

**SIXTH FIVE-YEAR REVIEW REPORT FOR
ARMY CREEK LANDFILL SUPERFUND SITE
NEW CASTLE COUNTY, DELAWARE**



Prepared by

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

ACL	Army Creek Landfill
ACPS	Army Creek Private Settlers
AWC	Artisan Water Company
BCEE	Bis(2-chloroethyl)ether
BTAG	Biological Technical Assistance Group
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
COC	Contaminant of Concern
CSM	Conceptual Site Model
DAWM	Division of Air and Waste Management
DCA	Dichloroethane
DNREC	Delaware Department of Natural Resources and Environmental Control
DS&G	Delaware Sand & Gravel Landfill
DWR	Division of Water Resources
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
FSSL	Freshwater Sediment Screening Level
FYR	Five-Year Review
GAC	Granular Activated Carbon
GPRA	Government Performance and Results Act
GMNC	Groundwater Migration Not Under Control
GMZ	Groundwater Management Zone
HEUC	Human Exposure Under Control
HFPO-DA	Hexafluoropropylene Oxide-Dimer Acid
HI	Hazard Index
IC	Institutional Control
MCL	Maximum Contaminant Level
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter
MOA	Memorandum of Agreement
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ng/L	Nanograms per Liter
NCC	New Castle County
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
PFBS	Perfluorobutane Sulfonate
PFNA	Perfluorononanoic Acid
PFHxS	Perfluorohexanesulfonic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
ppt	Parts per Trillion
PRP	Potentially Responsible Party
QAPP	Quality Assurance Project Plan

RAO	Remedial Action Objective
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
SVOC	Semivolatile Organic Compound
SWRAU	Sitewide Ready for Anticipated Use
UPCU	Upper Potomac Confining Unit
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 in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review 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 five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the sixth FYR for the Army Creek Landfill Superfund Site (ACL Site). The triggering action for this statutory review is the completion date of the previous FYR. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The ACL Site consists of two operable units (OUs), which are both addressed in this FYR. OU1 addresses source control (including the installation of a multi-layered landfill cap and the operation of a recovery well network downgradient from the ACL Site to prevent contaminated groundwater from migrating to potable water supply wells), and OU2 addresses treating recovery well discharge to Army Creek.

EPA Remedial Project Manager (RPM) Kait Hess led the FYR. Participants included the EPA community involvement coordinator (CIC), EPA hydrogeologist, EPA toxicologist, EPA Biological Technical Assistance Group (BTAG), and representatives from the Delaware Department of Natural Resources and Environmental Control (DNREC). The review began on 10/18/2023.

Site Background

The 50-acre ACL Site is located in New Castle, Delaware just east of the U.S. Route 13 railroad system overpass and west of Delaware Route 9 (Figure 1). The landfill is bordered immediately to the northwest by railroad tracks and to the southeast by Army Creek/Pond, which is a tributary of the Delaware River. The wetland areas adjacent to the landfill, including the creek and pond, provide a natural habitat for various species of vegetation and wildlife. Another Superfund site, Delaware Sand and Gravel Landfill (DS&G) is located immediately east of the ACL site on the opposite side of Army Creek. In addition to the landfill itself, the ACL Site includes areas to the south and east where groundwater has become contaminated due to releases of hazardous substances from the landfill.

The Site is an abandoned sand and gravel quarry operated by New Castle County (the County) from 1960 through 1968 for the disposal of two million cubic yards of municipal and industrial waste. Uncontrolled landfill leachate led to groundwater contamination. The ACL Site property is currently used as a wildlife habitat, with a mix of annual to perennial grasses and wildflowers planted to promote this use. Prominent visible features on the property include a security fence along the landfill perimeter, landfill gas vents, a drainage ditch and sedimentation basins, groundwater monitoring and recovery wells, and a groundwater treatment plant, which is no longer in use. Land use surrounding the ACL Site is residential and commercial.

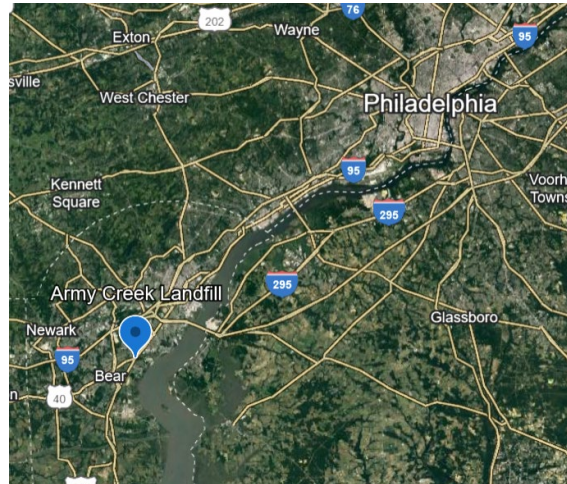
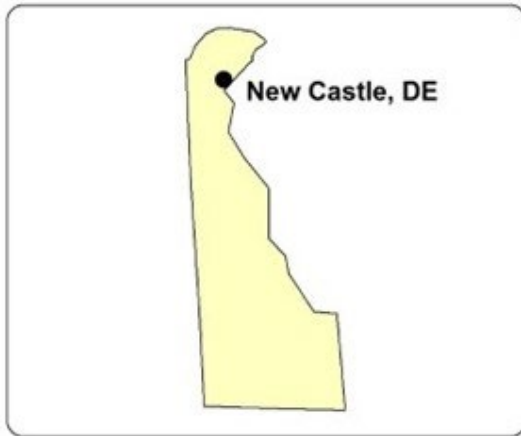
The Columbia Aquifer is the uppermost aquifer beneath the landfill. Beneath that is the Upper Potomac Aquifer, which underlies the two Superfund sites and is a primary source of water for the local water utility, Artesian Water Company (AWC). The Columbia Aquifer is separated from the Upper Potomac Aquifer by the Upper Potomac Confining Unit (UPCU), a regional competent clay unit. Areas where the UPCU has been eroded away and replaced by sands, gravels and cobbles have been identified at and near the ACL Site where paleochannels exist. These “zero-clay” areas represent potential pathways for leachate migration from the landfill into the Upper Potomac Aquifer. In addition, during landfill operations, deep excavations for expansion of the landfill may have

removed portions of the UPCU, potentially creating additional pathways for leachate migration from the Columbia Aquifer into the Upper Potomac Aquifer. Both aquifers have been contaminated by the ACL Site. AWC supplies water to all area homes and businesses. The natural groundwater flow direction in the Upper Potomac Aquifer is toward the Delaware River. Near the ACL Site, the groundwater flow direction is toward AWC's Llangollen well field (located half a mile south of the two Superfund sites), which is the largest pumping center in the area and locally influences groundwater flow (Figure 1).

Appendix A includes documents consulted during the preparation of this report. A chronology of activities at the ACL Site is included in Appendix B.

Figure 1: Site Vicinity Map

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



0 1,000 2,000 4,000 Feet

Sources: Esri, DeLorme, AND, Tele Atlas, First American, UNEP-WCMC, USGS, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, DeLDT DTC, the GIS User Community, the April 2018 Post-Remedial Monitoring Report, FirstMap Delaware and the 2019 Additional Investigation Work Plan.

Legend

- Approximate Army Creek Landfill Boundary
- AWC Potomac Aquifer Supply Well



Army Creek Landfill Superfund Site

City of New Castle, New Castle County, Delaware

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Army Creek Landfill Superfund Site		
EPA ID: DED980494496		
Region: 3	State: DE	City/County: New Castle / New Castle
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	Has the site achieved construction completion? Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Kait Hess		
Author affiliation: EPA Region 3		
Review period: 10/18/2023 - 9/5/2024		
Date of site inspection: 6/11/2024		
Type of review: Statutory		
Review number: 6		
Triggering action date: 9/5/2019		
Due date (<i>five years after triggering action date</i>): 9/5/2024		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

Groundwater contamination was initially detected in 1971, when landfill leachate constituents were discovered in a residential well in the Llangollen Estates housing development, which lies south of and adjacent to the landfill. In response, the County began environmental investigations and actions which are described below in the Response Actions section of this FYR. Investigations indicated that leachate originating from the ACL and DS&G Sites was contaminating local aquifers with volatile organic compounds (VOCs), semivolatiles organic compounds (SVOCs), and metals at concentrations exceeding drinking water standards. A formal risk assessment was not conducted for OU1.

In 1990, a focused remedial investigation for OU2 evaluated human health and ecological risks based on potential exposures to surface water, sediment, and groundwater. The risk assessment indicated there was no unacceptable risk to human health with respect to surface water and sediment and the remedy selected in the ROD for OU1 will mitigate the risk presented to human health via groundwater. The OU2 assessment indicated unacceptable risks for surface water and sediment to freshwater aquatic receptors due to the presence of iron in surface water.

Response Actions

Following the 1971 discovery of private well contamination, the County began monitoring groundwater in 1972. The County determined that ACL Site leachate was contaminating groundwater and that contaminated groundwater in the Upper Potomac Aquifer was moving toward downgradient receptors. The County paid for an extension of AWC water supply lines to residences with contaminated wells. There was also a settlement with the homeowners to offset monthly service costs. In 1973, the County installed a groundwater recovery system designed to maintain a groundwater divide between the ACL Site and AWC's downgradient Llangollen well field. Contaminated groundwater pumped from the recovery well system was discharged to Army Creek. The system was modified in 1980 to replace some wells with recovery wells located closer to the landfill.

EPA placed the ACL Site on the National Priorities List (NPL) in September 1983. In August 1984, EPA entered into a Consent Order with the County to perform a Feasibility Study (FS) at the ACL Site; the County submitted the FS in 1986. The September 30, 1986 OU1 Record of Decision (ROD) selected a source control remedy to prevent contaminated groundwater from migrating to potable water supply wells. The 1986 OU1 ROD stated that the remedial action objectives (RAOs) were to control the migration of contaminated groundwater and to minimize further groundwater contamination by reducing leachate generated by landfill. The OU1 ROD outlined the remedy in two phases as follows:

Phase I:

- Installation of multi-layer cap.
- Continued operations of the downgradient recovery well network.
- Evaluation of the remedial action for five years after the cap is installed to assess the effectiveness of the system during operation.

Phase II:

- Installation of upgradient groundwater controls, if determined to be necessary based on the five-year evaluation.¹

The June 29, 1990 OU2 ROD selected a remedy to address the need to treat the recovery well effluent before discharge to Army Creek/Pond. The OU2 ROD stated that the RAO was to ensure that recovery well discharges did not exceed applicable Delaware Surface Water Quality Standards that are protective of the designated uses of Army Creek/Pond. The OU2 remedial action included:

- Construction and operation of a water treatment plant capable of reducing the concentration of iron in the extracted groundwater level that is protective of the designated uses for Army Creek.
- Long-term monitoring of the surface water, sediments and recovered groundwater quality to gauge the effectiveness of the remedy, and a wetland monitoring program and evaluation plan.

In September 1991, the United States, the state of Delaware and 18 cooperating potentially responsible parties (PRPs) entered into a Consent Decree (CD), which established groundwater cleanup levels. According to Exhibit 4 of the CD, Scope of Work-2, groundwater collection and treatment could be terminated once the groundwater cleanup levels were met at the property boundary. The cleanup standards from the CD are no longer being used. Table 1 includes current Maximum Contaminant Levels (MCLs) and Risk-Based Levels (set at HI=0.1 and HI=1).

¹ The County submitted a Five-Year Evaluation Report in 2000. Based on the report, EPA determined that installation of upgradient groundwater controls was not necessary.

Table 1: Groundwater Cleanup Levels

Contaminant	Primary Drinking Water Standard (µg/L)
<i>Metals</i>	
Arsenic	10
Barium	2000
Cadmium	5
Chromium	100
Cobalt*	6
Iron*	14000
Lead	15
Manganese*	430
Mercury*	2
Nitrate (as N)	10000
Selenium	50
Silver*	94
<i>VOCs</i>	
Dibromochloromethane	60
Chloroform	70
Bromodichloromethane	80
Bromoform	80
Benzene	5
Vinyl chloride	2
Carbon tetrachloride	5
1,2-Dichloroethane (DCA)	5
Trichloroethylene	5
1,1-Dichloroethylene	7
1,1,1-Trichloroethane	200
1,4-Dichlorobenzene	75
<i>Pesticides</i>	
Endrin	2
Lindane	0.020
Methoxychlor	40
Toxaphene	3
2,4-Dichlorophenoxyacetic acid	70
2,4,5-Trichlorophenoxypropionic acid	50
<i>Notes:</i>	
Contaminants marked with an asterisk (*) indicate the cleanup goal is a risk-based standard set at HI=1.	

The OU2 ROD established the iron cleanup level of 1,000 micrograms per liter (µg/L) for recovered groundwater before discharge to Army Creek/Pond based on the Delaware Surface Water Quality Standards – Water Quality Criteria for the Protection of Aquatic Life. While the OU2 remedy required monitoring of surface water and sediment, cleanup levels were not identified for those media.

On February 6, 2020, EPA issued an Explanation of Significant Differences (ESD) for the ACL Site. The ESD modified the Selected Remedy to require the implementation of land and groundwater use restrictions to ensure the long-term protectiveness of the Selected Remedy.

Status of Implementation

In August 1989, EPA completed the remedial design for the landfill cap. In accordance with the CD, the PRPs implemented the OU1 remedial action and OU2 remedial design and remedial action. In 1992, EPA accepted a revised landfill cap design prepared by the PRPs following a value engineering analysis of EPA's 1989 cap design. The PRPs initiated the cap construction in May 1992. During the grading activities in preparation for cap construction, buried drums were unearthed along the northwestern end of the landfill. A drum detection and removal plan² was prepared, approved by EPA, and implemented. The cap construction included:

- Site filling and grading necessary to achieve design contours and slopes for the cap system.
- Installation of a multilayer cap system.³
- Installation of settlement markers and gas vents.
- Installation of a security fence.

The remedial design for the groundwater treatment plant was completed by the PRPs and approved by EPA in July 1991. The construction of the treatment plant occurred from June 1992 to December 1993. The major components of the treatment plant remedial action included:

- Construction of treatment plant building and influent pump station.
- Installation of underground piping to reroute the recovery well discharge water from Army Creek to the new pump station.
- Installation of water treatment support structures (e.g., aerators, chemical oxidant tank, etc.).
- Start-up and testing.

EPA, the State and the PRPs conducted a final inspection of the cap in November 1993 and of the treatment plant in January 1994. Treatment plant effluent laboratory results submitted to EPA by letter report in January 1994 indicated that the system was achieving performance standards and effluent was meeting the 1,000 µg/L discharge limit for iron. EPA and the State determined that all remedial action construction activities were performed according to specifications.

The County operated the groundwater recovery wells until 2004, when their operation was suspended for a pilot study. In 2004, EPA recommended that the County implement its proposal to suspend operation of the ACL Site groundwater recovery and treatment system for a one-year period, while pumping a substantially smaller volume of highly contaminated groundwater from the DS&G Site. The purposes of this pilot study were to: 1) determine whether rising groundwater elevations following shutdown of the ACL Site well field would cause new releases of contaminants to groundwater to Army Creek, and 2) evaluate focused source control measures as an alternative to the high-volume groundwater extraction needed to capture contaminants from the two Superfund sites using County's recovery well network.

EPA authorized several extensions to the original 2004 pilot study. In May 2009, EPA approved the County's request to terminate groundwater collection and treatment because groundwater cleanup levels had been met at

² This record is currently only available as a hard copy.

³ Comprised (from bottom to top) of a 12-inch thick low-permeability base layer; a barrier layer of 40-mil linear low-density polyethylene geomembrane; a drainage layer of continuous polyethylene web geonet; 18 inches of select fill material and 6 inches of topsoil and seeding with annual and perennial grasses and a wildflower mix.

the property boundary for known-site related contaminants since October 2005. Based on the results of extensive groundwater and stream monitoring programs during the pilot study, EPA concluded that suspension of pumping at the ACL Site well field had not resulted in new releases of contamination from the landfill. The PRPs properly abandoned unneeded wells in April 2010.

Emerging contaminants have been detected in the ACL Site vicinity. Since 2012, groundwater monitoring at the DS&G Site has demonstrated the presence of 1,4-dioxane in groundwater between the two Superfund sites and AWC's Llangollen well field. In addition, samples collected between 2013 and 2017 revealed the presence of perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS) and other per- and polyfluoroalkyl substances (PFAS) in groundwater downgradient of the two sites. In 2014, AWC began using an ultraviolet/hydrogen peroxide advanced oxidation process at the Llangollen water treatment plant to treat 1,4-dioxane. The updated treatment process ensures that 1,4-dioxane does not enter the potable water supply. In 2000, AWC installed a granular activated carbon (GAC) system at the Llangollen well field to address bis(2-chloroethyl)ether (BCEE); the GAC also removes PFOA and PFAS.

EPA determined that the extent of several contaminants in groundwater downgradient of the Western Lobe of the landfill had not been properly delineated. In response to a recommendation from the 2014 ACL Site FYR, the PRPs performed a metals (iron, manganese and cobalt) plume stability analysis in 2016. In 2017, EPA requested that the PRPs perform additional groundwater characterization to determine; 1) the extent of dissolved metals and 1,2-dichloroethane (DCA) contamination within the Upper Potomac Aquifer downgradient of the Western Lobe Area of Army Creek Landfill; 2) whether the Army Creek Landfill is a source of PFAS in groundwater within the Upper Potomac Aquifer; and 3) the vulnerability of the Llangollen well field to contaminant releases from the Western Lobe Area of the Army Creek Landfill. In May 2019, EPA approved the PRP's workplan for additional investigation. In accordance with the workplan, the PRPs installed additional monitoring wells and increased the scope of the site groundwater monitoring program. AWC installed new filtration technology to remove iron and manganese from groundwater pumped from the Llangollen well field; the system became fully operational in July 2019 and is effectively removing those metals.

Institutional Control (IC) Review

Institutional controls are summarized below in Table 2 and mapped in Figure 2. Neither the 1986 OU1 ROD nor the 1990 OU2 ROD required institutional controls as part of the site remedy. However, EPA issued an ESD in 2020 requiring the implementation of land and groundwater use restrictions. The 1991 CD established the need for and implemented certain land use and property conveyance restrictions to protect the landfill cap and other remedy components and to prevent exposure to contaminated materials in the landfill. Per the CD, the County agreed:

- Not to interfere with or disturb the work performed by the Private Settlers pursuant to the CD;
- Not to convey any title, easement, or other interest in the County's site property unless such conveyance includes a covenant that: (i) permits the United States, State, Private Settlers and their respective representatives to enter the property conveyed for purposes of effectuating all terms of the CD; (ii) contains a binding agreement not to interfere with or disturb the work and any future response activities; and (iii) contains a binding agreement to inform any person or entity that subsequently acquires any title, easement, or other interest in the property of the requirements of the Site Access section of the CD.

Groundwater restrictions have been in effect at the ACL Site since June 2006 when DNREC's Division of Air and Waste Management (DAWM) and Division of Water Resources (DWR) entered into a Memorandum of

Agreement (MOA) establishing a Groundwater Management Zone (GMZ) encompassing the ACL Site.⁴ The GMZ includes the following restrictions:

- No new public or domestic water supply wells will be allowed or permitted in the unconfined Columbia Aquifer and any hydraulically interconnected or confined Potomac Aquifer units within the GMZ Area A.
- No new public or domestic water supply wells or non-potable wells will be allowed in the unconfined Columbia Aquifer and any hydraulically interconnected Potomac Aquifer units within the GMZ Area B without demonstrating that well construction will likely prevent the movement of potential contaminants into the well. The potentially contaminated groundwater will be sufficiently treated to applicable use standards following joint review and approval by both DWR and DAWM.
- Monitoring, observation and contaminant recovery wells may be installed in the GMZ Areas A and B following joint review and approval by DWR and DAWM.
- Permits for any wells in the GMZ Areas A and B may be issued by DWR following joint review and approval by both DWR and DAWM.

To ensure long-term remedy protectiveness, EPA issued an Explanation of Significant Differences (ESD) in February 2020 to establish land use restrictions for the landfill areas owned by the State of Delaware to ensure long term protectiveness of the remedy. The 2020 ESD modified the Selected Remedy to include the implementation of the following land and groundwater use restrictions:

- There shall be no activities (including, but not limited to digging, drilling, excavating, grading, constructing, earth moving, or any land disturbing activity) that would disturb or interfere with any of the capped areas without prior written approval from EPA and DNREC.
- No new public or domestic water supply wells shall be allowed or permitted in the unconfined Columbia Aquifer and any hydraulically interconnected or confined Potomac Aquifer units within the GMZ Area A.
- No new public or domestic water supply wells or non-potable wells will be allowed in the unconfined Columbia Aquifer and any hydraulically interconnected Potomac Aquifer units within the GMZ Area B without demonstrating that well construction will likely prevent the movement of potential contaminants into the well; that potentially contaminated groundwater will be sufficiently treated to applicable use standards; and following joint review and approval by both DNREC Division of Waste and Hazardous Substances and the Division of Water.
- Monitoring, observation, and contaminant recovery wells may be installed in the GMZ Areas A and B following joint review and approval by both the DNREC Division of Waste and Hazardous Substances and the Division of Water.

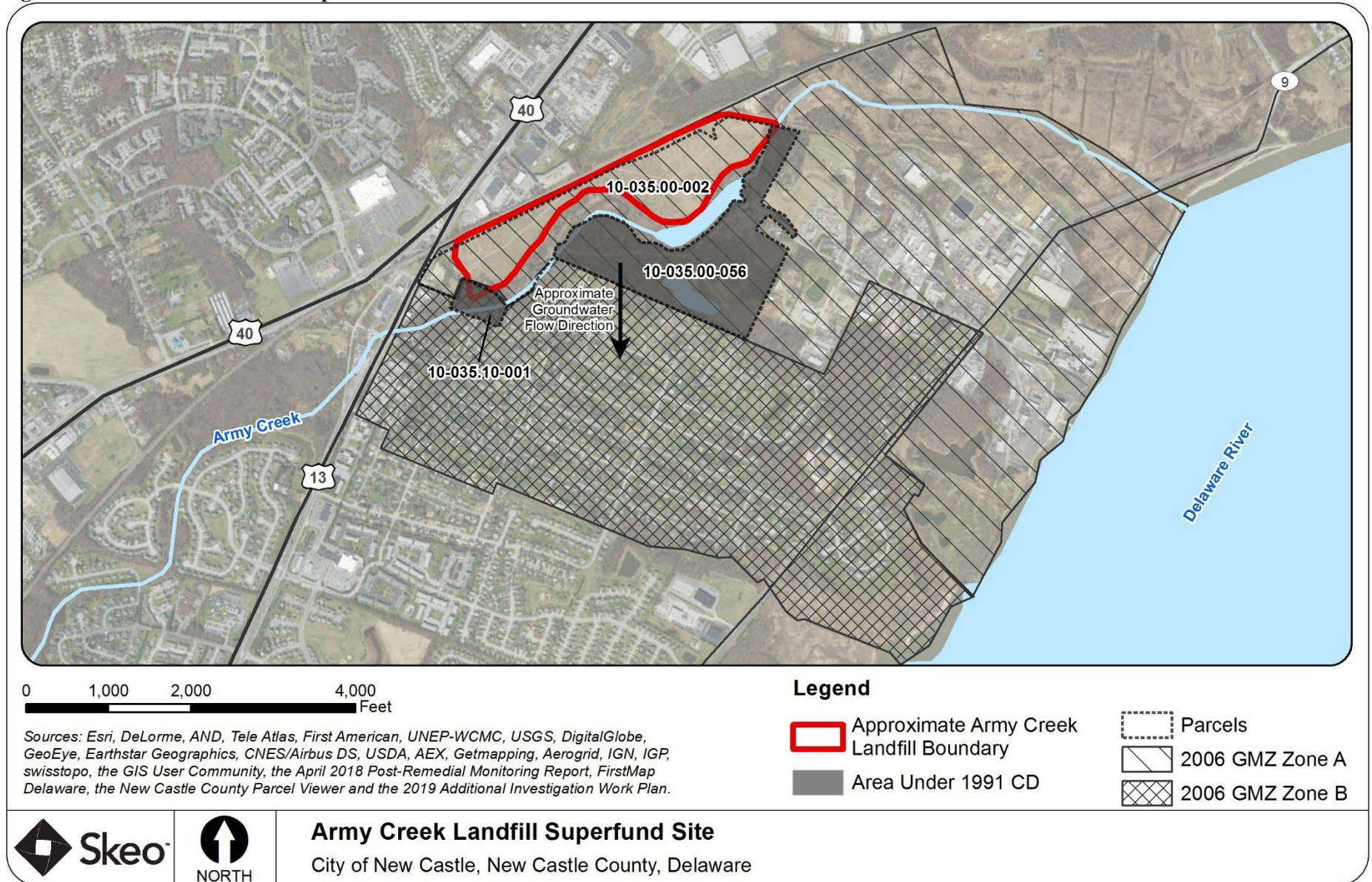
Table 2: Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
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⁴ DAWM is now known as the Division of Waste and Hazardous Substances and DWR is now known as the Division of Water.

Groundwater	Yes	Yes	See Figure 2	Prevent unacceptable use of contaminated groundwater.	2006 GMZ
Landfill	Yes	Yes	Parcels 0-0.35.00-056 and 10-0.35.10-001	Protect landfill cap and other remedy components. Prevent exposure to contaminated materials in the landfill.	1991 CD
Landfill	Yes	Yes	Parcel 10-0.35.00-002	Protect landfill cap and other remedy components. Prevent exposure to contaminated materials in the landfill.	2020 ESD

Figure 2: Institutional Control Map



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

Systems Operations/Operation & Maintenance

The Operation and Maintenance (O&M) plan has been changed several times since the remedy was implemented as site conditions have changed over time. Since the previous FYR, EPA approved changes to the Site-wide groundwater monitoring program. As of February 2022, the current O&M activities include:

- Groundwater monitoring in the Upper Potomac Aquifer – semi-annual sampling event conducted in April from 16 monitoring wells and annual sampling event conducted in October from 19 monitoring wells (Table 3) for VOCs, SVOCs, and inorganics.
- Water level measurements – collected at 29 monitoring wells during each sampling event.
- Army Creek surface water and sediment – sampling every five years.
- Annual inspection and maintenance, as needed, of the landfill cap, including vegetation, gas vents, surface water control features and security fence.
- Mowing of half of the vegetation on the cap once a year and area mowed should be rotated so that each area of the cover system is mowed once every two years.
- Surveying of landfill settlement monuments every 2.5 years.

