FIFTH FIVE-YEAR REVIEW REPORT FOR
DRAKE CHEMICAL SUPERFUND SITE
CLINTON COUNTY, PENNSYLVANIA

AUGUST 2023

Prepared by

U.S. Environmental Protection Agency
Region 3
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LIST OF ABBREVIATIONS AND ACRONYMS

AC&C	American Color and Chemical
ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
CSM	Conceptual Site Model
DCA	Dichloroethane
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five-Year Review
gpm	Gallons per Minute
HSCA	Hazardous Site Cleanup Act
IC	Institutional Control
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
µg/kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OU	Operable Unit
O&M	Operation and Maintenance
PADEP	Pennsylvania Department of Environmental Protection
PFAS	Per- and Polyfluoroalkyl Substances
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RCRA	Resource Conservation Recovery Act
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
SVOC	Semi-Volatile Organic Compound
TCE	Trichloroethene
UU/UE	Unlimited Use and Unrestricted Exposure
VOC	Volatile Organic Compound

I. INTRODUCTION

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

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

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

The Site consists of four operable units (OUs): the leachate stream (OU1), building demolition (OU2), soil incineration (OU3) and groundwater (OU4). This FYR Report addresses all four OUs.

EPA's remedial project manager (RPM) led the FYR. Additional participants from EPA included EPA's community involvement coordinator (CIC), human health and ecological risk assessors, a hydrogeologist and legal counsel. Staff from the Pennsylvania Department of Environmental Protection (PADEP) also participated in the review. Skeo provided EPA contractor support for this FYR. The potentially responsible party (PRPs), American Color and Chemical (AC&C) and Beazer East Inc., were notified of the initiation of the FYR. The review began on August 30, 2022.

Appendix A includes a list of documents reviewed for this FYR. Appendix B includes the Site's chronology of events.

Site Background

The Site is located near Paul Mack Boulevard and Highway 220 bisects part of Site. The Site is in the city of Lock Haven and Castanea Township in Clinton County, Pennsylvania. Currently, the Site includes a structure that is used for storage, a covered ash pile, and a groundwater treatment plant with associated infiltration gallery. A former AC&C facility borders the Site to the northwest, Paul Mack Boulevard borders the Site to the northeast, and Bald Eagle Creek borders the Site to the south (Figure 1). Bald Eagle Creek flows into the West Branch of the Susquehanna River. Both Bald Eagle Creek and the West Branch of the Susquehanna River are used for recreation and fishing.

From the 1960s until 1981, the Drake Chemical Company manufactured chemical ingredients for pesticides and other compounds on an 8-acre property (also referred to as Zone 1). During operations, there were buildings, wastewater treatment, tanks, lagoons and leachate that drained from the lagoons toward Bald Eagle Creek.

These operations resulted in the contamination of soil and groundwater with beta-naphthylamine (also referred to as 2-naphthylamine), 1,2-dichloroethane (DCA), trichloroethene (TCE) as well as other contaminants. The Site includes the former Drake facility and downgradient areas where groundwater impacts have been identified. All contaminated structures have been removed and taken off site for disposal.

A former AC&C facility, currently undergoing a Resource Conservation and Recovery Act (RCRA) cleanup, borders the Site to the northwest. Contaminants from chemical manufacturing activities at both the AC&C facility and the Site have leached into the groundwater aquifer characterized by sand and gravel materials, underlying both sites. The sand and gravel aquifer is located approximately 12 feet below ground surface. Groundwater use is

prohibited on the Site and in the city of Lock Haven (the Institutional Control section of this FYR Report provides more information).

The groundwater contamination plume was divided into three zones to reflect current and former use of the property parcels. These zones are administrative and do not reflect separate groundwater contaminant plumes (Figure 1). Historically, groundwater concentrations were highest in Zone 1, decreased in Zone 2 and decreased more in Zone 3. The groundwater plume is contained on site by groundwater extraction and treatment. The northernmost section, Zone 1, is the 8-acre property where the Drake Chemical Company facility was located. Zone 2 is south of Zone 1 and is divided from Zone 1 by railroad tracks and a new road. Zone 3 is south of Zone 2 and extends from the Route 220 Highway to Bald Eagle Creek. Groundwater flows to the southeast from the AC&C property and the site property toward Bald Eagle Creek (Figure H-3 in Appendix H). Zone 1 encompasses three different property parcels. One parcel is owned by a local family. It is not in use. The second parcel is used for commercial storage. The city of Lock Haven owns the third parcel, which includes the covered ash pile from the incineration of contaminated soil.

Most of Zone 2 and Zone 3 are owned by a local municipality, Castanea Township; a small part of the land belongs to the city of Lock Haven. Zone 2 consists of the area from the railroad tracks to Route 220 and includes the groundwater treatment plant, recovery wells, and monitoring wells. Castanea Township uses part of Zone 2 for residential disposal of yard waste for mulching. Zone 2 also includes a truck parking area. Zone 3 includes an infiltration gallery that is the discharge point for the groundwater treatment system. Zone 3 has historically been a public park with baseball fields. The park has not been used in several years. However, a local developer is working with Castanea Township to redevelop the park and restore the baseball fields and other recreational uses. EPA, PADEP and the PRPs have reviewed the current development plan, which will not impact the remedy components. All parties will continue to collaborate during park development.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Drake Chemical		
EPA ID: PAD003058047		
Region: 3	**State:** Pennsylvania	**City/County:** Lock Haven/Clinton
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the Site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name: Roy Schrock, with additional support provided by Skeo		
Author affiliation: EPA Region 3		
Review period: 8/30/2022 – 8/1/2023		
Date of site inspection: 2/23/2023		

SITE IDENTIFICATION
Type of review: Statutory
Review number: 5
Triggering action date: 8/23/2018
Due date *(five years after triggering action date)*: 8/23/2023

Figure 1: Site Vicinity Map

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

Starting in the 1940s, a company called Kilsdunk operated at the Site. It manufactured color dye compounds that produced a known carcinogen named beta-naphthylamine. In the 1960s, the Commonwealth of Pennsylvania banned the use and production of beta-naphthylamine and the facility was sold to the Drake Chemical Company, which produced pesticides and a variety of different chemical materials. Operations ceased in fall 1981 and the Drake Chemical Company filed for bankruptcy in 1982 after a series of Notices of Violations issued by the Pennsylvania Department of Environmental Resources.

In 1984, EPA completed the Site's first remedial investigation and feasibility study (RI/FS). It focused on a leachate stream that ran off site toward Bald Eagle Creek (OU1). The investigation found surface leachate discharges from a lagoon at Zone 1. It concluded that there was a risk associated with direct contact with water and sludge originating from a discharge swale at the Site under a recreational use scenario since the area of the Site was in use as a public park. Off-site surface water analyses indicated little impact of leachate contamination on aquatic life and water quality in Bald Eagle Creek.

EPA completed the second RI/FS in 1986 to address on-site buildings and surface features, soil, sludge and groundwater (OU2). The second RI/FS identified a threat of direct contact with contaminated buildings, structures, storage areas, lagoons and debris piles as well as the physical threats of building collapse and tank corrosion. Contaminated soil, sludge and debris buried at the Site also posed a direct contact threat and was the source of the Site's groundwater contamination. Soil and groundwater were contaminated with over a hundred compounds, including beta-naphthylamine, 1,2-DCA, benzene, TCE, chlorobenzene and other hazardous substances.

EPA conducted a combined RI/FS for OU3 and OU4 in 1988. Groundwater beneath the Site and next to the Site was contaminated at a level greater than EPA's acceptable risk range, considering the groundwater's potential future use as drinking water. In addition, contaminated groundwater had the potential for migration into Bald Eagle Creek, which could potentially impact recreational users and aquatic flora and fauna. The bulk of the risk was associated with organic contaminants and beta-naphthylamine.

Response Actions

EPA initiated a removal action in 1982. It removed hundreds of drums and emptied on-site tanks filled with a variety of compounds. EPA also fenced the facility to prevent direct contact with surface soil, buildings and lagoons. EPA added the Site to the Superfund program's National Priorities List (NPL) in September 1983. EPA determined that a phased approach would be implemented to expedite remediation.

OU1 – Leachate Stream

EPA signed the Site's first Record of Decision (ROD) in September 1984. The ROD selected a remedy to address a leachate stream that originated from the southern unlined lagoon on the Site (Figure C-1 in Appendix C). The purpose of the remedial action was to prevent the threat of direct human contact with the contaminants in the leachate stream and sediment. The OU1 remedy was an interim measure.

The remedial action objectives (RAOs) identified in the ROD include:

- Maintain public health and safety.
- Attempt to make the publicly owned land safe for human access.
- Develop remedial actions that are both technically feasible and cost effective.

The OU1 remedy required excavation of the contaminated soil and sediment, construction of a French drain and an underground sewer line to collect and carry the stormwater runoff to Bald Eagle Creek, and construction of a clay cap to cover the sewer line and adjacent surface soil.

OU2 – Building Demolition
In May 1986, EPA signed the Site's second ROD. The OU2 RAO was to reduce or eliminate exposure pathways that would allow contaminants to reach potential human receptors. The RAO focused on direct contact and potential migration of contaminants via fire or flood. The selected remedy for OU2 included draining and removing the two lined wastewater treatment lagoons; removing tanks, buildings and debris; incineration of chemicals stored at the Site; decontamination of salvageable material; and disposal of all material removed, other than decontaminated material, at an approved off-site facility.

OU3 – Soil Incineration
EPA signed the Site's third ROD in September 1988. RAOs were not specified but the OU3 remedy's purpose was to excavate contaminated soil, sludge and leachate lagoon sediment and decontaminate the excavated material using a transportable on-site incinerator. The selected remedy for OU3 included the installation of flood control measures, removal of leachate waste, installation of stormwater controls, excavation of contaminated sludge, soil and sediment, decontamination using a rotary kiln incinerator and consolidation of the ash in a pile, grading, and placement of clean fill cover. The ROD specified that the incinerator ash will be analyzed in accordance with state requirements.

OU4 – Groundwater
The 1988 ROD also included the selected remedy for groundwater (OU4), which was modified in 1995 and 2019 with Explanations of Significant Differences (ESDs). The 1995 ESD refined many of the groundwater components from the 1988 ROD. The final remedy for groundwater consisted of groundwater extraction and treatment with granular activated carbon and discharge to Bald Eagle Creek or a sewage treatment facility. In May 2019, EPA issued an ESD to include the requirement to discharge treated groundwater to an already constructed and operational infiltration gallery (the Status of Implementation section of this FYR Report provides more information).

RAOs were not specified but the 1988 ROD indicated that the OU4 cleanup goal is to meet current maximum contaminant levels (MCLs) or MCL goals (MCLGs). Although other contaminants were detected at the Site during the RI, the 1995 ESD clarified that only three compounds were detected above their respective MCLs. The 1995 ESD identifies performance standards for benzene and 1,2-DCA as the MCL of 5 micrograms per liter (µg/L) and the performance standard for beta-naphthylamine at 10 µg/L, which was the laboratory detection limit at the time of the ESD, because there was not an MCL. See Question B of this FYR Report for additional discussion on the current applicable screening levels for beta-naphthylamine.

Sitewide
EPA signed a sitewide ESD in 2016 requiring land and groundwater use restrictions for all four site OUs. Institutional controls were not required in any of the RODs or the 1995 ESD.

Status of Implementation

OU1 – Leachate Stream
EPA began the remedial action in September 1985 and finished it in August 1987. Contaminated soil was temporarily staged on the Zone 1 property and eventually removed for off-site disposal as part of the OU2 remedy. The on-site lagoon was drained and the construction of a French drain and an underground sewer line to collect and carry the surface water runoff to Bald Eagle Creek was completed. A cap was constructed over the sewer line and adjacent soil. The cap prevents rainfall infiltration. The ROD indicated this area would be visually inspected semi-annually for 30 years, however the OU3 remedy eliminated the leachate source and there was no need to inspect (see below for a description of the OU3 remedy implementation).

OU2 – Building Demolition
EPA began the remedial action in June 1987 and finished it in May 1990. EPA demolished and removed all buildings, tanks and other structures for off-site disposal.

OU3 – Incineration
EPA began the remedial action in September 1991 and finished it in February 2000. The remedial action included construction of an on-site incinerator, excavation of soil, sludge and sediment in the entire Zone 1 area to the water table (about 12 feet below ground surface), and treatment of the soil using incineration. About 295,000 tons of ash were placed in a large pile on the southern part of the Site, graded to specifications and covered with clean fill and vegetated. PADEP oversees the city of Lock Haven maintenance of the ash pile and cover.

During excavation, some drums and tanks were discovered and taken to an off-site hazardous waste facility for disposal. The incinerator was removed after the completion of the remedial action. The structure was not removed and is currently used as storage.

OU4 – Groundwater
The PRPs for OU4, AC&C and Beazer East Inc., are implementing the groundwater remedy pursuant to a Consent Decree with EPA and PADEP dated February 1996. Groundwater extraction and treatment began in 2000. The groundwater extraction and treatment system currently operates with three recovery wells (DPW-02, DPW-03 and DPW-04) in Zone 2. Recovery well DPW-01 has not been used as a recovery well since 2001, when EPA approved its removal based on contaminant concentrations meeting performance standards. DPW-01 is currently monitored quarterly and concentrations continue to meet performance standards.

