of contaminants to groundwater. However, a newly identified chemical, 1,4-dioxane, has been detected in site groundwater above the Act 2 MSC and EPA RSL, and at one residential well at concentrations above the EPA RSL based on a cancer risk of 1 x 10-6. This residential well does have a treatment system which is capable of removing the 1, 4-dioxane. Based on review of the current monitoring well network, the extent of 1,4-dioxane contamination is undefined east and downgradient of the MW-5 cluster (Figure 7). With the exception of residential well RW-7, no other residential wells downgradient of the Site on the western side of Cocalico Creek have detected 1,4-dioxane. However, it is unclear if Cocalico Creek is the discharge point for groundwater in all zones monitored (shallow, intermediate and deep), or if there is potential for some contamination to migrate beyond the creek to the east, particularly in the deeper zones where concentrations of 1,4-dioxane are greatest. Additional evaluation is warranted to address these uncertainties and to determine if any residential wells east of Cocalico Creek are affected by site-related contamination. Additional evaluation may also be warranted to determine a source of 1,4-dioxane in MW-1I.

Elevated concentrations of metals were detected in MW-5S and MW-15I. Several of the detected metals (arsenic, beryllium, chromium and mercury) were not included in the 2011 background metals evaluation because they were not found above the Act 2 MSCs. The particular metals evaluated in 2011 (Ba, Cu, Fe, Pb, Mn, Ni and Zn) was based upon these constituents exceeding Act 2 MSCs. Residential well data from 2010 and 2011 did not identify arsenic, beryllium, chromium and mercury above levels of concern in downgradient residential wells; however, current data should be collected.

In 2010, methane was detected in gas vent V-3 at a level near the explosive range (4.8 percent by volume compared to the methane LEL of 5 percent). However in the 2011 and 2014 Annual reports the methane was below the 2010 reading and below the LEL.

Institutional controls (ICs) to restrict excavation and construction on the landfill cap and groundwater use have been implemented for parcel 0908721200000, which includes the majority of the landfill. Site and county maps suggest that a small portion of the landfill may be located on parcel 0908171400000. Parcel 0908171400000 is not identified in the environmental covenant for the Site. Additional research or a land survey may be needed to determine if a portion of the landfill is located on parcel 0908171400000, and if additional institutional controls are needed to maintain the integrity of the remedy and restrict exposure on this parcel. ICs are not in place to address groundwater contamination which has been found beyond the property boundary.

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

No, the exposure assumptions, risk methodology, and toxicity factors used previously have changed. However, these changes do not change the protectiveness of the remedy. The indirect human exposure to groundwater contamination by inhalation of VOC vapors in indoor air was not addressed in the human health risk assessment. The potential for vapor intrusion to indoor air was evaluated as part of the 2010 FYR and is re-evaluated in this FYR using data collected within the last five years.

To determine if current VOC concentrations in Site groundwater remain protective of the vapor intrusion exposure pathway, maximum VOC concentrations in shallow wells sampled in June 2014 and maximum VOC concentrations from five residential wells were entered into EPA's Vapor Intrusion Screening Level (VISL) calculator to calculate cancer risk and noncancer hazard indices. Of the four VOCs detected (carbon disulfide, 1,4-dichlorobenzene, tetrahydrofuran and 1,4-dioxane) in 2014, three of the four were sufficiently volatile and could be carried forward in the risk calculations; 1,4-dioxane was not identified as a VOC in the VISL calculator. The VISL calculator indicated that none of the chemicals resulted in an individual cancer risk exceeding 1 x 10-6 or a noncancer HI of 1 (Appendix E). Results of this evaluation suggest vapor intrusion is not a concern at this time; however, it should be noted that the VI groundwater-based modeling is less certain than actual sampling. The pathway should be re-evaluated if VOC concentrations increase or migrate within 100 feet of another occupied building.

Since the previous FYR, 1,4-dioxane has been detected in multiple site monitoring wells and residential well RW-7. Detected 1,4-dioxane concentrations at this residential well are within EPA's risk management range of 1 x 10-6 to 1 x 10-4 and are considered acceptable at this time. However, the residential wells should continue to be monitored to ensure that concentrations remain protective. The homeowner at RW-7 recently independently installed a water treatment system that is removing 1,4-dioxane. December 2014 sampling results indicated 1,4-dioxane at 1.95 µg/L in a water sample collected prior to treatment and non-detect in the water sample collected after passing through the water treatment system.

It should be noted that 1,4-dioxane concentrations in monitoring wells upgradient of the residential wells are associated with a cancer risk above 1E-4.

Institutional controls restrict excavation and construction on the landfill cap and groundwater use for parcel 0908721200000, which includes the majority of the landfill. Site and county maps suggest that a small portion of the landfill may be located on parcel 0908171400000, which is not identified in the environmental covenant for the Site. Additional research or a land survey are needed to determine if part of the landfill is located on parcel 0908171400000, and if additional institutional controls are needed to maintain the integrity of the remedy and restrict exposure on this parcel.

The 1996 ROD did not establish numeric cleanup levels for site media. In the 1996 ROD, EPA waived attainment of MCLs for the Site's remedy. Now that site-related contamination (1,4-dioxane) has migrated beyond the landfill boundary and has also been detected in a residential well a groundwater remedy will need to be considered for the Site.

No changes in the risk assessment methodology and toxicity factors call into question the protectiveness of the remedy.

Because the ROD did not establish numeric cleanup levels for site media, the Annual Progress Reports evaluate groundwater and surface water data relative to the most recent Pennsylvania groundwater criteria and surface water criteria (protective of ecological receptors), federal MCLs, and EPA RSLs. The Annual Progress reports then base recommendations for further evaluation or remedial measures on the evaluation results. An updated evaluation of the potential for vapor intrusion did not identify any issues of concern at this time.

The groundwater remedy will be re-considered due to identification of 1,4-dioxane in groundwater. The RAO with respect to groundwater is not being met due to the presence of 1,4-dioxane in the groundwater beyond the boundary of the landfill.

7.3 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.

7.4 Technical Assessment Summary

The landfill cap prevents direct exposure to contaminated soil. A new contaminant for groundwater, (1,4-dioxane), has been identified since the previous FYR. Concentrations of 1,4-dioxane beyond the landfill boundary are associated with a cancer risk above 1E-4 and also exceed the Act 2 MSC. Concentrations in one residential well exceed the EPA tapwater RSL based on a cancer risk of 1 x 10-6 (0.78 µg/L) but are below the RSL based on a cancer risk of 1 x 10-5 (7.8 µg/L). Detected 1,4-dioxane concentrations at the residential well are within EPA's risk management range of 1 x 10-6 to 1 x 10-4 and are considered acceptable at this time. However, additional investigation of 1,4-dioxane is warranted to define the horizontal and vertical extent of 1,4-dioxane contamination. The remedy did not address1,4- dioxane in groundwater. Upon completion of the groundwater investigation, EPA should determine the appropriate remedial action.