Table 3: Long-Term Monitoring Program – ACL Western Lobe

Monitoring Location	Annual Sampling	Semi-Annual Sampling	Semi-Annual Water Levels
MW-28			X
MW-29			X
MW-31			X
RW-10			X
BW-1			X
BW-2			X
BW-3			X
MW-40	X	X	X
P-4	X	X	X
P-4L	X	X	X
MW-22NU	X	X	X
MW-22N	X	X	X
MW-26N			X
MW-38N			X
MW-49N	X	X	X
MW-54	X		X
MW-56	X		X
MW-58	X		X
MW-18			X
WL-1U	X	X	X
WL-1L	X	X	X
WL-2U	X	X	X
WL-2L	X	X	X
WL-3U	X	X	X
WL-3L	X	X	X
WL-4U	X	X	X
WL-4L	X	X	X
WL-4L	X	X	X
WL-5U	X	X	X

WL-5L	X	X	X
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The average annual O&M costs, as provided by the PRPs, for the past five years are presented in Table 4. The below costs represent expenses incurred by the Army Creek Private Settlers (ACPS) and New Castle County (NCC) to maintain the ACL Site cap. These costs do not include expenses incurred by ACPS or NCC in relation to the Western Lobe Investigation or the groundwater post remedial monitoring program.

Table 4: O&M Costs Over the FYR Period

Year	O&M Cost
2019	\$30,785.51
2020	\$37,466.33
2021	\$24,260.72
2022	\$49,815.12
2023	\$18,060.21

III. PROGRESS SINCE THE LAST REVIEW

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

Table 5: Protectiveness Determinations/Statements from the 2019 FYR

OU #	Protectiveness Determination	Protectiveness Statement
OU1	Short-term Protective	<p>The remedy at OU1 is protective, in the short term, of human health and the environment because the landfill cap is fenced, institutional controls are in place for the landfill and groundwater, and all the groundwater cleanup levels specified in the CD has been attained at the property boundary. However, in order for the remedy to be protective in the long term, the following activities are warranted:</p> <ul style="list-style-type: none"> • Upon completion of the ongoing additional site characterization, determine if groundwater contaminants not included in the 1991 CD are site related contaminants of concern (COCs). If unacceptable risks from newly identified site-related COCs are present, perform a focused feasibility study to evaluate remedial alternatives to address all site-related COCs and modify the remedy in an appropriate decision document. • Update the groundwater cleanup levels in accordance with the current federal standards and health-based criteria via an appropriate decision document. • Update analytical methods for metals and organics in surface water and sediment, where feasible, to achieve detection limits which support contaminant trend analyses.

		<ul style="list-style-type: none"> • Evaluate seep sediment data against appropriate ecological benchmarks to ensure that leachate seep sediment does not pose a potential risk to ecological receptors. • Add institutional controls to the ACL Site’s remedy via the appropriate decision document and implement land use restrictions.
OU2	Protective	The remedy at OU2 is protective of human health and the environment. Treatment of extracted groundwater to remove iron to achieve the cleanup goal of 1,000 µg/L has been completed, and groundwater recovery ended in 2004.
Sitewide	Short-term Protective	<p>The ACL Site’s remedy currently protects human health and the environment because the landfill is capped and fenced, institutional controls are in place for the landfill and groundwater, all the groundwater cleanup standards specified in the CD have been attained at the property boundary, and treatment of extracted groundwater has been completed. However, for the remedy to be protective in the long term, the following activities are warranted:</p> <ul style="list-style-type: none"> • Upon completion of the ongoing additional site characterization, determine if groundwater contaminants not included in 1991 CD are site related COCs. If unacceptable risks from newly identified site-related COCs are present, perform a focused feasibility study to evaluate remedial alternatives to address all site-related COCs and modify the remedy in an appropriate decision document. • Update the groundwater cleanup levels in accordance with the current federal standards and health-based criteria via an appropriate decision document. • Update analytical methods for metals and organics in surface water and sediment, where feasible, to achieve detection limits which support trend analyses. • Evaluate seep sediment data against ecological benchmarks to ensure that leachate seep sediment does not pose a potential risk to ecological receptors. • Add institutional controls to the ACL Site’s remedy via the appropriate decision document and implement land use restrictions.

Table 6: Status of Recommendations for OU1 from the 2019 FYR

Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Contaminants not included in the 1991 CD are detected at concentrations above risk-based values in groundwater.	Upon completion of ongoing additional site characterization, determine if groundwater contaminants not included in the 1991 CD are site related COCs. If unacceptable risks from newly identified site-related COCs are present, perform a focused feasibility study to evaluate remedial alternatives to address all site-related COCs and modify the remedy in an appropriate decision document.	Ongoing	The PRPs completed a Remedial Investigation (RI) in April 2022. The investigation recommended installation of downgradient monitoring wells and a quarterly groundwater monitoring program to determine if the Site is the source of additional contaminants. Site characterization is still ongoing and EPA is reviewing new and existing data to make a determination on site-related COCs.	n/a
The CD's groundwater cleanup level for total trihalomethanes is not as stringent as the current federal drinking water standard.	Update the groundwater cleanup levels in accordance with current federal and State standards and risk-based criteria via appropriate decision document.	Completed	The MCLs and screening levels for trihalomethanes provided in the groundwater monitoring reports are up to date. Trihalomethanes are now being reported as individual contaminants rather than total concentration.	10/28/2021
Contaminant trends cannot be determined in surface water or sediment to assess ecological risks due to elevated detection limits for many metals and organic analytes.	Update analytical methods for metals and organics in surface water and sediment, where feasible, to achieve detection limits which support contaminant trend analyses.	Completed	The PRPs revised their Quality Assurance Project Plan (QAPP) in 2022 to include updated analytical methods to achieve detection limits.	11/9/2022

<p>Leachate seeps observed along the wooded slope between the landfill cap and Army Creek have the potential to impact ecological receptors.</p>	<p>Evaluate seep sediment data against appropriate ecological benchmarks to ensure leachate seep sediment does not pose a potential risk to ecological receptors.</p>	<p>Completed</p>	<p>The PRPs conducted seep sampling at the three locations where seeps were observed. EPA concluded that the relatively low exceedances and small size of the sampled seeps does not pose a significant risk to ecological receptors.</p>	<p>10/27/2021</p>
<p>The ACL Site decision documents do not specify that institutional controls are needed.</p>	<p>Add institutional controls to the ACL Site remedy via the appropriate decision document and implement land use restrictions.</p>	<p>Completed</p>	<p>EPA issued an ESD in February 2020 to include institutional controls to protect the landfill cap and other remedy components, and to prevent exposure to contaminated materials in the landfill, and contaminated groundwater.</p>	<p>2/6/2020</p>

OTHER FINDINGS

Several additional recommendations were identified during the 2019 FYR. These recommendations do not affect current and/or future protectiveness.

- Groundwater monitoring reports use some outdated primary drinking water standards. In addition, the monitoring reports do not include risk-based criteria to interpret the detections of contaminants in the 1991 CD. Consider including current primary drinking water standards and risk-based criteria in groundwater monitoring reports to appropriately interpret groundwater results.
 - The PRPs have updated reports to reflect current drinking water standards and EPA completed a risk assessment from groundwater data collected during this FYR.
- Consider adjusting the cap mowing schedule to control growth of woody vegetation.
 - The mowing schedule was adjusted to mow half of the vegetation on the cap once a year and the area mowed is rotated so that each area of the cover system is mowed once every two years.
- Consider mapping plumes for the groundwater monitoring reports.
 - The PRPs do not include plume maps in their routine monitoring reports. However, the PRPs did include iso-concentration figures in the 2021 Conceptual Site Model (CSM) submittal.
- Consider issuing regular fact sheets to update community members about ACL and DS&G Site activities.
 - The EPA CIC issues fact sheets to update community members on activities occurring at both Sites.
- Consider surveying each of the three areas where differential settlement has occurred in the Western Lobe of the landfill on a regular basis (e.g. every two to three years).
 - Surveying of differential settlement occurs once every 2.5 years.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

A public notice (Appendix C) was published on May 31, 2024 in the Delaware News Journal/Delaware Online. The results of the review and the report will be made available at the ACL Site's information repository, located at the DNREC visitor's office at 391 Luken's Drive, New Castle, and online at <https://den.dnrec.delaware.gov/Detail/FacilityDetail.aspx?id=10056493> and at <http://www.epa.gov/superfund/armycreek>.

During the FYR period, EPA sent a factsheet to residents and businesses in the community with a site update and also a notification that the Site is being evaluated as a potential source of PFAS. The factsheet also provided general information about PFAS and contact information for Artesian Water Company, the local water utility. Interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The interviews are summarized below and forms completed during the interviews are provided in Appendix D.

In August 2024, the CIC conducted community interviews via telephone and email. The CIC interviewed a representative from the Llangollen Estates neighborhood and State government officials concerning their knowledge and perceptions of EPA's activities at the ACL Site.

Interview responses indicated mixed levels of awareness of activities at the ACL Site. Residents of the Llangollen Estates neighborhood generally knew of the ACL Site but were unfamiliar and not involved with the cleanup decisions or activities. Community members do not distinguish between the ACL Site and the adjacent DS&G Site. Representatives from the State were familiar with the cleanup activities to date.

Responses also indicated mixed views on whether the community was well-informed about the ACL Site. Residents of the Llangollen Estates neighborhood did not feel well informed about the Site, while AWC reported that communication had improved since the last FYR. Llangollen Estates residents suggested a fact sheet, or regular email updates would be appropriate to keep them informed of the activities at the ACL Site.

Residents of the Llangollen Estates neighborhood indicated previous frustration at the lack of communication about the ACL/DS&G Site, noting that not all stakeholders were informed in advance of construction and tree removal in 2023-2024, which was part of the DS&G remedial action. Community members did request a summary presentation at a community meeting when the FYR is complete.

Data Review

The FYR evaluates the effectiveness and protectiveness of the landfill cap and groundwater remedies at the ACL Site and includes a review of cap inspection reports; groundwater, surface water and sediment monitoring reports; and AWC's annual water quality reports. Supporting information is available in Appendix G.

Cap Inspections

Annual cap inspection reports document the monthly observations of the PRP's Project Engineer and routine maintenance activities. Maintenance activities include annual mowing, removal of shrubby vegetation from the landfill cap, minor fence, gate and access road repairs, settlement monument repairs and vegetation clearing from the drainage ditches.

In May 2019, EPA observed three seeps while inspecting the landfill cap and requested sampling of the groundwater that is seeping through sediments to ensure ecological risk is not present. In June 2019, the PRPs conducted groundwater sampling at the seeps at the three locations where seeps were observed. Results were compared to USEPA Region 3 RSLs Target Cancer Risk=1E-06, Target Hazard Quotient=0.1, and Region 3 Freshwater Sediment Screening Levels (FSSLs). While the results demonstrated that there are some exceedances of screening values at each seep location, EPA concluded that the relatively low exceedances and small size of the sampled seeps would not pose a significant risk to ecological receptors at the Site.

Groundwater Monitoring

The data evaluated in this FYR includes samples collected from 2019 through 2023 (See Appendix G Table 1). Monitoring requirements have changed over the years as conditions at the ACL Site have changed. An updated long-term monitoring plan was submitted by the PRPs on February 25, 2022 and EPA approved the plan on March 31, 2022. This update removed nine monitoring wells and added six new monitoring wells installed from May through June of 2019 (MW-22NU, P-4L, WL-1L, WL-UL, WL-2L, and WL-2U), and three upgradient wells (MW-54, MW-56, and MW-58). An updated work plan for the investigation of the Western Lobe Area was approved by EPA in July 2019. The update added six new wells in the Western Lobe Area installed from February through May 2023 (WL-3U, WL-3L, WL-4U, WL-4L, WL-5U, and WL-5L). Groundwater monitoring includes a semi-annual sampling event conducted in April from 16 monitoring wells and an annual sampling event conducted in October from 19 monitoring wells. In November 2022, EPA requested the inclusion of cobalt, iron, and manganese analysis to the long-term monitoring plan, in addition to the existing analyses for VOCs and SVOCs. The April 2023 semi-annual sampling event was the first event performed in accordance with the updated long-term monitoring plan to include analysis for these metals.

The 1991 CD required attainment of groundwater cleanup standards at monitoring wells located near the site property boundary (BW-1, BW-2, BW-3, and MW-40). Historical results were compared to the cleanup levels set in the 1991 CD; all four of the boundary wells continue to meet these cleanup levels for monitored contaminants, as they have since 2005 (see Appendix G Table 2). In addition, groundwater quality at the boundary wells has met current primary drinking water standards, including the standard for lead.

According to the 2009 FYR Report, BCEE and other contaminants, including benzene and 1,4-dioxane, are related to releases from the Drum Disposal Area of the DS&G Site⁵. BCEE and 1,4-dioxane were detected during this FYR period at concentrations that would not pose an unacceptable risk in tap water. Concentrations of BCEE and 1,4-dioxane which would present an unacceptable risk (one in 10,000 (1×10^{-4}) excess lifetime cancer risk) in tap water are 1.4 µg/L and 46 µg/L, respectively. The BCEE and 1,4-dioxane concentrations in the groundwater samples were 0.021 U⁶ µg/L and 2.9 µg/L, respectively. The concentrations were generally stable during the FYR monitoring period (See Appendix G Figures 1, 2, and 3). The presence of these two contaminants in groundwater is being addressed by the DS&G remedy.

Scope of Work-2 of the 1991 CD did not establish cleanup levels for iron, manganese or cobalt in groundwater at the ACL Site. These metals occur naturally as minerals in the aquifer matrix. However, these metals become mobilized in groundwater when oxygen levels in the aquifer decline as a result of microbial decomposition of the organic waste in the landfill. Following the shutdown of the ACL Site groundwater recovery wells in 2004, monitoring results indicated an increasing trend in dissolved iron, manganese, and cobalt concentrations in groundwater at several monitoring wells with concentrations exceeding EPA's tap water regional screening levels (RSLs) of 14,000 µg/L for iron, 430 µg/L for manganese, and 6µg/L for cobalt. From 2016 to 2019, dissolved iron concentrations in P-4 increased and during this FYR period concentrations have remained stable (See Appendix G Figures 4, 5, and 6). Dissolved manganese concentrations in P-4 have remained well above the RSL during this FYR period (See Appendix G Figures 7 and 8). Dissolved cobalt concentrations in P-4 decreased during this FYR period (See Appendix G Figures 9 and 10). The next FYR will review new and existing data to determine if manganese, iron, and cobalt will need to be added as site-related COCs.

Other notable detections of contaminants during this FYR period included 1,2-DCA, PFOA and PFOS. 1,2-DCA was detected above the primary drinking water standard or 5 µg/L in wells P-4 (13 µg/L in April 2021) and WL-3L (7.2 µg/L in April 2023) located downgradient of the Western Lobe Area of the landfill (See Appendix G Figure 11). Additional site characterization requested by EPA in 2017 to determine if the ACL is a source of PFAS in groundwater resulted in the October 2019 and April 2021 PFAS groundwater sampling events. Nine monitoring wells were sampled in 2019 and 2021 by the PRPs in the Western Lobe Area (See Appendix G Table 3) and data was included in the December 2021 PFAS source evaluation report. Wells that exceed EPA's MCL of 4ppt for PFOS, PFOA, and the sum of PFOS and PFOA are provided in Appendix G Table 3. Findings from this investigation indicate that the Western Lobe Area could possibly be a source of PFAS in groundwater. The revised PFAS source evaluation report that's due August 2024 will include the results from the April 2024 PFAS sampling event. The next FYR will review new and existing data for PFAS to determine if PFAS will need to be added as a site-related COC.

Artesian Monitoring Wells

AWC has several well fields in the vicinity of the ACL Site. Adjustments over time in the rate of pumping from AWC's production wells, particularly in the Llangollen well field, affect the groundwater flow direction and gradient in the vicinity of the ACL Site. Since 2014, AWC has been withdrawing from wells AWC-2, AWC-6R, AWC-7 and AWC-G3R at the Llangollen well field (see Figure 3).

⁵ An investigation is underway at the DS&G Site to determine if there are sources of 1,4-dioxane, in addition to the Drum Disposal Area.

⁶ Indicates analyte was not detected above the laboratory reporting limit.

AWC's 2019 through 2023 Water Quality Reports were reviewed during this FYR period (See Appendix G Table 4). The Water Quality Reports for drinking water supplies in northern New Castle County show that the water meets state and federal drinking water standards for regulated inorganic and organic contaminants. As noted in the Status of Implementation section of the FYR Report, AWC provides treatment at the Llangollen well field for BCEE and 1,4-dioxane. The treatment systems also removes cobalt, PFOA, and PFOS. AWC recently installed new filtration technology to remove iron and manganese from groundwater pumped from the Llangollen well field; the system became fully operational in July 2019 and is effectively removing those metals.

Surface Water and Sediment Monitoring

In 2013, EPA approved a reduction in the surface water and sediment monitoring frequency from annually to once every five years. The samples evaluated in this review were collected in October 2022 (See Appendix G Table 5). Surface water and sediment samples were collected from locations A through G at the ACL Site (see Figure 4). Sediment results were compared with EPA's BTAG screening levels. Surface water results were compared to BTAG screening levels and Delaware's Surface Water Quality Standards for protection of human health and aquatic life.

In surface water samples, no SVOCs or pesticides were detected above the BTAG or DNREC screening levels, however, dissolved metals were detected above the BTAG screening level, including barium (4 µg/L), iron (300 µg/L), manganese (120 µg/L), and selenium (1 µg/L). Location G is the upgradient sampling location with concentrations of 95 µg/L for barium, 340 µg/L for iron, and 1.3 µg/L for selenium. In location C, concentrations of barium (99 µg/L), iron (930 µg/L), and manganese (2100 µg/L) were higher than the upgradient G concentrations. Manganese and barium concentrations at upgradient sampling location G have fluctuated over time and the exceedances at downgradient locations appear to be consistent with the historical upgradient concentrations, indicating that these exceedances may not be related to the Western Lobe Area.

Sediment samples included several polycyclic aromatic hydrocarbons (PAHs) and metals detected above the BTAG screening levels. The frequency and magnitude of these detections were greatest at sampling locations D, E, F, and G. Location G is the upstream, or background sampling location, and location D is adjacent to an outfall that receives run-off from Route 13. Metals were also present in sediments at concentrations that exceed the screening levels at multiple sample locations, with higher concentrations generally at sampling locations A, B, C, and D. Cobalt, iron, manganese, and nickel were metals that exceeded the BTAG screening level in locations A, B, C, and D, but not at location G, indicating it may be related to the ACL Site. The next scheduled surface water and sediment sampling event is scheduled for October 2027.

Figure 3: Detailed Site Map

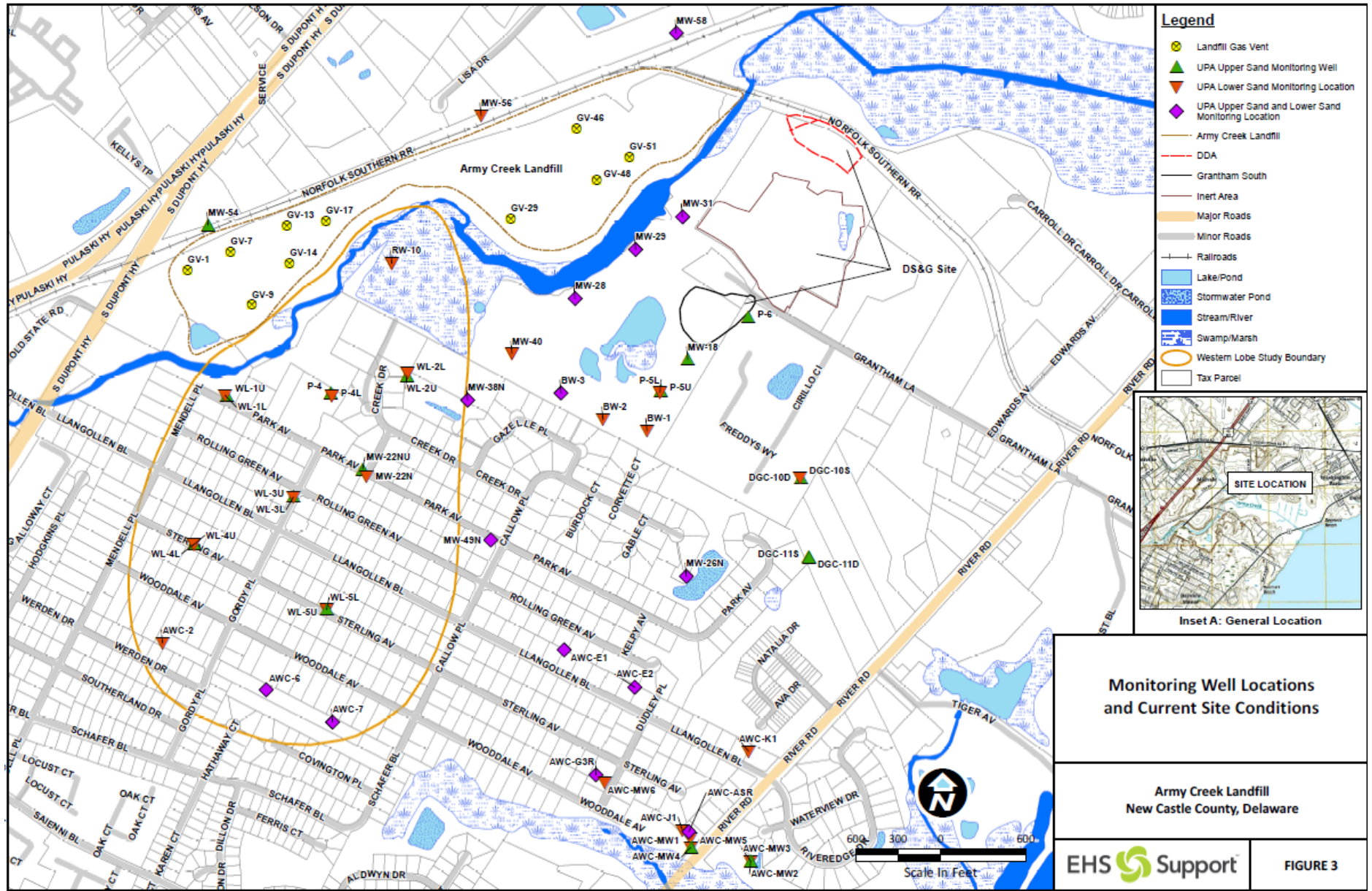


Figure 4: Surface Water and Sediment Sampling Locations



Site Inspection

The site inspection took place on June 11, 2024. The purpose of the inspection was to assess the protectiveness of the remedy. The site inspection checklist and photographs are included in Appendices E and F, respectively. Site inspection participants included the EPA RPM and hydrogeologist, a representative from DNREC, Private Settlor's Project Coordinator, Army Creek Landfill Technical Steering Committee Project Engineer, and New Castle County consultant.

The group began the inspection at the road that leads into the landfill. The ACL Site is fenced except along the creek, and the fence includes signage notifying this area is a Superfund Site. No holes were observed in the perimeter fence. There was no evidence of hunting observed as has been observed in the past (e.g., deer stands). The group walked the extent of the landfill. The cap was well vegetated with tall grasses and some woody vegetation. Mowing of the cap occurred at the end of March/early April of 2024. The gas vents and settlement monuments appeared to be in good condition, as well as the drainage ditch that runs along the railroad track. The cap is serving as a wildlife habitat, as evidenced by presence of birds and small mammals.

V. TECHNICAL ASSESSMENT

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

Yes. The remedy is generally functioning as intended by the decision documents. The OU1 landfill cap prevents direct contact with buried wastes and reduces precipitation infiltration, which in turn reduces leachate generation and groundwater contamination. The last settlement study completed in November 2021 indicated that minimal to zero settlement occurred during that period, and the cap retains sufficient tensile strength. The mowing frequency at the ACL Site was updated to allow for growth of vegetation, including woody vegetation, to ensure the area can serve as wildlife habitat. The Site fence is maintained and limits site access. O&M activities ensure that the fence is secured, and the cap and associated drainage structures are operating properly. Groundwater recovery (OU1) and treatment (OU2) continued until 2004; the groundwater cleanup goals have been met at the boundary wells since 2005.

Institutional controls have been implemented for the landfill and groundwater via the CD and GMZ, and land use restrictions for the landfill property owned by the State of Delaware via the 2020 ESD.

During this FYR period, the groundwater quality at boundary wells consistently met the groundwater cleanup levels. However, additional contaminants have been noted in groundwater downgradient of the landfill above risk-based criteria or drinking water standards, including iron, manganese, cobalt, 1,2-DCA, PFOA and PFOS. Based on these findings, additional site characterization was completed. The PRPs prepared a work plan and installed additional monitoring wells in 2019 and 2022 to further characterize these contaminants and evaluate the vulnerability of AWC's Llangollen well field to releases from the ACL Site Western Lobe Area.

The 2022 surface water and sampling data indicate that iron and manganese exceed the BTAG screening level, but the exceedances seem more closely linked with the eastern section of the landfill. In the sediment samples, cobalt, iron, and manganese exceeded the BTAG screening level, but the exceedances seem more closely linked with the eastern section of the landfill. EPA will monitor trends in iron, manganese, and cobalt concentrations to assess the potential for adverse impacts to ecological receptors. Iron, magnesium, and cobalt are already under investigation via the ACL Site Western Lobe study, which should consider potential effects on surface water.

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

Yes, toxicity values and cleanup levels have changed since the issuance of the 1986 and 1991 RODs, however, the RAOs remain valid as Site conditions have not changed. Specifically, MCLs have changed for the following contaminants; arsenic, barium, cadmium, chromium, lead, selenium, silver, lindane, methoxychlor, toxaphene, 2,4-dichlorophenoxyacetic acid, and 2,4,5-trichlorophenoxy. In addition, cobalt, iron, and manganese are now included in the monitoring program. Since those metals do not have MCLs, risk-based goals will be used to compare data results.

During the sixth FYR, PFAS were screened using EPA's Health Advisory Level of 70 ppt. This screening level was superseded by a Federal MCL of 4 ppt for both PFOA and PFOS and an HI of 1 for mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS. In addition, Regional Screening Levels (RSLs) are provided for thirteen (13) PFAS contaminants. Based on the most recent groundwater sampling event (April 2021) potential future residential exposure to groundwater from PFOS and PFOA exceeds EPA's acceptable non-cancer threshold for PFOS and both the non-cancer threshold and cancer risk for PFOA. In addition, cobalt, iron, and manganese also contributed to the non-cancer risk during the April 2021 sampling event. In addition, non-cancer risk also exceeds EPA's non-cancer threshold during the July 2023 sampling event due primarily to cobalt and lesser extent manganese. PFAS was not sampled during this event.