The groundwater is pumped from the three recovery wells to the treatment system building, where there are two carbon treatment units in sequence to treat the groundwater. After treatment, the groundwater flows to an infiltration gallery in Zone 3 (Figure 1). The infiltration gallery consists of 23 connected perforated pipes filled with gravel that are drilled into the aquifer. The gallery allows the groundwater to return to the water table. There are no permit requirements and discharge limitations for the effluent into the infiltration gallery. During the design, the PRPs determined that the granular activated carbon units would treat the groundwater to near nondetectable levels and that the treated groundwater would be reintroduced into the aquifer.

In 2014, a capture-zone analysis was performed to determine if the groundwater extraction network was providing hydraulic containment of the contaminants in Zone 2 and preventing migration into Zone 3. The capture-zone analysis consisted of observing water levels at times when recovery wells DPW-02, DPW-03 and DPW-04 were pumping and also when only recovery well DPW-4 was pumping. The results indicated that capture was demonstrated when the recovery wells pump at about 18 gallons per minute (gpm).

Institutional Control (IC) Review
In 2006 and 2007, PADEP issued administrative orders under Sections 512(a) and 1102 of the Pennsylvania Hazardous Site Cleanup Act (HSCA) to the owners of the three parcels in the Zone 1 property. The orders prohibit groundwater use and restrict activities that could affect the integrity of the covered ash pile.

In 2010, the city of Lock Haven and Castanea Township enacted ordinances that prohibit using groundwater in areas affected by the Site for potable purposes. The ordinances also require that all residents abandon existing potable wells in that area and connect to a public water supply.[1] These ordinances apply to the entire city of Lock Haven and all Castanea Township parcels surrounding the Site. Table 1 and Figure 2 summarize and show the Site's institutional controls.

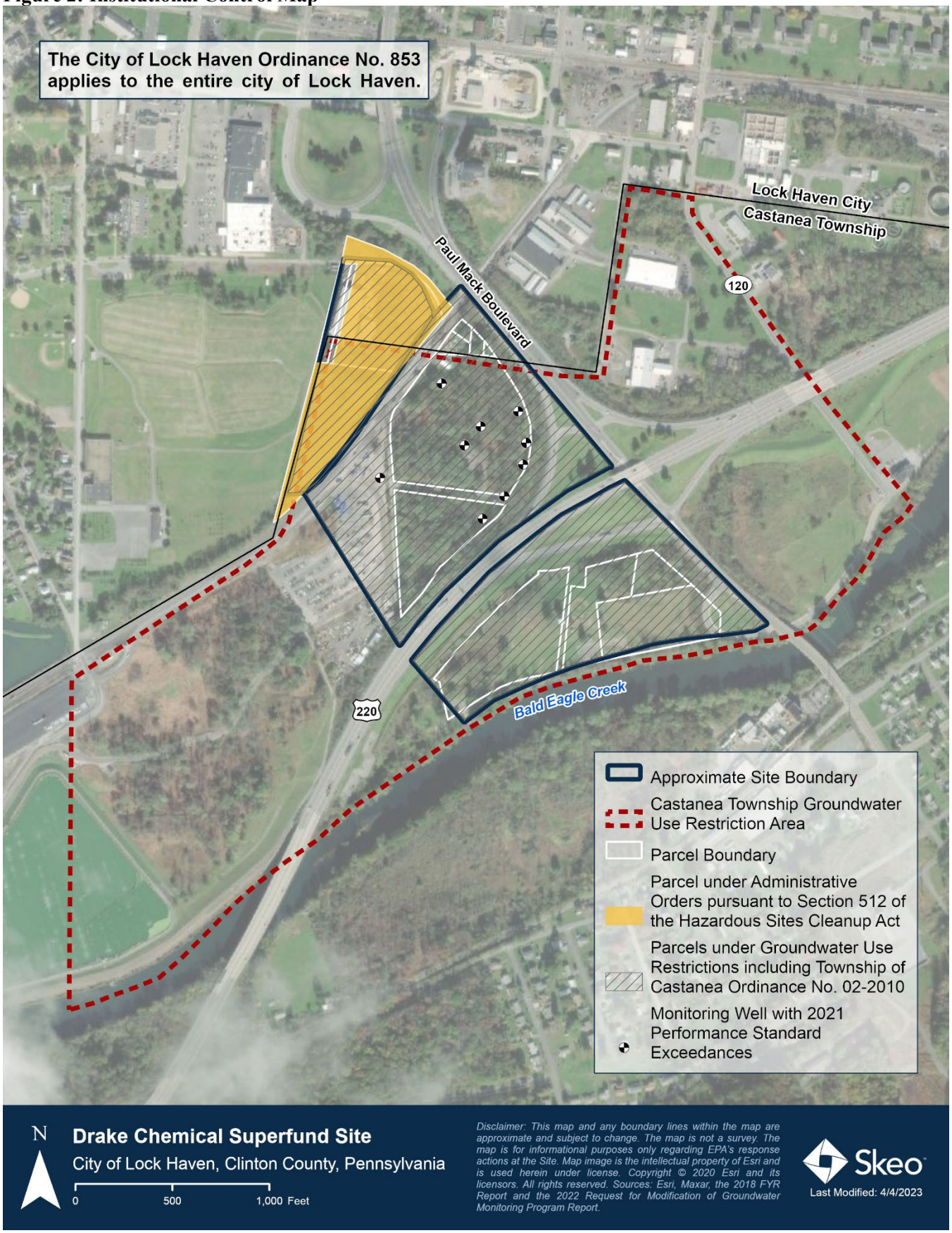
In 2016, EPA issued an ESD requiring land use and groundwater use restrictions and documenting the already implemented controls.

[1] While this is a requirement, historical documentation for the Site, including all decision documents, indicates that there was only one well in the Lock Haven area. This well was located at the high school and when the high school was rebuilt, they abandoned this well.

Table 1: Summary of Planned and/or Implemented Institutional Controls (ICs)

Media, Engineered Controls, and Areas That Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Soil	Yes	Yes	Zone 1	Restrict disturbance of the covered ash pile.	Pennsylvania HSCA Section 512 Order November 8, 2006
				Current vegetative cover shall be maintained to provide adequate erosion and sedimentation control.	
				Restrict disturbance of the covered ash pile.	Pennsylvania HSCA Section 512 Order August 21, 2007
Groundwater	Yes	Yes	Zone 1	Restrict extraction or use of groundwater.	Pennsylvania HSCA Section 512 Order November 8, 2006
					Pennsylvania HSCA Section 512 Order August 21, 2007
			Numerous	Restriction of groundwater for potable use. Prohibition of the installation of monitoring wells. Abandonment of any current potable supply wells and connection to city water service.	Township of Castanea Ordinance Number 02-2010 2010
			City of Lock Haven		City of Lock Haven Ordinance Number 853 2010

Figure 2: Institutional Control Map



Systems Operations/Operation and Maintenance (O&M)

The PRPs operate and maintain the groundwater extraction and treatment system and discharge and infiltration maintenance activities consistent with the Site's 2001 Operation and Maintenance Plan, Monitoring and Maintenance Plan (revised March 2014). The PRPs, as part of O&M requirements, change the carbon units quarterly and sample the effluent monthly.

The PRPs submit quarterly progress reports detailing the following activities conducted during the quarterly reporting period:

- Periodically monitor groundwater recovery rates (via flowrate and totalizer readings).
- Monitor system operating pressures through direct readings.
- Obtain recovery well, influent and effluent samples.
- Collect volatile organic compound (VOC) and semi-volatile organic compound (SVOC) samples from the recovery wells, system influent and effluent, and monitoring wells.
- The current monitoring network is shown on Figure 3 and includes 19 monitoring and recovery wells in Zones 2 and 3 and one background well. Monitoring frequency varies. The four recovery wells (DPW-01, DPW-02, DPW-03 and DPW-04) are sampled quarterly. Ten monitoring wells are sampled semiannually. Five more monitoring wells are sampled annually. An additional 17 wells are gauged quarterly for water level measurements only.
- Conduct hydraulic monitoring once per quarter.
- Conduct routine activities to maintain the system.

Since the groundwater treatment system started operating in 2000, about 154.9 million gallons have been extracted and treated.

In 2014, a capture-zone analysis was performed to determine if the groundwater extraction network was providing hydraulic containment of the contaminants in Zone 2 and preventing migration into Zone 3. The capture-zone analysis consisted of observing water levels at times when recovery wells DPW-02, DPW-03 and DPW-04 were pumping and also when only recovery well DPW-4 was pumping. The results indicated that capture was demonstrated when the recovery wells pump at about 18 gallons per minute (gpm).

During this FYR period, the average yearly pumping rate ranged from 15 gpm to 18.6 gpm (2022). The decreased pumping rates seem to be mainly attributable to high water levels in the infiltration gallery. In March 2022, the infiltration gallery was redeveloped to mitigate this issue. During the first quarter of 2022, the pumping rate was only 12 gpm due infiltration gallery redevelopment efforts. In Quarter 4 of 2022 (most recent quarterly progress report available for this FYR), the average quarterly pumping rate was 21.54 gpm.

The PRPs' contractor will continue to monitor the pumping rate and provide the findings in the Site's quarterly reports. In 2022, the PRPs submitted a request to modify the groundwater monitoring program. In the request, the PRPs recommended terminating further analysis of beta-naphthylamine, reducing the number of analyzed VOCs, removing or consolidating the monitoring network, and modifying sampling frequency. EPA is reviewing this request and plans to address the PRPs' comments (see Other Findings section of this FYR Report).

The effluent results were not detected for VOCs and SVOCs above the laboratory detection limits. The influent results were also mostly not detected, with the exception of select VOCs and SVOCs. The most recent influent, effluent and recovery well data is provided as Table H-3 in Appendix H.

III. PROGRESS SINCE THE PREVIOUS REVIEW

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

Table 2: Protectiveness Determinations/Statements from the 2018 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The OU1 remedy is protective of human health and the environment. The excavation of the contaminated soil and sediment from the area south of Zone 1 was completed.
2	Protective	The OU2 remedy is protective of human health and the environment. EPA demolished and removed all buildings, tanks and other structures for off-site disposal.
3	Protective	The OU3 remedy is protective of human health and the environment. The entire Zone 1 area was excavated to the water table and all soil was treated by incineration. The treated soils were placed in a large pile, graded and covered with clean materials. Institutional controls are in place on the Zone 1 property to prohibit the groundwater use and restricts activities that could disturb the ash pile.
4	Short-term Protective	The OU4 remedy is protective of human health and the environment in the short-term. The groundwater treatment system is capturing and treating contaminated groundwater. Institutional controls are in place to restrict the use of the groundwater. However, in order for the remedy to be protective in the long-term, sampling of the hyporheic zone in Bald Eagle Creek should be performed. A decision document should be prepared for the treatment system discharge location.
Sitewide	Short-term Protective	The sitewide remedies are protective of human health and the environment in the short-term. As part of the OU1 and OU2 remedies contaminated materials, soils and structures have been disposed off-site. The soils as part of OU3 have been treated on-site by incineration. The groundwater is being captured and treated. ICs are in place at the Site to prevent disruption to the ash pile and restrict the use of the groundwater. However, in order for the remedy to be protective in the long-term, sampling of the hyporheic zone in Bald Eagle Creek should be performed. A decision document should be prepared for the treatment system discharge location.

Table 3: Status of Recommendations from the 2018 FYR Report

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
4	Groundwater is discharged to an infiltration gallery and not Bald Eagle Creek or a sewage treatment plant, as required in the 1988 ROD.	Prepare a decision document to document the change of location of the treatment system discharge.	Completed	EPA documented the requirement to discharge treated groundwater to the infiltration gallery in the 2019 ESD.	3/19/2019
4	The hyporheic zone was not considered during previous sampling or during the ecological risk assessment of Bald Eagle Creek.	Collect samples from the hyporheic zone in Bald Eagle Creek.	Completed	EPA collected pore water and sediment samples from Bald Eagle Creek and documented the results in the 2019 Trip Report. The results are discussed in the Data Review section of this FYR Report.	12/18/2019

In addition to the issues and recommendations, the 2018 FYR Report identified the following other findings:

- Detection limits are above the MCL for several parameters. Different analytical methods should be selected and the O&M Plan should be updated.
    - Detection limits for some analytes, including benzene, continue to exceed the MCL. This is mainly due to the high concentration of chlorobenzene, which impacts the detection limit for benzene. The PRPs should determine if any modifications can be made to lower the detection limit for benzene and update the O&M Plan if needed.
- The performance standard for beta-naphthylamine was based on a detection limit that is above the acceptable risk range. Although groundwater pumping and treatment is effective in addressing the beta-naphthylamine contamination, an evaluation will need to be performed once the detection limit decreases to below the risk range.
    - The detection limit for beta-naphthylamine has been decreasing and is now approximately 3.2 µg/L, within EPA's acceptable cancer risk range. Beta-naphthylamine-impacted groundwater is captured by the recovery wells and there are no current exposure pathways. Prior to closure, EPA should evaluate if the beta-naphthylamine concentrations and detection limits are within acceptable risk ranges.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Community Involvement and Site Interviews