Additional investigation is recommended to evaluate metal contamination in MW-5S and MW-15I.

Institutional controls restrict excavation and construction on the landfill cap and groundwater use for parcel 0908721200000, which includes the landfill.

Results of a vapor intrusion screening assessment found that vapor intrusion to indoor air is not a current issue for the Site or downgradient residential properties.

The 1996 ROD did not establish numeric cleanup levels for site media. A decision document may be needed to establish numeric cleanup levels for groundwater.

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

8.0 Issues

Table 11 summarizes the current Site issues.

Table 11: Current Site Issues

Issue	Affects Current Protectiveness?	Affects Future Protectiveness?
The extent of 1,4-dioxane and metal contamination in groundwater is not defined.	Yes	Yes
ICs were not found for the portion of the landfill that may be located on parcel 0908171400000.	No	Yes

9.0 Recommendations and Follow-up Actions

Table 12 provides recommendations to address the current Site issues.

Table 12: Recommendations to Address Current Site Issues

Issue	Recommendation / Follow-Up Action	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
The extent of 1,4-dioxane and metal contamination in groundwater is not defined.	Define the extent of 1,4-dioxane and metal contamination in groundwater. Determine if site groundwater discharges to Cocalico Creek or migrates beyond the creek to downgradient receptors at unacceptable levels. Upon completion of the groundwater investigation, determine the appropriate remedial action. Continue to monitor residential wells to ensure residents remain protected.	PADEP/EPA	EPA	09/27/2016	Yes	Yes
ICs were not found for the portion of the landfill that may be located on parcel 0908171400000.	Conduct additional research and a land survey to determine if a portion of the landfill is located on parcel 0908171400000. If part of the landfill is located on this parcel, implement additional institutional controls to maintain the integrity of the remedy and restrict exposure on this parcel.	PADEP/EPA	EPA	09/27/2016	No	Yes

10.0 Protectiveness Statement

A protectiveness determination of the remedy at the Berkley Products Dump Superfund Site cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions:

- Define the extent of 1,4-dioxane and metal contamination in groundwater. Determine if site groundwater discharges to Cocalico Creek or migrates beyond the creek to downgradient receptors at unacceptable levels. Upon completion of the groundwater investigation, determine the appropriate remedial action. Continue to monitor residential wells to ensure residents remain protected.

It is expected that these actions will take approximately one year to complete, at which time a protectiveness determination will be made.

11.0 Next Review

The next FYR will be due within five years of the signature/approval date of this FYR.

Appendix A: List of Documents Reviewed

2010 Annual Progress Report, Berkley Products Landfill Site, West Cocalico Township, Lancaster County, PA. Prepared by URS Corporation. May 2011.

2011 Annual Progress Report, Berkley Products Landfill Site, West Cocalico Township, Lancaster County, PA. Prepared by URS Corporation. April 2012.

2013 Annual Progress Report, Berkley Products Landfill Site, West Cocalico Township, Lancaster County, PA. Prepared by URS Corporation. October 2013.

2014 Annual Progress Report – Letter Report Submittal, Berkley Products Landfill Site, West Cocalico Township, Denver, Lancaster County, PA. Prepared by URS Corporation. December 9, 2014.

Explanation of Significant Differences, Berkley Products Co. Dump, Denver, PA. Prepared by USEPA, Region III. August 20, 1999.

First Five-Year Review Report for Berkley Products Company Dump Superfund Site, West Cocalico Township, Lancaster County, Pennsylvania. Prepared by USEPA, Region III. August 2005.

Monitoring Well Installation and 2012 Annual Progress Report, Berkley Products Landfill Site, West Cocalico Township, Lancaster County, PA. Prepared by URS Corporation. May 2013.

Operations and Maintenance Work Plan – Final, Berkley Products Landfill Site, West Cocalico Township, Lancaster County, PA. Prepared by URS Corporation. September 2003.

Post-Closure Operations and Maintenance Plan for Berkley Products Site, Landfill Cap Remedial Action, Lancaster County, Pennsylvania. Prepared by Tetratech NUS, Incorporated. December 2001, revised February 3, 2003.

Record of Decision, Berkley Products Co. Dump, Denver, Pennsylvania. Prepared by USEPA, Region III. June 28, 1996.

Second Five-Year Review Report for Berkley Products Company Dump Superfund Site, West Cocalico Township, Lancaster County, Pennsylvania. Prepared by USEPA, Region III. September 2010.

Appendix B: Data Review Supporting Documentation

Attachment B-1: Groundwater Analytical Data

(Source: 2014 Annual Progress Report, dated December 2014, prepared by URS)

Table 4A. Conventional Monitoring Well Groundwater Analytical Results - VOCs.
2014 Annual Progress Report
Berkley Products Landfill Site
West Cocalico Township, Lancaster County, PA