The exposure assumptions remain valid, including those for pathways of potential residential use of contaminated groundwater in the Upper Potomac Aquifer, recreational exposure to surface water and sediment in Army Creek (including ingestion of contaminated fish), and exposure of aquatic organisms to contaminated surface water and sediment in Army Creek. A vapor intrusion pathway evaluation was performed at the ACL Site in 2009. As documented in the 2010 Addendum to the 2009 FYR Report, EPA concluded that this potential exposure pathway was incomplete. The environmental setting has not changed since 2010; therefore, the vapor intrusion pathway remains incomplete.

The 1991 CD did not specify groundwater cleanup levels for contaminants that lacked primary drinking water standards. Additional contaminants without primary drinking water standards (iron, manganese, and cobalt) are present in groundwater downgradient of the ACL Site. However, in order to be protective, the remedy must prevent exposure to site-related contaminants at levels that present a risk that exceeds EPA's cancer benchmark value of 1×10^{-4} or a noncancer hazard index (HI) greater than 1.0. Thus, a screening-level risk evaluation was performed using the groundwater data from April 2021, May 2023, and July 2023 laboratory analytical results (see Appendix G Memorandum dated June 17, 2024). The PRPs are conducting additional groundwater characterization and EPA is evaluating new and existing data to determine if they are Site-related COCs and if additional response actions are warranted. In the interim, the public water treatment system has been upgraded to address all contaminants identified, exposure is not occurring as institutional controls prevent exposure to groundwater, and all homes and businesses near the ACL Site are served by public water supply (AWC), which treats the water before distribution.

To ensure long-term protectiveness is achieved, a risk evaluation should be performed when the remedy is believed to have been achieved cleanup goals to confirm cumulative risk met EPA's acceptable non-cancer threshold of $HI < 1.0$ and cancer risk less than $1E-04$.

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

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

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations	
OU(s) without Issues/Recommendations Identified in the Five-Year Review:	
OU2	

Issues and Recommendations Identified in the FYR:

OU(s): OU1	Issue Category: Remedy Performance			
	Issue: Contaminants not included in the 1991 CD are detected at concentrations above risk-based values in groundwater.			
	Recommendation: Upon completion of the ongoing additional site characterization and EPA review of new and existing data, determine if groundwater contaminants not included in the 1991 CD are site-related COCs. If unacceptable risks from newly identified site-related COCs (iron, cobalt, manganese, PFAS) are present, perform a focused feasibility study to evaluate remedial alternatives to address all site-related COCs and modify the remedy in an appropriate decision document.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	EPA/PRP	EPA	9/5/2026

OTHER FINDINGS

One additional recommendation was identified during this FYR. This recommendation does not affect current and/or future protectiveness:

- Locate the drum detection and removal plan that was prepared, approved, and implemented by EPA so it can be properly referenced in the Status of Implementation section.
- The PFAS groundwater program only includes groundwater sampling. Because PFAS has been detected in leachate samples, surface water and sediment sampling should also be included in the sampling program.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
<i>Operable Unit:</i> OU1	<i>Protectiveness Determination:</i> Short-term Protective

Protectiveness Statement:

The remedy at OU1 is protective, in the short term, of human health and the environment because the landfill cap is fenced, institutional controls are in place for the landfill and groundwater, and all the groundwater cleanup levels specified in the CD has been attained at the property boundary. However, in order for the remedy to be protective in the long term, the following activities are warranted:

- Upon completion of the ongoing additional site characterization and EPA review of new and existing data, determine if groundwater contaminants not included in the 1991 CD are site related COCs. If unacceptable risks from newly identified site-related COCs are present, perform a focused feasibility study to evaluate remedial alternatives to address all site-related COCs and modify the remedy in an appropriate decision document.
- Upon completion of the ongoing additional site characterization and EPA review of new and existing data, update the groundwater cleanup levels in accordance with the current federal standards and health-based criteria via an appropriate decision document.

Protectiveness Statement(s)

Operable Unit:
OU2

Protectiveness Determination:
Protective

Protectiveness Statement:

The remedy at OU2 is protective of human health and the environment. Treatment of extracted groundwater to remove iron to achieve the cleanup goal of 1,000 µg/L has been completed, and groundwater recovery ended in 2004.

Sitewide Protectiveness Statement(s)

Protectiveness Determination:
Short-term Protective

The ACL Site's remedy currently protects human health and the environment because the landfill is capped and fenced, institutional controls are in place for the landfill and groundwater, all the groundwater cleanup standards specified in the CD have been attained at the property boundary, and treatment of extracted groundwater has been completed. However, for the remedy to be protective in the long-term, the following activities are warranted:

- Upon completion of the ongoing additional site characterization and EPA review of new and existing data, determine if groundwater contaminants not included in 1991 CD are site related COCs. If unacceptable risks from newly identified site-related COCs are present, perform a focused feasibility study to evaluate remedial alternatives to address all site-related COCs and modify the remedy in an appropriate decision document.
- Upon completion of the ongoing additional site characterization and EPA review of new and existing data, update the groundwater cleanup levels in accordance with the current federal standards and health-based criteria via an appropriate decision document.

GPRA Measure Review

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

Environmental Indicators

Human Health: Current Human Exposure Under Control (HEUC)

Groundwater Migration: Contaminated Groundwater Migration Not Under Control (GMNC)

Site-Wide RAU

The ACL Site was determined Sitewide Ready for Anticipated Use (SWRAU) on March 12, 2010.

VIII. NEXT REVIEW

The next five-year review report for the Army Creek Landfill Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

- Artesian Water Company Water Quality Report. 2019-2023, Public Water System I.D. DE0000552.
- Cap System and Operation and Maintenance Plan, Addendum 3. Army Creek Landfill Superfund Site, New Castle, Delaware, Army Creek Landfill Trust Fund Steering Committee, August 2020.
- Consent Decree, Army Creek Landfill Superfund Site, New Castle, Delaware, September 1991. Consolidated Civil Action No. 91-409-007JJF and 91-418.
- Email Re: Army Creek Landfill mowing program and control of woody species. From Debra Rossi to John Andrade. March 5, 2020.
- Final Seep Sampling and Analysis Plan. September 23, 2019. Prepared for by Ruth Associates Inc.
- Five-Year Review Report, Army Creek Landfill Superfund Site, New Castle, DE. U.S. EPA, September 5, 2019.
- Focused Remedial Investigation. Army Creek Landfill Superfund Site, New Castle, Delaware. Prepared by NUS Corporation. January 1990.
- Landfill Cover Assessment (2016-2021). Army Creek Landfill Superfund Site. New Castle County, Delaware. Prepared by GHD. November 16, 2021.
- PFAS Source Evaluation Report. December 2021. Prepared for Army Creek Landfill Private Settlers Group and New Castle County. Prepared by EHS Support.
- Post-Remedial Monitoring Report. 2019-2023. Prepared for Army Creek Landfill Private Settlers Group. Prepared by EHS Support.
- Preliminary Closeout Report Army Creek Landfill Superfund Site. New Castle County, Delaware. Prepared by U.S. EPA. April 1994.
- Quarterly Event Groundwater Monitoring and well Installation Report, Western Lobe Area Army Creek Landfill New Castle, DE. 2019-2023.
- Quinquennial Surface Water and Sediment Sampling Report. April 3, 2023. Prepared by Ruth Associates, Inc.
- Record of Decision, Army Creek Landfill Operable Unit Two, U.S. EPA, June 29, 1990.
- Record of Decision, Remedial Alternative Selection, Site: Army Creek Landfill Site, New Castle County, Delaware, U.S. EPA, September 30, 1986.
- Western Lobe Long-Term Monitoring Sampling and Analysis and Quality Assurance Project Plan. October 24

APPENDIX B – SITE CHRONOLOGY

Event	Date
New Castle County operated a municipal and industrial waste landfill at the former sand and gravel quarry	1960-1968
Residential well developed water quality problems in Llangollen Estates	Late 1971
PRP conducted a groundwater monitoring program and determined that leachate originating from the ACL and DS&G landfill was contaminating groundwater and moving towards downgradient receptors	1972
PRP extended water supply lines to affected residences	1970-1975
PRP installed groundwater recovery wells in the Upper Potomac Aquifer to prevent landfill leachate from reaching AWC's Llangollen field	1973
PRP modified the groundwater recovery system with the addition of more recovery wells	1980
EPA proposed the Site for inclusion on the NPL	October 1981
EPA finalized the Site on the NPL	September 8, 1983
EPA entered into an Administrative Order on Consent with PRP to perform the OU1 FS; PRP began the OU1 FS	August 1984
PRP finalized the OU1 FS	August 21, 1986
EPA issued the OU1 ROD	September 30, 1986
EPA began the OU1 RD	March 31, 1988
EPA completed the OU1 RD	August 8, 1989
EPA began the OU2 RI/FS	August 9, 1989
EPA completed the OU2 RI/FS	February 1990
EPA issued the OU2 ROD	June 29, 1990
PRPs entered into a Consent Decree with EPA and the state of Delaware to implement OU1 and OU2 remedies and implement land use and property conveyance restrictions	September 12, 1991
PRP contractors begin OU1 remedial construction activities	May 11, 1992
PRP contractors begin OU2 remedial construction activities	June 1, 1992
EPA, DNREC and PRPs conducted the final inspection of OU1 remedial construction activities	November 18, 1993
EPA, DNREC and PRPs conducted the final inspection of OU2 remedial construction activities	December 21, 1993
EPA issued the Preliminary Close Out Report for OU1 and OU2 remedial construction activities	April 29, 1994
EPA approved OU1 RA Report documenting completion of OU1 remedial activities	November 1, 1994
EPA approved O&M manual	June 12, 1995
EPA approved OU2 RA Report documenting completion of OU2 remedial activities	September 29, 1995
EPA completed first FYR	November 25, 1998
EPA completed the second FYR	September 30, 2004
PRPs initiated a pilot study to determine if rising groundwater elevations following shutdown of the ACL well field would cause new releases of contaminants to groundwater and creek. Groundwater recovery operations shifted to adjacent DS&G Site.	October 2004
DNREC established a GMZ at the Site	June 2006
EPA approved County's request to terminate groundwater collection, treatment and monitoring activities	May 2009
EPA completed third FYR	September 28, 2009
EPA completed the addendum to the third FYR	April 9, 2010
PRP abandoned wells no longer needed	April 2010
EPA completed the fourth FYR	September 8, 2014
EPA approved revised O&M plan	March 2015
PRP prepared a draft plume stability analysis	December 12, 2016
PRPs prepared a work plan for additional groundwater investigation	February 14, 2018
PRPs completed a landfill cover assessment report	November 9, 2018
PRP completed a draft work plan for additional characterization of groundwater and evaluation of vulnerability of Llangollen well field to releases from ACL Western Lobe	December 2018
EPA approves updated work plan for the investigation of the Western Lobe.	June 2019

Event	Date
PRPs conduct seep sampling to ensure ecological risk is not present	June 2019
PRPs removed 9 monitoring wells and installed six monitoring wells.	May-June 2019
EPA completed fifth FYR	September 5, 2019
PRPs conducted PFAS sampling to determine if ACL is a source of PFAS in groundwater	October 2019
EPA issued Environmental Covenant to establish land use restrictions for the landfill areas owned by the State of Delaware	February 2020
PRPs conducted PFAS sampling to determine if ACL is source of PFAS in groundwater	April 2021
EPA approves updated O&M Plan	February 2022
EPA approves updated long-term monitoring plan submitted by PRPs	March 31, 2022
PRPs added six new wells in the Western Lobe	February-May 2023
PRP conducts PFAS sampling to determine if ACL is source of PFAS in groundwater	April 2024
PRP submits final quarterly groundwater monitoring report for the Western Lobe	July 2024

APPENDIX C – PRESS NOTICE

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Bidens visit church, veterans



President Joe Biden visits Veterans Memorial Park near New Castle on Thursday. PHOTO BY ELIZABETH FRANKENBERGER

Family visits Beau's grave on anniversary of death

Hannah Edelman
Delaware News Journal
USA TODAY NETWORK

President Joe Biden and various family members, including First Lady Jill Biden and son Hunter Biden, visited St. Joseph on the Brandywine in Greenville on Thursday morning to the ninth anniversary of Beau Biden's death.

The president's son and former Delaware attorney general was buried in the church's cemetery after dying of brain cancer at age 46. The family visited his grave following a memorial mass.

The president then met former state Sen. Nancy Cook at Veterans Memorial Park near New Castle before traveling with his family to Rehoboth Beach via the Marine One helicopter, according to reports from the White House press pool.

Biden spent Wednesday night at his Greenville home after a day of campaigning with Vice President Kamala Harris in Philadelphia.

Send story tips or ideas to Hannah Edelman at hedelman@delawarenewsjournal.com. For more reporting, follow them on X at @Hedelman.



President Joe Biden visits Veterans Memorial Park near New Castle on Thursday.



President Joe Biden walks toward the gravesite of his late son, Beau Biden, at St. Joseph on the Brandywine Catholic Church in Greenville on the anniversary of Beau's death. The former Delaware attorney general died nine years ago.

Biden criticizes Trump's record on race, seeks support of Black voters

Rachel Barber
USA TODAY

In a rare joint appearance, President Joe Biden and Vice President Kamala Harris attempted to show up support among Black voters by attacking former President Donald Trump's record on race at an event in Philadelphia Wednesday.

Speaking to supporters at Grand College, they launched "Black Voters for Biden Harris," a campaign initiative aimed at energizing and mobilizing the voting bloc that was crucial to their election in 2020. Recent swing state polling shows the move may be necessary to support for the incumbent Democratic president in slipping among Black voters. On Wednesday, Biden scolded the crowd of Trump's past comments on race.

"What do you think he would've done on January 6th if Black Americans had stormed the Capitol? I don't think he'd be talking about pardons," Biden said. "This is the same guy that wanted to tear you as you pleased

by perked George Floyd's murder. The same guy who still calls the Capitol Park free rally, even though they are cancelled. He's that kind of white devil, housing applications because of the color of your skin. He's that guy who won't say 'Black Lives Matter' still involve two-foot 'Black Lives Matter'."

In one of his most aggressive attacks on the pro-Trump Republicans nationwide, Biden called Trump "clearly unhinged" and said "something literally snapped" in him after he lost in 2020.

He continued his criticism of the 45th president, saying Trump peddles "the old stereotypes." Biden highlighted Trump's record with his own priorities in office, listing his student loan debt forgiveness and investment in gun violence prevention.

"America has always been a place where we've worked toward a more perfect union, where those who were excluded in the past are included in the promise in the country today. I still believe that. I'm still optimistic. But I trust you," Biden said.

EPA PUBLIC NOTICE

EPA REVIEWS CLEANUP
ARMY CREEK LANDFILL SUPERFUND SITE

The U.S. Environmental Protection Agency (EPA) is reviewing the cleanup that was conducted at the Army Creek Landfill Superfund Site located in New Castle, Delaware. EPA conducted a site visit to review the cleanup contract to protect public health and the environment. EPA conducted the previous 18-month Review in 2020 and concluded that the remedy was working as designed and was currently protective. EPA will make the findings from this site visit available in a public notice in September 2024.

To access site information, including the 18-month Review, visit www.epa.gov/superfund/armycreek.

For questions or to provide site-related information for the review, contact Lisa Trullis, EPA Community Involvement Coordinator at 302-833-6425 or lisa.trullis@epa.gov.

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Army Creek Landfill Superfund Site Five Year Review Community Feedback

This questionnaire is meant to collect information from the community about the Site for inclusion in the Five Year Review Report which will be shared with the Public **late 2024**.

* Required

* This form will record your name, please fill your name.

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date? *

The LGM Board is aware and residents very close to the Site are more aware. Others in the community are less aware.
Some community members view the Army Creek Landfill and Delaware Sand and Gravel similarly and may not draw distinction between the different sites and cleanup activities.

Questions? Contact the Site Team!

Kaitlin Hess, Remedial Project Manager
215-814-3259
hess.kaitlin@epa.gov

Lisa Trakis, Community Involvement
Coordinator 215-814-5433
trakis.lisa@epa.gov

2. What is your overall impression of the project, including cleanup, maintenance, and reuse activities? *

Most of the work takes place on site and not visible from neighborhood. Community members that participated in a site tour reported that conditions were clean and orderly.

Overall the clean up is progressing well. The community would like to keep receiving status updates.

3. What have been the effects of this Site on the surrounding community, if any? *

Some community members were not informed of work related to the construction of a service road for maintenance activities for a pipeline installation for the Army Creek/Delaware Sand and Gravel water treatment process. The location of the pipeline changed after the public meeting on the design several years ago. Some members of the community did not feel informed or supportive of the change.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism, or trespassing? *

Sometimes people trespass and ride ATVs on the service roads. Not aware of trespassing on site since it's not visible unless properties back up to the site.

5. Has EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can EPA best provide site-related information in the future? *

The DE Sand and Gravel Trust has kept interested organizations informed. In the future, EPA should reach out to civic associations and maintenance groups. EPA should consider other forms of sharing information - for example local Facebook groups.

EPA did meet with the community to hear concerns and answer questions when construction was getting started on the service road. It would have been better if the community and property owners were all informed of the change in prior to construction starting.

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used? *

No private well.

7. Do you have any comments, suggestions, or recommendations regarding any aspects of the project? *

The community would like an opportunity to review the Five Year Review Report when it's complete and to potentially have EPA present a summary of the findings and recommendations.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	O&M Documents <input type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
2.	Site-Specific Health and Safety Plan <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
3.	O&M and OSHA Training Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
4.	Permits and Service Agreements <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____ Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
5.	Gas Generation Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
6.	Settlement Monument Records Remarks _____	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
7.	Groundwater Monitoring Records Remarks _____	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	Leachate Extraction Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
9.	Discharge Compliance Records <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> N/A
10.	Daily Access/Security Logs Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A

C. Institutional Controls (ICs)			
1.	Implementation and enforcement		
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____		
	Frequency _____		
	Responsible party/agency _____		
	Contact _____		
	Name	Title	Date Phone no.
	Reporting is up-to-date	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
	Reports are verified by the lead agency	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached		

2.	Adequacy	<input checked="" type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A
	Remarks _____		

D. General			
1.	Vandalism/trespassing	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident
	Remarks _____		

2.	Land use changes on site	<input checked="" type="checkbox"/> N/A	
	Remarks _____		

3.	Land use changes off site	<input checked="" type="checkbox"/> N/A	
	Remarks _____		

VI. GENERAL SITE CONDITIONS			
A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	Roads damaged	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A
	Remarks _____		

B. Other Site Conditions		
Remarks _____ _____ _____ _____ _____		
VII. LANDFILL COVERS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A		
A. Landfill Surface		
1.	Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks <u>Some settlement evident in locations previously identified. These areas are being monitored.</u> _____	
2.	Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks _____ _____	
3.	Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____ _____	
4.	Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident Areal extent _____ Depth _____ Remarks _____ _____	
5.	Vegetative Cover <input checked="" type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks <u>Vegetative cover is well established on Site. There were some smaller trees popping up and the PRP is removing them because of extensive root system.</u> _____	
6.	Alternative Cover (armored rock, concrete, etc.) <input checked="" type="checkbox"/> N/A Remarks _____ _____	
7.	Bulges <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Bulges not evident Areal extent _____ Height _____ Remarks _____ _____	
8.	Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident <input checked="" type="checkbox"/> Wet areas <input type="checkbox"/> Location shown on site map Areal extent _____ <input checked="" type="checkbox"/> Ponding <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Seeps <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Soft subgrade <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks _____ _____	

9.	Slope Instability	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of slope instability
	Areal extent _____			
	Remarks _____			
B. Benches				
	<input type="checkbox"/> Applicable		<input checked="" type="checkbox"/> N/A	
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	Flows Bypass Bench	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay	
	Remarks _____			
2.	Bench Breached	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay	
	Remarks _____			
3.	Bench Overtopped	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay	
	Remarks _____			
C. Letdown Channels				
	<input type="checkbox"/> Applicable		<input checked="" type="checkbox"/> N/A	
	(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	Settlement	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement	
	Areal extent _____	Depth _____		
	Remarks _____			
2.	Material Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation	
	Material type _____	Areal extent _____		
	Remarks _____			
3.	Erosion	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion	
	Areal extent _____	Depth _____		
	Remarks _____			

4.	Undercutting	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____ _____		
5.	Obstructions	Type _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____ _____		
6.	Excessive Vegetative Growth	Type _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____ _____		
D. Cover Penetrations <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	Gas Vents	<input type="checkbox"/> Active	<input checked="" type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration		<input type="checkbox"/> Needs Maintenance
	<input type="checkbox"/> N/A		
	Remarks _____ _____		
2.	Gas Monitoring Probes	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A
	Remarks _____ _____		
3.	Monitoring Wells (within surface area of landfill)	<input type="checkbox"/> Properly secured/locked	<input checked="" type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____ _____		
4.	Leachate Extraction Wells	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A
	Remarks _____ _____		
5.	Settlement Monuments	<input checked="" type="checkbox"/> Located	<input checked="" type="checkbox"/> Routinely surveyed
			<input type="checkbox"/> N/A
	Remarks _____ _____		

E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	Gas Treatment Facilities <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
2.	Gas Collection Wells, Manifolds and Piping <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
3.	Gas Monitoring Facilities (<i>e.g.</i> , gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
F. Cover Drainage Layer <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
2.	Outlet Rock Inspected <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ Outlet rocks in place _____ _____	
G. Detention/Sedimentation Ponds <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____	
2.	Erosion Areal extent _____ Depth _____ <input type="checkbox"/> Erosion not evident Remarks _____ _____	
3.	Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
4.	Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	

H. Retaining Walls		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Deformations	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement _____	Vertical displacement _____	
	Rotational displacement _____		
	Remarks _____		

2.	Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks _____		

I. Perimeter Ditches/Off-Site Discharge		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Siltation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent _____	Depth _____	
	Remarks _____		

2.	Vegetative Growth	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	<input type="checkbox"/> Vegetation does not impede flow		
	Areal extent _____	Type _____	
	Remarks _____		

3.	Erosion	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent _____	Depth _____	
	Remarks _____		

4.	Discharge Structure	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks _____		

VIII. VERTICAL BARRIER WALLS		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Settlement	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent _____	Depth _____	
	Remarks _____		

2.	Performance Monitoring	Type of monitoring _____	
	<input type="checkbox"/> Performance not monitored		
	Frequency _____	<input type="checkbox"/> Evidence of breaching	
	Head differential _____		
	Remarks _____		

IX. GROUNDWATER/SURFACE WATER REMEDIES <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
A. Groundwater Extraction Wells, Pumps, and Pipelines <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A <small>System no longer operating.</small>	
1.	Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ _____
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ _____
3.	Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ _____
B. Surface Water Collection Structures, Pumps, and Pipelines <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ _____
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ _____
3.	Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ _____

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

D. Monitored Natural Attenuation			
1.	Monitoring Wells (natural attenuation remedy)		
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> All required wells located	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	Remarks _____		<input checked="" type="checkbox"/> N/A
X. OTHER REMEDIES			
If there are remedies applied at the site which are 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 to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).			
<p>_____ The remedy appears to be generally functioning as designed. Contaminated soil has been capped, and the cap appears functional. Differential settlement is being monitored. Trespassing on the site has not been observed in years. The groundwater treatment system operated for years and stopped operation in 2004 because cleanup goals were met. Institutional controls are in place. Groundwater investigations are ongoing for the area downgradient of the western lobe of the ACL.</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>			
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.			
<p>_____ O&M appears adequate and the revised mowing schedule is generally preventing the growth of too much woody vegetation.</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>			

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.

There are no early indicators of potential remedy problems.

D. Opportunities for Optimization

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

There are no opportunities for optimization.