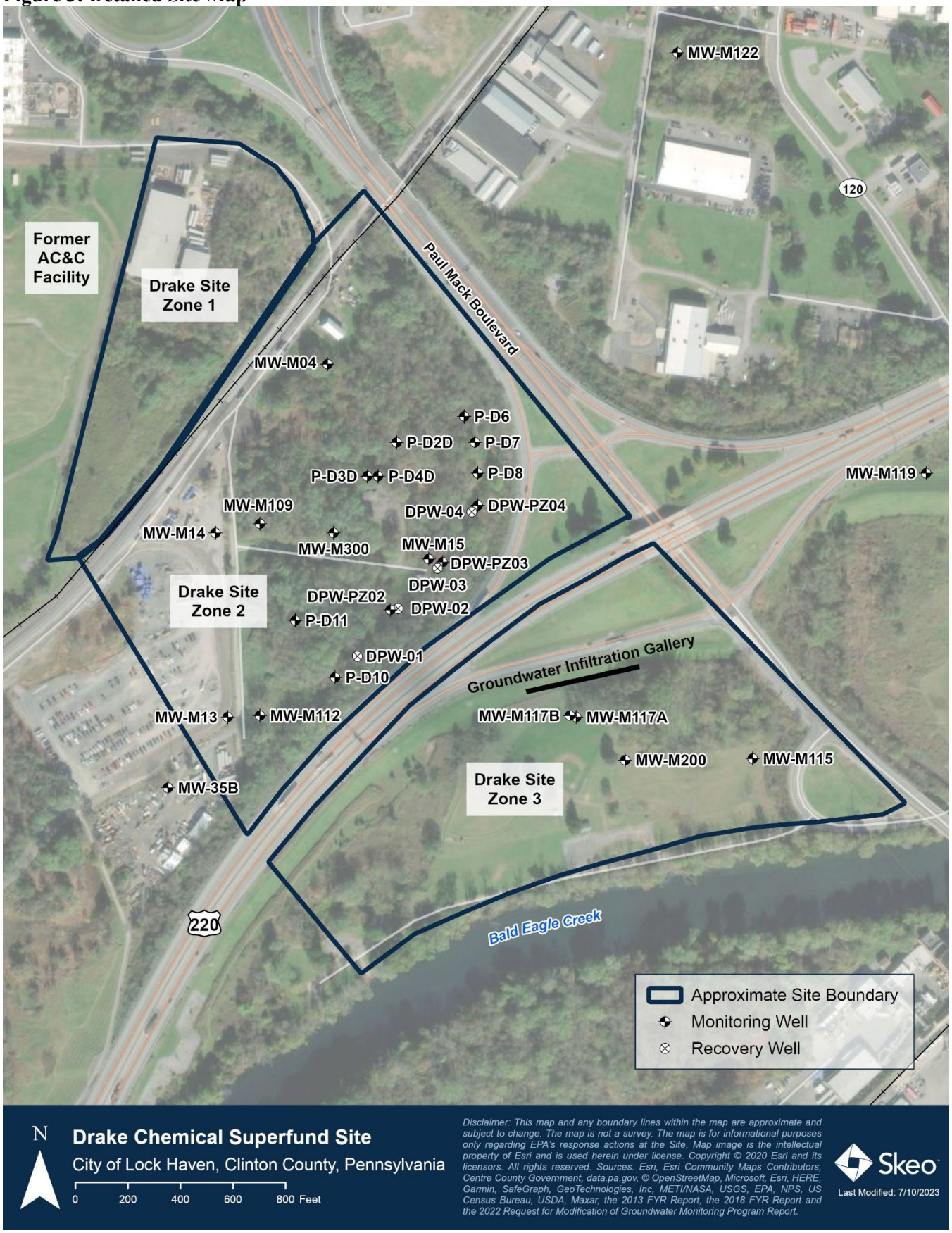
A public notice was published in *The Express* on May 16, 2023 (Appendix D). It stated that the FYR was underway and invited the public to submit any comments to EPA. The results of the review and the report will be made available at the Site's information repository, Ross Public Library, located at 232 West Main Street, Lock Haven, PA 17745.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The interviews are summarized below.

PADEP's overall impression of the project is that cleanup and maintenance at the Site has been very successful over the years. Monitoring data from the Site shows improvement and evidence of successful cleanup efforts. Parcels at the Site that have been cleaned up and can be reused are being reused by the community for their benefit. Some examples of reuse at the Site are the recreational public park and some privately owned parcels that are used for storage. Areas that currently cannot be used for reuse are fenced off, covered, or actively used for groundwater monitoring and treatment. A resident called PADEP to report that the local firefighting company was testing firefighting foam along the perimeter of the Site, just along the fencing. PADEP determined the fire training was occurring next to the Site and not on the Site. PADEP spoke with the fire department about what type of foam they were using. PADEP also indicated that a reduction in sampling frequency may be appropriate.

The Lock Haven City Manager shared that his overall impression of the cleanup and maintenance of the Site is significantly better than before the cleanup took place. When asked if the City feels well-informed about maintenance and work at the Site, the City Manager confirmed that the state Department of Environmental Protection provides an annual update of activities. The City Manager is not aware of any site-related complaints or inquiries from community members, trespassing, or vandalism in the last five years at the Site. There also have not been any recent changes to state laws that might affect the site remedy.

Figure 3: Detailed Site Map



Data Review

During this FYR period, the PRPs collected groundwater data as part of the OU4 requirements. In 2019, EPA also collected pore water and sediment samples from Bald Eagle Creek. These data are summarized below.

The PRPs submit quarterly progress reports to EPA and PADEP. In August 2022, the PRPs submitted a Request for Modification of Groundwater Monitoring Program (2022 Evaluation). This report included an evaluation of all groundwater data collected from 2000 through May 2022. This data review summary will mainly reference the 2022 Evaluation as well as the quarterly reports from 2018 through 2022 as needed.

Groundwater

The PRPs conduct groundwater monitoring in accordance with the Site's 2001 Final Groundwater Monitoring Plan that was updated on March 6, 2014. The current sampling network consists of 19 monitoring and recovery wells in Zones 2 and 3 and one background well (see Figure 3 and Figure H-1 in Appendix H). In Zone 1 there are no monitoring wells; in Zone 2 there are 14 monitoring wells (which includes the three active recovery wells and one inactive recovery well); and in Zone 3 there are 4 monitoring wells (MW-M115, MW-M117A, MW-M117B, and MW-M200) (see Figure 3). The sampling frequency of each of these wells varies. The four recovery wells (DPW-01, DPW-02, DPW-03 and DPW-04) are sampled quarterly. Ten monitoring wells, depicted in blue on Figure H-1 in Appendix H are sampled semiannually. Five more monitoring wells are sampled annually, depicted in green. In addition to the 19 wells, an additional 17 wells are gauged for water-level measurements on a quarterly basis (depicted with black markers on Figure H-1 in Appendix H).

The monitoring well program is required to have sampling locations upgradient of, within, and downgradient from the Zone 2 extraction system. Currently there are two monitoring wells that are considered upgradient of Zone 2 (near Zone 1: MW-M04 and MW-M14), eight monitoring wells upgradient of the recovery wells, and four recovery wells (within the extraction system). Due to the close proximity of the recovery wells to the Route 220 interchange property and its steep embankment, installation of downgradient wells within Zone 2 was not feasible. Four monitoring wells located in Zone 3 are downgradient of the Zone 2 recovery wells.

As specified in the OU4 ROD and ESDs, only two VOCs (benzene and 1,2-DCA) and one SVOC (beta-naphthylamine) have performance standards. The current analytical program at the Site monitors these three contaminants and other VOCs and SVOCs, as well as natural attenuation parameters. Although not a natural attenuation remedy, natural attenuation monitoring has been conducted since 2000.

Site Contaminants

During this FYR period, beta-naphthylamine concentrations were below the performance standard of 10 µg/L (which was based on the method detection limit at the time of the 1988 ROD) at all monitoring locations. Beta-naphthylamine has been below the performance standard selected in the 1988 ROD since 2012. Beta-naphthylamine has been detected three times during this FYR period. In 2018, beta-naphthylamine was detected at an estimated concentration of 4 µg/L and 1.6 µg/L at MW-M04 and PD2D, respectively. In 2019, beta-naphthylamine was detected at an estimated concentration of 6.7 µg/L (MW-M04). Since 2019, beta-naphthylamine has not been detected. In addition, the current detection limit is within EPA's acceptable risk range based on EPA's tapwater regional screening level (RSL) (see Question B of this FYR Report). There is no state standard or MCL for beta-naphthylamine.

The 2022 Evaluation evaluated the maximum concentration for each target constituent to determine changes in exceedances over time. Table 4 lists the results of these analyses. For all constituents, the maximum detected concentrations are decreasing over time.

Table 5 shows the maximum 1,2-DCA concentrations observed above the performance standard during this FYR period. All wells shown in Table 5 are in Zone 2. As shown in Table 5, the maximum concentrations are generally observed in DPW-04 and MW-M04 (Figure 3).

Table 4: Maximum Concentration Trends Over Time

Analyte	Performance Standard	Maximum Concentration Detected Above Performance Standard (µg/L)						
		Entire dataset	2000 to 2003	2004 to 2007	2008 to 2011	2012 to 2015	2016 to 2019	Since 2020
1,2-DCA	5	870	870	390	380	190	140	81
Benzene	5	65	65	38	41	26	41	22
Beta-naphthylamine	10	39	15.4	39	18	--	--	--

Notes:
Source: The Site's 2022 Evaluation.
The 1995 ESD identifies performance standards for benzene and 1,2-DCA as the MCL of 5 µg/L and the performance standard for beta-naphthylamine at 10 µg/L, which was the laboratory detection limit at the time of the ESD, because there was not an MCL
-- = did not exceed performance standard.

Table 5: 1,2-DCA Maximum Detected Concentrations – 2018 to 2022

Sampling Location	2018	2019	2020	2021	2022
	1,2-DCA Performance Standard = 5 µg/L				
DPW-02	8.5	14	25	9.9 H	9.5
DPW-03	25 J	16	19	11	18
DPW-04	140	78 J	81	55	36
MW-M04	45 J	24	20 JH	27	29
MW-M14	31 J	17	19 J	8.9 J	4.5
P-D2D	38 J	14	<120	21 J	21
P-D3D	11	3.4 J	7.4	3.7 J	3.5 J
P-D6	24	17	29	16	16
P-D8	53	23	17 J	15	32

Notes:
Source: Groundwater data provided by EPA.
All results are shown in µg/L.
For locations with duplicate sample results, the highest concentration is shown.
J = estimated concentration.
< = not detected above laboratory detection limit.

The 2022 Evaluation also evaluated the extent of exceedances in each zone. Only benzene and 1,2-DCA were evaluated since beta-naphthylamine has not exceeded its performance standard of 10 µg/L since 2012.

In Zone 3, only MW-M200 exceeded a performance standard in the previous six years (once in 2016 and once in 2017). The other downgradient wells (MW-M115, MW-117A and MW-117B) had no exceedances during this period. As shown, exceedances are generally clustered around the recovery wells and appear to be within or upgradient of the capture zone of the treatment system.

The 2022 Evaluation noted that concentrations of chlorobenzene (see discussion below for detected constituents that exceed MCLs but were not identified in the ROD) at DPW-02, DPW-03, DPW-04, P-D8 and PD2D are often diluted to bring chlorobenzene concentrations within the calibration range of the analytical instruments. When this occurs, the corresponding benzene detection limits are sometimes higher than the performance standard of 5 µg/L. Many of the benzene concentrations at these locations were reported as "undetected" by the lab. However, because of the elevated detection limits, it is not possible to determine whether these benzene concentrations fell above or below the performance standard and the 2022 Evaluation excluded these results from this analysis.

Other Detected Constituents
As part of the 2022 Evaluation, the PRPs evaluated concentrations of monitored and detected constituents that were not identified in the ROD. Of the monitored VOCs and SVOCs, ten constituents are present above their respective MCLs (Table 6 provides these constituents). Chlorobenzene and TCE are the two compounds that make up the majority of the exceedances.

Chlorobenzene was not identified as a COC in any decision document but is present above its MCL on Site. EPA believes chlorobenzene has likely migrated from the AC&C facility.[2] The highest chlorobenzene concentrations are in Zone 2 in well MW-M04 (2,900 µg/L in Quarter 4 of 2022), which is the monitoring well closest to the AC&C facility, and the recovery wells (240 µg/L to 570 µg/L in Quarter 4 of 2022).

The highest TCE concentrations were observed in wells PD2D and MW-M04 (120 µg/L, estimated at PD2D in 2020 and 75 µg/L at MW-M04 in 2021). As shown in Table 6, concentrations have decreased over time.

To evaluate further that these other detected constituents are not migrating from the Drake Site this FYR evaluated the concentrations of the other detected constituents at the Zone 3 wells (MW-M115, MW-117A, MW-117B and MW-M200). Based on the results from 2018 through 2022, for the other detected constituents, none of them were detected above their respective MCLs in Zone 3 wells.

Table 6: Maximum Concentrations Above MCLs, Non-Target Constituents

Chemical Name	MCL (µg/L)	Maximum Concentration Detected Above MCL (µg/L)						
		Entire dataset	2000 to 2003	2004 to 2007	2008 to 2011	2012 to 2015	2016 to 2019	Since 2020
Volatile Organic Compounds								
1,1,2-Trichloroethane	5	**18**	18	-	-	-	-	8.8
1,1-Dichloroethene	7	**40**	-	40	-	-	-	-
Chlorobenzene	100	**8900**	8900	5800	5200	4200	4300	3600
Methylene Chloride	5	**300**	53	14	18	110	300	6.4
Tetrachloroethene	5	**25**	-	-	-	-	25	9.2
Trichloroethene	5	**250**	130	250	140	81	58	120
Vinyl Chloride	2	**330**	-	39	-	-	330	-
Semi-Volatile Organic Compounds								
1,4-Dichlorobenzene	75	**130**	130	85	-	-	-	-
Benzo(a)pyrene	0.2	**3.8**	3.8	-	2.4	-	-	-
bis(2-Ethylhexyl) phthalate	6	**130**	64	12	11	38	130	-

Notes:
1 – All concentrations in µg/L

Source: The Site's 2022 Evaluation.