Compound	CAS #	Units	PADEP MSC	EPA Screening Level	MW-1S		MW-1I		MW-1D		MW-5S		MW-5S (Dup)		MS-5I		MW-5D	
			Sample Date:		6/23/14		6/23/14		6/23/14		6/24/14		6/24/14		6/24/14		6/24/14	
PADEP Bureau of Labs (BOL)			BOL Sequence ID #:		004		003		002		013		014		012		011	
VOCs (µg/L)																		
(1,1-Dimethylethyl)benzene	98066	µg/L	1,500	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
(1-Methylethyl)benzene	98828	µg/L	840	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
(1-Methylpropyl)benzene	135988	µg/L	1,500	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1,1,2-Tetrachloroethane	630206	µg/L	70	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1,1-Trichloroethane	71556	µg/L	200	200	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1,2,2-Tetrachloroethane	79345	µg/L	0.8	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1,2-Trichloroethane	79005	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethane	75343	µg/L	31	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	75354	µg/L	7	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloropropene	563586	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2,3-Trichlorobenzene	87616	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2,3-Trichloropropane	96184	µg/L	40	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2,4-Trichlorobenzene	120821	µg/L	70	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2,4-Trimethylbenzene	95636	µg/L	15	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dibromo-3-Chloropropane	96128	µg/L	0.2	0.2	0.020	U	0.0198	U	0.0198	U	0.02	U	0.0196	U	0.0203	U	0.020	U
1,2-Dibromoethane	106934	µg/L	0.05	0.05	0.020	U	0.0198	U	0.0198	U	0.02	U	0.0196	U	0.0203	U	0.020	U
1,2-Dichlorobenzene	95501	µg/L	600	600	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dichloroethane	107062	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dichloropropane	78875	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,3,5-Trimethylbenzene	108678	µg/L	13	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,3-Dichlorobenzene	541731	µg/L	600	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,3-Dichloropropane	142289	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,4-Dichlorobenzene	106467	µg/L	75	75	0.5	U	0.5	U	0.5	U	**0.56**		**0.54**		**0.52**		**0.6**	
1-Chloro-4-(trifluoromethyl)benzene	98566	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
2,2-Dichloropropane	594207	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
2-Butanone	78933	µg/L	4,000	-	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
2-Hexanone	591786	µg/L	11	-	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
2-Methoxy-2-methyl propane (MTBE)	1634044	µg/L	20	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
4-Isopropyltoluene	99876	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
4-Methyl-2-pentanone	108101	µg/L	2,900	-	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Acetone	67641	µg/L	33,000	-	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Benzene	71432	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Bromobenzene	108861	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Bromodichloromethane	75274	µg/L	80	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Bromoform	75252	µg/L	80	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Bromomethane	74839	µg/L	10	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Carbon Disulfide	75150	µg/L	1,500	-	**1.2**		**18.6**		**16.4**		**0.64**		0.5	U	**1.1**		**5.5**	
Carbon Tetrachloride	56235	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Chlorobenzene	108907	µg/L	100	100	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Chloroethane	75003	µg/L	230	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Chloroform	67663	µg/L	80	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Chloromethane	74873	µg/L	30	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	156592	µg/L	70	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,3-Dichloropropene	10061015	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dibromochloromethane	124481	µg/L	80	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dibromomethane	74953	µg/L	370	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dichlorodifluoromethane	75718	µg/L	1,000	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dichloromethane	75092	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Ethylbenzene	100414	µg/L	700	700	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Hexachlorobutadiene	87683	µg/L	8.5	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
m,p-Xylene	108383	µg/L	-	-	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Naphthalene	91203	µg/L	100	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
N-Butylbenzene	104518	µg/L	1,500	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
n-Propylbenzene	103651	µg/L	1,500	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
O-Chlorotoluene	95498	µg/L	100	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
o-Xylene	95476	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
P-Chlorotoluene	95498	µg/L	100	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Styrene	100425	µg/L	100	100	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
t-Butyl Alcohol	75650	µg/L	-	-	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
tert-Butyl Acetate	540885	µg/L	5	-	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Tetrachloroethene	127184	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Tetrahydrofuran	109999	µg/L	25	-	0.5	U	0.5	U	0.5	U	**6.1**		**5.0**		0.5	U	0.5	U
Toluene	108883	µg/L	1,000	1,000	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
trans-1,2-Dichloroethene	156605	µg/L	100	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
trans-1,3-Dichloropropene	10061026	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Trichloroethene	79016	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Trichlorofluoromethane	75694	µg/L	2,000	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl Acetate	108054	µg/L	420	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	75014	µg/L	2	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,4-Dioxane	123911	µg/L	6.4	-	2.5	U	**2.06**	J	2.5	U	**49.6**		**49.1**		**72.9**		**228**	

Notes:
Results compared to EPA Maximum contaminant levels (MCLs) (EPA 816-F-09-004, May 2009) and PADEP Act 2 Appendix A - Medium -Specific Concentrations (MSCs) in Groundwater (Updated 2010).
Detections above MCLs and MSCs are highlighted.
Positive detections are in bold.
U = Not Detected, detection limit given
J = Indicates an estimated value, below the quantitation limit, but above the detection limit.
µg/L - Micrograms per Liter.

Table 4A. Conventional Monitoring Well Groundwater Analytical Results - VOCs.
2014 Annual Progress Report
Berkley Products Landfill Site
West Cocalico Township, Lancaster County, PA

Compound	CAS #	Units	PADEP MSC	EPA Screening Level	MW-15S		MW-15I		MW-15D		MW-16S		MW-16I		MW-16D		TB-01	
			Sample Date:		6/24/14		6/24/14		6/24/14		6/24/14		6/24/14		6/24/14		6/23/14	
PADEP Bureau of Labs (BOL)			BOL Sequence ID #:		007		006		005		010		009		008		001	
VOCs (µg/L)																		
(1,1-Dimethylethyl)benzene	98066	µg/L	1,500	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
(1-Methylethyl)benzene	98828	µg/L	840	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
(1-Methylpropyl)benzene	135988	µg/L	1,500	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1,1,2-Tetrachloroethane	630206	µg/L	70	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1,1-Trichloroethane	71556	µg/L	200	200	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1,2,2-Tetrachloroethane	79345	µg/L	0.8	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1,2-Trichloroethane	79005	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethane	75343	µg/L	31	-	0.5	U	**0.65**		**0.86**		0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	75354	µg/L	7	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloropropene	563586	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2,3-Trichlorobenzene	87616	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2,3-Trichloropropane	96184	µg/L	40	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2,4-Trichlorobenzene	120821	µg/L	70	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2,4-Trimethylbenzene	95636	µg/L	15	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dibromo-3-Chloropropane	96128	µg/L	0.2	0.2	0.0195	U	0.0196	U	0.0199	U	0.0203	U	0.020	U	0.020	U	0.020	U
1,2-Dibromoethane	106934	µg/L	0.05	0.05	0.0195	U	0.0196	U	0.0199	U	0.0203	U	0.020	U	0.020	U	0.020	U
1,2-Dichlorobenzene	95501	µg/L	600	600	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dichloroethane	107062	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dichloropropane	78875	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,3,5-Trimethylbenzene	108678	µg/L	13	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,3-Dichlorobenzene	541731	µg/L	600	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,3-Dichloropropane	142289	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,4-Dichlorobenzene	106467	µg/L	75	75	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1-Chloro-4-(trifluoromethyl)benzene	98566	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
2,2-Dichloropropane	594207	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
2-Butanone	78933	µg/L	4,000	-	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
2-Hexanone	591786	µg/L	11	-	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
2-Methoxy-2-methyl propane (MTBE)	1634044	µg/L	20	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
4-Isopropyltoluene	99876	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
4-Methyl-2-pentanone	108101	µg/L	2,900	-	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Acetone	67641	µg/L	33,000	-	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Benzene	71432	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Bromobenzene	108861	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Bromodichloromethane	75274	µg/L	80	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Bromoform	75252	µg/L	80	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Bromomethane	74839	µg/L	10	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Carbon Disulfide	75150	µg/L	1,500	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Carbon Tetrachloride	56235	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Chlorobenzene	108907	µg/L	100	100	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Chloroethane	75003	µg/L	230	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Chloroform	67663	µg/L	80	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Chloromethane	74873	µg/L	30	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	156592	µg/L	70	70	0.5	U	0.5	U	**0.75**		0.5	U	0.5	U	0.5	U	0.5	U
cis-1,3-Dichloropropene	10061015	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dibromochloromethane	124481	µg/L	80	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dibromomethane	74953	µg/L	370	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dichlorodifluoromethane	75718	µg/L	1,000	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dichloromethane	75092	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Ethylbenzene	100414	µg/L	700	700	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Hexachlorobutadiene	87683	µg/L	8.5	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
m,p-Xylene	108383	µg/L	-	-	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Naphthalene	91203	µg/L	100	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
N-Butylbenzene	104518	µg/L	1,500	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
n-Propylbenzene	103651	µg/L	1,500	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
O-Chlorotoluene	95498	µg/L	100	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
o-Xylene	95476	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
P-Chlorotoluene	95498	µg/L	100	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Styrene	100425	µg/L	100	100	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
t-Butyl Alcohol	75650	µg/L	-	-	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
tert-Butyl Acetate	540885	µg/L	5	-	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Tetrachloroethene	127184	µg/L	5	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Tetrahydrofuran	109999	µg/L	25	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Toluene	108883	µg/L	1,000	1,000	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
trans-1,2-Dichloroethene	156605	µg/L	100	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
trans-1,3-Dichloropropene	10061026	µg/L	-	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Trichloroethene	79016	µg/L	5	5	0.5	U	0.5	U	**0.94**		0.5	U	0.5	U	0.5	U	0.5	U
Trichlorofluoromethane	75694	µg/L	2,000	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl Acetate	108054	µg/L	420	-	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	75014	µg/L	2	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,4-Dioxane	123911	µg/L	6.4	-	2.5	U	**17.0**		**46.4**		2.5	U	2.5	U	2.5	U	2.5	U