APPENDIX F – SITE INSPECTION PHOTOS



Road spanning the landfill



Tree line along Army Creek



Vegetation on landfill cover



Passive gas vents



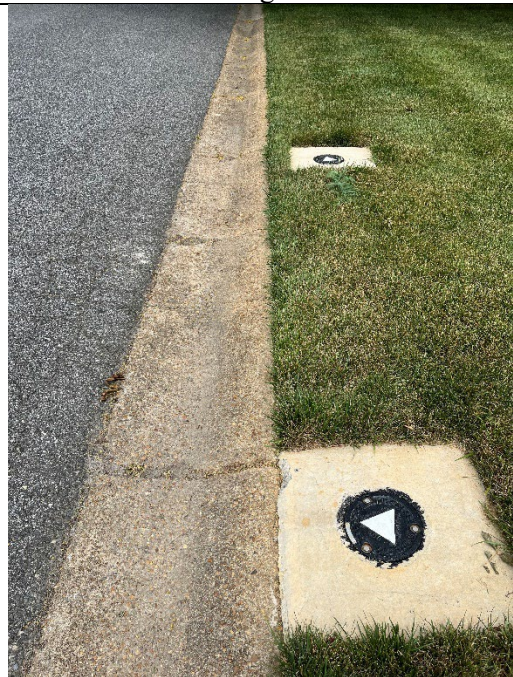
Drainage ditch



Passive gas vent



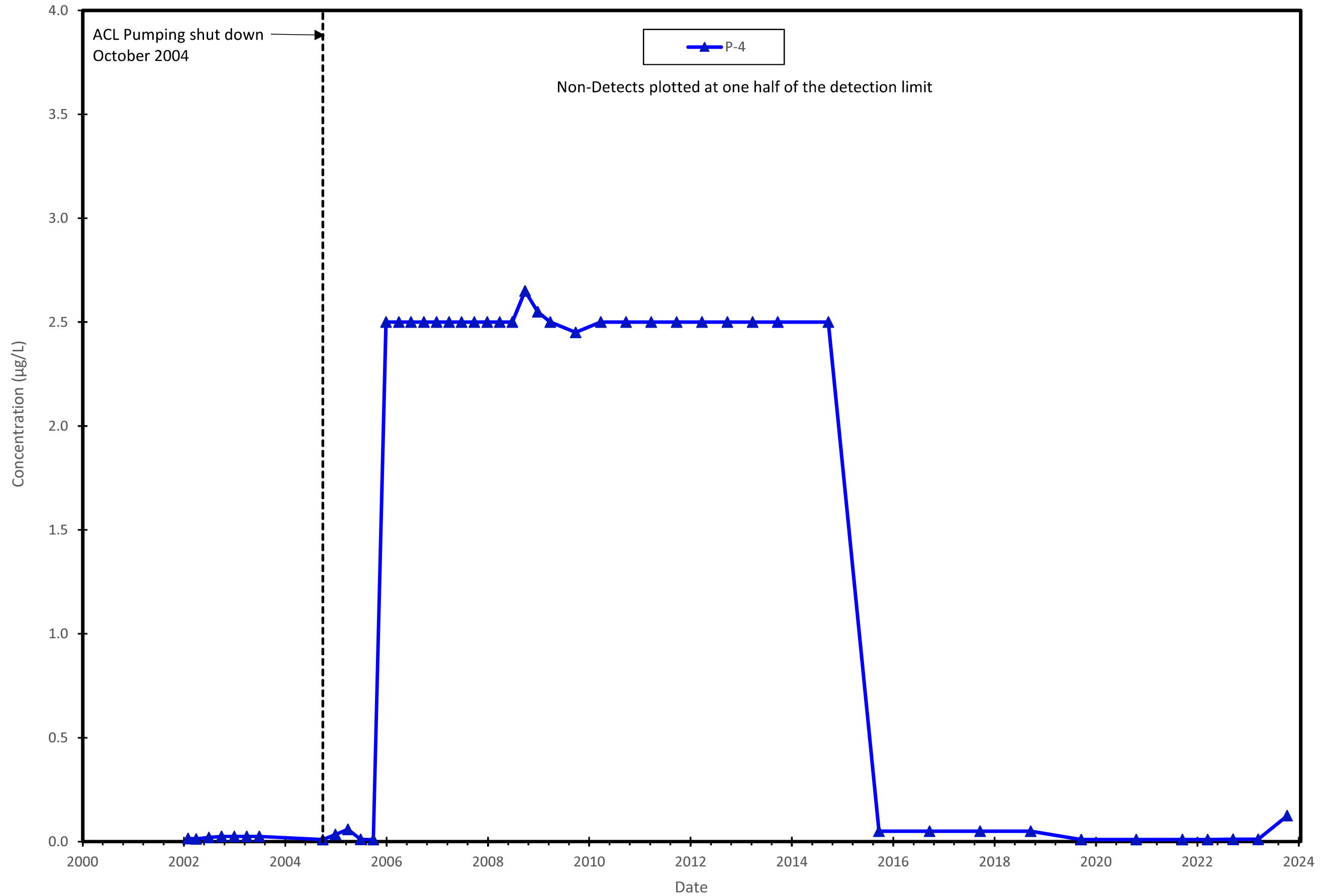
Coyote from February 2024

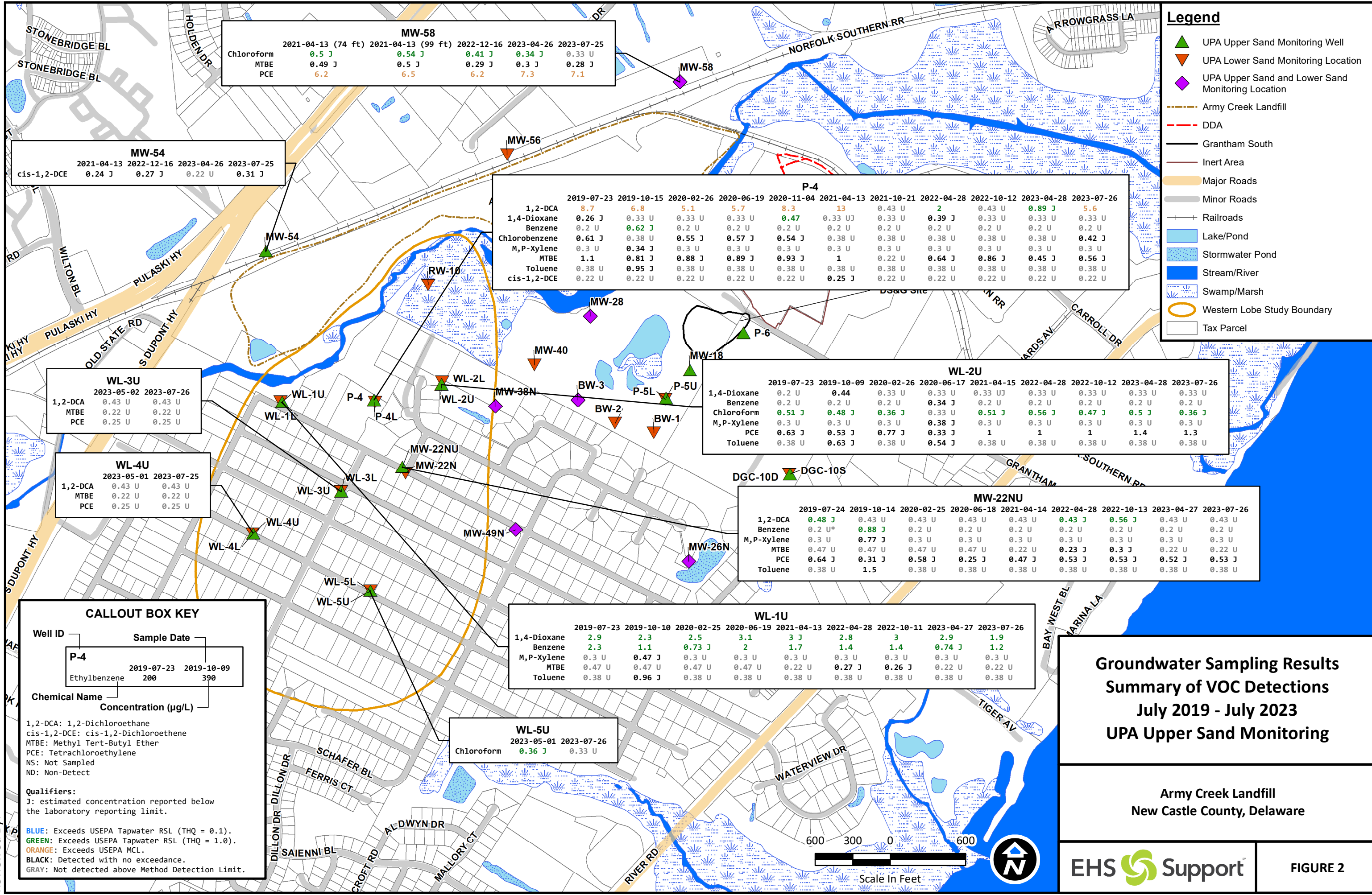


Downgradient monitoring wells

APPENDIX G – DETAILED DATA ANALYSIS

Figure 1
BCEE Concentrations at Select Monitoring Well
(P-4)





MW-58

	2021-04-13 (74 ft)	2021-04-13 (99 ft)	2022-12-16	2023-04-26	2023-07-25
Chloroform	0.5 J	0.54 J	0.41 J	0.34 J	0.33 U
MTBE	0.49 J	0.5 J	0.29 J	0.3 J	0.28 J
PCE	6.2	6.5	6.2	7.3	7.1

MW-54

	2021-04-13	2022-12-16	2023-04-26	2023-07-25
cis-1,2-DCE	0.24 J	0.27 J	0.22 U	0.31 J

P-4

	2019-07-23	2019-10-15	2020-02-26	2020-06-19	2020-11-04	2021-04-13	2021-10-21	2022-04-28	2022-10-12	2023-04-28	2023-07-26
1,2-DCA	8.7	6.8	5.1	5.7	8.3	13	0.43 U	2	0.43 U	0.89 J	5.6
1,4-Dioxane	0.26 J	0.33 U	0.33 U	0.33 U	0.47	0.33 UJ	0.33 U	0.39 J	0.33 U	0.33 U	0.33 U
Benzene	0.2 U	0.62 J	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chlorobenzene	0.61 J	0.38 U	0.55 J	0.57 J	0.54 J	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.42 J
M,P-Xylene	0.3 U	0.34 J	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
MTBE	1.1	0.81 J	0.88 J	0.89 J	0.93 J	1	0.22 U	0.64 J	0.86 J	0.45 J	0.56 J
Toluene	0.38 U	0.95 J	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
cis-1,2-DCE	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.25 J	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U

WL-2U

	2019-07-23	2019-10-09	2020-02-26	2020-06-17	2021-04-15	2022-04-28	2022-10-12	2023-04-28	2023-07-26
1,4-Dioxane	0.2 U	0.44	0.33 U	0.33 U	0.33 UJ	0.33 U	0.33 U	0.33 U	0.33 U
Benzene	0.2 U	0.2 U	0.2 U	0.34 J	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloroform	0.51 J	0.48 J	0.36 J	0.33 U	0.51 J	0.56 J	0.47 J	0.5 J	0.36 J
M,P-Xylene	0.3 U	0.3 U	0.3 U	0.38 J	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
PCE	0.63 J	0.53 J	0.77 J	0.33 J	1	1	1	1.4	1.3
Toluene	0.38 U	0.63 J	0.38 U	0.54 J	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U

WL-3U

	2023-05-02	2023-07-26
1,2-DCA	0.43 U	0.43 U
MTBE	0.22 U	0.22 U
PCE	0.25 U	0.25 U

WL-4U

	2023-05-01	2023-07-25
1,2-DCA	0.43 U	0.43 U
MTBE	0.22 U	0.22 U
PCE	0.25 U	0.25 U

MW-22NU

	2019-07-24	2019-10-14	2020-02-25	2020-06-18	2021-04-14	2022-04-28	2022-10-13	2023-04-27	2023-07-26
1,2-DCA	0.48 J	0.43 U	0.43 U	0.43 U	0.43 U	0.43 J	0.56 J	0.43 U	0.43 U
Benzene	0.2 U*	0.88 J	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
M,P-Xylene	0.3 U	0.77 J	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
MTBE	0.47 U	0.47 U	0.47 U	0.47 U	0.22 U	0.23 J	0.3 J	0.22 U	0.22 U
PCE	0.64 J	0.31 J	0.58 J	0.25 J	0.47 J	0.53 J	0.53 J	0.52 J	0.53 J
Toluene	0.38 U	1.5	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U

WL-1U

	2019-07-23	2019-10-10	2020-02-25	2020-06-19	2021-04-13	2022-04-28	2022-10-11	2023-04-27	2023-07-26
1,4-Dioxane	2.9	2.3	2.5	3.1	3 J	2.8	3	2.9	1.9
Benzene	2.3	1.1	0.73 J	2	1.7	1.4	1.4	0.74 J	1.2
M,P-Xylene	0.3 U	0.47 J	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
MTBE	0.47 U	0.47 U	0.47 U	0.47 U	0.22 U	0.27 J	0.26 J	0.22 U	0.22 U
Toluene	0.38 U	0.96 J	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U

WL-5U

	2023-05-01	2023-07-26
Chloroform	0.36 J	0.33 U

Legend

- ▲ UPA Upper Sand Monitoring Well
- ▼ UPA Lower Sand Monitoring Location
- ◆ UPA Upper Sand and Lower Sand Monitoring Location
- Army Creek Landfill
- - - DDA
- Grantham South
- Inert Area
- Major Roads
- Minor Roads
- Railroads
- Lake/Pond
- Stormwater Pond
- Stream/River
- Swamp/Marsh
- Western Lobe Study Boundary
- Tax Parcel

CALLOUT BOX KEY

Well ID: P-4
Sample Date: 2019-07-23, 2019-10-09
Chemical Name: Ethylbenzene
Concentration (µg/L): 200, 390

1,2-DCA: 1,2-Dichloroethane
cis-1,2-DCE: cis-1,2-Dichloroethene
MTBE: Methyl Tert-Butyl Ether
PCE: Tetrachloroethylene
NS: Not Sampled
ND: Non-Detect

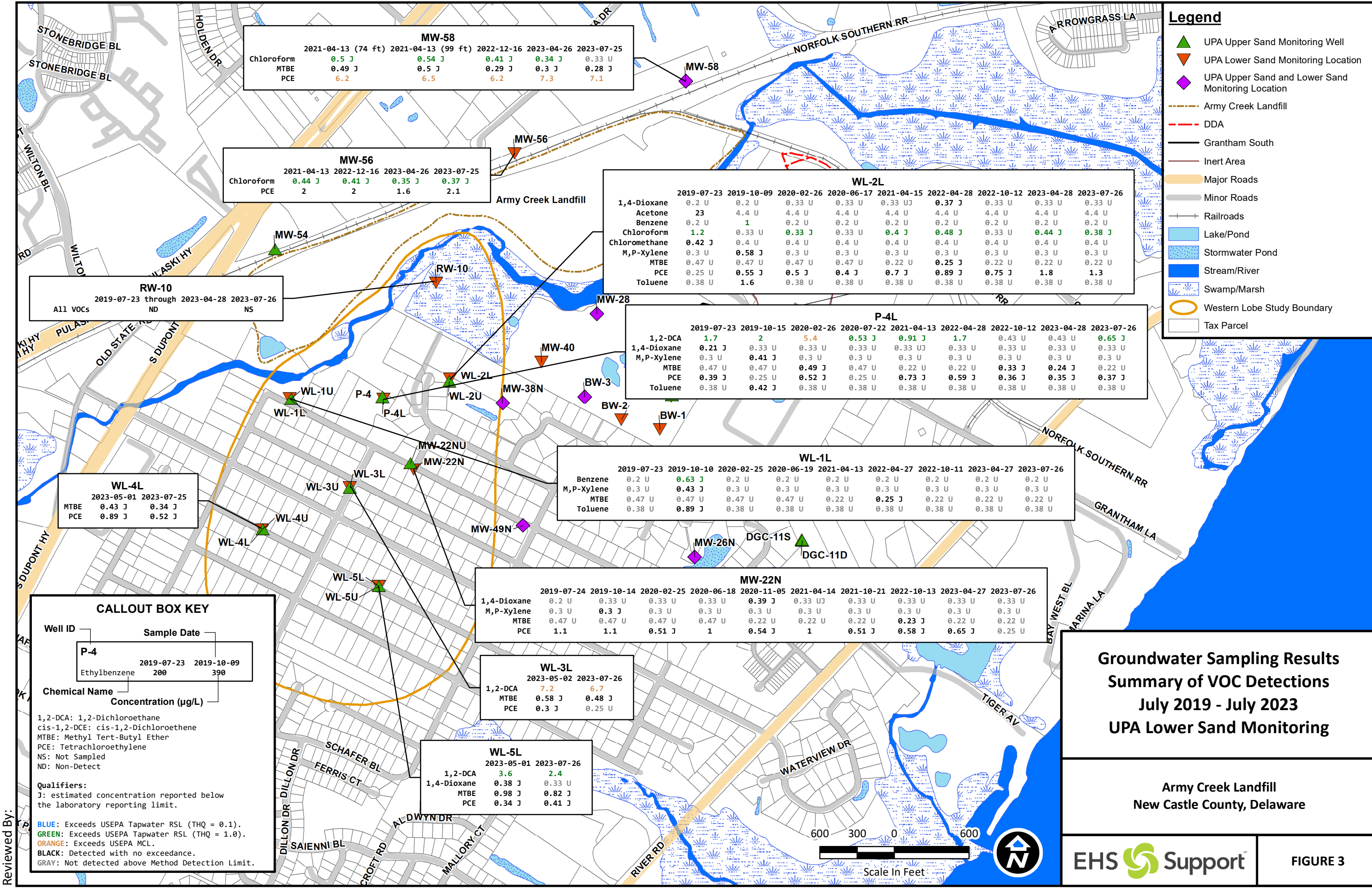
Qualifiers:
J: estimated concentration reported below the laboratory reporting limit.

BLUE: Exceeds USEPA Tapwater RSL (THQ = 0.1).
GREEN: Exceeds USEPA Tapwater RSL (THQ = 1.0).
ORANGE: Exceeds USEPA MCL.
BLACK: Detected with no exceedance.
GRAY: Not detected above Method Detection Limit.

**Groundwater Sampling Results
Summary of VOC Detections
July 2019 - July 2023
UPA Upper Sand Monitoring**

Army Creek Landfill
New Castle County, Delaware

Reviewed By:



	2021-04-13 (74 ft)	2021-04-13 (99 ft)	2022-12-16	2023-04-26	2023-07-25
Chloroform	0.5 J	0.54 J	0.41 J	0.34 J	0.33 U
MTBE	0.49 J	0.5 J	0.29 J	0.3 J	0.28 J
PCE	6.2	6.5	6.2	7.3	7.1

	2021-04-13	2022-12-16	2023-04-26	2023-07-25
Chloroform	0.44 J	0.41 J	0.35 J	0.37 J
PCE	2	2	1.6	2.1

	2019-07-23	2019-10-09	2020-02-26	2020-06-17	2021-04-15	2022-04-28	2022-10-12	2023-04-28	2023-07-26
1,4-Dioxane	0.2 U	0.2 U	0.33 U	0.33 U	0.33 UJ	0.37 J	0.33 U	0.33 U	0.33 U
Acetone	23	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Benzene	0.2 U	1	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloroform	1.2	0.33 U	0.33 J	0.33 U	0.4 J	0.48 J	0.33 U	0.44 J	0.38 J
Chloromethane	0.42 J	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
M,P-Xylene	0.3 U	0.58 J	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
MTBE	0.47 U	0.47 U	0.47 U	0.47 U	0.22 U	0.25 J	0.22 U	0.22 U	0.22 U
PCE	0.25 U	0.55 J	0.5 J	0.4 J	0.7 J	0.89 J	0.75 J	1.8	1.3
Toluene	0.38 U	1.6	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U

	2019-07-23 through	2023-04-28	2023-07-26
All VOCs	ND	NS	NS

	2019-07-23	2019-10-15	2020-02-26	2020-07-22	2021-04-13	2022-04-28	2022-10-12	2023-04-28	2023-07-26
1,2-DCA	1.7	2	5.4	0.53 J	0.91 J	1.7	0.43 U	0.43 U	0.65 J
1,4-Dioxane	0.21 J	0.33 U	0.33 U	0.33 U	0.33 UJ	0.33 U	0.33 U	0.33 U	0.33 U
M,P-Xylene	0.3 U	0.41 J	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
MTBE	0.47 U	0.47 U	0.49 J	0.47 U	0.22 U	0.22 U	0.33 J	0.24 J	0.22 U
PCE	0.39 J	0.25 U	0.52 J	0.25 U	0.73 J	0.59 J	0.36 J	0.35 J	0.37 J
Toluene	0.38 U	0.42 J	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U

	2019-07-23	2019-10-10	2020-02-25	2020-06-19	2021-04-13	2022-04-27	2022-10-11	2023-04-27	2023-07-26
Benzene	0.2 U	0.63 J	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
M,P-Xylene	0.3 U	0.43 J	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
MTBE	0.47 U	0.47 U	0.47 U	0.47 U	0.22 U	0.25 J	0.22 U	0.22 U	0.22 U
Toluene	0.38 U	0.89 J	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U

	2023-05-01	2023-07-25
MTBE	0.43 J	0.34 J
PCE	0.89 J	0.52 J

	2019-07-24	2019-10-14	2020-02-25	2020-06-18	2020-11-05	2021-04-14	2021-10-21	2022-10-13	2023-04-27	2023-07-26
1,4-Dioxane	0.2 U	0.33 U	0.33 U	0.33 U	0.39 J	0.33 UJ	0.33 U	0.33 U	0.33 U	0.33 U
M,P-Xylene	0.3 U	0.3 J	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
MTBE	0.47 U	0.47 U	0.47 U	0.47 U	0.22 U	0.22 U	0.22 U	0.23 J	0.22 U	0.22 U
PCE	1.1	1.1	0.51 J	1	0.54 J	1	0.51 J	0.58 J	0.65 J	0.25 U

	2023-05-02	2023-07-26
1,2-DCA	7.2	6.7
MTBE	0.58 J	0.48 J
PCE	0.3 J	0.25 U

	2023-05-01	2023-07-26
1,2-DCA	3.6	2.4
1,4-Dioxane	0.38 J	0.33 U
MTBE	0.98 J	0.82 J
PCE	0.34 J	0.41 J

CALLOUT BOX KEY

Well ID: P-4
Sample Date: 2019-07-23, 2019-10-09
Chemical Name: Ethylbenzene
Concentration (µg/L): 200, 390

1,2-DCA: 1,2-Dichloroethane
cis-1,2-DCE: cis-1,2-Dichloroethene
MTBE: Methyl Tert-Butyl Ether
PCE: Tetrachloroethylene
NS: Not Sampled
ND: Non-Detect

Qualifiers:
J: estimated concentration reported below the laboratory reporting limit.

BLUE: Exceeds USEPA Tapwater RSL (THQ = 0.1).
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**Groundwater Sampling Results
Summary of VOC Detections
July 2019 - July 2023
UPA Lower Sand Monitoring**

Army Creek Landfill
New Castle County, Delaware

EHS Support

FIGURE 3

Reviewed By:

Figure 4
Dissolved Iron Concentrations at Select Monitoring Wells
(MW-22N, MW-22NU, and MW-49N)

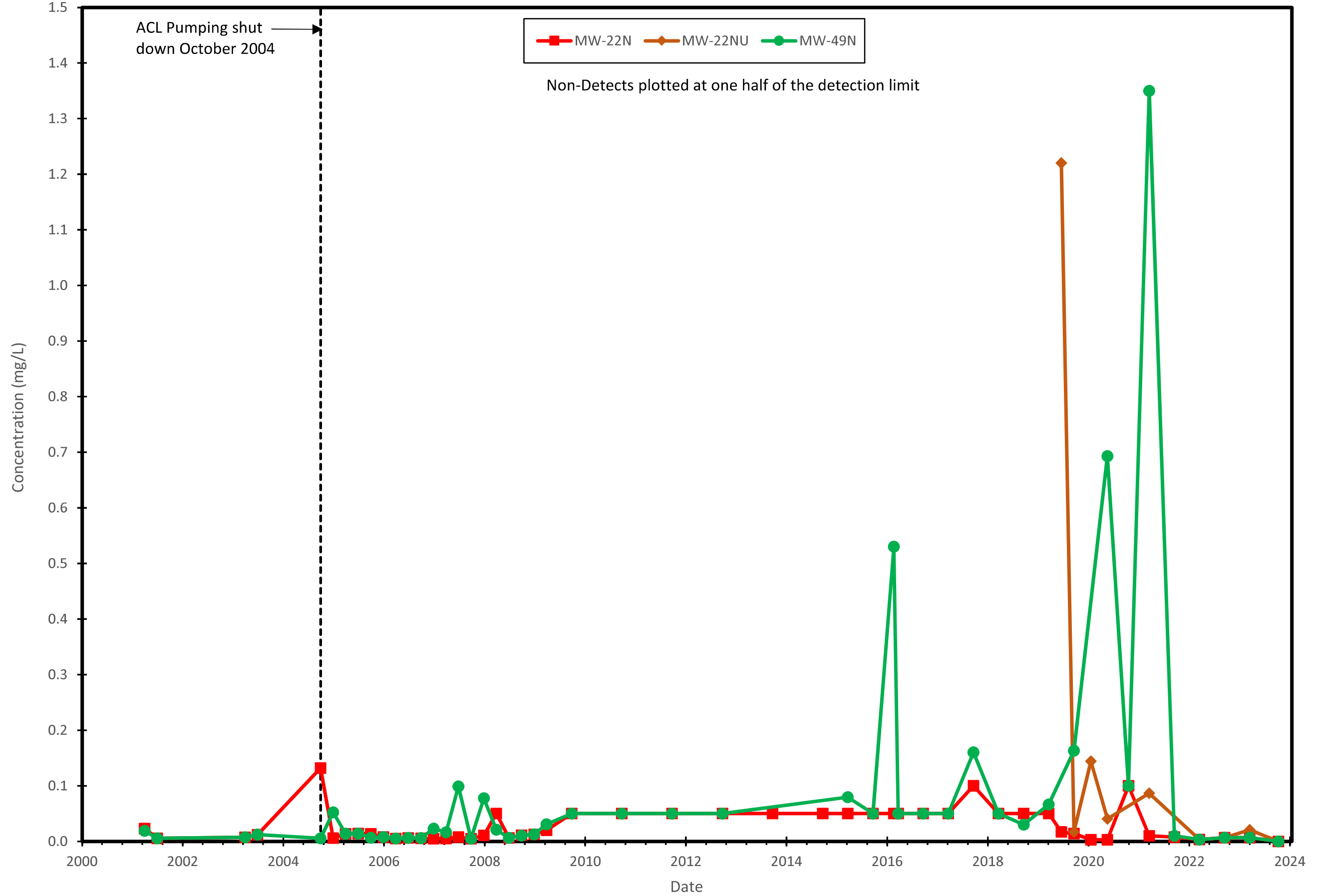


Figure 5
Dissolved Iron Concentrations at Select Monitoring Wells
(P-4, P-4L, and MW-40)