Bald Eagle Creek
In September 2019, EPA and their contractor installed passive diffusion bags in Bald Eagle Creek. In October 2019, EPA and their contractor collected pore water samples and sediment samples (Figure H-2 in Appendix H). All samples were analyzed for VOCs.

VOCs were detected in each pore water sample collected for analysis. The VOCs detected include 1,1-DCA, 1,2-dichlorobenzene, 1,2-DCA, 1,4-dichlorobenzene, chlorobenzene, cis-1,2-dichloroethene, methylene chloride and toluene. A summary of VOC results for pore water samples is provided in Table H-1 in Appendix H. The concentrations are well below PADEP human health and aquatic life criteria (Table 7). However, the data does suggest that the treatment system may not be completely containing contaminants from reaching Bald Eagle Creek.

[2] As indicated in the 1995 ESD, groundwater beneath the AC&C facility also contains organic and inorganic compounds of concern. Some compounds identified in the RCRA Facility Investigation Report (McLaren/Hart, 1994) include benzene, chlorobenzene, nitrobenzene, phenol, toluene, arsenic, copper, lead and mercury.

Four VOCs were detected in the sediment samples. Carbon disulfide was detected in samples SD-03 and SD-10 at estimated concentrations of 2.9 micrograms per kilogram (µg/kg) and 3.4 µg/kg, respectively; 1,2-dichlorobenzene was detected in samples SD-01 and SD-04 at estimated concentrations of 3.3 µg/kg and 2.5 µg/kg, respectively; chlorobenzene was detected in sample SD-04 at a concentration of 8.1 µg/kg; and methylene chloride was detected in samples SD-02, SD-04 and SD-06 at concentrations of 24 µg/kg, 19 µg/kg and 29 µg/kg, respectively. VOCs were not detected in samples SD-05, SD-07, SD-08 or SD-09. Table H-2 in Appendix H provides a summary of VOC results for sediment samples. There were no exceedances of regulatory standards.

Carbon disulfide at SD-03 exceeded the Region 3 Biological Technical Assistance Group Freshwater Sediment Screening Benchmark (Table 8).[3] The laboratory detection limit for all carbon disulfide results and most of the chlorobenzene results were above the screening benchmarks. While carbon disulfide exceeded the screening benchmark, there are no exceedances of regulatory standards.

[3] For Region 3, Biological Technical Assistance Group Screening Benchmarks are values used for the evaluation of sampling data at Superfund sites. These values facilitate consistency in screening-level ecological risk assessments across Region 3.

Table 7: VOC Detection – Bald Eagle Creek Pore Water

Detected VOC	PADEP Water Quality Criteria – Aquatic Life, Chronic Exposure[a]	01	02	03	04	05[b]	06	07	08	09	10
1,1-DCA	N/A	<0.5	0.11 J	0.11 J	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	160	<0.5	<0.5	<0.5	1	0.58	0.54	0.41 J	0.56	0.54	0.37 J
1,2-DCA	3,100	<0.5	0.46 J	0.22 J	0.18 J	0.19 J	0.17 J	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	150	<0.5	<0.5	<0.5	0.1 J	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorobenzene	240	<0.5	<0.5	<0.5	1.4	0.53	0.42 J	0.34 J	0.33 J	0.22 J	0.15 J
Cis-1,2-DCE	N/A	<0.5	<0.5	<0.5	0.13 J	0.26 J	0.2 J	<0.5	<0.5	<0.5	<0.5
Methylene chloride	2,400	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.32 J	<0.5	<0.5	<0.5
Toluene	330	<0.5	<0.5	<0.5	0.18 J	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Notes:
Source: The Site's 2019 Draft Trip Report – Pore Water and Sediment Sampling.
All concentrations and standards shown are in µg/L.
N/A = not applicable, no standard exists for this constituent.

a. PADEP Water Quality Criteria located here: http://www.pacodeandbulletin.gov/Display/pacode?file=/secure/pacode/data/025/chapter93/s93.8c.html&d=reduce# (accessed 3/2/2023)
b. A duplicate sample was collected at surface water sampling location 05. The highest concentration between the parent and duplicate is shown in this table.

Table 8: VOC Detection – Bald Eagle Creek Sediment

Detected VOC	Region 3 Biological Technical Assistance Group Freshwater Sediment Screening Benchmarks[a]	01	02	03	04	05[c]	06	07	08	09	10
Carbon disulfide	0.851	<10	<9.1	**2.9**	<5.7	<8.4	<11	<8	<8.9J	<11	3.4
1,2-Dichlorobenzene	16.5	3.3 J	<9.1	<7.6	2.5 J	<8.4	<11	8 R[b]	<8.9J	<11J	<13
Chlorobenzene	8.42	<10	<9.1	<7.6	8.1	<8.4	<11	<8J	<8.9J	<11	<13
Methylene chloride	N/A	<10	24	<7.6	19	<8.4	29	<8J	<8.9J	<11	<13

Notes:
Source: Site's 2019 Draft Trip Report – Pore Water and Sediment Sampling.
All concentrations and standards shown are in µg/L.
N/A = not applicable, no standard exists for this constituent.
J = estimated concentration.
Bold = exceeds screening benchmark.

a. EPA Region 3 Biological Technical Assistance Group Freshwater Sediment Screening Benchmarks, available at https://www.epa.gov/risk/freshwater-sediment-screening-benchmarks (accessed 3/17/2023)
b. The "R" flag was not defined in the Draft Trip Report. However, it is used frequently to designate an unusable data point.

Site Inspection

The site inspection took place on February 23, 2023. Participants included EPA's RPM, Skeo staff (EPA contractor support) and PADEP. The purpose of the inspection was to assess the protectiveness of the remedy. The completed checklist is in Appendix F. Site photographs are in Appendix G.

Site inspection participants met at the gated entrance to the AC&C facility office. Participants observed Zone 1 property from several access roads but were unable to obtain access to the covered ash pile area because access permission was not attained prior to the inspection. Participants then observed Zone 2, the groundwater treatment system and building as well as several recovery wells and monitoring wells. Participants toured the groundwater treatment building which was secure. All wells were secured, and the groundwater treatment system was in good condition. Only two of the three active recovery wells were operating. The third recovery well, DWP-04, was not operating at the time of the inspection. EPA has since confirmed that DWP-04 is now operational. Participants observed Zone 3 from a locked access gate and discussed the planned reuse of the former public park.

Following the inspection, Skeo staff visited the public information repository and confirmed that all current and relevant site documents were available.

V. TECHNICAL ASSESSMENT

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

Question A Summary:

The remedy is generally functioning as intended by the decision documents. EPA completed the remedial actions at OU1 (leachate stream) in 1987 and OU2 (building demolition) in 1990. EPA completed the remedial action at OU3 in 2000, including construction of an on-site incinerator, excavation of soil, sludge and sediment in the entire Zone 1 area, and soil treatment using incineration. About 295,000 tons of ash were placed in a large pile on the southern part of the Site, graded to specifications and covered with clean fill and vegetated. The OU4 remedy includes ongoing groundwater extraction and treatment and monitoring.

Based on drive-by observation of the covered ash pile, the OU3 vegetated ash pile remains undisturbed. PADEP and the city of Lock Haven are responsible for the continued maintenance of the ash pile and vegetated cover.

The OU4 groundwater extraction system has been effective in containing contaminated groundwater from the Drake Site within Zone 2. The groundwater concentrations in Zone 3 have decreased to below MCLs since 2017. The 1988 ROD and 1995 ESD specified performance standards for three Target Constituents: beta-naphthylamine, benzene, and 1,2-DCA. However, additional VOCs and SVOCs are also being monitored. The groundwater contamination from the AC&C Site appears to be co-mingling with the contamination from the Drake Site. The PRPs conducted an evaluation in 2022 and determined that 10 of these constituents exceed their respective MCLs at the Site, primarily chlorobenzene and TCE, which exceed their respective MCLs by two orders of magnitude. The Zone 3 wells meet MCLs for these other constituents.. It does not appear that groundwater performance standards will be achieved in a reasonable timeframe based on current contaminant concentration trends.

The system did not attain the target pumping rates from 2018 through 2020 due to issues with high water in the infiltration gallery. In March 2022, the infiltration gallery was redeveloped. In Quarter 4 of 2022 (the most recent quarterly progress report available for this FYR), the average quarterly pumping rate was 21.54 gpm. The PRPs' contractor will continue to monitor the system closely.

The institutional controls required in the 2016 ESD are in place in the form of three Pennsylvania HSCA Section 512 Orders, a city of Lock Haven ordinance and a Castanea Township ordinance that restrict the disturbance of the capped mound of ash and restrict the use of the groundwater. EPA, PADEP and the PRPs have reviewed the current development plan in Zone 3 and confirmed it will not impact the infiltration gallery or other components. All parties will continue to collaborate during development.

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

Question B Summary:

The exposure assumptions and RAOs for all OUs remain valid. While toxicity data have changed, these changes do not affect the current remedy because there is no exposure to contamination. Groundwater is not in use on or near the Site and institutional controls are in place.

Changes in Standards and To Be Considered

The 1988 ROD selected a performance standard for beta-naphthylamine of 10 µg/L, which was based on a laboratory detection limit. A 10 µg/L concentration of beta-naphthylamine corresponds to a 2.6×10^{-4} cancer risk, which is outside the upper bound of the acceptable cancer risk range of 1×10^{-4}. The current RSL for beta-naphthylamine is 0.039 µg/L (based on the most recent update for the EPA RSL Table from May 2023). Concentrations of beta-naphthylamine over the last five years have ranged from non-detect to an estimated 6.7 µg/L in a monitoring well in Zone 2 (MW-M04 in 2019). Beta-naphthylamine has been detected three times during this FYR period. In 2018, beta-naphthylamine was detected at an estimated concentration of 4 µg/L and 1.6 µg/L at MW-M04 and PD2D, respectively. In 2019, beta-naphthylamine was detected at an estimated concentration of 6.7 µg/L (MW-M04). Since 2019, beta-naphthylamine has not been detected. The detection limit for beta-naphthylamine has been decreasing and is now about 3.2 µg/L, within EPA's acceptable cancer risk range. The O&M Plan should be updated to include analytical methods that can obtain a method detection limit that is less than the current RSL. Beta-naphthylamine-impacted groundwater is captured by the recovery wells and there are no current exposure pathways. Prior to closure, EPA should evaluate if the beta-naphthylamine concentrations and detection limits are within acceptable risk ranges.

The performance standards of MCLs for benzene and 1,2-DCA remain valid and have not changed since the 1995 ESD. Detection limits for some analytes, including benzene, continue to exceed the MCL. This is mainly due to the high concentration of chlorobenzene, which impacts the detection limit for benzene. The O&M Plan should be

updated to include analytical methods for chlorobenzene and benzene that are capable of attaining a method detection limit for each compound that are below MCLs or performance standards.
The 2013 FYR Report recommended sampling and analyzing for 1,4-dioxane as a contaminant of potential concern in groundwater at the Site. Samples were collected from the influent and effluent of the treatment system. Based on the results, EPA does not consider 1,4-dioxane to be a contaminant of potential concern for the Site.

Changes in Exposure Pathways
While the exposure pathways evaluated in the decision documents remain valid, the remedy did not account for the hyporheic zone in Bald Eagle Creek. EPA sampled pore water and sediment in 2019. This FYR compared the pore water results with PADEP water quality standards and the results were well below standards. Carbon disulfide at SD-03 exceeded the Region 3 Biological Technical Assistance Group Freshwater Sediment Screening Benchmark (Table 8).[4] The laboratory detection limit for all carbon disulfide results and most of the chlorobenzene results were above the screening benchmarks.

Because VOCs are present in the shallow groundwater, vapor intrusion is a potential concern at the Site. Currently, there are no enclosed, occupied buildings on site. If conditions were to change in the future, vapor intrusion should be evaluated.

Expected Progress Toward Meeting RAOs
RAOs have been met for OU1, OU2, and OU3. The 1988 ROD indicated the goal of the groundwater remedy was to meet MCLs. Performance standards were set for three contaminants: beta-naphthylamine, benzene, and 1,2-DCA.

Based on this evaluation , the groundwater remedy has shown limited progress toward meeting MCLs for the three target constituents (beta-naphthylamine, benzene and 1,2-DCA). Although beta-naphthylamine appears to be below the target concentration, benzene and 1,2-DCA remain above performance standards in Zone 2. Contaminants including chlorobenzene and TCE among others are also detected above MCLs in Zone 2. For all monitored constituents, results indicate that Zone 3 groundwater concentrations are below MCLs and performance standards. The groundwater treatment system appears effective in maintaining hydraulic control and preventing downgradient migration of contamination from the Drake Site. However, due to the results of the porewater and sediment sampling in Bald Eagle Creek described above and the Zone 2 VOC concentrations, additional information is needed to confirm hydraulic control and improve the groundwater treatment system. A comprehensive third party optimization study is required to (i) evaluate the current groundwater treatment systems ability to ensure complete groundwater plume capture and attain MCLs and risk-based standards in a reasonable time frame, and (ii) update a sitewide conceptual site model (CSM) including a comprehensive hydrogeological investigation to address the migrating groundwater plume from the AC&C Site to the Drake Chemical Site.