Notes:
Results compared to EPA Maximum contaminant levels (MCLs) (EPA 816-F-09-004, May 2009) and
PADEP Act 2 Appendix A - Medium -Specific Concentrations (MSCs) in Groundwater (Updated 2010).
Detections above MCLs and MSCs are highlighted.
Positive detections are in bold.
U = Not Detected, detection limit given
J = Indicates an estimated value, below the quantitation limit, but above the detection limit.
µg/L - Micrograms per Liter.

Table 4B. Conventional Monitoring Well Groundwater Analytical Results - Metals and General Chemistry.

2014 Annual Progress Report
Berkley Products Landfill Site
West Cocalico Township, Lancaster County, PA

Compound	CAS #	Units	PADEP MSC	EPA Screening Level	MW-1S		MW-1I		MW-1D		MW-5S		MW-5S (Dup)		MS-5I		MW-5D	
			Sample Date:		6/23/14		6/23/14		6/23/14		6/24/14		6/24/14		6/24/14		6/24/14	
PADEP Bureau of Labs (BOL)			BOL Sequence ID #:		004		003		002		013		014		012		011	
Total Metals																		
Aluminum*	7429905	µg/L	200	-	200	U	311		200	U	654		583		200	U	200	U
Antimony	7440360	µg/L	6	6	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Arsenic	7440382	µg/L	10	10	3	U	3	U	3	U	3.6		3.5		4.6		3	U
Barium	7440393	µg/L	2,000	2,000	124		602		232		1178		1186		276		1007	
Beryllium	7440417	µg/L	4	4	1	U	1	U	1	U	1	U	1		1	U	1	U
Boron	7440428	µg/L	6,000	-	200	U	200	U	200	U	200	U	200	U	200	U	200	U
Cadmium	7440439	µg/L	5	5	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Calcium	7440702	mg/L	-	-	18.5		57.1		26		127		128		78.9		225	
Chromium	7440473	µg/L	100	100	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Cobalt	7440484	µg/L	11	-	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Copper	7440508	µg/L	1,000	1,300	10	U	10	U	11		10	U	10	U	10	U	10	U
Iron*	7439896	µg/L	300	-	204		70900		32500		28000		24500		8058		5129	
Lead	7439921	µg/L	5	15	1	U	1	U	1	U	1.000		1	U	1	U	1	U
Magnesium	7439954	mg/L	-	-	3.918		11.6		4.73		55.8		37.7		17.4		45.2	
Manganese	7439965	µg/L	300	-	12		3361		1737		309		313		747		142	
Mercury	7439976	µg/L	2	2	0.2	U	0.2	U	0.2	U	7.48		6.74		0.2	U	0.2	U
Nickel	7440020	µg/L	100	-	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Potassium	7440097	mg/L	-	-	1.395		2.891		1.566		2.669		2.708		2.041		2.876	
Selenium	7782492	µg/L	50	50	7	U	7	U	7	U	7	U	7	U	7	U	7	U
Silver	7440224	µg/L	100	-	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Sodium	7440235	mg/L	-	-	5.083		36.9		5.323		53.5		56.8		95.8		61.6	
Thallium	7440280	µg/L	2	2	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Vanadium	7440622	µg/L	260	-	20	U	20	U	20	U	20	U	20	U	20	U	20	U
Zinc	7440666	µg/L	2,000	-	10	U	14		10	U	10	U	11		10	U	10	U
Dissolved Metals																		
Aluminum*	7429905	µg/L	200	-	200	U	200	U	200	U	200	U	200	U	200	U	200	U
Antimony	7440360	µg/L	6	6	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Arsenic	7440382	µg/L	10	10	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Barium	7440393	µg/L	2,000	2,000	122		563		201		877		845		224		1000	
Beryllium	7440417	µg/L	4	4	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Boron	7440428	µg/L	6,000	-	200	U	200	U	200	U	200	U	200	U	200	U	200	U
Cadmium	7440439	µg/L	5	5	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Calcium	7440702	mg/L	-	-	17.9		56.5		25.96		132		126		79		224	
Chromium	7440473	µg/L	100	100	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Cobalt	7440484	µg/L	11	-	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Copper	7440508	µg/L	1,000	1,300	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Iron*	7439896	µg/L	300	-	24		47200		12640		2111		1531		37		4584	
Lead	7439921	µg/L	5	15	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Magnesium	7439954	mg/L	-	-	3.837		11.5		4.644		37.95		35.7		17.4		44.3	
Manganese	7439965	µg/L	300	-	10	U	3174		1679		261		252		688		141	
Mercury	7439976	µg/L	2	2	0.2	U	0.2	U	0.2	U	0.39		0.34		0.2	U	0.2	U
Nickel	7440020	µg/L	100	-	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Potassium	7440097	mg/L	-	-	1.377		2.832		1.586		2.586		2.482		2.04		2.871	
Selenium	7782492	µg/L	50	50	7	U	7	U	7	U	7	U	7	U	7	U	7	U
Silver	7440224	µg/L	100	-	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Sodium	7440235	mg/L	-	-	4.986		37.1		5.226		56.9		55.3		96.1		62.8	
Thallium	7440280	µg/L	2	2	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Vanadium	7440622	µg/L	260	-	20	U	20	U	20	U	20	U	20	U	20	U	20	U
Zinc	7440666	µg/L	2,000	-	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Field Indicator Parameters																		
pH	na	pH units	-	-	6.33		6.58		6.47		6.44		NA		6.53		6.53	
Specific Conductivity	na	mS/cm	-	-	0.124		0.579		0.176		1.084		NA		0.739		1.408	
Turbidity	na	NTU	-	-	26.3		139		163		168		NA		246		434	
Dissolved Oxygen	na	mg/L	-	-	4.55		0.43		0.45		1.07		NA		0.86		0.89	
Temperature	na	C	-	-	12.19		13.28		12.70		15.71		NA		12.59		13.76	
Oxidation Reduction Potential	na	mV	-	-	127.9		-160.0		-126.6		69.9		NA		40.0		-112.3	