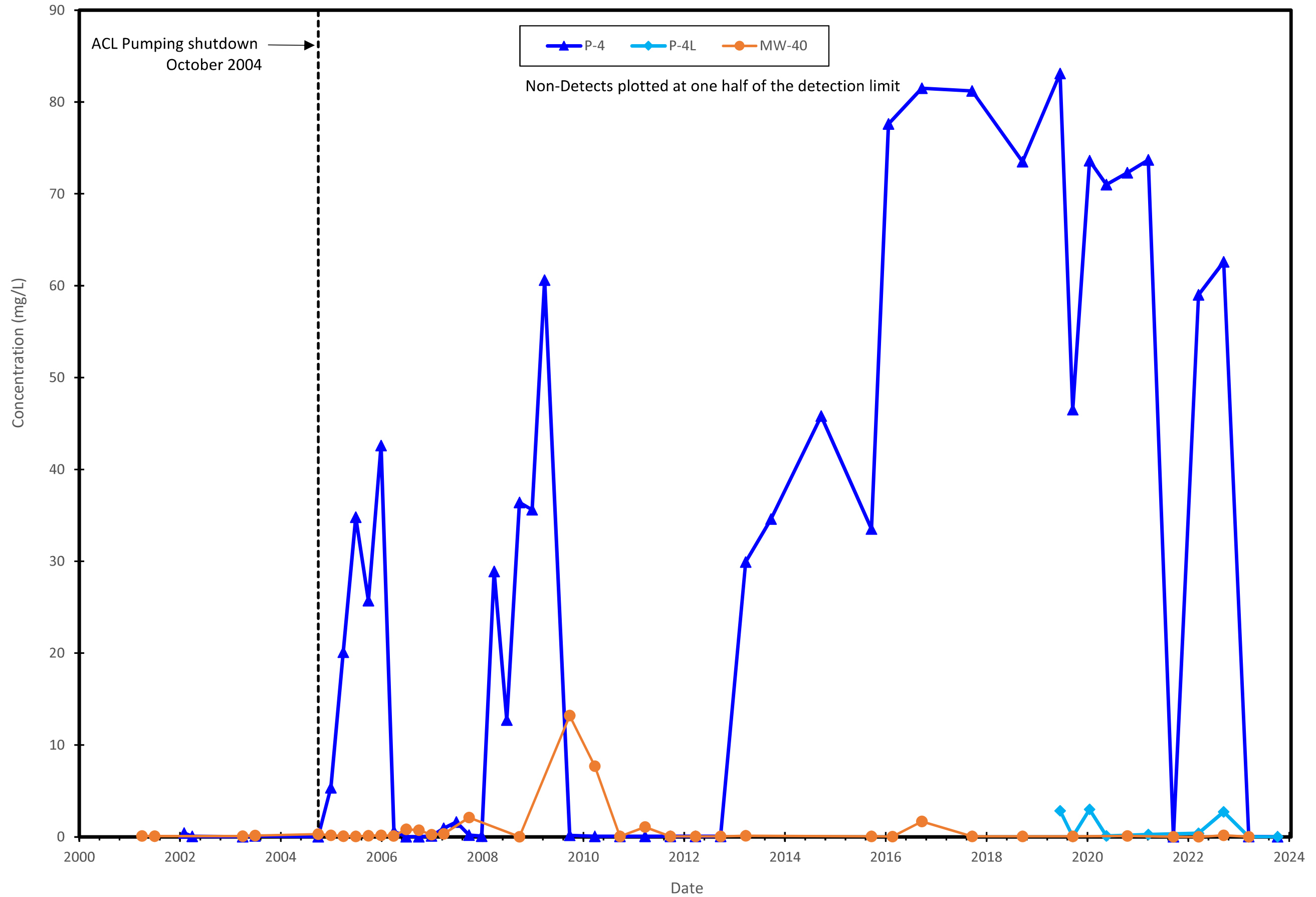


Figure 6
Dissolved Iron Concentrations at Select Monitoring Wells
(WL-1U, WL-1L, WL-2U, and WL-2L)

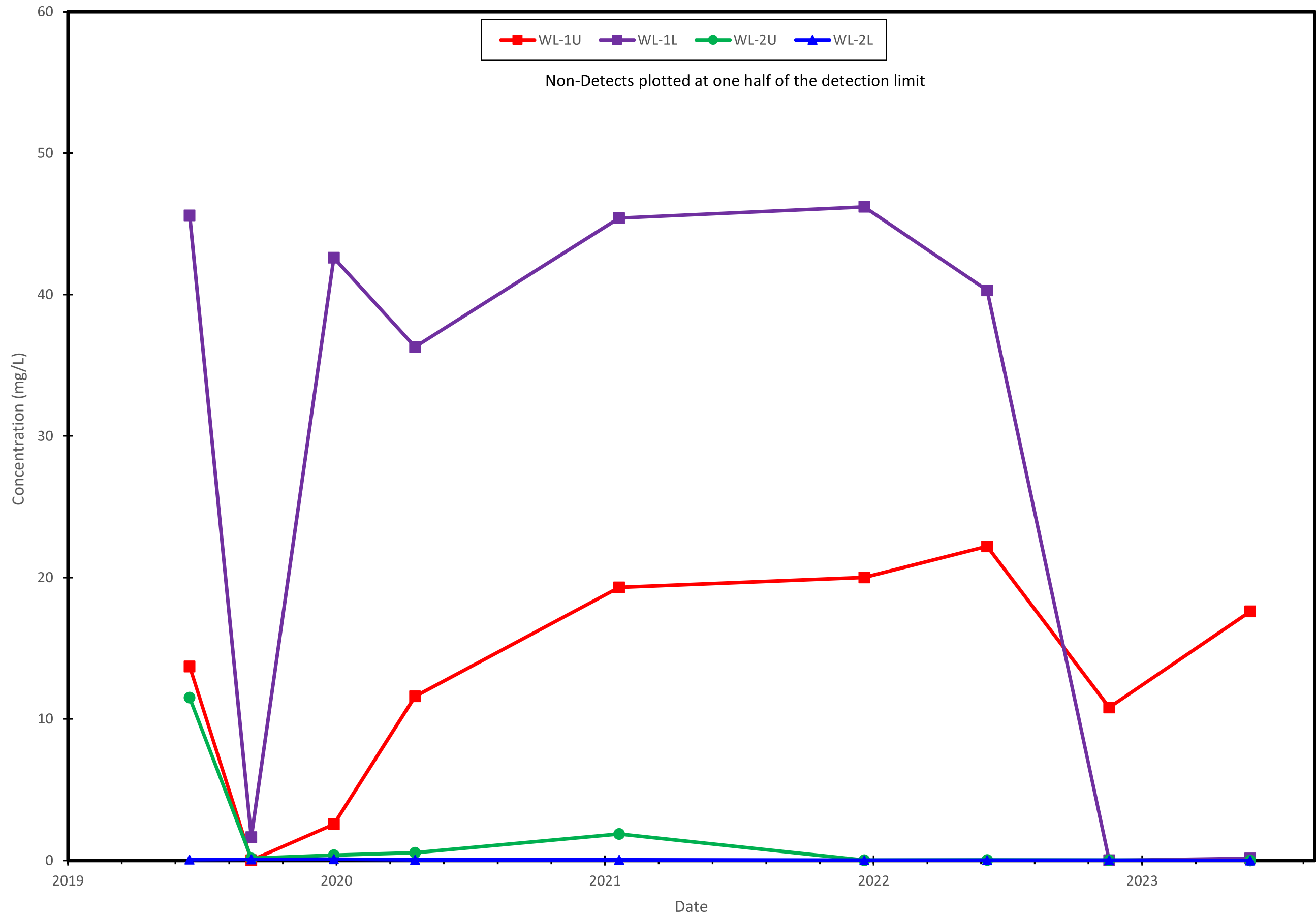


Figure 7
Dissolved Manganese Concentrations at Select Monitoring Wells
(MW-22N, MW-22NU, MW-40, MW-49N, P-4 and P-4L)

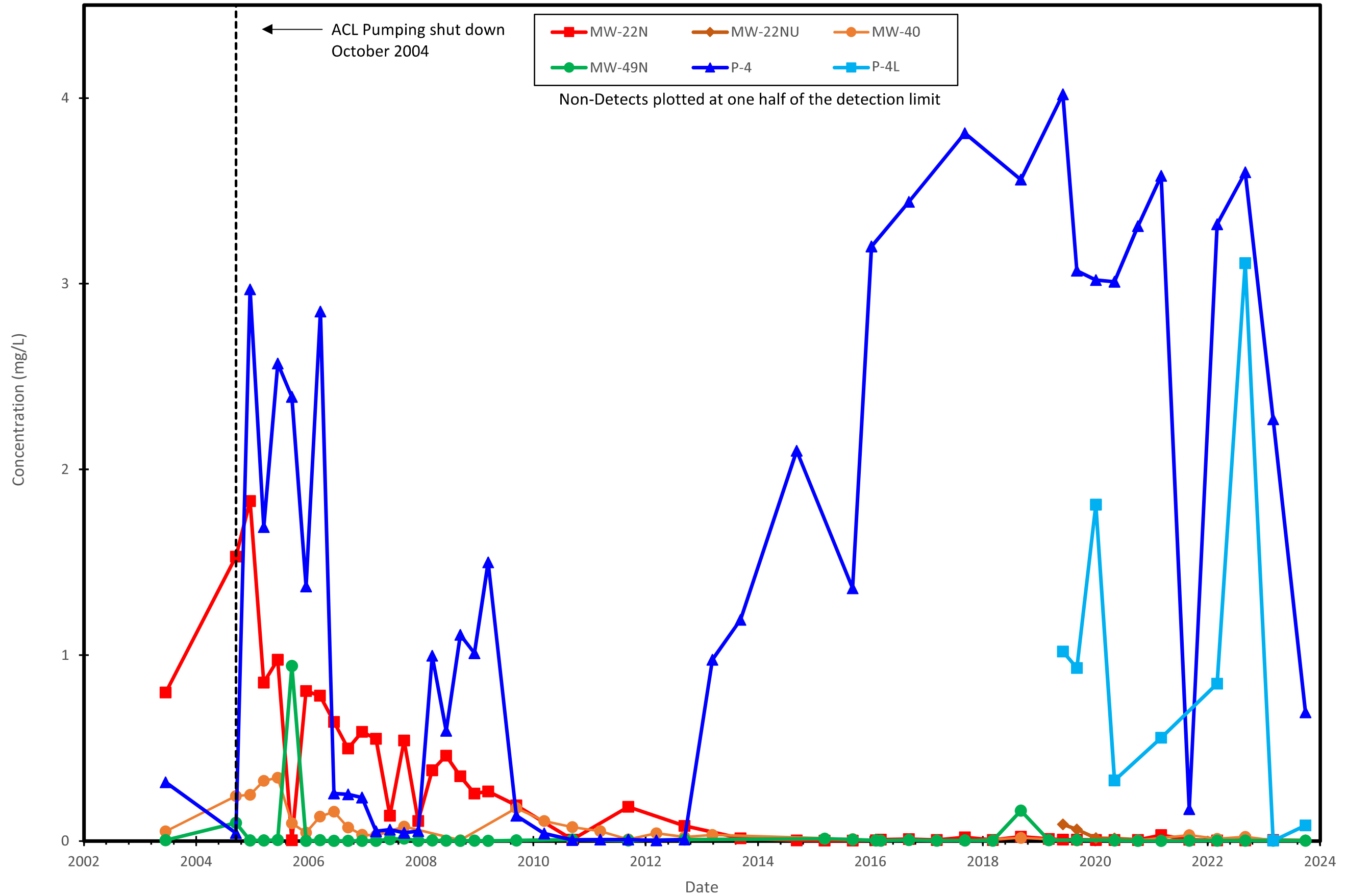


Figure 8
Dissolved Manganese Concentrations at Select Monitoring Wells
(WL-1U, WL-1L, WL-2U, and WL-2L)

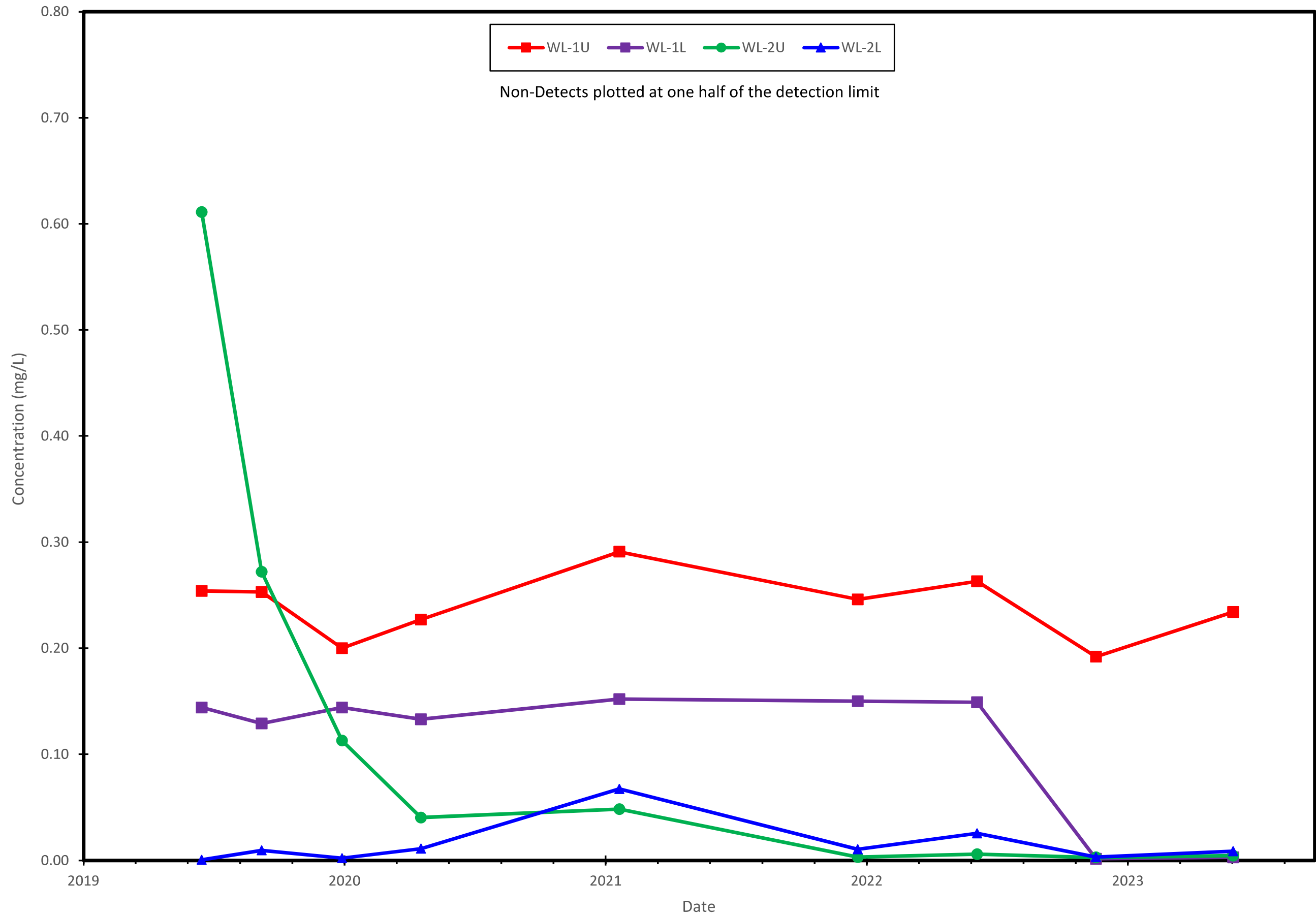


Figure 9
Dissolved Cobalt Concentrations at Select Monitoring Wells
(MW-22N, MW-22NU, MW-40, MW-49N, P-4, and P-4L)

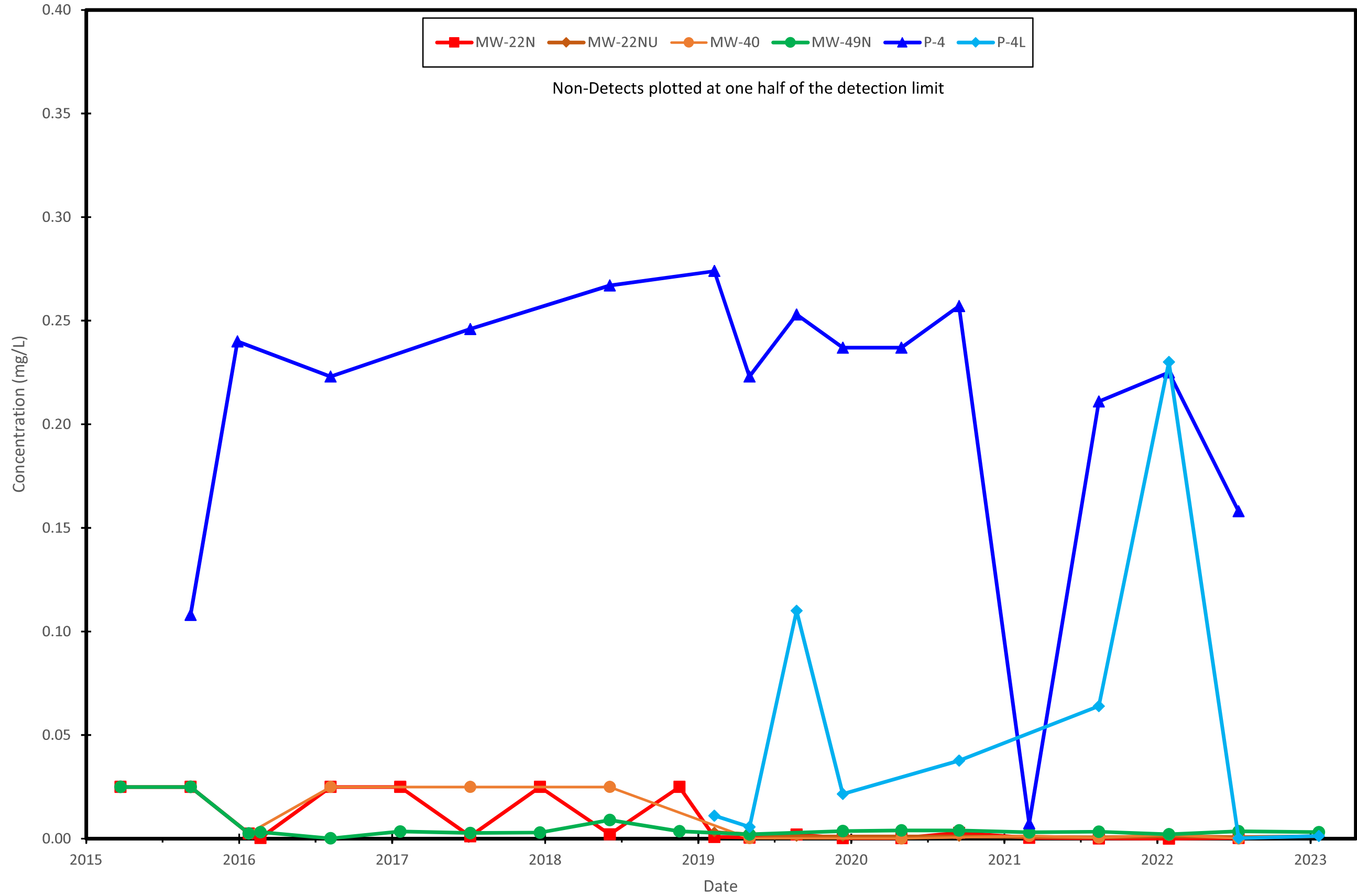
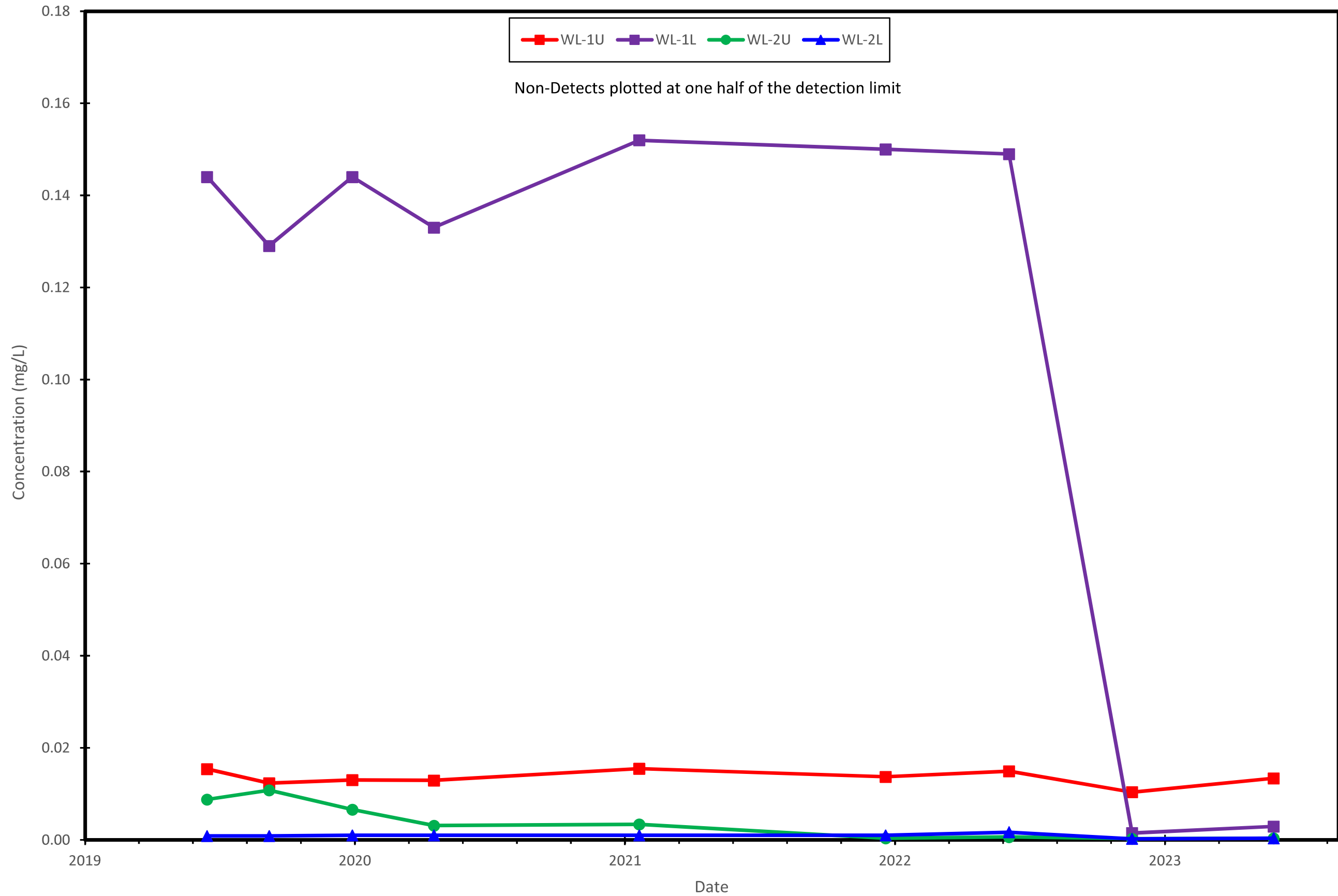
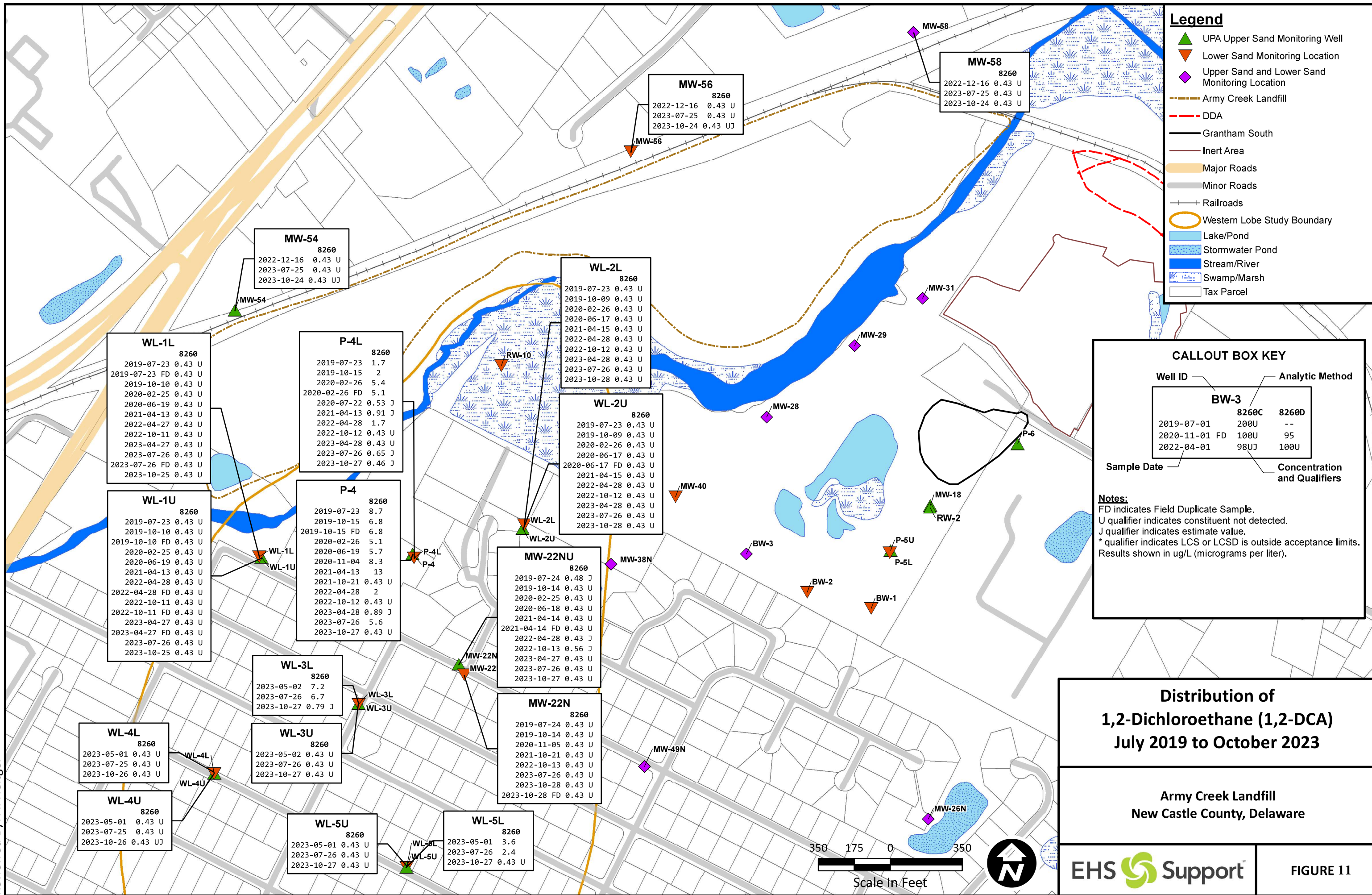


Figure 10
Dissolved Cobalt Concentrations at Select Monitoring Wells
(WL-1U, WL-1L, WL-2U, and WL-2L)





- Legend**
- ▲ UPA Upper Sand Monitoring Well
 - ▼ Lower Sand Monitoring Location
 - ◆ Upper Sand and Lower Sand Monitoring Location
 - Army Creek Landfill
 - - - DDA
 - Grantham South
 - Inert Area
 - Major Roads
 - Minor Roads
 - Railroads
 - Western Lobe Study Boundary
 - Lake/Pond
 - Stormwater Pond
 - Stream/River
 - Swamp/Marsh
 - Tax Parcel

CALLOUT BOX KEY

Well ID	Analytic Method	
BW-3	8260C	8260D
	2019-07-01	200U
	2020-11-01	100U
	2022-04-01	98UJ
Sample Date	Concentration and Qualifiers	

Notes:
 FD indicates Field Duplicate Sample.
 U qualifier indicates constituent not detected.
 J qualifier indicates estimate value.
 * qualifier indicates LCS or LCSD is outside acceptance limits.
 Results shown in ug/L (micrograms per liter).