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

Chlorobenzene, TCLs and other VOCs detected on the Drake Site appear to be migrating from the AC&C facility. The AC&C Facility cleanup is being managed under RCRA. Cleanup activities currently include groundwater remediation, quarterly monitoring and reporting, financial assurance, and maintenance of institutional and engineering controls. The groundwater remediation consists of two components: a pump & treat system installed in 2000 to contain groundwater at the northern facility boundary and in-situ injections on the southeastern portion of the Facility initiated in September 2017 to treat the primary constituent of concern, chlorobenzene. The most recent highest northern Facility boundary Chlorobenzene concentration was 3,400 ug/L (EPA MCL 100 ug/L), reduced from the initial 10,000 ug/L. The most recent highest southeast facility boundary concentration was 3,700 ug/L, reduced from 9,400 ug/L since in-situ treatments began. Chlorobenzene migrating from AC&C Site is

[4] For Region 3, Biological Technical Assistance Group Screening Benchmarks are values used for the evaluation of sampling data at Superfund sites. These values facilitate consistency in screening-level ecological risk assessments across Region 3.

currently being treated as part of the groundwater extraction and treatment at the Drake Site and should be contained at the AC&C facility boundary. Also, due to the results of the porewater and sediment sampling in Bald Eagle Creek described above and the Zone 2 VOC concentrations, additional information is needed to confirm hydraulic control of the VOCs from the Drake Site.

The current Quality Assurance Project Plan for the Site is from 2015. Since 2015, EPA guidelines have changed and the Quality Assurance Project Plan should be updated accordingly.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OUs without Issues/Recommendations Identified in the FYR:
OU 1, 2, 3

Issues and Recommendations Identified in the FYR:				
OU(s): OU4	**Issue Category: Remedy Performance**			
	Issue: It does not appear that groundwater clean-up standards will be achieved throughout the aquifer in a reasonable time frame.			
	Recommendation: Implement a comprehensive third-party independent optimization study to: (i) evaluate the current groundwater treatment systems ability to ensure complete groundwater plume capture and attain MCLs and risk-based standards in a reasonable time frame, and (ii) update a sitewide conceptual site model (CSM) including a comprehensive hydrogeological investigation to address the migrating groundwater plume from the AC&C Site to the Drake Chemical Site.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/30/2025

OTHER FINDINGS

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

- *EPA in consultation with PADEP will review and respond to the 2022 Request for Modification of Groundwater Monitoring Program.*
- *EPA requested PADEP evaluate the existing vegetated cover and coordinate with the city if any maintenance is needed.*
- *The O&M Plan should be updated to include analytical methods for chlorobenzene and benzene that are capable of attaining a method detection limit for each compound that are below MCLs or performance standards.*
- *The O&M Plan should be updated to include an analytical method for beta-naphthylamine that is capable of meeting the current RSL.*

- *The Site Quality Assurance and Project Plan is out of date. The Quality Assurance and Project Plan should be updated in compliance with current EPA guidance.*

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement	
Operable Unit: 1	*Protectiveness Determination:* Protective
Protectiveness Statement: The OU1 remedy is protective of human health and the environment because contaminated soil and sediment from the area south of Zone 1 was excavated and the sewer drain area was capped.	

Protectiveness Statement	
Operable Unit: 2	*Protectiveness Determination:* Protective
Protectiveness Statement: The OU2 remedy is protective of human health and the environment. EPA demolished and removed all buildings, tanks and other structures and took them off site for disposal.	

Protectiveness Statement	
Operable Unit: 3	*Protectiveness Determination:* Protective
Protectiveness Statement: The OU3 remedy is protective of human health and the environment because the Zone 1 area was excavated to the water table and all soil was treated by incineration. Treated soils were placed in a large pile, graded, covered with clean fill and vegetated. Institutional controls are in place on the Zone 1 property to prohibit groundwater use and restrict activities that could disturb the ash pile.	

Protectiveness Statement	
Operable Unit: 4	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The OU4 remedy is protective of human health and the environment in the short term because the groundwater treatment system appears to be capturing and treating contaminated groundwater. Institutional controls are in place to restrict the use of the groundwater. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: implement a comprehensive third-party independent optimization study to: (i) evaluate the current groundwater treatment systems ability to ensure complete groundwater plume capture and attain MCLs and risk-based standards in a reasonable time frame, and (ii) update a sitewide conceptual site model (CSM) including a comprehensive hydrogeological investigation to address the migrating groundwater plume from the AC&C Site to the Drake Chemical Site.	

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The sitewide remedies are protective of human health and the environment in the short term. As part of the OU1 and OU2 remedies, contaminated materials, soils and structures have been taken off site for disposal. As part of OU3, the soils have been treated on site by incineration. In OU4, the groundwater is being captured and treated. Institutional controls are in place at the Site to prevent disruption of the ash pile and to restrict the use of the groundwater. However, in order for the OU4 remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: implement a comprehensive third-party independent optimization study to: (i) evaluate the current groundwater treatment systems ability to ensure complete groundwater plume capture and attain MCLs and risk-based standards in a reasonable time frame, and (ii) update a sitewide conceptual site model (CSM) including a comprehensive hydrogeological investigation to address the migrating groundwater plume from the AC&C Site to the Drake Chemical Site.

VIII. GOVERNMENT PERFORMANCE AND RESULTS ACT MEASURES

As part of this FYR, the federal Government Performance and Results Act (GPRA) Measures have been reviewed. The GPRA measures and their status are as follows:

Environmental Indicators
Human Health: Current Human Exposure Controlled
Groundwater Migration: Contaminated Groundwater Migration Under Control

Sitewide Ready for Anticipated Use (SWRAU)
The Site has achieved SWRAU status.

IX. NEXT REVIEW

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

APPENDIX A – REFERENCE LIST

DPW-04 Capture Zone Extent Evaluation, Drake Chemical Superfund Site, Lock Haven, Pennsylvania. Prepared by Key Environmental, Inc. June 2015.

Explanation of Significant Differences, Drake Chemical Superfund Site, Lock Haven, Pennsylvania. EPA Region 3. June 1995.

Five-Year Review Report for the Drake Chemical Superfund Site, Clinton, Pennsylvania. September 2013.

Operations and Maintenance Plan, Monitoring and Maintenance Plan, Drake Chemical Superfund Site, Lock Haven, Pennsylvania. Prepared by Key Environmental, Inc. February 2001.

Operations and Maintenance Plan, Monitoring and Maintenance Plan, Drake Chemical Superfund Site, Lock Haven, Pennsylvania. Prepared by Key Environmental, Inc. March 2014.

Quarterly Progress Reports No. 89 through 108. Civil Action No. 4: CV-92-1352, Drake Chemical Superfund Site, Lock Haven, Pennsylvania. Prepared by Key Environmental, Inc. 2018 through 2022.

Record of Decision Phase 1 – Remedial Alternative Selection, Drake Chemical Site, Lock Haven, Pennsylvania. EPA Region 3. September 1984.

Record of Decision – Remedial Action Alternative Selection, Drake Chemical Site (Phase II), Lock Haven, Pennsylvania. EPA Region 3. May 1986.

Record of Decision Remedial, Drake Chemical Site, Lock Haven, Pennsylvania. EPA Region 3. September 1988.

Request for Modification of Groundwater Monitoring Program, Drake Chemical Superfund Site, Lock Haven, Pennsylvania. Prepared by Key Environmental, Inc. August 2022.

Second Explanation of Significant Differences for the Drake Chemical Superfund Site, Lock Haven, Pennsylvania. EPA Region 3. August 2016.

Simulation of Ground-Water flow and Areas Contributing Recharge to Extraction Wells at the Drake Chemical Superfund Site, City of Lock Haven and Castanea Township, Pennsylvania. Prepared by the U.S. Geological Survey. 2006.

APPENDIX B – SITE CHRONOLOGY

Table B-1: Site Chronology

Event	Date
Kilsdunk started operating at the Site and manufactured color dye compounds that produced a known carcinogen named beta-naphthylamine	1940s
Facility sold to Drake Chemical Company, which produced pesticides and a variety of different chemical materials	1960s
EPA was made aware of site contamination	April 1, 1979
EPA initiated the first site inspection	July 1, 1980
Drake Chemical Company operations ceased	1981
EPA initiated a removal action to remove drums from the surface of the Site and emptied the on-site tanks	March 2, 1982
EPA completed the removal action to remove drums from the surface of the Site and emptied the on-site tanks	June 24, 1982
EPA issued notice letters to the Site's PRPs	October 29, 1982
EPA proposed the Site for listing on the NPL	December 30, 1982
EPA finalized the Site's listing on the NPL	September 8, 1983
EPA completed a combined RI/FS for OU1 EPA began the remedial design for OU1 EPA signed the first ROD to remediate an off-site leachate stream	September 30, 1984
EPA issued notice letters to the PRPs	November 21, 1984
EPA and site PRPs completed RI/FS negotiations	February 15, 1985
EPA finished the remedial design for OU1	July 1985
EPA completed a combined RI/FS for OU2 EPA signed the second ROD for on-site remediation of remaining buildings, tanks and other OU2 structures	May 13, 1986
EPA completed the RI/FS for OU2	September 15, 1986
EPA began a removal action at the Site for building demolition	June 20, 1987
EPA completed the OUl remedial action	August 1987
EPA established the Site's information repository	August 31, 1988
EPA completed the combined RI/FS study for OU3/OU4 EPA signed the third ROD for the remediation of contaminated soil, sludge and other debris at OU3 and groundwater at OU4	September 29, 1988
EPA concluded the OU2 remedial action	May 25, 1990
EPA began the OU3 remedial action	September 30, 1991
EPA issued a Special Notice to the Site's PRPs	September 28, 1992
Alternative dispute resolution efforts started	February 1, 1993
EPA entered into a Consent Decree with site PRPs	July 5, 1994
EPA signed an ESD for OU4	June 14, 1995
Federal court entered into a Consent Decree with site PRPs Site PRPs began the OU4 remedial design	February 14, 1996
Site PRPs began the remedial action for OU4	May 30, 1999
EPA completed the remedial action for OU3	February 1, 2000
Site PRPs completed the remedial action for OU4 Site PRPs started a long-term response action for OU4	September 28, 2000
EPA prepared the Site's Preliminary Close-Out Report	September 29, 2000
PRPs' contractor Key Environmental, Inc. prepared the Site's Monitoring and Maintenance Plan	February 26, 2001
EPA issued the Site's first FYR Report	September 25, 2003
PADEP recorded a Section 512 order for institutional controls	December 2006
EPA issued the Site's second FYR Report	September 22, 2008

Event	Date
Local governments implemented groundwater use restriction ordinances	February 2010
EPA signed a sitewide ESD requiring institutional controls	August 2, 2016
EPA issued the Site's third FYR Report	September 23, 2018
EPA signed an ESD for OU4	March 19, 2019
Site PRPs submitted a request to modify the Site's groundwater monitoring program	August 2022

APPENDIX C – SITE MAPS

Figure C-1: Historical Site Features

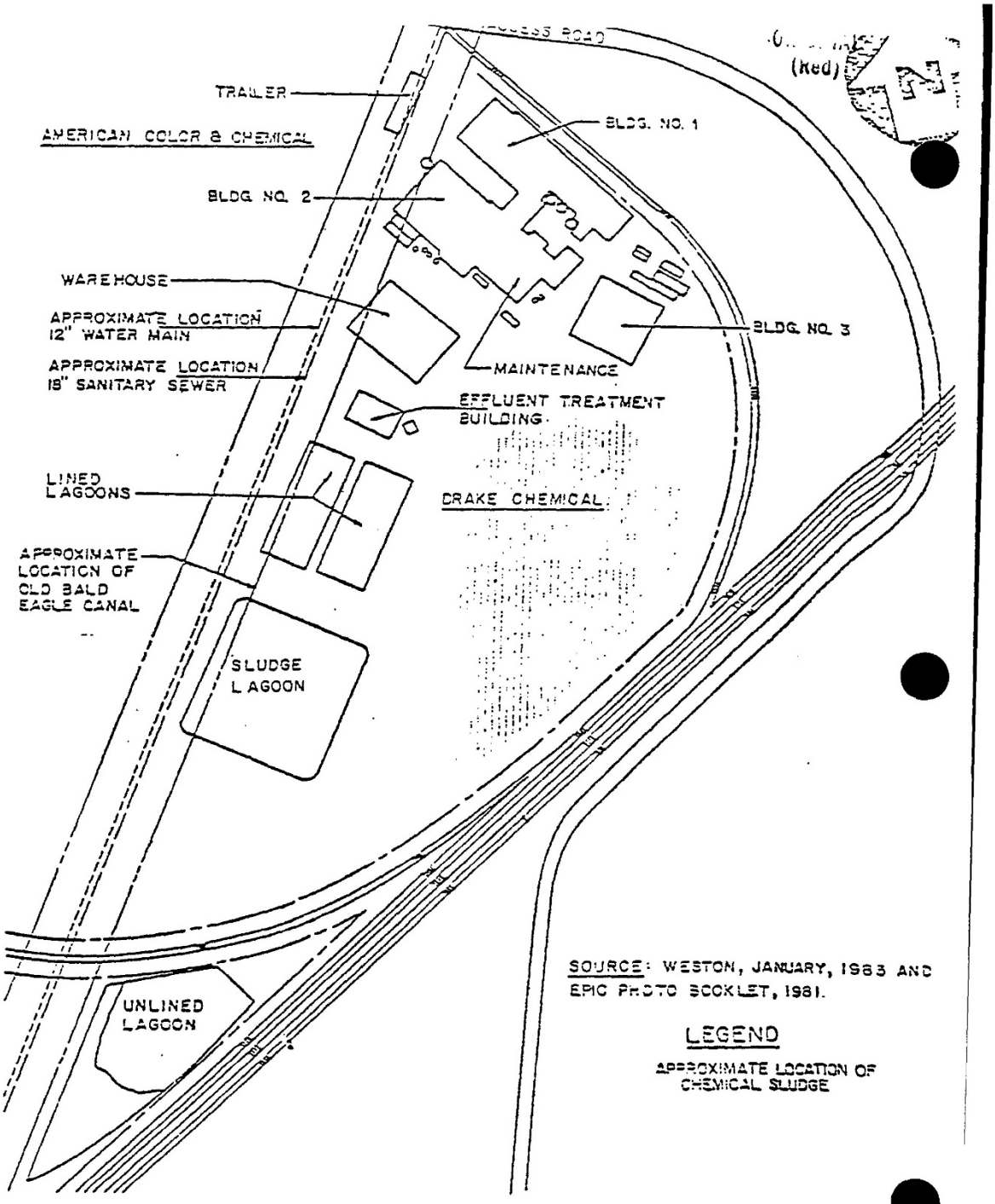


FIGURE 2

DRAKE CHEMICAL, INC. SITE MAP
LOCK HAVEN, CLINTON COUNTY, PA.
NOT TO SCALE

AR300803

APPENDIX D – PRESS NOTICE

EPA PUBLIC NOTICE

EPA REVIEWS CLEANUP
DRAKE CHEMICAL SUPERFUND SITE

The U.S. Environmental Protection Agency (EPA) is reviewing the cleanup that was conducted at the Drake Chemical Superfund Site located in Lock Haven, Pennsylvania. EPA conducts Five-Year Reviews to ensure that cleanups continue to protect public health and the environment. EPA conducted the previous Five-Year Review in 2018 and concluded that the remedies were protective of human health and the environment in the short-term. EPA will make the findings from this Five-Year Review available in August 2023.