Notes:
Results compared to EPA Maximum contaminant levels (MCLs) (2009) and
PADEP Act 2 Appendix A - Medium -Specific Concentrations (MSCs) in Groundwater (Updated 2010); * = indicates secondary contaminant level.
Detections above MCLs and MSCs are highlighted.
Positive detections are in bold.
µg/L - Micrograms per Liter.
mg/L - Milligrams per liter.
NR - Not reported by the bureau of Laboratories (BOL).
NA - Not applicable.

Table 4B. Conventional Monitoring Well Groundwater Analytical Results - Metals and General Chemistry.

2014 Annual Progress Report
Berkley Products Landfill Site
West Cocalico Township, Lancaster County, PA

Compound	CAS #	Units	PADEP MSC	EPA Screening Level	MW-15S		MW-15I		MW-15D		MW-16S		MW-16I		MW-16D	
			Sample Date:		6/24/14		6/24/14		6/24/14		6/24/14		6/24/14		6/24/14	
PADEP Bureau of Labs (BOL)			BOL Sequence ID #:		007		006		005		010		009		008	
Total Metals																
Aluminum*	7429905	µg/L	200	-	**15300**		**25900**		**1090**		**3905**		**2298**		200	U
Antimony	7440360	µg/L	6	6	2	U	2	U	2	U	2	U	2	U	2	U
Arsenic	7440382	µg/L	10	10	3	U	**11.4**		3	U	**3.3**		3	U	3	U
Barium	7440393	µg/L	2,000	2,000	**1240**		**1210**		**659**		**730**		**475**		**531**	
Beryllium	7440417	µg/L	4	4	**1**		**4**		1	U	1	U	1	U	1	U
Boron	7440428	µg/L	6,000	-	200	U	200	U	200	U	200	U	200	U	200	U
Cadmium	7440439	µg/L	5	5	10	U	10	U	10	U	10	U	10	U	10	U
Calcium	7440702	mg/L	-	-	**47.7**		**61.3**		**442.6**		**94.18**		**77.43**		**70.5**	
Chromium	7440473	µg/L	100	100	**53**		**198**		50	U	50	U	**65**		50	U
Cobalt	7440484	µg/L	11	-	50	U	50	U	**55**		50	U	50	U	50	U
Copper	7440508	µg/L	1,000	1,300	**14**		**42**		10	U	10	U	10	U	10	U
Iron*	7439896	µg/L	300	-	**17900**		**37800**		**461**		**3075**		**2352**		20	U
Lead	7439921	µg/L	5	15	**9.50**		**27.6**		na		**2.8**		**1.5**		1	U
Magnesium	7439954	mg/L	-	-	**13.1**		**14.7**		**24.29**		**12.04**		**14.06**		**11**	
Manganese	7439965	µg/L	300	-	**451**		**2096**		**15860**		**206**		**326**		10	U
Mercury	7439976	µg/L	2	2	0.2	U	**0.43**		0.2	U	0.2	U	0.2	U	0.2	U
Nickel	7440020	µg/L	100	-	**72**		**224**		**70**		50	U	50	U	50	U
Potassium	7440097	mg/L	-	-	**5.198**		**5.905**		**16.55**		**2.428**		**2.456**		**1.632**	
Selenium	7782492	µg/L	50	50	7	U	7	U	7	U	7	U	7	U	7	U
Silver	7440224	µg/L	100	-	10	U	10	U	10	U	10	U	10	U	10	U
Sodium	7440235	mg/L	-	-	**6.317**		**6.482**		**34.03**		**10.87**		**8.966**		**7.91**	
Thallium	7440280	µg/L	2	2	2	U	2	U	2	U	2	U	2	U	2	U
Vanadium	7440622	µg/L	260	-	**30**		**94**		20	U	20	U	20	U	20	U
Zinc	7440666	µg/L	2,000	-	**108**		**135**		**25**		**15**		**16**		10	U
Dissolved Metals																
Aluminum*	7429905	µg/L	200	-	**884**		**114000**		200	U	200	U	**282**		200	U
Antimony	7440360	µg/L	6	6	2	U	2	U	2	U	2	U	2	U	2	U
Arsenic	7440382	µg/L	10	10	3	U	**24.1**		3	U	3	U	3	U	3	U
Barium	7440393	µg/L	2,000	2,000	**797**		**5314**		**203**		**492**		**400**		**509**	
Beryllium	7440417	µg/L	4	4	1	U	**19**		1	U	1	U	1	U	1	U
Boron	7440428	µg/L	6,000	-	200	U	200	U	200	U	200	U	200	U	200	U
Cadmium	7440439	µg/L	5	5	10	U	10	U	10	U	10	U	10	U	10	U
Calcium	7440702	mg/L	-	-	**44.8**		**94**		**62.83**		**90.22**		**68.93**		**64.9**	
Chromium	7440473	µg/L	100	100	50	U	**382**		50	U	50	U	50	U	50	U
Cobalt	7440484	µg/L	11	-	50	U	**202**		50	U	50	U	50	U	50	U
Copper	7440508	µg/L	1,000	1,300	10	U	**197**		10	U	10	U	10	U	10	U
Iron*	7439896	µg/L	300	-	**972**		**170000**		20	U	**123**		**286**		20	U
Lead	7439921	µg/L	5	15	1	U	**180**		na		1	U	1	U	1	U
Magnesium	7439954	mg/L	-	-	**8**		**32.5**		**6.237**		**10.41**		**11.9**		**9.76**	
Manganese	7439965	µg/L	300	-	**48**		**10200**		**3599**		**11**		**70**		10	U
Mercury	7439976	µg/L	2	2	0.2	U	**2.1**		0.2	U	0.2	U	0.2	U	0.2	U
Nickel	7440020	µg/L	100	-	50	U	**529**		50	U	50	U	50	U	50	U
Potassium	7440097	mg/L	-	-	**1.866**		**16.7**		**14.27**		**1.436**		**1.995**		**1.625**	
Selenium	7782492	µg/L	50	50	7	U	7	U	7	U	7	U	7	U	7	U
Silver	7440224	µg/L	100	-	10	U	10	U	10	U	10	U	10	U	10	U
Sodium	7440235	mg/L	-	-	**5.839**		**7.19**		**30.54**		**10.7**		**8.727**		**7.838**	
Thallium	7440280	µg/L	2	2	2	U	2	U	2	U	2	U	2	U	2	U
Vanadium	7440622	µg/L	260	-	20	U	**356**		20	U	20	U	20	U	20	U
Zinc	7440666	µg/L	2,000	-	10	U	**598**		10	U	**11**		10	U	10	U
Field Indicator Parameters																
pH	na	pH units	-	-	6.48		6.45		6.88		6.67		6.68		7.10	
Specific Conductivity	na	mS/cm	-	-	0.248		0.301		0.316		0.428		0.379		0.334	
Turbidity	na	NTU	-	-	957		975		297		283		253		82.1	
Dissolved Oxygen	na	mg/L	-	-	3.46		1.09		2.07		4.39		3.07		2.17	
Temperature	na	C	-	-	14.49		12.50		12.21		14.34		14.29		13.43	
Oxidation Reduction Potential	na	mV	-	-	91.4		119.6		25.3		89.6		73.2		18.6	