**Distribution of
1,2-Dichloroethane (1,2-DCA)
July 2019 to October 2023**

**Army Creek Landfill
New Castle County, Delaware**

Table 1
 Quarterly Sampling Results
 July 2019 - July 2023
 Army Creek Landfill
 New Castle, Delaware

Compound	USEPA MCLs ¹	USEPA RSL - THQ=1.0 ²	USEPA RSL - THQ=0.1 ³	P-4L				P-4L			RW-10					WL-1L								
				Sample ID	P-4L 07232019	P-4L 10152019	P-4L_WG 202002261221	DUP01-02262020_WG 202002261200	P-4L_20200619 ⁴	P-4L_20200722 ⁵	P-4L_20210414	P-4L_20230428	P-4L_20230726	RW-10-07242019	RW-10-10152019	RW-10_WG 202002260820	RW-10_20200617	RW-10_20210414	RW-10_20230425	WL-1L 07232019	DUP-01 (WL-1L) 07232019	WL-1L-10102019	WL-1L_WG 202002250321	WL-1L_20200619
				Sampling Date	23 July 2019	15 Oct 2019	26 Feb 2020	26 Feb 2020	19 June 2020	22 July 2020	14 Apr 2021	28 Apr 2023	26 July 2023	24 July 2019	15 Oct 2019	26 Feb 2020	17 June 2020	14 Apr 2021	25 Apr 2023	23 July 2019	23 July 2019	10 Oct 2019	25 Feb 2020	19 June 2020
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L			
VOLATILE ORGANIC COMPOUNDS - 8260C																								
1,1,1-Trichloroethane	200	8000	800	U	0.24 U	0.24 U	0.24 U	0.24 U	--	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U		
1,1,2-Tetrachloroethane	--	0.076	0.076	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	--	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U		
1,1,2-Trichloro-1,2,2-Trifluoroethane	--	10000	1000	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	--	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U		
1,1,2-Trichloroethane	5	0.28	0.041	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	--	0.43 U	0.2 U	0.2 U	0.2 U	0.43 U	0.43 U	0.43 U	0.2 U	0.2 U	0.43 U	0.43 U	0.43 U	0.43 U		
1,1-Dichloroethane	--	2.8	2.8	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	--	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U		
1,1-Dichloroethene	7	280	28	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	--	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U		
1,2,3-Trichlorobenzene	--	7	0.7	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	--	0.36 U	0.36 UJ	0.36 U	0.36 U	0.36 U *	0.36 U	0.36 U	0.36 U	0.36 UJ	0.36 U	0.36 U	0.36 U F1	0.36 U		
1,2,4-Trichlorobenzene	70	1.2	0.4	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	--	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U		
1,2-Dibromo-3-Chloropropane	0.2	0.00033	0.00033	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	--	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	--		
1,2-Dibromoethane (Ethylene Dibromide)	0.05	0.0075	0.0075	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	0.5 U	0.5 U	0.5 U	0.5 U	--		
1,2-Dichlorobenzene	600	300	30	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	--	0.43 U	0.21 U	0.21 U	0.21 U	0.43 U	0.43 U	0.43 U	0.21 U	0.21 U	0.43 U	0.43 U	0.43 U	0.43 U		
1,2-Dichloroethane	5	0.17	0.17	1.7	2	5.4	5.1	--	0.53 J	0.91 J	0.43 U	0.65 J	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U		
1,2-Dichloropropane	5	0.85	0.82	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	--	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U		
1,3-Dichlorobenzene	--	--	--	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	--	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U		
1,4-Dichlorobenzene	75	0.48	0.48	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	--	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U		
1,4-Dioxane (P-Dioxane)	--	0.46	0.46	0.21 J	0.33 U	0.33 U	0.33 U	0.33 U	--	0.33 U	0.33 UJ	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U		
2-Hexanone	--	38	3.8	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	--	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U		
Acetone	--	14000	1400	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	--	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U		
Benzene	5	0.46	0.46	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U *	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U		
Bromochloromethane	--	83	8.3	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	--	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U		
Bromodichloromethane	80	0.13	0.13	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	--	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U		
Bromoform	80	3.3	3.3	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	--	0.54 U	0.54 UJ	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U		
Bromomethane	--	7.5	0.75	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	--	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U		
Carbon Disulfide	--	810	81	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	--	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U		
Carbon Tetrachloride	5	0.46	0.46	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	--	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U		
Chlorobenzene	100	78	7.8	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	--	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U		
Chlorodibromomethane	80	0.87	0.87	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	--	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U		
Chloroethane	--	21000	2100	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	--	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U		
Chloroform	80	0.22	0.22	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	--	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U		
Chloromethane	--	190	19	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	--	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U		
cis-1,2-Dichloroethene	70	36	3.6	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	--	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U		
cis-1,3-Dichloropropene	--	--	--	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	--	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U		
Cyclohexane	--	13000	1300	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	--	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U		
Dichlorodifluoromethane	--	200	20	0.31 U *	0.31 U	0.31 U	0.31 U	0.31 U	--	0.31 U	0.31 U	0.31 U	0.31 UJ	0.31 U	0.31 U	0.31 U	0.31 U *	0.31 U *	0.31 U *	0.31 U *	0.31 U *	0.31 U *		
Ethylbenzene	700	1.5	1.5	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	--	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U		
Isopropylbenzene (Cumene)	--	450	45	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	--	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U		
M,P-Xylene	10000	--	--	0.3 U	0.41 J	0.3 U	0.3 U	0.3 U	--	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.43 J	0.3 U		
Methyl Acetate	--	20000	2000	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	--	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U		
Methyl Ethyl Ketone (2-Butanone)	--	5600	560	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	--	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U		
Methyl isobutyl Ketone (4-Methyl-2-Pentanone)	--	6300	630	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	--	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U		
Methyl tert-butyl ether	--	14	1.4	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	--	0.47 U	0.22 U	0.24 J	0.22 U	0.47 U	0.47 U	0.47 U	0.22 U	0.22 U	0.47 U	0.47 U	0.47 U	0.47 U		
Methylcyclohexane	--	--	--	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	--	0.26 U	0.71 U	0.71 U	0.71 U	0.26 U	0.26 U	0.26 U	0.71 U	0.71 U	0.26 U	0.26 U	0.26 U	0.26 U		
Methylene Chloride	5	11	11	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	--	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U		
O-Xylene (1,2-Dimethylbenzene)	10000	190	19	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	--	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U		
Styrene	100	1200	120	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	--	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U		
Tetrachloroethylene (PCE)	5	11	4.1	0.39 J	0.25																			

Table 1
Quarterly Sampling Results
July 2019 - July 2023
Army Creek Landfill
New Castle, Delaware

Compound	USEPA MCLs ¹	USEPA RSL - THQ=1.0 ²	USEPA RSL - THQ=0.1 ³	Monitoring Well		MW-54			MW-56			MW-58							
				Sample ID	Sampling Date Units	MW-38N_20210415	MW-40_20210415	MW-54_20210413	MW-54_20230426	MW-54_20230725	MW-56_20210413	MW-56_20230426	MW-56_20230725	MW-58-3XVOL_20210413	MW-58-74_20210413	MW-58-99_20210413	MW-58_20230426	MW-58_20230725	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
VOLATILE ORGANIC COMPOUNDS - 8260C																			
1,1,1-Trichloroethane	200	8000	800	--	--	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
1,1,2-Tetrachloroethane	--	0.076	0.076	--	--	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	--	10000	1000	--	--	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U
1,1,2-Trichloroethane	5	0.28	0.041	--	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1-Dichloroethane	--	2.8	2.8	--	--	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
1,1-Dichloroethene	7	280	28	--	--	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
1,2,3-Trichlorobenzene	--	7	0.7	--	--	0.36 UJ	0.36 U	0.36 U	0.36 UJ	0.36 U	0.36 U	0.36 UJ	0.36 U	0.36 UJ	0.36 U	0.36 UJ	0.36 U	0.36 U	0.36 U
1,2,4-Trichlorobenzene	70	1.2	0.4	--	--	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
1,2-Dibromo-3-Chloropropane	0.2	0.00033	0.00033	--	--	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
1,2-Dibromoethane (Ethylene Dibromide)	0.05	0.0075	0.0075	--	--	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	0.5 U
1,2-Dichlorobenzene	600	300	30	--	--	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
1,2-Dichloroethane	5	0.17	0.17	--	--	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U
1,2-Dichloropropane	5	0.85	0.82	--	--	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U
1,3-Dichlorobenzene	--	--	--	--	--	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U
1,4-Dichlorobenzene	75	0.48	0.48	--	--	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,4-Dioxane (P-Dioxane)	--	0.46	0.46	--	--	0.33 UJ	0.33 U	0.33 U	0.33 UJ	0.33 U	0.33 U	0.33 UJ	0.33 U	0.33 UJ	0.33 U	0.33 UJ	0.33 U	0.33 U	0.33 U
2-Hexanone	--	38	3.8	--	--	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Acetone	--	1400	1400	--	--	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Benzene	5	0.46	0.46	--	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromochloromethane	--	83	8.3	--	--	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U
Bromodichloromethane	80	0.13	0.13	--	--	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U
Bromoform	80	3.3	3.3	--	--	0.54 UJ	0.54 U	0.54 U	0.54 UJ	0.54 U	0.54 U	0.54 UJ	0.54 U	0.54 UJ	0.54 U	0.54 UJ	0.54 U	0.54 U	0.54 U
Bromomethane	--	7.5	0.75	--	--	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
Carbon Disulfide	--	810	81	--	--	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U
Carbon Tetrachloride	5	0.46	0.46	--	--	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
Chlorobenzene	100	78	7.8	--	--	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Chlorodibromomethane	80	0.87	0.87	--	--	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U
Chloroethane	--	21000	2100	--	--	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U
Chloroform	80	0.22	0.22	--	--	0.33 U	0.33 U	0.33 U	0.44 J	0.35 J	0.37 J	0.51 J	0.5 J	0.54 J	0.34 J	0.33 U			
Chloromethane	--	190	19	--	--	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
cis-1,2-Dichloroethene	70	3.6	3.6	--	--	0.24 J	0.22 U	0.31 J	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
cis-1,3-Dichloropropene	--	--	--	--	--	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
Cyclohexane	--	13000	1300	--	--	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U
Dichlorodifluoromethane	--	200	20	--	--	0.31 U	0.31 U	0.31 UJ	0.31 U	0.31 U	0.31 UJ	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U
Ethylbenzene	700	1.5	1.5	--	--	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Isopropylbenzene (Cumene)	--	450	45	--	--	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U
M,P-Xylene	10000	--	--	--	--	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Methyl Acetate	--	20000	2000	--	--	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U
Methyl Ethyl Ketone (2-Butanone)	--	5600	560	--	--	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	6300	630	--	--	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
Methyl tert-butyl ether	--	14	14	--	--	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.5 J	0.49 J	0.5 J	0.3 J	0.28 J			
Methylcyclohexane	--	--	--	--	--	0.71 U	0.71 U	0.71 U	0.71 U	0.71 U	0.71 U	0.71 U	0.71 U	0.71 U	0.71 U	0.71 U	0.71 U	0.71 U	0.71 U
Methylene Chloride	5	11	11	--	--	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U
O-Xylene (1,2-Dimethylbenzene)	10000	190	19	--	--	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Styrene	100	1200	120	--	--	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Tetrachloroethylene (PCE)	5	11	4.1	--	--	0.25 U	0.25 U	0.25 U	2	1.6	2.1	7.1	6.2	6.5	7.3	7.1			
Toluene	1000	1100	110	--	--	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
trans-1,2-Dichloroethene	100	68	6.8	--	--	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
trans-1,3-Dichloropropene	--	--	--	--	--	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
Trichloroethylene (TCE)	5	0.49	0.28	--	--	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U
Trichlorofluoromethane	--	5200	520	--	--	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U
Vinyl Chloride	2	0.019	0.019	--	--	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
DISSOLVED METALS - Method 6010D / 6020B																			
Cobalt	--	6	0.6	--	--	12.6 J	13.1	13.5	24.1 J	24.3	25	2.6 J	2.5 J	2.7 J	1.6 J	1.7 J			
Iron	--	14,000	1,400	--	--	80.8 U	18.4 U	18.4 U	80.8 U	20.5 J	18.4 U	82.7 J	80.8 U	82.8 J	18.4 U	18.4 U			
Manganese	--	430	43	--	--	270	293 J	286	38.9	37.6	35.5	96.5 J	95.2 J	80.2	194	132			
TOTAL METALS - Method 6020B																			
Cobalt	--	6	0.6	5.8 J	2 U	15.8	14	15	24	25.3	25.2	2.9 J	2.7 J	4.4	3 J	10.7			
Iron	--																		

Table 2
Historical Summary of Groundwater Quality Data
Post-Remedial Monitoring Report - October 2023 Event
Army Creek Landfill, New Castle, Delaware

Parameter	RSL ¹	BW-1																											
		6/94	10/94	1/95	3/95	6/95	10/95	1/96	3/96	6/96	9/96	12/96	3/97	6/97	9/97	12/97	3/98	6/98	10/98	12/98	3/99	6/99	9/99	12/99	3/00	7/00	10/00	12/00	
Non-Halogenated VOCs (µg/L)																													
Benzene	0.46	0.5 U	0.5 U	0.7	0.7	1.0 B	1.4 B	1.0	0.5	0.5 U	0.5 U	0.2 J	0.2 J	0.2 J	0.8	0.3 J	0.8 J	1.3	0.8	0.7	0.8	1.0 B	1.0	4.3	2.8	8.2	14.0	68	
Toluene	110	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Ethylbenzene	1.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Xylene (total)	19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2-Butanone	560	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Acetone	1800	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Carbon Disulfide	81	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Cyclohexane	1300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Isopropylbenzene	45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Methy-tert-butyl ether	14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Methylcyclohexane	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
4-Methyl-2-pentanone	630	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Halogenated VOCs (µg/L)																													
Bromoform	3.3	--	--	--	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	
Bromodichloromethane	0.13	--	--	--	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	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	0.46	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	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	0.5 U	
Chlorobenzene	7.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Chloroform	0.22	--	--	--	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	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	0.87	--	--	--	1 U	1 U	0.11 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2-Dichloroethane	0.17	0.5 U	0.5 U	0.7	0.7	0.7	0.6	0.5 J	0.5 J	0.4 J	0.3 J	0.2 J	0.5 U	0.5 U	0.7	0.3 J	0.5 U	0.5 J	0.6	1.0	1.8	2.1	2.3	5.0	4.8	3.9	3.4	5.4	
1,1-Dichloroethane	2.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
cis-1,2-Dichloroethene	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
trans-1,2-Dichloroethene	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,1-Dichloroethene	28	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	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	0.2 J	0.5 U	0.5 U	
1,2-Dichloroethene (total)	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,2-Dichlorobenzene	30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,3-Dichlorobenzene	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,4-Dichlorobenzene	0.48	--	0.5 U	0.1 J	0.1 JB	0.1 J	0.4 J	0.5	0.4 J	0.4 J	0.4 J	0.3 J	0.4 J	0.6	1.2	1.6	1.6	2.0	1.1	0.9	1.1	1.0	1.2	3.8	3.7	2.0	3.4	4.9	
Chloroethane	2100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Tetrachloroethene	4.1	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	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	0.2 J	0.3 J	0.5 U	0.5 U
1,1,1-Trichloroethane	800	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	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	0.5 U	
Trichloroethene	0.28	0.5 U	0.5 U	0.2 J	0.3 J	0.2 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	0.5 U	0.1 J	0.1 J	0.5 U	0.5 U	0.5 U	0.2 J	0.7	0.7	0.3 J	0.3 J	0.6	
Vinyl Chloride	0.019	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	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	0.2 J	0.3 J	0.5 J	
1,2,4-Trichlorobenzene	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
cis-1,3-Dichloropropene	0.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Methylene Chloride	11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Trichlorofluoromethane	520	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Semi-Volatiles (µg/L)																													
Bis(2-chloroethyl)Ether	0.014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	23.47 D	23 D	46 U
1,4-Dioxane	0.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	5.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,2'-oxybis(1-Chloropropane)	0.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetophenone	190	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Caprolactam	990	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diethylphthalate	1500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	0.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenol	580	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Inorganics (mg/L)																													
Total Manganese	0.043	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Iron	1.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Manganese	0.043	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Iron	1.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biological Oxygen Demand (mg/L)																													
Biological Oxygen Demand	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Field Parameters																													
Temperature (Degrees Celsius)	--	13.9	13.5	12.3	13.4	13.8	13.3	12.0	12.8	13.6	13.0	13.2	12.2	13.1	11.0	12.9	13.4	14.1	13.5	13.4	13.4	13.6	13.5	13.3	14.2	13.8	14.0	13.6	
Conductivity (µs/cm)	--	120	115	148	154	139	160	190	168	167	178	144	118	172	235	179	218	240	231	185	197	224	178	190	290	211	254	38	
pH (standard units)	--	6.12	5.71	7.94	6.37	5.99	5.93	6.66	6.05	7.49	6.24	6.27	5.80	5.98	5.97	6.24	6.10	6.28	6.02	6.26	6.21	6.21	6.21	7.63	6.11	6.23	7.65	6.09	
Dissolved Oxygen (mg/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.30	0.22	
ORP (mV)	--	-118	88	96	140	119	72	110	84	8	107	--	-91	82	--	-44	50	--	-291	6	146.1	187.9	33.6	286.4	86	124.3	129.2	107	
Water-Level																													

Table 2
Historical Summary of Groundwater Quality Data
Post-Remedial Monitoring Report - October 2023 Event
Army Creek Landfill, New Castle, Delaware

Parameter	RSL ¹	BW-1																											
		4/01	7/01	10/01	1/02	4/02	7/02	10/02	1/03	4/03	7/03	10/03	1/04	4/04	7/04	10/04	1/05	4/05	7/05	10/05	1/06	4/06	7/06	10/06	1/07	4/07	10/07	4/08	
Non-Halogenated VOCs (µg/L)																													
Benzene	0.46	12	2	9.2	5.4	2.4	4.4	3.1	2.7	2 J	2.8 B	4.6	4.6	3.7	6.2	7.6	12	20	24	4 J	1.9 J	1.2	0.47 J	0.25 J	0.22 J	0.23 J	0.3 J	0.84 J	
Toluene	110	--	0.5 U	--	0.5 U	--	--	--	--	5 U	0.5 U	--	0.5 U	--	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Ethylbenzene	1.50	--	--	--	0.1 J	--	--	--	--	5 U	0.078 J	--	0.7	--	0.5 U	0.12 J	4 J	13	15	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Xylene (total)	19	--	--	--	1 U	--	--	--	--	5 U	0.17 J	--	1 U	--	1 U	0.5 U	5 U	5 U	5 U	5 U	10 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	
2-Butanone	560	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	10 U	10 R	10 R	10 R	10 U	10 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Acetone	1800	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	20 R	20 R	20 R	20 R	20 R	10 U	5 U	5 U	5 U	5 U	5 U	4 J	5 U	
Carbon Disulfide	81	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U	5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Cyclohexane	1300	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U	--	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Isopropylbenzene	45	--	--	--	--	--	--	--	--	--	--	--	--	--	1.5	--	--	--	--	--	10 U	0.32 J	1 U	1 U	1 U	1 U	1 U	1 U	
Methy-tert-butyl ether	14	--	--	--	--	--	--	--	--	--	--	--	--	--	1.1	--	--	--	--	--	10 U	0.68 J	0.75 J	0.37 J	1 U	1 U	0.2 J	0.34 J	
Methylcyclohexane	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U	--	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
4-Methyl-2-pentanone	630	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	10 U	10 U	10 U	10 U	10 U	10 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Halogenated VOCs (µg/L)																													
Bromoform	3.3	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	5 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.17 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Bromodichloromethane	0.13	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Carbon Tetrachloride	0.46	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Chlorobenzene	7.8	--	--	--	31	--	--	--	--	19	22	--	29	--	21 D	24 D	30	32	32	18	13	10	5.2	3.1	2.8	2.0	2.4	6.2	
Chloroform	0.22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Dibromochloromethane	0.87	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	0.5 U	1 U	0.5 U	1 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2-Dichloroethane	0.17	5.8	12 J	11 J	11	11	16	16	12	7	9.1	17	13	7	14	6.5	5 U	7	2 J	5 U	10 U	0.49 J	0.36 J	0.22 J	0.12 J	1 U	1 U	1 U	
1,1-Dichloroethane	2.8	--	--	--	1.6	--	--	--	--	0.7 J	1	--	1.7	--	1.4	1.2 L	2 J	3 J	3 J	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
cis-1,2-Dichloroethene	3.6	--	0.5 U	--	2.1	--	--	--	--	1 J	1.7	--	2.5	--	2.0	1.4	3 J	2 J	2 J	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
trans-1,2-Dichloroethene	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.22 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,1-Dichloroethene	28	0.5 U	0.1 B	0.2 J	0.1 J	0.1 J	0.5 U	0.1 J	0.5 U	5 U	0.5 U	0.1 J	0.1 J	0.5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2-Dichloroethene (total)	NP	--	--	--	2.2 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,2-Dichlorobenzene	30	--	--	--	1.7	--	--	--	--	5 U	1.2	--	1.9	--	1.2	1.2	--	--	--	--	10 U	0.67 J	0.4 J	1 U	1 U	0.12 J	0.17 J	0.26 J	
1,3-Dichlorobenzene	NP	--	--	--	0.5 U	--	--	--	--	0.3 J	0.63	--	0.9	--	0.7	0.79	--	--	--	--	10 U	0.28 J	0.22 J	1 U	1 U	1 U	1 U	1 U	
1,4-Dichlorobenzene	0.48	3.0	4.8	4.9	3.8	4.0	3.9	4.9	3.2	5 U	2.3	3.7	3.3	1.8	2	2.3	--	--	--	--	1.1 J	1.0	0.59 J	0.27 J	0.25 J	0.17 J	0.36 J	1.1	
Chloroethane	2100	--	--	--	0.8	--	--	--	--	5 U	0.85	--	0.9	--	1	0.89	5 U	1 J	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Tetrachloroethene	4.1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.13 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,1,1-Trichloroethane	800	0.5 U	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Trichloroethene	0.28	0.4 J	0.7	0.7	0.6	0.7	0.7	0.8	0.6	5 U	0.5 U	0.6	0.4 J	0.2 J	0.3 J	0.24 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Vinyl Chloride	0.019	0.2 J	0.3 J	0.3 J	0.3 J	0.3 J	0.2 J	0.3 J	0.3 J	5 U	0.19 J	0.4 J	0.3 J	0.2 J	0.3 J	0.18 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2,4-Trichlorobenzene	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.17 J	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
cis-1,3-Dichloropropene	0.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Methylene Chloride	11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Trichlorofluoromethane	520	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.26 J	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Semi-Volatiles (µg/L)																													
Bis(2-chloroethyl)Ether	0.014	32	22	37	28	21	40	31	30 D	31	60 D	--	--	--	--	31	43	58	77	17	15	11	5.1	3.8 J	4.4 J	2.9 J	3.7 J	5.3	
1,4-Dioxane	0.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Bis(2-ethylhexyl)phthalate	5.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5.1 U	4.6 J	5 U	5.1 UL	5 U	5 U	5 U	5 U	5 UL	
2,2'-oxybis(1-Chloropropane)	0.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5.1 U	5 U	5.1 UL	5 U	5 U	5 U	5 U	5 U	5 U	
2,4-Dimethylphenol	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5.1 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
2-Methylnaphthalene	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5.1 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
2-Methylphenol	93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5.1 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
4-Methylphenol	37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5.1 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Acetophenone	190	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5.1 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Caprolactam	990	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5.1 UL	5 U	5 U	5.1 UL	11 L	5 U	5 U	5 U	2.4 J	5.1 UL
Diethylphthalate	1500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5.1 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.1 UL	
N-Nitrosodiphenylamine	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5.1 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Naphthalene	0.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5.1 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Phenol	580	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5.1 J	5 U	5.1 UL	5 U	5 U	5 U	5 U	5 U	5 U	
Inorganics (mg/L)																													
Total Manganese	0.043	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Total Iron	1.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Total Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved Manganese	0.043	--	--	--	--	--	--	--	--	--	1.30	--	--	--	--	1.03	2.12	2.67 J	2.65	2.53	2.58	2.3	1.98	1.65	1.33	1.17	1.15	1.76	
Dissolved Iron	1.4	0.270	0.264	--	--	--	--	--	--	0.609	0.357	--	--	--	--	1.01	0.775	1.09 J	4.83	20.3	16.6	19.4	18.1	18.3	20.5	18.5	16.8	24.5	
Dissolved Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Biological Oxygen Demand (mg/L)	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10.2	5.2	1 U	3.2	2 U	2 U	2 U	--	--	--	--		
Field Parameters																													
Temperature (Degrees Celsius)	--	13.7	13.6	--	13.8	13.8	14.8	15.0	13.6	14.42	15.0	14.5	13.7	13.71	14.63	13.65	13.26	13.35	13.88										

Table 2
Historical Summary of Groundwater Quality Data
Post-Remedial Monitoring Report - October 2023 Event
Army Creek Landfill, New Castle, Delaware