To access site information, including the Five-Year Review, visit: www.epa.gov/superfund/drake

For questions or to provide site-related information for the review, contact:
Katie Page, EPA Community Involvement Coordinator
215-814-2409 or page.katherine@epa.gov

APPENDIX E – INTERVIEW FORMS

INTERVIEW RECORD

Site Name: DRAKE CHEMICAL SUPERFUND SITE	**EPA ID No.:**	
Subject: FYR Interview	**Time:** N/A	**Date:** 5/15/23
Type: Teams Call **Location of Visit:** N/A	Incoming X Outgoing	

Contact Made By:

Name: Katie Page	**Title:** CIC	**Organization:** EPA

Individual Contacted:

Name: Cheryl Sinclair and Jeffrey Szybist	**Title:** PADEP Supervisor and Project Officer	**Organization:** PADEP

Telephone No: 570-327-3418 (Cheryl Sinclair) **Fax No:** **E-Mail Address:** csinclair@pa.gov and jszybist@pa.gov	**Street Address:**

Summary Of Conversation

The CIC had a virtual Teams meeting with PADEP Supervisor and Project Officer for the site. PADEP's overall impression of the project is that cleanup and maintenance at the site has been very successful over the years. Monitoring data from the site shows improvement and evidence of successful cleanup efforts. Parcels at the site that have been cleaned up and can be reused are being reused by the community for their benefit. Some examples of reuse at the site are the residential public park and some privately owned parcels that are used for storage. Areas that currently cannot be used for reuse are fenced off, covered, or actively used for groundwater monitoring and treatment.

The PADEP team shared that they do not receive a lot of regular communication from EPA regarding this site. To improve communications, the PADEP team suggested that they be copied onto future emails about monitoring events at the site and relevant communications with the potentially responsible party. The PADEP Project Manager for this site is relatively new to the agency and feels that regular communication about site updates would help him become familiar with the site.

PADEP responded that they are not aware of any complaints or inquiries from community members about the site in recent years, but there have been inquiries from developers related to the residential park on some of the site parcels. PADEP also responded that there have not been any reported incidents of vandalism or trespassing at the site. However, a resident once called PADEP to report that the local firefighting company was testing firefighting foam along the perimeter of the site, just along the fencing. PADEP and the resident are unsure if this is a regular activity done by the firefighting company and are also unsure if this poses an issue for the site.

PADEP is not aware of any changes to state laws that might affect the protectiveness of the site's remedy. However, they did mention Pennsylvania state and EPA's new per- and polyfluoroalkyl substances (PFAS) maximum contaminant levels and wondered if PFAS would be considered for sampling at the site in the future.

Finally, PADEP referenced recent data evaluations from the responsible party's contractor. The data shows that many of the samples had low levels of site contaminants and wondered if it would be possible to reduce the frequency of sampling at the site moving forward.

INTERVIEW RECORD

Site Name: DRAKE CHEMICAL SUPERFUND SITE	**EPA ID No.:**	
Subject: FYR Interview	**Time: N/A**	**Date: 5/8/23**
Type: Email **Location of Visit:** N/A	Incoming X Outgoing	

Contact Made By:

Name: Katie Page	**Title: CIC**	**Organization: EPA**

Individual Contacted:

Name: Gregory Wilson	**Title: City Manager**	**Organization: City of Lock Haven, PA**
Telephone No: 570-893-5907 **Fax No:** **E-Mail Address: gwilson@lockhavenpa.gov**	**Street Address: 20 E Church Street** **City, State, Zip: Lock Haven, PA 17745**	

Summary Of Conversation

The CIC emailed a list of interview questions to the City Manager of the City of Lock Haven in May 2023. The City Manager shared that his overall impression of the cleanup and maintenance of the site is significantly better than before the cleanup took place. He also noted that there doesn't seem to be any reuse efforts on about 35 vacant acres on the site. When asked if the City feels well-informed about maintenance and work at the site, the City Manager confirmed that the state Department of Environmental Protection provides an annual update of activities. The City Manager is not aware of any site-related complaints or inquiries from community members, trespassing, or vandalism in the last five years at the site. There also have not been any recent changes to state laws that might affect the site remedy.

The City Manager concluded the interview by raising a question about site reuse. Currently, there only appears to be maintenance activities at the site. The surrounding city is largely built out, and by contrast 35 acres of the site area is underutilized. The CIC took this response as a question about potential site reuse options for the site.

APPENDIX F – SITE INSPECTION CHECKLIST

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Drake Chemical	**Date of Inspection: 2/23/2023**
Location and Region: Lock Haven, Pennsylvania, Region 3	**EPA ID: PAD003058047**
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature: 40s, cloudy**

Remedy Includes: (check all that apply)

- ☒ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other: Excavation, French drain and clay cap, building demolition, soil incineration
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

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

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

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

Agency PADEP				
Contact	Cheryl Sinclair and Jeffrey Szybist (Name)	Supervisor and Project Officer (Title)	5/15/2023 (Date)	570-327-3418 (Phone)
Problems/suggestions ☐ Report attached: _____				
Agency City of Lock Haven				
Contact	Gregory Wilson (Name)	City Manager (Title)	5/8/2023 (Date)	570-893-5907 (Phone)
Problems/suggestions ☐ Report attached: _____				
Agency _____				
Contact	_____ (Name)	_____ (Title)	_____ (Date)	_____ (Phone)
Problems/suggestions ☐ Report attached: _____				
Agency _____				
Contact	_____ (Name)	_____ (Title)	_____ (Date)	_____ (Phone)
Problems/suggestions ☐ Report attached: _____				

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone
Problems/suggestions ☐ Report attached: _____

4. **Other Interviews** (optional) ☐ Report attached: _____

III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)

1. **O&M Documents**

☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☒ Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks: _____

2.	**Site-Specific Health and Safety Plan**	☒ Readily available	☒ Up to date	☐ N/A
	☐ Contingency plan/emergency response plan	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

3.	**O&M and OSHA Training Records**	☒ Readily available	☒ Up to date	☐ N/A

Remarks: _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

7.	**Groundwater Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A

Remarks: _____

8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for state

☐ PRP in-house ☒ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☐ _____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place ☒ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

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

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

Describe costs and reasons: _____

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

A. Fencing

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

Remarks: Gated access to groundwater treatment system.

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): Self-reporting

Frequency: _____

Responsible party/agency: City of Lock Haven, Castanea Township, PADEP

Contact _____ _____ _____ _____

Name Title Date Phone

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

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

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

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

Other problems or suggestions: ☐ Report attached

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

Remarks: More institutional controls may be needed in Zone 3.

D. General

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

Remarks: _____

2. **Land Use Changes On Site** ☐ N/A

Remarks: A new road along the railroad separates Zone 1 and Zone 2.

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

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

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

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

The ash pile (OU3) has a vegetative cover. However, the area was not accessible during the site inspection and could not be evaluated.

A. Landfill Surface

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

Area extent: _____ Depth: _____

Remarks: _____

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

Lengths: _____ Widths: _____ Depths: _____

	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☐ Erosion not evident
	Area extent: _____		Depth: _____
	Remarks: _____		
4.	**Holes**	☐ Location shown on site map	☐ Holes not evident
	Area extent: _____		Depth: _____
	Remarks: _____		
5.	**Vegetative Cover**	☐ Grass	☐ Cover properly established
	☐ No signs of stress	☐ Trees/shrubs (indicate size and locations on a diagram)	
	Remarks: _____		
6.	**Alternative Cover** (e.g., armored rock, concrete)		☐ N/A
	Remarks: _____		
7.	**Bulges**	☐ Location shown on site map	☐ Bulges not evident
	Area extent: _____		Height: _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☐ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Area extent: _____
	☐ Ponding	☐ Location shown on site map	Area extent: _____
	☐ Seeps	☐ Location shown on site map	Area extent: _____
	☐ Soft subgrade	☐ Location shown on site map	Area extent: _____
	Remarks: _____		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☐ No evidence of slope instability		
	Area extent: _____		
	Remarks: _____		
B. Benches		☐ Applicable ☐ N/A	
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
2.	**Bench Breached**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
3.	**Bench Overtopped**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
C. Letdown Channels		☐ Applicable ☐ N/A	
	(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side		

slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ No evidence of settlement
   Area extent: _____ Depth: _____
   Remarks: _____

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

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

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

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

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

D. Cover Penetrations ☐ Applicable ☐ N/A

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

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

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

4. **Extraction Wells Leachate**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A
Remarks: _____

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

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

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

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

Remarks: DPW-04 was not operating at the time of the inspection.

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

☒ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

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

Remarks: _____

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

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

   ☐ Good condition ☐ Needs maintenance

   Remarks: _____

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

   ☐ Good condition ☐ Needs maintenance

   Remarks: _____

3. **Spare Parts and Equipment**

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

   Remarks: _____

C. Treatment System ☒ Applicable ☐ N/A

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

   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

   ☐ Air stripping ☒ Carbon adsorbers

   ☐ Filters: _____

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

   ☐ Others: _____

   ☐ Good condition ☐ Needs maintenance

   ☐ Sampling ports properly marked and functional

   ☒ Sampling/maintenance log displayed and up to date

   ☒ Equipment properly identified

   ☒ Quantity of groundwater treated annually: 10 million gallons (2022)

   ☐ Quantity of surface water treated annually: _____

   Remarks: _____

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

   ☐ N/A ☒ Good condition ☐ Needs maintenance

   Remarks: _____

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

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

   Remarks: _____

4. **Discharge Structure and Appurtenances**

   ☒ N/A ☐ Good condition ☐ Needs maintenance

   Remarks: _____

5. **Treatment Building(s)**

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

   ☐ Chemicals and equipment properly stored

   Remarks: _____

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

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

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

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☒ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

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

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

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

Remarks: _____

X. OTHER REMEDIES

If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).

The remedy is generally functioning as intended by site decision documents. EPA completed the remedial actions for OU1 (leachate stream) in 1987 and for OU2 (building demolition) in 1990. EPA completed the remedial action for OU3 in 2000, including construction of an on-site incinerator, excavation of soil, sludge and sediment in the entire Zone 1 area, and soil treatment using incineration. About 295,000 tons of ash were placed in a large pile on the southern part of the Site, graded to specifications and covered with clean fill. The OU4 remedy includes groundwater extraction and treatment and monitoring. The OU3 vegetated ash pile remains undisturbed but there is no ongoing maintenance of the pile or cover. The 2016 ESD indicated that institutional controls are needed to ensure the pile remains undisturbed and the cover should be maintained to provide adequate erosion and sedimentation control. However, there is no indication that the property owner, the city of Lock Haven, has maintained the covered ash pile. During the inspection, EPA and PADEP were not able to access the pile. To ensure future protectiveness, the city of Lock Haven should conduct regular inspections and any necessary maintenance of the ash pile and vegetated cover, and report the results to EPA and PADEP.

The OU4 remedy appears to be functioning as intended. The groundwater extraction system has been effective in containing contaminated groundwater within Zone 2. Groundwater contaminant concentrations in Zone 3 have decreased to below MCLs since 2017. The 1988 ROD and 1995 ESD specified performance standards for three Target Constituents. However, an additional 95 compounds are being monitored. The PRPs conducted an evaluation in 2022 and determined that 10 non-target compounds have exceeded their respective MCLs at the Site. The main compounds of concern are chlorobenzene and TCE, which exceed their respective MCLs by two orders of magnitude. The Zone 3 wells meet MCLs for other non-target compounds, indicating that the groundwater extraction and treatment system is working to maintain hydraulic control and treat the other compounds. Prior to determining that the Site has met cleanup goals, EPA should evaluate all detected compounds and determine if more remedial action is needed.