Notes:
Results compared to EPA Maximum contaminant levels (MCLs) (2009) and
PADEP Act 2 Appendix A - Medium -Specific Concentrations (MSCs) in Groundwater (Updated 2010); * =
Detections above MCLs and MSCs are highlighted.
Positive detections are in bold.
µg/L - Micrograms per Liter.
mg/L - Milligrams per liter.
NR - Not reported by the bureau of Laboratories (BOL).
NA - Not applicable.

Table 5. Residential Well Groundwater Analytical Results - VOCs.
2014 Annual Progress Report
Berkley Products Landfill Site
West Cocalico Township, Lancaster County, PA

Compound	CAS #	Units	PADEP MSC	EPA Screening Level	RW-7		RW-18		RW-19		RW-22		RW-42	
			Sample Date:		6/23/14		6/23/14		6/23/14		6/24/14		6/24/14	
PADEP Bureau of Labs (BOL)			BOL Sequence ID #:		400		100		200		300		500	
VOCs (µg/L)														
(1,1-Dimethylethyl)benezene	98066	µg/L	1,500	690	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
(1-Methylethyl)benzene	98828	µg/L	840	450	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
(1-Methylpropyl)benzene	135988	µg/L	1,500	2000	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,1,1,2-Tetrachloroethane	630206	µg/L	70	0.57	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,1,1-Trichloroethane	71556	µg/L	200	8,000	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,1,2,2-Tetrachloroethane	79345	µg/L	0.84	0.076	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,1,2-Trichloroethane	79005	µg/L	5	0.28	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,1-Dichloroethane	75343	µg/L	31	2.7	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,1-Dichloroethene	75354	µg/L	7	280	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,1-Dichloropropene	563586	µg/L	-	-	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,2,3-Trichlorobenzene	87616	µg/L	-	7.0	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,2,3-Trichloropropane	96184	µg/L	40	0.00075	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,2,4-Trichlorobenzene	120821	µg/L	70	1.1	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,2,4-Trimethylbenzene	95636	µg/L	15	15	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,2-Dibromo-3-Chloropropane	96128	µg/L	0.2	0.00033	0.0196	U	0.0199	U	0.0198	U	0.0198	U	0.0198	U
1,2-Dibromoethane	106934	µg/L	0.05	0.0075	0.0196	U	0.0199	U	0.0198	U	0.0198	U	0.0198	U
1,2-Dichlorobenzene	95501	µg/L	600	300	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,2-Dichloroethane	107062	µg/L	5	0.17	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,2-Dichloropropane	78875	µg/L	5	0.44	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,3,5-Trimethylbenzene	108678	µg/L	13	120	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,3-Dichlorobenzene	541731	µg/L	600	-	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,3-dichloropropane	142289	µg/L	-	370	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,4-Dichlorobenzene	106467	µg/L	75	0.48	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1-Chloro-4-(trifluoromethyl)benzene	98566	µg/L	-	35	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,2-Dichloropropane	594207	µg/L	-	-	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-Butanone	78933	µg/L	4,000	5,600	1.25	U	1.25	U	1.25	U	1.25	U	1.25	U
2-Hexanone	591786	µg/L	11	38	1.25	U	1.25	U	1.25	U	1.25	U	1.25	U
2-Methoxy-2-methyl propane (MTBE)	1634044	µg/L	20	14	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-Isopropyltoluene	99876	µg/L	-	-	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-Methyl-2-pentanone	108101	µg/L	2,900	1,200	1.25	U	1.25	U	1.25	U	1.25	U	1.25	U
Acetone	67641	µg/L	33,000	14,000	1.25	U	1.25	U	1.25	U	1.25	U	1.25	U
Benzene	71432	µg/L	5	0.45	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Bromobenzene	108861	µg/L	-	62	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Bromochloromethane	74975	µg/L	90	83	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Bromodichloromethane	75274	µg/L	80	0.13	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Bromoform	75252	µg/L	80	9.2	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Bromomethane	74839	µg/L	10	7.5	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Carbon Disulfide	75150	µg/L	1,500	810	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Carbon Tetrachloride	56235	µg/L	5	0.45	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Chlorobenzene	108907	µg/L	100	78	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Chloroethane	75003	µg/L	230	21,000	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Chloroform	67663	µg/L	80	0.22	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Chloromethane	74873	µg/L	30	190	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
cis-1,2-Dichloroethene	156592	µg/L	70	36	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
cis-1,3-Dichloropropene	10061015	µg/L	-	-	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Dibromochloromethane	124481	µg/L	80	0.17	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Dibromomethane	74953	µg/L	370	8.0	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Dichlorodifluoromethane	75718	µg/L	1,000	200	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Dichloromethane	75092	µg/L	5	11	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Ethylbenzene	100414	µg/L	700	1.5	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Hexachlorobutadiene	87683	µg/L	8.5	0.3	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
m,p-Xylene	108383	µg/L	-	190	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Naphthalene	91203	µg/L	100	0.17	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
N-Butylbenzene	104518	µg/L	1,500	1000	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
n-Propylbenzene	103651	µg/L	1,500	660	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
O-Chlorotoluene	95498	µg/L	100	240	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
o-Xylene	95476	µg/L	-	190	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
P-Chlorotoluene	95498	µg/L	100	250	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Styrene	100425	µg/L	100	1,200	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
t-Butyl Alcohol	75650	µg/L	-	-	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
tert-Butyl Acetate	540885	µg/L	5	-	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Tetrachloroethene	127184	µg/L	5	11	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Tetrahydrofuran	109999	µg/L	25	3400	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Toluene	108883	µg/L	1,000	1,100	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
trans-1,2-Dichloroethene	156605	µg/L	100	360	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
trans-1,3-Dichloropropene	10061026	µg/L	-	-	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Trichloroethene	79016	µg/L	5	0.49	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Trichlorofluoromethane	75694	µg/L	2,000	1,100	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Vinyl Acetate	108054	µg/L	420	410	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Vinyl chloride	75014	µg/L	2	0.019	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,4-Dioxane	123911	µg/L	6.4	0.78	**1.19**	J	2.5	U	2.5	U	2.5	U	2.5	U
Field Indicator Parameters														
pH	na	pH units	-	-	6.39		6.33		6.27		6.36		6.81	
Specific Conductivity	na	mS/cm	-	-	0.269		0.264		0.119		0.326		0.467	
Turbidity	na	NTU	-	-	6.77		2.01		3.71		4.54		7.19	
Dissolved Oxygen	na	mg/L	-	-	3.05		4.09		5.88		4.61		3.83	
Temperature	na	C	-	-	15.63		14.74		13.69		17.69		24.54	
Oxidation Reduction Potential	na	mV	-	-	125.1		149.1		152.3		110.9		86.7	