Parameter	RSL ¹	BW-1																			
		10/08	4/09	10/09	4/10	10/10	4/11	10/11	4/12	10/12	4/13	10/13	10/14	10/15	3/16	10/16	10/17	10/18	10/19	11/20	10/21
Non-Halogenated VOCs (µg/L)																					
Benzene	0.46	0.89 J	0.61 J	0.59 J	0.5 J	0.22 J	0.26 J	0.16 J	0.17 J	0.16 J	1 U	0.13 J	0.5 U	0.14 J	--	0.5 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U
Toluene	110	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.38 U	0.38 U	0.38 U
Ethylbenzene	1.50	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.3 U	0.3 U	0.3 U	
Xylene (total)	19	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	1.5 U	3 U	--	0.5 U	0.5 U	0.5 U	0.66 U	0.66 U	0.66 U
2-Butanone	560	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	50 UJ	5 U	--	10 U	10 U	10 U	1.9 U	1.9 U	1.9 U
Acetone	1800	5 U	5 UJ	2.9 U	6.1 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	3.5 J	--	10 U	2.6 J	10 U	4.4 U	4.4 U	4.4 U
Carbon Disulfide	81	0.35 J	1 U	1 U	1 U	0.28 J	0.24 J	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.82 U	0.82 U	0.82 U
Cyclohexane	1300	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	0.5 U	0.5 U	0.5 U	0.32 U	0.32 U	0.32 U
Isopropylbenzene	45	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	0.5 U	0.5 U	0.5 U	0.34 U	0.34 U	0.34 U
Methy-tert-butyl ether	14	0.47 J	0.41 J	0.77 J	0.77 J	0.83 J	1	1.2	0.76 J	0.64 J	0.69 J	0.79 J	0.95	0.77 J	--	0.46 J	0.5 U	0.5 U	0.47 U	0.47 U	0.22 U
Methylcyclohexane	NP	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	5 U	5 U	5 U	0.26 U	0.71 U	0.71 U
4-Methyl-2-pentanone	630	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	--	10 U	10 U	10 U	1.3 U	1.3 U	1.3 U
Halogenated VOCs (µg/L)																					
Bromoform	3.3	1 U	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.54 U	0.54 U	0.54 U
Bromodichloromethane	0.13	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.31 J	1 U	--	0.5 U	0.5 U	0.5 U	0.34 U	0.34 U	0.34 U
Carbon Tetrachloride	0.46	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.21 U	0.21 U	0.21 U
Chlorobenzene	7.8	6.8	5.8	8.6	6.8	3.4	4.2	2.7	3.6	3.8	3.3	4.6	6.4	5.9	--	6.4	6.6	6.1	9.4	8.5	6.6
Chloroform	0.22	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.33 U	0.33 U	0.33 U
Dibromochloromethane	0.87	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.28 U	0.28 U	0.28 U
1,2-Dichloroethane	0.17	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.43 U	0.43 U	0.43 U
1,1-Dichloroethane	2.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.26 U	0.26 U	0.26 U
cis-1,2-Dichloroethane	3.6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.22 U	0.22 U	0.22 U
trans-1,2-Dichloroethane	36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.24 U	0.24 U	0.24 U
1,1-Dichloroethene	28	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.26 U	0.26 U	0.26 U
1,2-Dichloroethene (total)	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	30	0.26 J	0.22 J	0.37 J	0.25 J	1 U	0.15 J	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.43 U	0.21 U	0.21 U
1,3-Dichlorobenzene	NP	1 U	1 U	0.13 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.34 U	0.34 U	0.34 U
1,4-Dichlorobenzene	0.48	1.1	1.4	1.9	1.7	0.95 J	0.96 J	0.76 J	0.83 J	0.87 J	0.69 J	1.1	1.7	1.4	--	0.5 U	1.7	1.5	2.1	0.33 U	1.4
Chloroethane	2100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.32 U	0.32 U	0.32 U
Tetrachloroethene	4.1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.31 J	1 U	--	0.5 U	0.5 U	0.5 U	0.25 U	0.25 U	0.25 U
1,1,1-Trichloroethane	800	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.24 U	0.24 U	0.24 U
Trichloroethene	0.28	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.31 U	0.31 U	0.31 U
Vinyl Chloride	0.019	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.17 U	0.17 U	0.17 U
1,2,4-Trichlorobenzene	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 UJ	1 U	--	0.5 U	0.5 U	0.5 U	0.37 U	0.37 U	0.37 U
cis-1,3-Dichloropropene	0.47	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.22 U	0.22 U	0.22 U
Methylene Chloride	11	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.32 U	0.32 U	0.32 U
Trichlorofluoromethane	520	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	--	0.5 U	0.5 U	0.5 U	0.32 U	0.32 U	0.32 U
Semi-Volatiles (µg/L)																					
Bis(2-chloroethyl)Ether	0.014	8.7	4.4 J	4.8 J	2.4 J	5 U	2.9 J	1.6 J	1.8 J	1.4 J	5 U	5 U	5 U	0.54	--	0.40	0.27	0.3 J	0.4	0.43 J	0.18
1,4-Dioxane	0.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.3	1.8 J	2.4	5.1	5.2	4.0
Bis(2-ethylhexyl)phthalate	5.6	8.3 J	5.3 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	--	0.61 J	4.8 U	5 U	5 U	4.6 U	2 U
2,2'-oxybis(1-Chloropropane)	0.71	5 U	5.3 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	--	10 U	9.5 U	10 U	0.5 U	0.46 U	0.49 U
2,4-Dimethylphenol	36	5 U	5.3 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	4.8 U	5 U	3 U	2.8 U	2.9 U
2-Methylnaphthalene	3.6	5 U	5.3 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	4.8 U	5 U	0.1 U	0.093 U	0.098 U
2-Methylphenol	93	5 U	5.3 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	--	10 U	9.5 U	10 U	0.5 UJ	0.46 U	0.49 U
4-Methylphenol	37	5 U	5.3 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	--	10 U	9.5 U	10 U	0.5 UJ	0.46 U	0.49 U
Acetophenone	190	5 U	5.3 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	--	10 U	9.5 U	10 U	4 UJ	3.7 U	0.98 U
Caprolactam	990	5 UJ	5.3 R	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2 J	2.5 J	1.5 J	5 U	--	10 U	9.5 U	10 U	5 U	4.6 U	2.9 U
Diethylphthalate	1500	5 U	5.3 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	4.8 U	5 U	2 U	1.9 U	2 U
N-Nitrosodiphenylamine	12	5 U	5.3 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	4.8 U	5 U	0.7 U	0.65 U	0.49 U
Naphthalene	0.12	5 U	5.3 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	4.8 U	5 U	0.1 U	0.093 U	0.098 U
Phenol	580	5 U	5.3 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	--	10 U	9.5 U	10 U	0.5 U	0.46 U	0.49 U
Inorganics (mg/L)																					
Total Manganese	0.043	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.19
Total Iron	1.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12.9
Total Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0289 J
Dissolved Manganese	0.043	1.85	2.12	2.05	2.19	2.19	1.91	1.86	1.59	1.78	1.87	1.91	1.93 J	2.32	1.9	2.57	3.52	3.55	3.47	3.38	3.19
Dissolved Iron	1.4	20.9	22.1	20.2	21.0	20.1	15.9	14.4	12.4	14.5	15.0	15.4	14.3	11.7	11.3	12.9	14.2	12.5	11.8	13.1	12.5
Dissolved Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	0.0305 J	0.026	0.0274 J	0.029 J	0.0294 J	0.0262	0.0301	0.0284 J
Biological Oxygen Demand (mg/L)																					
Field Parameters																					
Temperature (Degrees Celsius)	--	12.3	12.6	12.8	12.4	13.4	16.2	14.9	16.1	14.0	15.8	13.4	13.3	13.4	10.0	14.1	15.0	12.3	15.14	15.1	16.0
Conductivity (µs/cm)	--	328	468	514	534	293	382	346	373	394	402	444	419	523	426	534	503	452	560	524	522
pH (standard units)	--	7.15	6.39	6.70	6.49	6.40	6.50	6.62	6.21	6.03	6.04	5.89	6.76	6.80	6.35	6.54	6.71	6.72	6.77	6.55	6.59
Dissolved Oxygen (mg/L)	--	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	1.84	1.68
ORP (mV)	--	-58	-59	-63	-51	-72	-66	-84	-81	-58	53	-69	-100	-45	-47	-63	-47	-34	143.3	-55.2	-49.1
Water-Level Elevation (ft, MSL)	--	-15.85	-10.66	-15.27	-7.63	-10.27	-8.44	-13.43	-5.99	-6.79	-7.97	-9.19	-8.69	-12.07	-9.13	-16.45	-14.80	-11.43	-6.17	-5.05	-10.75

Table 2
Historical Summary of Groundwater Quality Data
Post-Remedial Monitoring Report - October 2023 Event
Army Creek Landfill, New Castle, Delaware

Parameter	RSL ¹	BW-2																											
		6/94	10/94	1/95	3/95	6/95	10/95	1/96	3/96	6/96	9/96	12/96	3/97	6/97	9/97	12/97	3/98	6/98	10/98	12/98	3/99	6/99	11/99	12/99	3/00	7/00	10/00	12/00	
Non-Halogenated VOCs (µg/L)																													
Benzene	0.46	0.5 U	0.5 U	0.3 J	0.2 J	0.5 B	0.2 JB	0.4 J	0.6	0.5 U	0.5 U	0.6	0.7	1.1	0.9	2.8	1.4	1.9	1.3	2.2	3.8	3.0	0.9	4.3	1.1	1.4	4.9	2.4	
Toluene	110	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Ethylbenzene	150	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Xylene (total)	19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2-Butanone	560	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Acetone	1800	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Carbon Disulfide	81	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Cyclohexane	1300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Isopropylbenzene	45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Methy-tert-butyl ether	14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Methylcyclohexane	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
4-Methyl-2-pentanone	630	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Halogenated VOCs (µg/L)																													
Bromoform	3.3	--	--	--	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	
Bromodichloromethane	0.13	--	--	--	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	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	0.46	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	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	7.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Chloroform	0.22	--	--	--	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	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	0.87	--	--	--	1 U	1 U	0.1 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2-Dichloroethane	0.17	0.5 U	0.7	0.9	0.5 U	0.9	0.8	0.5 U	0.6	0.8	0.9	0.8	0.8	1	0.4 J	1	3.2	2.4	3.7	3.2	4.7	5.3	4.9	5	3.1	2.6	1.8	2.2	
1,1-Dichloroethane	2.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
cis-1,2-Dichloroethene	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
trans-1,2-Dichloroethene	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,1-Dichloroethene	28	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	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-Dichloroethene (total)	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,2-Dichlorobenzene	30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,3-Dichlorobenzene	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,4-Dichlorobenzene	0.48	--	0.5 U	0.1 J	0.2 JB	0.2 J	0.4 J	0.6	0.6	1.0	0.9	0.9	1.0	1.3	0.9	1.4	1.7	2.1	2.1	2.1	2.7	2.4	3.1	3.8	1.7	2.5	2.6	2.4	
Chloroethane	2100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Tetrachloroethene	4.1	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	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		
1,1,1-Trichloroethane	800	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	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	0.28	0.5 U	0.5 U	0.5 U	0.2 J	0.1 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 J	0.5 U	0.5 U	0.4 J	0.3 J	0.3 J	0.3 J	0.4 J	0.5	0.6	0.7	0.3 J	0.3 J	0.3 J	0.3 J	
Vinyl Chloride	0.019	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	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	0.5 U		
1,2,4-Trichlorobenzene	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
cis-1,3-Dichloropropene	0.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Methylene Chloride	11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Trichlorofluoromethane	520	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Semi-Volatiles (µg/L)																													
Bis(2-chloroethyl)Ether	0.014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	30.82 D	37 D	47 D	
Bis(2-ethylhexyl)phthalate	5.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2,2'-oxybis(1-Chloropropane)	0.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2,4-Dimethylphenol	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2-Methylnaphthalene	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2-Methylphenol	93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
4-Methylphenol	37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Acetophenone	190	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Caprolactam	990	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Diethylphthalate	1500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
N-Nitrosodiphenylamine	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Naphthalene	0.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Phenol	580	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Inorganics (mg/L)																													
Total Manganese	0.043	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Total Iron	1.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Total Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved Manganese	0.043	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved Iron	1.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Biological Oxygen Demand (mg/L)																													
Biological Oxygen Demand	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Field Parameters																													
Temperature (Degrees Celsius)	--	14.5	13.9	13.3	14.0	14.6	13.8	12.5	13.7	14.2	13.4	13.4	12.6	13.4	12.0	13.2	13.5	14.5	13.6	13.4	13.4	13.8	13.2	13.3	14.0	13.5	13.8	14.1	
Conductivity (µs/cm)	--	127	126	163	169	141	150	171	198	203	189	229	181	245	228	183	173	219	232	218	226	277	255	272	410	271	370	45	
pH (standard units)	--	6.07	5.82	6.66	6.33	6.28	6.55	6.73	6.43	6.91	5.90	6.26	6.55	6.18	5.89	6.17	6.19	6.19	6.12	6.08	6.03	6.08	6.37	8.02	6.10	6.20	7.81	6.06	
Dissolved Oxygen (mg/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.41
ORP (mV)	--	-76	58	61	140	70	33	146	81	49	32	--	-109	-75	--	-39	24	--	-333	3	81.3	64	116.7	178.3	41	95.4	54.4	79	
Water-Level Elevation (ft, MSL)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-18.98	

Table 2
 Historical Summary of Groundwater Quality Data
 Post-Remedial Monitoring Report - October 2023 Event
 Army Creek Landfill, New Castle, Delaware

Parameter	RSL ¹	BW-2																											
		4/01	7/01	10/01	1/02	4/02	7/02	10/02	1/03	4/03	7/03	10/03	1/04	4/04	7/04	10/04	1/05	4/05	7/05	10/05	1/06	4/06	7/06	10/06	1/07	4/07	10/07	10/08	
Non-Halogenated VOCs (µg/L)																													
Benzene	0.46	2.1	2.2	3.3	5.2	3.5	7.1	6	5.7	7	18	6.3	2.8	2.8	4.3	2.9	1 J	0.8 J	0.5 J	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	0.28 J	
Toluene	110	--	0.5 U	--	0.5 U	--	--	--	--	5 U	0.5 U	--	0.5 U	--	0.5 U	1.3 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	0.36 J	
Ethylbenzene	150	--	--	--	0.5 U	--	--	--	--	--	--	--	--	--	0.1 J	1.3 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Xylene (total)	19	--	--	--	1 U	--	--	--	--	5 U	0.24 J	--	1 U	--	1 U	1.3 U	5 U	5 U	5 U	5 U	10 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	
2-Butanone	560	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13 U	10 U	10 R	10 R	10 U	10 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Acetone	1800	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12.5 R	20 U	20 R	20 R	20 R	10 U	4.3 J	5 U	5 U	5 U	5 U	5 U	5 U	
Carbon Disulfide	81	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.3 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	0.27 J	0.33 J	1 U	1 U	0.5 J	
Cyclohexane	1300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.3 UJ	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Isopropylbenzene	45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.32 J	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Methy-tert-butyl ether	14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.74 J	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	0.25 J	0.44 J	
Methylcyclohexane	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.3 U	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
4-Methyl-2-pentanone	630	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13 U	10 U	10 U	10 U	10 U	10 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Halogenated VOCs (µg/L)																													
Bromoform	3.3	2 U	2 U	2 U	0.5 U	2 U	2 U	2 U	2 U	2 U	5 UJ	0.5 U	2 U	0.5 U	0.5 U	1.3 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Bromodichloromethane	0.13	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	5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.3 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Carbon Tetrachloride	0.46	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	5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.3 U	5 UJ	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Chlorobenzene	7.8	--	--	--	31	--	--	--	--	--	28	30 D	--	22	--	21 D	24	17	11	9	3 J	2 J	1.6	1.4	1.1	1.2	1.3	1.7	2.5
Chloroform	0.22	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	5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.3 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Dibromochloromethane	0.87	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	0.5 U	1 U	0.5 U	1.3 U	5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2-Dichloroethane	0.17	2.8	2.2	1.6	2	1.4	1.6	1.3	1.3	5 U	1.3	1.3	0.9	1.1	1.2	1.3	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,1-Dichloroethane	2.8	--	--	--	1	--	--	--	--	5 U	0.92	--	0.6	--	0.7	0.93 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
cis-1,2-Dichloroethene	3.6	--	1 U	--	0.6	--	--	--	--	0.5 J	0.82	--	0.5 U	--	0.6	0.82 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
trans-1,2-Dichloroethene	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.27 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,1-Dichloroethene	28	0.1 J	0.1 B	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2-Dichloroethene (total)	NP	--	--	--	0.7 J	--	--	--	--	--	--	--	--	0.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
1,2-Dichlorobenzene	30	--	--	--	2.5	--	--	--	--	1 J	1.8	--	1.3	--	1.5	1.6	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,3-Dichlorobenzene	NP	--	--	--	0.9	--	--	--	--	0.6 J	0.92	0.9	0.5	--	0.6	0.75 J	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,4-Dichlorobenzene	0.48	2.9	3.2	2.8	3.0	2.8	3.1	2.4	2.5	5 U	3.2	2.5	1.9	1.8	2.1	2.5	--	--	--	--	10 U	0.28 J	0.34 J	0.27 J	0.3 J	0.32 J	0.43 J	0.81 J	
Chloroethane	2100	--	--	--	0.6	--	--	--	--	5 U	1.5	--	0.3 J	--	0.4 J	0.37 J	5 U	5 U	5 U	5 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Tetrachloroethene	4.1	0.3 J	0.3 J	0.1 J	0.2 J	0.2 J	0.2 J	0.2 J	0.2 J	5 U	0.5 U	0.2 J	0.2 J	0.2 J	0.2 J	0.4 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,1,1-Trichloroethane	800	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.3 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Trichloroethene	0.28	0.45	0.3 J	0.2 J	0.2 J	0.2 J	0.2 J	0.2 J	0.2 J	5 U	0.5 U	0.2 J	0.2 J	0.2 J	0.2 J	0.35 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Vinyl Chloride	0.019	0.1 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.1 J	5 U	0.17 J	0.5 U	0.5 U	0.5 U	0.5 U	1.3 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2,4-Trichlorobenzene	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.3 U	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
cis-1,3-Dichloropropene	0.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.3 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Methylene Chloride	11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.6 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Trichlorofluoromethane	520	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.3 U	--	--	--	--	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Semi-Volatiles (µg/L)																													
Bis(2-chloroethyl)Ether	0.014	36	25	43	25	30	34	38	54 D	43	42 D	--	--	--	--	25	24	20	21	7.4	5.6	4.9 J	4.8 J	3.3 J	3.6 J	3.1 J	2.3 J	1.7 J	
Bis(2-ethylhexyl)phthalate	5.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 UJ	5 U	5 U	5 U	5 U	5 U	5.3 U	
2,2'-oxybis(1-Chloropropane)	0.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 UJ	5 U	5 U	5 U	5 U	5 U	5.3 U	
2,4-Dimethylphenol	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	
2-Methylnaphthalene	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	
2-Methylphenol	93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	
4-Methylphenol	37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	
Acetophenone	190	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	
Caprolactam	990	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 UJ	5 U	5 U	5 UJ	5 UJ	5 U	5 U	5 U	5 U	5.3 UJ	
Diethylphthalate	1500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	
N-Nitrosodiphenylamine	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	
Naphthalene	0.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	
Phenol	580	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 UJ	5 U	5 U	5 U	5 U	5 U	5.3 U	
Inorganics (mg/L)																													
Total Manganese	0.043	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Total Iron	1.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Total Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved Manganese	0.043	--	--	--	--	--	--	--	--	--	1.21	--	--	--	--	0.969	0.972	1.02 J	1.2	1.17	1.13	1.04	1.19	1.34	1.40	1.47	1.43	1.82	
Dissolved Iron	1.4	0.779	1.05	--	--	--	--	--	--	1.10	2.40	--	--	--	--	1.21	2.33	1.87 J	2.1	1.81	1.87	1.60	2.05	1.34	1.79	1.07	0.428	1.62	
Dissolved Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Biological Oxygen Demand (mg/L)	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Field Parameters																													
Temperature (Degrees Celsius)	--	13.7	--	--	13.6	14.1	14.3	15.1	13.1	13.59	14.34	14.2	13.2	13.65	14.4	13.75	12.90	13.28	13.84	15.0	14.5	16.4	18.0	16.0	14.2	14.6	17.0	14.7	
Conductivity (µs/cm)	--	290	--	--	376	361	341	312	414	316	361.4	424	168.0	324	105	389													

Table 2
Historical Summary of Groundwater Quality Data
Post-Remedial Monitoring Report - October 2023 Event
Army Creek Landfill, New Castle, Delaware

Parameter	RSL ¹	BW-2														
		4/15	10/15	3/16	4/16	10/16	4/17	10/17	4/18	10/18	4/19	10/19	6/20	11/20	4/21	10/21
Non-Halogenated VOCs (µg/L)																
Benzene	0.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	110	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	1.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene (total)	19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Butanone	560	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetone	1800	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Disulfide	81	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cyclohexane	1300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropylbenzene	45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methy-tert-butyl ether	14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylcyclohexane	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone	630	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Halogenated VOCs (µg/L)																
Bromoform	3.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	0.13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Tetrachloride	0.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorobenzene	7.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloroform	0.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibromochloromethane	0.87	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	0.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	2.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethene (total)	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	0.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloroethane	2100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	4.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane	800	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene	0.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	0.019	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	0.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene Chloride	11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane	520	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Semi-Volatiles (µg/L)																
Bis(2-chloroethyl)Ether	0.014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	5.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,2'-oxybis (1-Chloropropane)	0.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetophenone	190	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Caprolactam	990	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diethylphthalate	1500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	0.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenol	580	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Inorganics (mg/L)																
Total Manganese	0.043	--	--	--	--	--	--	--	--	--	--	--	--	--	2.01	2.14
Total Iron	1.4	--	--	--	--	--	--	--	--	--	--	--	--	--	12.3	2.21
Total Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0191 J	0.0243 J
Dissolved Manganese	0.043	1.45	1.36	1.40	1.20	1.45	1.57	1.58	1.62	1.41	1.60	1.69	1.54	2.35	1.75	2.09
Dissolved Iron	1.4	0.0243 J	1.65	4.0	2.94	3.92	3.92	3.87	4.10	1.85	3.67	2.90	1.60	3.39	11.4	0.179
Dissolved Cobalt	0.0006	0.0122 J	0.0149 J	0.017	0.0137 J	0.0164 J	0.0168 J	0.0169 J	0.0191 J	0.016 J	0.0185 J	0.0157	0.0119	0.03	0.0198	0.0235 J
Biological Oxygen Demand (mg/L)																
Biological Oxygen Demand	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Field Parameters																
Temperature (Degrees Celsius)	--	15.6	14.4	13.3	16.4	15.2	16.6	15.2	14.4	12.9	16.6	15.9	17.0	15.3	15.4	14.2
Conductivity (µs/cm)	--	386	378	325	336	392	401	325	370	334	271	371	430	424	388	434
pH (standard units)	--	6.67	6.88	6.46	6.59	6.46	6.45	6.64	6.40	6.80	6.64	6.10	6.16	6.60	6.42	6.63
Dissolved Oxygen (mg/L)	--	0.28	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	4.60	2.63	5.23	0.63	0.60
ORP (mV)	--	100	-7	-37	-32	-43	-60	-1	-10	19	-6	35.1	14.3	-6.50	29.6	89.0
Water-Level Elevation (ft, MSL)	--	-9.30	-11.65	-8.82	-8.71	-15.95	-10.58	-14.46	-7.92	-10.95	-4.03	-5.62	-3.01	-6.10	-3.67	-9.82

Table 2
Historical Summary of Groundwater Quality Data
Post-Remedial Monitoring Report - October 2023 Event
Army Creek Landfill, New Castle, Delaware

Parameter	RSL ¹	BW-3																															
		6/94	10/94	1/95	3/95	6/95	10/95	1/96	3/96	6/96	9/96	12/96	3/97	6/97	9/97	12/97	3/98	6/98	10/98	12/98	3/99	6/99	9/99	12/99	3/00	7/00	10/00	12/00	4/01	7/01	10/01		
Non-Halogenated VOCs (µg/L)																																	
Benzene	0.46	0.5 U	0.5 U	0.5 U	0.5 U	0.1 JB	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.6	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	0.7	0.3 J	0.5 U	1.5	1.2	0.3 J	0.6	0.1 J		
Toluene	110	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U	--		
Ethylbenzene	1.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Xylene (total)	19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
2-Butanone	560	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Acetone	1800	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Carbon Disulfide	81	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Cyclohexane	1300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Isopropylbenzene	45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Methy-tert-butyl ether	14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Methycyclohexane	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
4-Methyl-2-pentanone	630	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Halogenated VOCs (µg/L)																																	
Bromoform	3.3	--	--	--	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U		
Bromodichloromethane	0.13	--	--	--	0.5 U	0.5 U	0.005 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	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	0.5 U		
Carbon Tetrachloride	0.46	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	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	0.5 U	0.5 U	0.5 U	0.5 U		
Chlorobenzene	7.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Chloroform	0.22	--	--	--	9 J	0.06 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	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	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		
Dibromochloromethane	0.87	--	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U		
1,2-Dichloroethane	0.17	0.5 U	0.5 U	0.3 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 J	0.5 U	0.5 U	0.5 U	9.1	2.1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 J	0.5 U	0.3 J	0.5	0.1 J	
1,1-Dichloroethane	2.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
cis-1,2-Dichloroethane	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1 U	--		
trans-1,2-Dichloroethane	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
1,1-Dichloroethene	28	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	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	0.1 J	0.3 JB	0.5 U	0.5 U	0.5 U	0.2 B	0.5 U		
1,2-Dichloroethene (total)	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
1,2-Dichlorobenzene	30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
1,3-Dichlorobenzene	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
1,4-Dichlorobenzene	0.48	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	0.1 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	0.5 U	0.5 U	0.5 J	0.5 U	2.1	1.4	0.5 U	0.2 J	0.5 J	
Chloroethane	2100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Tetrachloroethene	4.1	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	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	0.1 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.1 J	0.1 J	0.2 J	
1,1,1-Trichloroethane	800	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	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	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
Trichloroethene	0.28	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	0.5 U	0.5 U	0.2 J	0.7	0.3 J	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	0.5 U	0.5 U	0.5 U	
Vinyl Chloride	0.019	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	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	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
1,2,4-Trichlorobenzene	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
cis-1,3-Dichloropropene	0.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Methylene Chloride	11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Chloromethane	11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Trichlorofluoromethane	520	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Semi-Volatiles (µg/L)																																	
Bis(2-chloroethyl)Ether	0.014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.135	3.3 D	3 D	2 J	5	1	
Bis(2-ethylhexyl)phthalate	5.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2,2'-oxybis(1-Chloropropane)	0.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2,4-Dimethylphenol	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2-Methylnaphthalene	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
2-Methylphenol	93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
4-Methylphenol	37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Acetophenone	190	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Caprolactam	990	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Diethylphthalate	1500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
N-Nitrosodiphenylamine	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Naphthalene	0.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Phenol	580	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Inorganics (mg/L)																																	
Total Manganese	0.043	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Total Iron	1.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Total Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved Manganese	0.043	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved Iron	1.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0263 B	0.011 U	--
Dissolved Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biological Oxygen Demand (mg/L)																																	
Field Parameters																																	
Temperature (Degrees Celsius)	--	14.0	13.3	13.4	13.7	13.4	13.4	13.0	13.0	12.7	13.0	12.9	13.0	11.0	13.2	13.1	14.6	13.2	13.2	13													