While the groundwater monitoring data indicate the groundwater extraction and treatment system is maintaining hydraulic control, the system did not attain the target pumping rates from 2018 through 2020. In March 2022, the infiltration gallery was redeveloped. In Quarter 4 of 2022 (the most recent quarterly

	progress report available for this FYR), the average quarterly pumping rate was 21.54 gpm. The PRPs' contractor will continue to monitor the system closely.
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. The O&M activities for the groundwater treatment system appear to be adequate.
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. Prior to the infiltration gallery redevelopment in 2022, there were frequent downtime events due to high water levels in the infiltration gallery. These events resulted in an average pumping rate below the target of 18 gpm. In Quarter 4 of 2022 (the most recent quarterly progress report available for this FYR), the average quarterly pumping rate was 21.54 gpm. The PRPs' contractor will continue to monitor the system closely.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The PRPs' contractor has requested a modification to monitoring frequency. EPA and PADEP will review the request and respond accordingly.

APPENDIX G – SITE INSPECTION PHOTOS

Storage shed in Zone 1

New signage and new road for trucking facility in Zone 2

Groundwater extraction and treatment building in Zone 2

Filters inside the groundwater extraction and treatment building

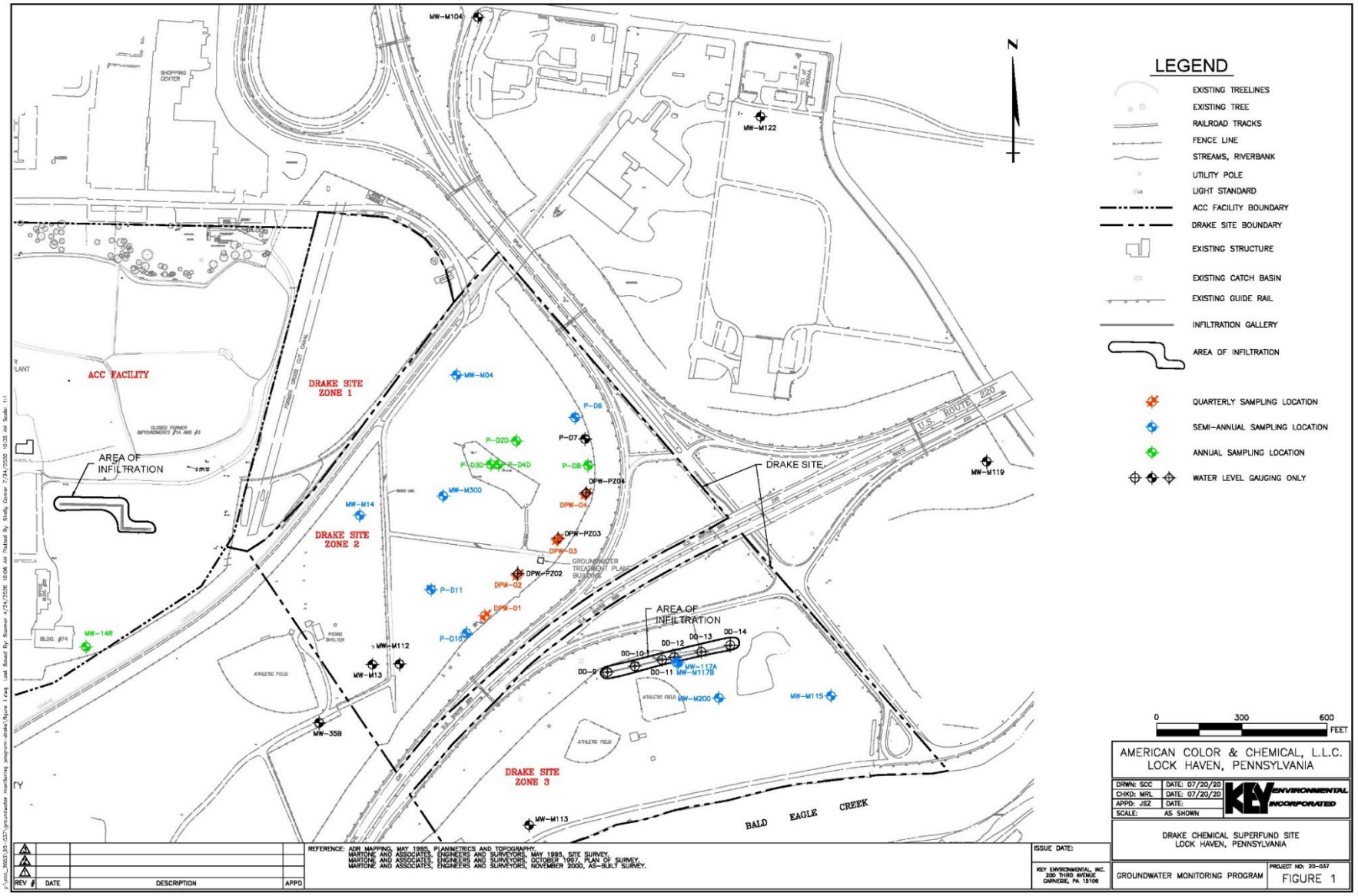
DPW-03 and DPW-PZ03

Zone 3 former park entrance, with Bald Eagle Creek on the left


Bald Eagle Creek

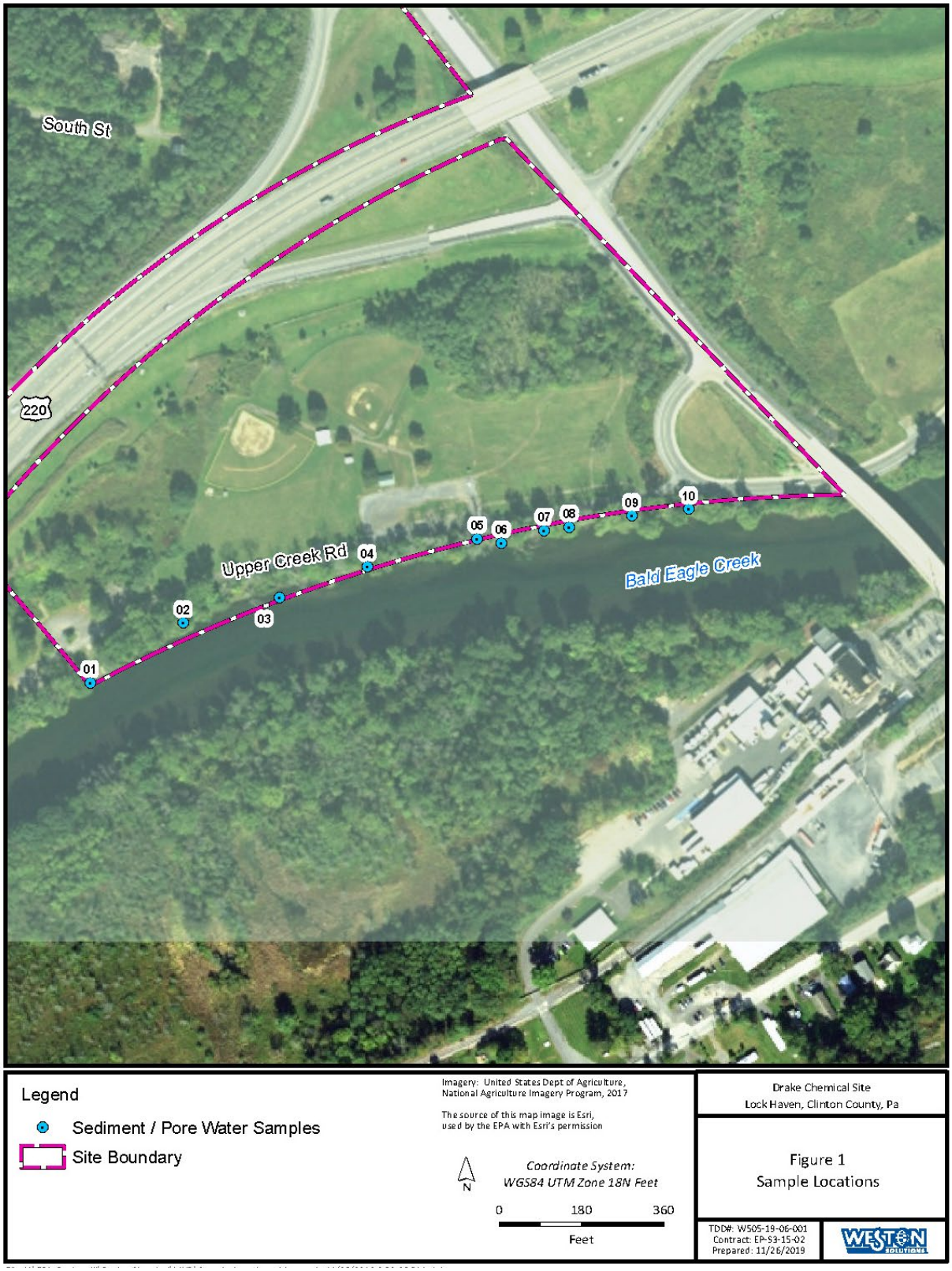
APPENDIX H – DATA REVIEW FIGURES AND TABLES

Figure H-1: Groundwater Monitoring Locations[5]



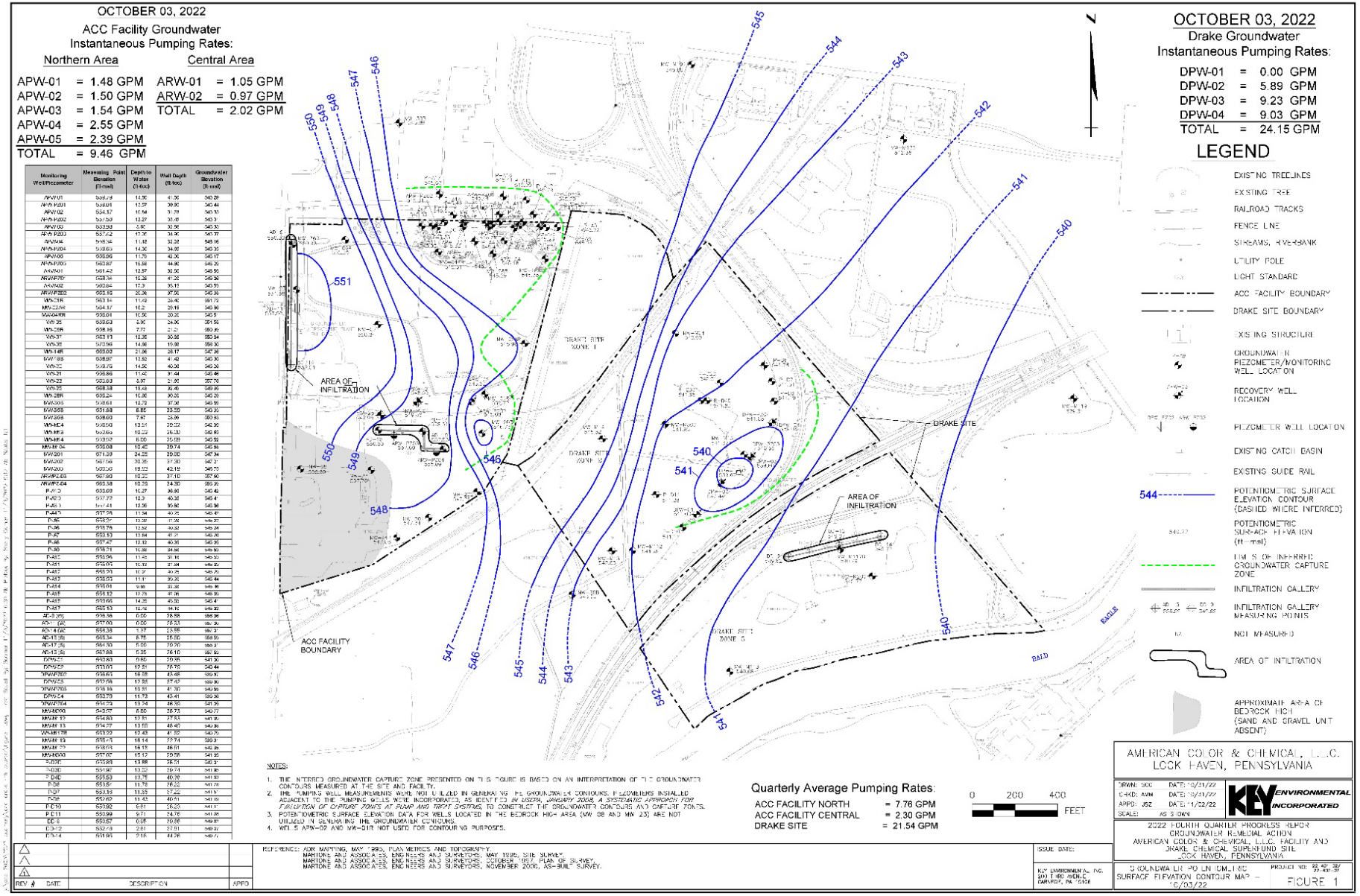
[5] *Source:* The Site's 2022 Evaluation.

Figure H-2: Sediment/Pore Water Sample Locations[6]



[6] *Source:* The Site's 2019 Draft Trip Report – Pore Water and Sediment Sampling.

Figure H-3: Potentiometric Surface Map, Quarter 4 of 2022[7]



[7] *Source:* Site's Quarterly Progress Report No. 108, October, November and December 2022.