Notes:
Results compared to EPA Region 3 Regional Screening Levels (RSLs) for Tapwater (May 2014) with Target Hazard Quotient of 0.1 and Cancer Risk 1e-6 and PADEP Act 2 Appendix A - Medium -Specific Concentrations (MSCs) in Groundwater (Updated 2010).
Detections above MCLs and MSCs are highlighted.
Positive detections are in bold.
U = Not Detected, detection limit given
J = Indicates an estimated value, below the quantitation limit, but above the detection limit.
µg/L - Micrograms per Liter.

Attachment B-2: Landfill Gas Monitoring Data

(Source: 2014 Annual Progress Report, dated December 2014, prepared by URS)

Table 6. 2006-2014 Landfill Gas Vent Monitoring Data.

2014 Annual Progress Report
Berkley Products Landfill Site
West Cocalico Township, Lancaster County, PA

Gas Vent	Methane (%)												Carbon Dioxide (%)												Oxygen (%)											
	3/24/06	6/6/06	9/14/06	11/9/06	5/16/07	5/12/08	4/27/09	10/12/10	11/3/11	11/12/12	7/22/13	6/25/14	3/24/06	6/6/06	9/14/06	11/9/06	5/16/07	5/12/08	4/27/09	10/12/10	11/3/11	11/12/12	7/22/13	6/25/14	3/24/06	6/6/06	9/14/06	11/9/06	5/16/07	5/12/08	4/27/09	10/12/10	11/3/11	11/12/12	7/22/13	6/25/14
V-1	2.8	0.0	1.0	0.0	0.0	0.4	0.0	0.1	0.3	1.6	0.0	0.00003	1.8	0.0	1.1	0.0	0.0	1.1	0.0	0.3	0.1	1.4	0.0	0.0	19.4	20.6	19.7	20.1	20.9	21.0	20.0	20.4	21.3	18.8	20.8	20.8
V-2	4.4	0.0	1.2	0.0	0.0	0.0	0.0	0.4	0.2	1.9	0.0	0.00008	3.2	0.0	2.4	0.0	0.0	0.8	0.0	0.2	0.1	1.6	0.0	0.1	17.8	20.7	18.4	19.9	20.9	21.6	20.1	20.4	21.3	18.7	20.8	20.8
V-3	2.8	0.0	0.0	0.0	0.0	0.0	0.0	4.8	0.1	0.0	0.0	0.00000	2.3	0.0	0.0	0.0	0.0	0.2	0.0	6.5	0.0	0.0	0.0	0.0	18.7	20.6	20.6	20.4	20.8	21.9	20.1	14.1	21.4	20.2	20.8	20.8
V-4	4.2	0.4	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00000	2.8	1.1	2.2	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	18.5	18.8	18.8	19.8	20.8	22.0	20.1	20.2	21.3	20.1	20.8	20.8
V-5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.6	0.0	0.00000	0.0	0.0	0.8	0.0	0.0	0.1	0.0	0.1	0.0	1.0	0.0	0.0	21.1	20.6	20.3	20.1	20.8	22.0	20.1	20.4	21.4	19.2	20.8	20.8
V-6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.00034	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	21.1	20.5	20.7	20.8	20.8	22.1	20.1	19.9	21.3	19.8	20.6	20.8
V-7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00086	0.0	0.3	0.0	0.0	0.0	0.4	0.2	0.1	0.1	0.0	0.0	0.2	21.1	19.5	20.6	20.7	20.8	22.1	19.8	20.4	21.3	20.1	20.8	20.6
V-8	0.0	0.7	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.00074	0.0	4.4	0.0	0.0	0.3	0.1	0.2	0.1	0.0	0.0	0.0	0.2	21.1	15.9	20.7	20.5	20.3	22.2	19.7	20.4	21.4	19.8	20.9	20.6
Ambient	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	21.2	20.6	20.9	20.8	20.9	21.0	20.1	20.7	21.3	20.2	20.8	20.8

Notes:
Results measured using a calibrated Landtec Gem 2000 Meter gas analyzer
All concentrations in percent (%)
Amibient monitoring location established at northwestern area of landfill.

Appendix C: Site Inspection Checklist

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Berkley Products Company Dump	**Date of Inspection:** 03/31/2015
Location and Region: Lancaster Co., PA, Region 3	**EPA ID:** PAD980538649
Agency, Office or Company Leading the Five-Year Review: EPA Region 3	**Weather/Temperature:** Cloudy / Upper 40s

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Ground water pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other:
- ☐ Monitored natural attenuation
- ☐ Ground water 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: _____			
Representative of West Cocalico Township				
	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.	**Ground Water 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	
From: ______	To: ______	______	☐ Breakdown attached
From: ______	To: ______	______	☐ Breakdown attached
From: ______	To: ______	______	☐ Breakdown attached
From: ______	To: ______	______	☐ Breakdown attached
From: ______	To: ______	______	☐ 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: Access gates prevent vehicle traffic.