Table H-1: Pore Water Analytical Results, 2019[8]

CLP Sample Number:	C0AA0	C0AA1	C0AA2	C0AA3	C0AA4	C0AB1	C0AA6	C0AA7	C0AA9	C0AB0	C0AC3	C0AA8	C0AC4
Sampling Location:	DCS-PW-01	DCS-PW-02	DCS-PW-03	DCS-PW-04	DCS-PW-05	DCS-PW-05-D	DCS-PW-06	DCS-PW-07	DCS-PW-09	DCS-PW-10	DCS-TB-01	DCW-PW-08	DCS-FB-01
Matrix:	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled:	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019
Volatile Organic Compound													
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	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	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	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	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	**0.11 J**	**0.11 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	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	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	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	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	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	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	**1**	**0.53**	**0.58**	**0.54**	**0.41 J**	**0.54**	**0.37 J**	0.5 U	**0.56**	0.5 U
1,2-Dichloroethane	0.5 U	**0.46 J**	**0.22 J**	**0.18 J**	**0.19 J**	**0.18 J**	**0.17 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	**0.1 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Hexanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	**2.9 J**	**2.9 J**	**2.4 J**	**3 J**	**2.3 J**	**3 J**	**2.4 J**	**2.5 J**	**2.7 J**	**2.4 J**	**4.2 J**	**2.4 J**	**7**
Benzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	**1.4**	**0.5**	**0.53**	**0.42 J**	**0.34 J**	**0.22 J**	**0.15 J**	0.5 U	**0.33 J**	0.5 U
Chloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	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	0.5 U	0.5 U	0.5 U	**0.13 J**	**0.26 J**	**0.17 J**	**0.2 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
m,p-Xylene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.09 J**	0.5 U	0.5 U
Methyl Acetate	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl tert-butyl Ether	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.32 J**	0.5 U	0.5 U	**0.18 J**	0.5 U	0.5 U
o-Xylene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.06 J**	0.5 U	0.5 U
Styrene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	0.5 U	0.5 U	0.5 U	**0.18 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.2 J**	0.5 U	0.5 U
trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	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	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Notes
Bold values indicate detected result
ug/L = micrograms per kilogram
U= analyte not detected
J = result value is estimated
CLP = contract laboratory program

[8] *Source:* The Site's 2019 Draft Trip Report – Pore Water and Sediment Sampling.

Table H-2: Sediment Analytical Results, 2019[9]

CLP Sample Number:	C0AB2	C0AC2	C0AB3	C0AB4	C0AB5	C0AB6	C0AB7	C0AB8	C0AB9	C0AC0	C0AC1
Sampling Location:	DCS-SD-01	DCS-SD-01-D	DCS-SD-02	DCS-SD-03	DCS-SD-04	DCS-SD-05	DCS-SD-06	DCS-SD-07	DCS-SD-08	DCS-SD-09	DCS-SD-10
Matrix:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Units:	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Date Sampled:	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/16/2019
Volatile Organic Compound											
1,1,1-Trichloroethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
1,1,2,2-Tetrachloroethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
1,1,2-Trichloro-1,2,2-trifluoroethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
1,1,2-Trichloroethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
1,1-Dichloroethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
1,1-Dichloroethene	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
1,2,3-Trichlorobenzene	10 UJ	9.2 UJ	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 R	8.9 UJ	11 UJ	13 U
1,2,4-trichlorobenzene	10 UJ	9.2 UJ	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 R	8.9 UJ	11 UJ	13 U
1,2-Dibromo-3-chloropropane	10 UJ	9.2 UJ	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 R	8.9 UJ	11 UJ	13 U
1,2-Dibromoethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
1,2-Dichlorobenzene	**3.3 J+**	9.2 UJ	9.1 U	7.6 U	**2.5 J**	8.4 U	11 U	8 R	8.9 UJ	11 UJ	13 U
1,2-Dichloroethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
1,2-Dichloropropane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
1,3-Dichlorobenzene	10 UJ	9.2 UJ	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 R	8.9 UJ	11 UJ	13 U
1,4-Dichlorobenzene	10 UJ	9.2 UJ	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 R	8.9 UJ	11 UJ	13 U
2-Butanone	21 U	18 U	18 U	15 U	11 U	17 U	22 U	16 UJ	18 UJ	22 U	26 U
2-Hexanone	21 U	18 U	18 U	15 U	11 U	17 U	22 U	16 UJ	18 UJ	22 U	26 U
4-Methyl-2-pentanone	21 U	18 U	18 U	15 U	11 U	17 U	22 U	16 UJ	18 UJ	22 U	26 U
Acetone	21 U	18 U	18 U	15 U	11 U	17 U	22 U	16 UJ	18 UJ	22 U	**48**
Benzene	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Bromochloromethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Bromodichloromethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Bromoform	10 UJ	9.2 UJ	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 R	8.9 UJ	11 UJ	13 U
Bromomethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Carbon disulfide	10 U	9.2 U	9.1 U	**2.9 J**	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	**3.4 J**
Carbon tetrachloride	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Chlorobenzene	10 U	9.2 U	9.1 U	7.6 U	**8.1**	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Chloroethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Chloroform	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Chloromethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
cis-1,2-Dichloroethene	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
cis-1,3-Dichloropropene	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Cyclohexane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Dibromochloromethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Dichlorodifluoromethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Ethylbenzene	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Isopropylbenzene	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
m,p-Xylene	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Methyl Acetate	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Methyl tert-butyl Ether	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Methylcyclohexane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Methylene chloride	10 U	9.2 U	**24**	7.6 U	**19**	8.4 U	**29**	8 UJ	8.9 UJ	11 U	13 U
o-xylene	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Styrene	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Tetrachloroethene	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Toluene	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
trans-1,2-Dichloroethene	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
trans-1,3-Dichloropropene	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Trichloroethene	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Trichlorofluoromethane	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U
Vinyl chloride	10 U	9.2 U	9.1 U	7.6 U	5.7 U	8.4 U	11 U	8 UJ	8.9 UJ	11 U	13 U

Notes
Bold values indicate detected result
ug/kg = micrograms per kilogram
U= analyte not detected
J = result value is estimated
J+ = result value is estimated and may be biased high
CLP = contract laboratory program

[9] *Source:* The Site's 2019 Draft Trip Report – Pore Water and Sediment Sampling.

Table H-3: Influent and Effluent VOC and SVOC Results, Quarter 4 of 2022[10]

CONSTITUENT	UNITS	D-EFFLUENT DLGAC77102422 10/24/2022	D-EFFLUENT DLGAC77111422 11/14/2022	D-EFFLUENT DLGAC77120122 12/1/2022	D-INFLUENT DLINF102422 10/24/2022
1,1,1-Trichloroethane	ug/l	<0.24	<0.24	<2.5	<0.24
1,1,2,2-Tetrachloroethane	ug/l	<0.37	<0.37	<3	<0.37
1,1,2-Trichloroethane	ug/l	<0.2	<0.2	<2.4	<0.2
1,1-Dichloroethane	ug/l	<0.26	<0.26	<1.8	0.3 J
1,1-Dichloroethylene	ug/l	<0.26	<0.26	<2.9	<0.26
1,2-Dichloroethane	ug/l	<0.43	<0.43	<1.5	27
1,2-Dichloroethene	ug/l	<0.44	<0.44	<4	5.5
1,2-Dichloropropane	ug/l	<0.35	<0.35	<2.5	<0.35
2-Butanone	ug/l	<1.9	<1.9	<2.9	<1.9
2-Hexanone	ug/l	<1.1	<1.1	<4.2	<1.1
4-Methyl-2-pentanone	ug/l	<1.3	<1.3	<1.9	<1.3
Acetone	ug/l	<4.4	<4.4	<5.5	<4.4
Benzene	ug/l	<0.2	<0.2	<2	4.1
Bromodichloromethane	ug/l	<0.34	<0.34	<2.4	<0.34
Bromoform	ug/l	<0.54	<0.54	<2.6	<0.54
Bromomethane	ug/l	<0.55	<0.55	<4.5	<0.55
Carbon disulfide	ug/l	<0.82	<0.82	<3	<0.82
Carbon Tetrachloride	ug/l	<0.21	<0.21	<3.3	<0.21
Chlorobenzene	ug/l	<0.38	<0.38	<1.6	460 H
Chloroethane	ug/l	<0.32	<0.32	<2.6	<0.32
Chloroform	ug/l	<0.33	<0.33	<2.1	0.45 J
Chloromethane	ug/l	<0.4	<0.4	<3.9	<0.4
cis-1,3-Dichloropropene	ug/l	<0.22	<0.22	<1.6	<0.22
Dibromochloromethane	ug/l	<0.28	<0.28	<2.4	<0.28
Ethylbenzene	ug/l	<0.3	<0.3	<2.2	<0.3
Methylene chloride	ug/l	<0.32	<0.32	<3.9	<0.32
Styrene	ug/l	<0.42	<0.42	<1.3	<0.42
Tetrachloroethylene	ug/l	<0.25	<0.25	<2	0.34 J
Toluene	ug/l	<0.38	<0.38	<1.7	<0.38
Trans-1,3-Dichloropropene	ug/l	<0.22	<0.22	<1.7	<0.22
Trichloroethylene	ug/l	<0.31	<0.31	<1.5	14
Vinyl chloride	ug/l	<0.17	<0.17	<3.7	0.39 J
Xylene (total)	ug/l	<0.65	<0.65	<4.3	<0.65

Notes:

ug/l = Microgram per liter

< = Constituent not detected at reported concentration

J = Estimated result. Result is less than reporting limit.

H = Sample was anlyzed outside of the hold time.

[10] *Source:* Quarterly Progress Report No. 108, October, November and December 2022.

CONSTITUENT	UNITS	D-EFFLUENT DLGAC77102422 10/24/2022	D-INFLUENT DLINF102422 10/24/2022
1,2,4-Trichlorobenzene	ug/l	<1.1	<1.1
1,2-Dichlorobenzene	ug/l	<0.79	8.4
1,3-Dichlorobenzene	ug/l	<0.83	<0.83
1,4-Dichlorobenzene	ug/l	<0.51	4.8 J
2,2'-oxybis(1-chloropropane)	ug/l	<0.48	<0.48
2,4,5-Trichlorophenol	ug/l	<2.1	<2.1
2,4,6-Trichlorophenol	ug/l	<1.9	<1.9
2,4-Dichlorophenol	ug/l	<0.43	<0.43
2,4-Dimethylphenol	ug/l	<1.4	<1.4
2,4-Dinitrophenol	ug/l	<13	<13
2,4-Dinitrotoluene	ug/l	<2.9	<2.9
2,6-Dinitrotoluene	ug/l	<1.4	<1.4
2-Chloronaphthalene	ug/l	<0.49	<0.49
2-Chlorophenol	ug/l	<1.1	<1.1
2-Methylnaphthalene	ug/l	<0.52	<0.52
2-Methylphenol	ug/l	<2.5	<2.5
2-Naphthylamine	ug/l	<3.3	<3.3
2-Nitroaniline	ug/l	<4.6	<4.6
2-Nitrophenol	ug/l	<1.6	<1.6
3,3-Dichlorobenzidine	ug/l	<4.9	<4.9
3-Nitroaniline	ug/l	<3.6	<3.6
4,6-Dinitro-2-methylphenol	ug/l	<12	<12
4-Bromophenylphenyl ether	ug/l	<2.7	<2.7
4-Chloro-3-methylphenol	ug/l	<2.3	<2.3
4-Chloroaniline	ug/l	<3.1	<3.1
4-Chlorophenyl phenyl ether	ug/l	<1.8	<1.8
4-Methylphenol	ug/l	<3.1	<3.1
4-Nitroaniline	ug/l	<3	<3
4-Nitrophenol	ug/l	<7.8	<7.8
Acenaphthene	ug/l	<0.54	<0.54
Acenaphthylene	ug/l	<0.54	<0.54
Anthracene	ug/l	<0.41	<0.41
Benzo(a)anthracene	ug/l	<0.63	<0.63
Benzo(a)pyrene	ug/l	<0.44	<0.44
Benzo(b)fluoranthene	ug/l	<0.81	<0.81
Benzo(ghi)perylene	ug/l	<0.58	<0.58
Benzo(k)fluoranthene	ug/l	<0.73	<0.73
Bis(2-chloroethoxy)methane	ug/l	<1.3	<1.3
Bis(2-chloroethyl)ether	ug/l	<0.33	<0.33
Bis(2-ethylhexyl)phthalate	ug/l	<52	<52
Butyl benzyl phthalate	ug/l	<3.9	<3.9
Carbazole	ug/l	<0.43	<0.43
Chrysene	ug/l	<0.68	<0.68
Dibenzo(a,h)anthracene	ug/l	<0.6	<0.6
Dibenzofuran	ug/l	<1.6	<1.6
Diethyl phthalate	ug/l	<4.7	<4.7
Dimethyl phthalate	ug/l	<1.7	<1.7
Di-n-butyl phthalate	ug/l	21	13
Di-n-octyl phthalate	ug/l	<5.7	<5.7
Fluoranthene	ug/l	<0.5	<0.5
Fluorene	ug/l	<0.58	<0.58
Hexachlorobenzene	ug/l	<0.47	<0.47
Hexachlorobutadiene	ug/l	<0.58	<0.58
Hexachlorocyclopentadiene	ug/l	<4.1	<4.1
Hexachloroethane	ug/l	<1.1	<1.1
Indeno(1,2,3-cd)pyrene	ug/l	<0.71	<0.71
Isophorone	ug/l	<1.6	<1.6
Naphthalene	ug/l	<0.49	<0.49
Nitrobenzene	ug/l	<4.2	<4.2
N-Nitrosodiphenylamine	ug/l	<0.99	<0.99
N-Nitrosodipropylamine	ug/l	<0.59	<0.59
Pentachlorophenol	ug/l	<7.1	<7.1
Phenanthrene	ug/l	<0.46	<0.46
Phenol	ug/l	<4.1	<4.1
Pyrene	ug/l	<0.45	<0.45

Notes:

ug/l = Microgram per liter

< = Constituent not detected at reported concentration

J = Estimated result. Result is less than reporting limit.