B. Other Access Restrictions

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

Remarks: ______

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): walk through			
	Frequency: during routine monitoring			
	Responsible party/agency: PADEP			
	Contact David Hrobuchak	Env. Protection Specialist	_____	717-705-4843
	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			
D. General				
1.	**Vandalism/Trespassing** ☐ Location shown on site map ☒ No vandalism evident			
	Remarks: _____			
2.	**Land Use Changes On Site** ☐ N/A			
	Remarks: None			
3.	**Land Use Changes Off Site** ☐ N/A			
	Remarks: None			
VI. GENERAL SITE CONDITIONS				
A. Roads ☒ Applicable ☐ N/A				
1.	**Roads Damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A			
	Remarks: Vehicle tracks in grass noted near access road to landfill, outside of capped area.			
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			
	Arial 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
	Arial extent: _____		Depth: _____
	Remarks: _____		
4.	**Holes**	☐ Location shown on site map	☒ Holes not evident
	Arial 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
	Arial extent: _____		Height: _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☒ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Arial extent: _____
	☐ Ponding	☐ Location shown on site map	Arial extent: _____
	☐ Seeps	☐ Location shown on site map	Arial extent: _____
	☐ Soft subgrade	☐ Location shown on site map	Arial extent: _____
	Remarks: _____		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☒ No evidence of slope instability		
	Arial 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

Arial extent: _____ Depth: _____

Remarks: _____

2. **Material Degradation** ☐ Location shown on site map ☒ No evidence of degradation

Material type:_____ Arial extent: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☒ No evidence of erosion

Arial extent: _____ Depth: _____

Remarks: _____

4. **Undercutting** ☐ Location shown on site map ☒ No evidence of undercutting

Arial extent: _____ Depth: _____

Remarks: _____

5. **Obstructions** Type: _____ ☒ No obstructions

☐ Location shown on site map Arial 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 Arial 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: _____

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: _____		Type: _____
	Remarks: _____		
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: _____	
	☐ Performance not monitored		
	Frequency: _____		☐ Evidence of breaching
	Head differential: _____		
	Remarks: _____		
IX. GROUND WATER/SURFACE WATER REMEDIES		☐ Applicable	☒ N/A
A. Ground Water 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 ground water 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:** ☐ Ground water 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 major objectives of the remedy were to consolidate the landfill materials and contain the Site by capping the landfill to prevent direct contact and limit contaminant leaching into groundwater, thereby reducing contaminant migration. The remedy is functioning as designed. However, a newly identified contaminant, 1,4-dioxane, has been identified in site groundwater and in a residential well downgradient of the Site. Additional mercury concentrations in one well are showing a slight increasing trend.
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 procedures are adequate with respect to the current and long-term protectivenss of the remedy. Quarterly sampling of residential wells is currently being conducted to evaluate the 1,4-dioxane concentrations and annual sampling is conducted for additional site wells.
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. None, with the exception of the 1,4-dioxane and mercury detections in groundwater. The extent of 1,4-dioxane contamination in groundwater needs to be defined.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Additional investigation of the extent of 1,4-dioxane and possibly mercury contamination may be warranted.

Site Inspection Participants:

Roy Schrock, EPA RPM
David Hrobuchak, PADEP
Frederic Coll, URS
Ryan Burdge, Skeo Solutions
Jill Billus, Skeo Solutions

Appendix D: Site Inspection Photographs

View of landfill looking north from Swamp Bridge Road

Access gate and catch basin along Swamp Bridge Road

Landfill cap and drainage channels looking north. Some vegetative growth within the channels.

Sedimentation basin 1 (west)


Vehicle tracks on the property west of the landfill (outside of cap)


Western access gate to the landfill

Landfill cap and a gas vent, looking east

Sedimentation basin 2 (east)


Rip rap east of sedimentation basin 2 (east)


Monitoring wells in the MW-15 cluster

Western drainage channel, looking south toward Swamp Bridge Road

Rip rap in northwestern portion of the landfill, looking east

Cocalico Creek south of Penny’s Hill Road, looking south

Appendix E: Vapor Intrusion Assessment

OSWER VAPOR INTRUSION ASSESSMENT
Groundwater Concentration to Indoor Air Concentration (GWC-IAC) Calculator Version 3.3.1, May 2014 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)
Average Groundwater Temperature (^{o}C)	Tgw	14	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

			Site Groundwater Concentration	Calculated Indoor Air Concentration	VI Carcinogenic Risk	VI Hazard	Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator
			Cgw	Cia	CR	HQ	IUR		RfC		
	CAS	Chemical Name	(ug/L)	(ug/m^3)			$(ug/m^3)^{-1}$		(mg/m^3)		i
x	75-15-0	Carbon Disulfide	1.2E+00	4.59E-01	No IUR	6.3E-04			7.00E-01	I	
x	106-46-7	Dichlorobenzene, 1,4-	5.6E-01	2.67E-02	1.0E-07	3.2E-05	1.10E-05	CA	8.00E-01	I	
x	109-99-9	Tetrahydrofuran	6.1E+00	1.07E-02	No IUR	5.1E-06			2.00E+00	I	

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Exposure Scenario							
Averaging time for carcinogens	(yrs)	ATc_R_GW	70	ATc_C_GW	70	ATc_GW	70
Averaging time for non-carcinogens	(yrs)	ATnc_R_GW	26	ATnc_C_GW	25	Atnc_GW	26
Exposure duration	(yrs)	ED_R_GW	26	ED_C_GW	25	ED_GW	26
Exposure frequency	(days/yr)	EF_R_GW	350	EF_C_GW	250	EF_GW	350
Exposure time	(hr/day)	ET_R_GW	24	ET_C_GW	8	ET_GW	24

(2) **Generic Attenuation Factors:**

	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Source Medium of Vapors							
Groundwater	(-)	AFgw_R_GW	0.001	AFgw_C_GW	0.001	AFgw_GW	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_GW	0.1	AFss_C_GW	0.1	AFss_GW	0.1

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)

Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)

Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Trichloroethylene						
	mIURTCE_R_GW	1.00E-06	IURTCE_C_GW	0.00E+00	mIURTCE_GW	1.00E-06
	IURTCE_R_GW	3.10E-06	IURTCE_C_GW	4.10E-06	IURTCE_GW	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).

OSWER VAPOR INTRUSION ASSESSMENT

Groundwater Concentration to Indoor Air Concentration (GWC-IAC) Calculator Version 3.3.1, May 2014 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)
Average Groundwater Temperature (^oC)	Tgw	14	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

CAS	Chemical Name	Site Groundwater Concentration	Calculated Indoor Air Concentration	VI Carcinogenic Risk	VI Hazard	Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator
		Cgw	Cia	CR	HQ	IUR		RfC		
		(ug/L)	(ug/m^3)			(ug/m^3)$^{-1}$		(mg/m^3)		i

Yellow highlighting indicates site-specific parameters that may be edited by the user.

Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.

Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).