Table 2
Historical Summary of Groundwater Quality Data
Post-Remedial Monitoring Report - October 2023 Event
Army Creek Landfill, New Castle, Delaware

Parameter	RSL ¹	MW-40																											
		10/01	1/02	4/02	7/02	10/02	1/03	4/03	7/03	10/03	1/04	4/04	7/04	10/04	1/05	4/05	7/05	10/05	1/06	4/06	7/06	10/06	1/07	4/07	10/07	10/08	10/09	4/10	10/10
Non-Halogenated VOCs (µg/L)																													
Benzene	0.46	1 U	0.5 U	0.3 J	0.1 J	0.5 U	0.2 J	0.3 J	0.5 U	0.5 U	0.5 U	0.6	0.5	0.23 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	110	--	0.5 U	--	--	--	--	5 U	0.5 U	--	0.5 U	--	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	0.46 J	0.49 J	0.65 J	1 U	0.55 J	1 U	1 U	1 U
Ethylbenzene	1.50	--	0.5 U	--	--	--	--	5 U	0.5 U	--	0.5 U	--	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene (total)	19	--	1 U	--	--	--	--	5 U	0.075 J	--	1 U	--	1 U	0.5 U	5 U	5 U	5 U	5 U	10 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
2-Butanone	560	--	--	--	--	--	--	--	--	--	--	--	--	5 U	10 R	10 U	10 R	10 U	10 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	1800	--	--	--	--	--	--	--	--	--	--	--	--	5 UJ	20 R	20 U	20 R	20 R	10 U	5 U	5 U	4.1 J	3.6 U	5 U	6.5 J	5 U	5 U	5 U	8.8 U
Carbon Disulfide	81	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	0.24 J	0.32 J	1 U	1 U
Cyclohexane	1300	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	45	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methy-tert-butyl ether	14	--	--	--	--	--	--	--	--	--	--	--	--	3.7	--	--	--	--	2.3 J	1.7	0.98 J	0.98 J	0.45 J	0.52 J	0.53 J	1 U	1 U	1 U	1 U
Methylcyclohexane	NP	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4-Methyl-2-pentanone	630	--	--	--	--	--	--	--	--	--	--	--	--	5 U	10 U	10 U	10 U	10 U	10 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Halogenated VOCs (µg/L)																													
Bromoform	3.3	2 U	2 U	2 U	2 U	2 U	2 U	5 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.16 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	0.13	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	0.46	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	7.8	--	0.5 U	--	--	--	--	5 U	0.5 U	--	0.5 U	--	0.1 J	0.34 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	0.22	0.1 J	0.2 J	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.074 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.14 J	5 U	5 U	5 U	5 U	10 U	0.43 J	1 U	1 U	0.20 J	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	0.87	1 U	1 U	1 U	1 U	1 U	1 U	5 U	0.5 U	1 U	0.5 U	1 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.17	0.5 U	0.5 U	37	13	0.5 U	24	19	0.5 U	1.8	0.5 U	73	68 D	32 D	7	5 J	5 U	5 U	10 U	1 U	1 U	0.21 J	0.12 J	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	2.8	--	0.5 U	--	--	--	--	5 U	0.5 U	--	0.5 U	--	0.3 J	0.32 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethane	3.6	--	0.5 U	--	--	--	--	0.4 J	0.5 U	--	0.5 U	--	0.7	0.58	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethane	36	--	--	--	--	--	--	--	--	--	--	--	--	0.18 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	28	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	ND	--	0.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	30	--	0.5 U	--	--	--	--	5 U	0.5 U	--	0.5 U	--	0.5 U	0.13 J	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	ND	--	0.5 U	--	--	--	--	5 U	0.5 U	--	0.5 U	--	0.5 U	0.5 U	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	0.48	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.2 J	0.1 J	0.2 J	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	2100	--	0.5 U	--	--	--	--	5 U	0.5 U	--	0.5 U	--	0.5 U	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	4.1	0.6	0.6	0.6	0.4 J	0.6	0.6	0.7 J	0.82 B	1	1.1	0.6	0.5 J	0.78	0.8 J	1 J	1 J	1 J	10 U	0.31 J	0.60 J	0.69 J	0.72 J	0.70 J	0.59 J	0.31 J	0.45 J	0.61 J	0.28 J
1,1,1-Trichloroethane	800	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.21 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	0.28	0.5 U	0.5 U	1.1	0.4 J	0.5 U	0.7	1 J	0.5 U	0.3 J	0.1 J	2	1.9	1.7	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.23 J	0.35 J	0.24 J
Vinyl Chloride	0.019	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.1 J	0.1 J	0.16 J	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.4 J	0.53 J	1 U
1,2,4-Trichlorobenzene	0.4	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U	--	--	--	--	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	0.47	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene Chloride	11	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U	5 U	5 U	5 U	5 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichlorofluoromethane	520	--	--	--	--	--	--	--	--	--	--	--	--	1.6	--	--	--	--	1.2 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Semi-Volatiles (µg/L)																													
Bis(2-chloroethyl)Ether	0.014	0.024 U	0.024 U	0.97	1.1	0.041 J	0.7	0.8	0.2	--	--	--	--	2.5 J	0.26 B	0.14	0.083	0.019 U	0.67	0.46	0.33	0.24	0.043	0.018 U	5 U	5.3 U	5 U	5 U	5 U
Bis(2-ethylhexyl)phthalate	0.46	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	64	5 U	6.2	16 J	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	210 JD	5 U	5 U
2,2'-oxybis(1-Chloropropane)	5.6	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5 U	5 U	5 U
2,4-Dimethylphenol	0.71	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5 U	5 U	5 U
2-Methylnaphthalene	36	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5 U	5 U	5 U
2-Methylphenol	3.6	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5 U	5 U	5 U
4-Methylphenol	93	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5 U	5 U	5 U
Acetophenone	37	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5 U	5 U	5 U
Caprolactam	190	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5 U	5 U	1.7 J
Diethylphthalate	990	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5 U	5 U	5 U
Di-n-octyl phthalate	1500	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	60	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5 U	5 U	5 U
N-Nitrosodiphenylamine	12	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5 U	5 U	5 U
Naphthalene	0.12	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5 U	5 U	5 U
Phenol	580	--	--	--	--	--	--	--	--	--	--	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5.3 U	5 U	5 U	5 U
Inorganics (mg/L)																													
Total Manganese	0.043	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Iron	1.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Manganese	0.043	--	--	--	--	--	--	--	0.052	--	--	--	--	0.242	0.248	0.323	0.341	0.0947	0.0447	0.131	0.157	0.0726	0.0329	0.0287	0.0779	0.0036	0.177	0.107	0.0744
Dissolved Iron																													

Table 2
Historical Summary of Groundwater Quality Data
Post-Remedial Monitoring Report - October 2023 Event
Army Creek Landfill, New Castle, Delaware

Parameter	RSL ¹	MW-40																	
		4/11	10/11	4/12	10/12	4/13	10/15	3/16	10/16	10/17	10/18	10/19	11/20	4/21	10/21	4/22	10/22	4/23	10/23
Non-Halogenated VOCs (µg/L)																			
Benzene	0.46	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	110	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	1.50	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene (total)	19	3 U	3 U	3 U	3 U	3 U	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Butanone	560	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetone	1800	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Disulfide	81	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Cyclohexane	1300	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropylbenzene	45	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Methy-tert-butyl ether	14	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylcyclohexane	NP	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone	630	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Halogenated VOCs (µg/L)																			
Bromoform	3.3	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	0.13	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Tetrachloride	0.46	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorobenzene	7.8	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloroform	0.22	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloromethane	19	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibromochloromethane	0.87	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	0.17	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	2.8	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	3.6	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	36	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	28	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethene (total)	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	30	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	ND	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	0.48	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloroethane	2100	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	4.1	1.4	0.44 J	0.87 J	1.4	1.3	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane	800	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene	0.28	0.29 J	0.29 J	0.35 J	0.3 J	0.32 J	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	0.019	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	0.4	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	0.47	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene Chloride	11	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane	520	1 U	1 U	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Semi-Volatiles (µg/L)																			
Bis(2-chloroethyl)Ether	0.014	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	0.46	5 U	5 U	5 U	5 U	2.4 J	--	--	--	--	--	--	--	--	--	--	--	--	--
2,2'-oxybis(1-Chloropropane)	5.6	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	0.71	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	36	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	3.6	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	93	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetophenone	37	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Caprolactam	190	5 U	5 U	5 U	7.2	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Diethylphthalate	990	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Di-n-octyl phthalate	1500	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	12	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	0.12	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenol	580	5 U	5 U	5 U	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Inorganics (mg/L)																			
Total Manganese	0.043	--	--	--	--	--	--	--	--	--	--	--	--	0.0374	0.0309	--	--	0.0045	0.0052
Total Iron	1.4	--	--	--	--	--	--	--	--	--	--	--	--	1.47	0.138	--	--	0.23	0.084 J
Total Cobalt	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	0.002 U	0.0012 J	--	--	0.00027 J	0.00031 J
Dissolved Manganese	0.043	0.0526	0.0086 J	0.0411	0.0203	0.0319	0.0091 J	0.005 J	0.0054 J	0.0018 J	0.0168 J	0.0028	0.0023	--	0.0308	0.0113	0.0217	0.0026	0.003
Dissolved Iron	1.4	1.06	0.1 U	0.0407 J	0.0535 J	0.108	0.10 U	0.05 U	1.68	0.10 U	0.10 U	0.0538 J	0.20 U	--	0.015 U	0.20 U	0.159 J	0.013 U	0.024 U
Dissolved Cobalt	0.0006	--	--	--	--	--	0.05 U	0.005 U	0.05 U	0.05 U	0.05 U	0.001 U	0.00012 J	--	0.0013 J	0.00055 J	0.0019	0.00014 J	0.00015 J
Dissolved Lead	0.015	0.0099 J	0.01 U	0.005 J	0.0069 J	0.0114	--	--	--	--	--	--	--	--	--	--	--	--	--
Biological Oxygen Demand (mg/L)																			
Biological Oxygen Demand (mg/L)	NP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
General Chemistry - mg/L																			
Chloride	--	--	--	--	--	--	--	--	--	--	--	50.5	--	--	--	--	77.6	--	52
Field Parameters																			
Temperature (Degrees Celsius)	--	14.1	14.2	14.5	13.2	13.8	13.5	11.1	12.6	13.3	11.5	14.0	12.8	13.1	19.4	10.7	13.7	13.5	15.3
Conductivity (µs/cm)	--	306	284	295	275	274	244	232	283	240	221	299	294	262	296	329	280	332	272
pH (standard units)	--	6.03	6.07	5.65	5.55	5.43	6.35	5.62	5.43	5.71	5.70	5.88	5.57	5.52	5.83	5.37	5.55	5.62	5.54
Dissolved Oxygen (mg/L)	--	1.51	0.00	0.00	2.11	0.06	0.00	1.50	2.22	2.65	2.25	7.42	3.01	10.98	2.51	2.33	2.33	1.96	3.02
ORP (mV)	--	11	82	50	102	202	101	179	283	292	277	191.8	170.2	163.2	192.4	169.2	198.1	119.2	123.1
Water-Level Elevation (ft, MSL)	--	-5.25	-9.39	-3.91	-4.97	-5.48	-8.75	-6.21	-12.75	-11.45	-7.85	-2.87	-3.34	-1.34	-6.81	-4.46	-5.91	-7.64	-6.44

Table 3
Western Lobe Study Area Wells Groundwater Analytical Summary – 2019-2021
Army Creek Landfill, New Castle, Delaware
PFAS Source Evaluation Report

PFAS Analyte	Unit	Screened Unit	UPA Upper Sand			UPA Upper Sand				UPA Upper Sand				UPA Upper Sand		
		Location	MW-22NU			P-4				WL-1U				WL-2U		
		Sample Type	Low Flow	Low Flow	Low Flow	3X Well Volume	Low Flow	Low Flow	Low Flow	3X Well Volume	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
		Sample ID	MW-22NU_WG_101420190923	MW-22NU_WG_041420211225	DUP01-FD_WG_041420211235	P-4:3XVOL_WG_101520191100	P-4_WG_101520190859	P-4_WG_101520190859	P-4_WG_041320211455	WL-1U:3XVOL_WG_101020191120	DUP01-FD_WG_101020190936	WL-1U_WG_101020190926	WL-1U_WG_041320211248	WL-2U_WG_100920191257	WL-2U_WG_041520211402	
		Sample Date	14 Oct 2019	14 Apr 2021	14 Apr 2021 (Duplicate)	15 Oct 2019	15 Oct 2019	15 Oct 2019 Duplicate	13 Apr 2021	10 Oct 2019	10 Oct 2019 Duplicate	10 Oct 2019	13 Apr 2021	9 Oct 2019	15 Apr 2021	
		DE DNREC Screening Level	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	
11CI-PF3OUdS	ng/L	--	0.45 U	0.44 U	0.44 U	0.45 U	0.48 U	0.47 U	0.45 U	0.44 U	0.47 U	0.45 U	0.47 U	0.44 UJ	0.43 U	
ADONA	ng/L	--	0.45 U	0.44 U	0.44 U	0.45 U	0.48 U	0.47 U	0.45 U	0.44 U	0.47 U	0.45 U	0.47 U	0.44 UJ	0.43 U	
9CI-PF3ONS	ng/L	--	0.45 U	0.44 U	0.44 U	0.45 U	0.48 U	0.47 U	0.45 U	0.44 U	0.47 U	0.45 U	0.47 U	0.44 UJ	0.43 U	
GenX	ng/L	--	0.65 J	1.2 J	0.74 J	2.4 J	0.6 J	0.58 J	1.7 J	5.7	0.88 J	0.65 J	2.1 J	0.44 UJ	0.62 J	
N-EtFOSAA	ng/L	--	0.45 U	0.44 U	0.44 U	2.5 J	0.48 UJ	0.47 U	0.45 U	0.44 U	0.47 U	0.45 U	0.47 U	0.44 UJ	0.43 U	
N-MeFOSAA	ng/L	--	0.54 U	0.52 U	0.53 U	1.9	0.57 U	0.56 U	0.55 U	0.53 U	0.56 U	0.54 U	0.56 U	0.52 UJ	0.52 U	
PFBS	ng/L	600 ^a / 6000 ^b	3.6	4.9	5	6.2	14	13	18	2.6	1.4 J	1.2 J	1.8 J	1.4 J	1.6 J	
PFDA	ng/L	--	0.45 U	1.2 U	5.3 U	41	0.48 U	0.47 U	8.3 U	0.44 U	0.47 U	0.45 U	0.47 U	0.44 UJ	0.43 U	
PFDaA	ng/L	--	0.45 U	0.44 U	0.44 U	2.8	0.48 UJ	0.47 U	0.45 U	0.44 U	0.47 U	0.45 U	0.47 U	0.44 UJ	0.43 U	
PFHpA	ng/L	--	7.1	13	13	77	11	10	29	22	2.7	2.1	4.9	6.5 UJ	8.6	
PFHxS	ng/L	--	21	58	58	390	27	29	130	27	2.2	1.8	8	2.8 J	5.7	
PFHxA	ng/L	--	25	33	33	50	49	45	79	38	9	7.4	13	73 UJ	13	
PFNA	ng/L	--	8	28	29	180	8.5	8.3	39	4.4	0.47 U	0.45 U	1.7 J	0.83 J	3.3	
PFTA	ng/L	--	0.45 U	0.44 U	0.44 U	0.45 UJ	0.48 R	0.47 U	0.45 U	0.44 U	0.47 UJ	0.45 U	0.47 U	0.44 UJ	0.43 U	
PFTTrDA	ng/L	--	0.45 U	0.44 U	0.44 U	0.45 U	0.48 UJ	0.47 U	0.45 U	0.44 U	0.47 U	0.45 U	0.47 U	0.44 UJ	0.43 U	
PFUnA	ng/L	--	0.45 U	0.87 U	0.89 U	16	0.48 U	0.47 U	0.59 U	0.44 U	0.47 U	0.45 U	0.47 U	0.44 UJ	0.43 U	
PFOS	ng/L	70 ^c	3.1	14	14	110	5.4	5.3	30	14	1.4 J	1.2 J	8.8	2 J	6.7	
PFOA	ng/L	70 ^c	19	73	74	440	26	27	160	120	8.4	7.1	37	13 UJ	30	
PFOA+PFOS	ng/L	70 ^c	22.1	87	88	550	31.4	32.3	190	134	9.8	8.3	45.8	2 J	36.7	

Notes:
Two different purging methods were utilized for informational/comparison purposes during this event.

Table 3
Western Lobe Study Area Wells Groundwater Analytical Summary – 2019-2021
Army Creek Landfill, New Castle, Delaware
PFAS Source Evaluation Report

PFAS Analyte	Unit	Screened Unit	UPA Lower Sand			UPA Lower Sand		UPA Lower Sand		UPA Lower Sand			UPA Lower Sand	
		Location	MW-22N			P-4L		RW-10		WL-1L			WL-2L	
		Sample Type	3X Well Volume	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	3X Well Volume	Low Flow	Low Flow	Low Flow	Low Flow
		Sample ID	MW-22N:3XVOL_WG_101420191340	MW-22N_WG_101420191200	MW-22N_WG_041420211453	P-4L_WG_101520191215	P-4L_WG_041420210831	RW-10_WG_101520191412	RW-10_WG_041420210909	WL-1L:3XVOL_WG_101020191440	WL-1L_WG_101020191229	WL-1L_WG_041320211030	WL-2L_WG_100920191431	WL-2L_WG_041520211437
		Sample Date	14 Oct 2019	14 Oct 2019	14 Apr 2021	15 Oct 2019	14 Apr 2021	15 Oct 2019	14 Apr 2021	10 Oct 2019	10 Oct 2019	13 Apr 2021	9 Oct 2019	15 Apr 2021
		DE DNREC Screening Level	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)	Result (ng/L)
11CI-PF3OUdS	ng/L	--	0.47 U	0.44 U	0.42 U	5 U	0.42 U	0.45 U	0.44 U	0.43 U	0.45 U	0.45 U	0.46 UJ	0.45 U
ADONA	ng/L	--	0.47 U	0.44 U	0.42 U	5 U	0.42 U	0.45 U	0.44 U	0.43 U	0.45 U	0.45 U	0.46 UJ	0.45 U
9CI-PF3ONS	ng/L	--	0.47 U	0.44 U	0.42 U	5 U	0.42 U	0.45 U	0.44 U	0.43 U	0.45 U	0.45 U	0.46 UJ	0.45 U
GenX	ng/L	--	0.93 J	0.54 J	0.73 J	5 U	0.78 J	0.89 J	0.98 J	1.5 J	0.45 U	0.46 J	0.46 UJ	0.67 J
N-EtFOSAA	ng/L	--	0.47 U	0.44 U	0.42 U	5 U	0.42 U	0.45 U	0.44 U	0.43 U	0.45 U	0.45 U	0.46 UJ	0.45 U
N-MeFOSAA	ng/L	--	0.56 U	0.53 U	0.51 U	6 U	0.51 U	0.54 U	0.53 U	0.51 U	0.54 U	0.54 U	0.55 UJ	0.54 U
PFBS	ng/L	600 ^a / 6000 ^b	1.8 J	1.5 J	1.8	5 U	3	5	5.2	0.74 J	0.45 U	0.67 J	0.79 J	1.3 J
PFDA	ng/L	--	1.5 J	0.44 U	0.42 U	5 U	1.2 U	1.9	2.9 U	0.43 U	0.45 U	0.45 U	0.46 UJ	0.45 U
PFDoA	ng/L	--	0.47 U	0.44 U	0.42 U	5 U	0.42 U	0.45 U	0.44 U	0.43 UJ	0.45 U	0.45 U	0.46 R	0.45 U
PFHpA	ng/L	--	14	4.4	9.5	5 U	8.6	17	15	7.5	0.82 J	2.5	5.9 UJ	8.1
PFHxS	ng/L	--	51	5.5	15	7.6 J	25	45	42	8.7	0.83 J	4	1.6 J	5.4
PFHxA	ng/L	--	18	11	15	17 J	19	37	36	9	3.1	5.7	73 UJ	12
PFNA	ng/L	--	46	1.6 J	9	5 U	9.3 U	20	14	0.91 J	0.45 U	0.45 U	0.46 UJ	2.8
PFTA	ng/L	--	0.47 U	0.44 U	0.42 U	5 U	0.42 U	0.45 U	0.44 U	0.44 UJ	0.45 U	0.45 U	0.46 R	0.45 U
PFTTrDA	ng/L	--	0.47 U	0.44 U	0.42 U	5 U	0.42 U	0.45 U	0.44 U	0.43 U	0.45 U	0.45 U	0.46 R	0.45 U
PFUnA	ng/L	--	0.47 U	0.44 U	0.42 U	5 U	0.42 U	0.83 J	1.1 U	0.43 U	0.45 U	0.45 U	0.46 R	0.45 U
PFOS	ng/L	70 ^c	28	0.98 J	6.4	5 U	6.5	6.6	6.4	5.4	0.45 U	1.2 J	0.89 J	6.2
PFOA	ng/L	70 ^c	150	7.5	33	8.9 J	43	60	63	16	1.3 J	8.2	9.6 UJ	27
PFOA+PFOS	ng/L	70 ^c	178	8.48	39.4	8.9 J	49.5	66.6	69.4	21.4	1.3 J	9.4	0.89 J	33.2

Notes:

Bold - indicates result detected above laboratory reporting limit

 = Exceeds human health advisory level

-- = Not Applicable

DE DNREC = Delaware Department of Natural Resources and Environmental Control

DUP = duplicate

J = The result is an estimated quantity. The associated numerical value is the approximate

ng/L = nanograms per liter

PFAS = Per - and polyfluoroalkyl substances

PFOA = perfluorooctanoic acid

PFOS = perfluorooctane sulfonate

R = The data are unusable. The sample results are rejected due to deficiencies in meeting Quality

THQ = Target Hazard Quotient

U = The analyte was included in the analysis but was not detected above the reported quantitation limit.

UJ = The analyte was included in the analysis but was not detected. The reported quantitation

UPA = Upper Potomac Aquifer

USEPA = United States Environmental Protection Agency

^a Regional screening level (May 2021 - THQ = 0.1)

^b Regional screening level (May 2021 - THQ = 1.0)

^c DE DNREC adopted USEPA's human health advisory level of 70 ng/L as a screening level for

Table 4
Groundwater Sampling Results Summary
Artesian Water Company (AWC) Wells - August 2019 through July 2023
Army Creek Landfill, New Castle, Delaware

Compound	USEPA MCLs ¹	USEPA RSL THQ = 1.0 ²	USEPA RSL THQ = 0.1 ³	AWC-2																									
				Well 2 8 Aug 2019 µg/L	Well 2 6 Sept 2019 µg/L	Well 2 31 Oct 2019 µg/L	Well 2 19 Dec 2019 µg/L	AWC-2_110719 7 Nov 2019 µg/L	AWC-2 9 Jan 2020 µg/L	AWC-2 8 April 2020 µg/L	AWC-2 14 April 2021 µg/L	AWC-2 4 April 2022 µg/L	AWC-2 12 April 2022 µg/L	AWC-2 9 June 2022 µg/L	AWC-2 9 Sept 2022 µg/L	AWC-2 5 Oct 2022 µg/L	AWC-2 5 Dec 2022 µg/L	AWC-2 4 Jan 2023 µg/L	AWC-2 18 Jan 2023 µg/L	AWC-2 2 Feb 2023 µg/L	AWC-2 2 March 2023 µg/L	AWC-2 13 April 2023 µg/L	AWC-2 20 April 2023 µg/L	AWC-2 4 May 2023 µg/L	AWC-2 5 June 2023 µg/L	AWC-2 7 July 2023 µg/L	AWC-2 17 July 2023 µg/L	AWC-2 26 July 2023 µg/L	
VOLATILE ORGANIC COMPOUNDS																													
1,4-Dioxane (P-Dioxane)	--	0.46	0.46	--	--	--	--	--	--	--	--	--	0.14	--	--	0.1	--	--	0.11	--	--	--	0.12	--	--	--	0.12	--	
SEMI-VOLATILE ORGANIC COMPOUNDS																													
bis(2-chloroethyl)ether	--	0.014	0.014	--	--	--	--	--	--	--	--	0.0034 J	--	--	19 U	--	--	0.019 U	--	--	0.02 U	--	--	--	--	--	--	0.0053 J	
TOTAL METALS																													
Cobalt	--	6	0.6	--	--	1	--	--	2	2.6 J	2.4 J	2	--	--	2	--	2	--	3	--	3	--	--	--	--	2	--	--	
Iron	--	14,000	1,400	100 U	100 U	100 U	100 U	--	100 U	150 U	120 U	100 U	--	200 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	10 U	100 U	--
Manganese	--	430	43	10 U	10 U	10 U	10 U	--	10 U	10 U	3.8 J	3.7 J	10 U	10 U	10 U	10 U	100 U	--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	3 J	10 U	--
CATIONS / ANIONS																													
Calcium	--	--	--	--	--	--	--	11,900	11,200	11,200	10,500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Magnesium	--	--	--	--	--	--	--	5,950	5,650	5,790	5,500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Potassium	--	--	--	--	--	--	--	2,040	2,060	2,120	2,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Sodium	--	--	--	--	--	--	--	13,200	13,900	14,800	13,700	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
DISSOLVED METALS																													
Cobalt	--	0.6	0.6	--	--	--	--	--	2.1 J	3.4 J	3.4 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Iron	--	1,400	1,400	--	--	--	--	--	150 U	150 U	150 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Manganese	--	43	43	--	--	--	--	--	3.5 J	26.9	26.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
GENERAL CHEMISTRY																													
Alkalinity, Bicarbonate (as CaCO3)	--	--	--	--	--	--	--	14,000	14,400	--	5,000 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, Carbonate (as CaCO3)	--	--	--	--	--	--	--	5,000 U	--	--	5,000 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Chloride (as Cl)	--	--	--	--	--	--	--	28,500 D	42,100	--	29,600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Nitrite (as N)	1,000	2,000	200	--	--	--	--	76 U	120 U	--	160 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Nitrogen, Ammonia (as N)	--	--	--	--	--	--	--	34 U	--	100 U	100 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Nitrogen, Nitrate (as N)	10,000	32,000	3,200	--	--	--	--	4,200	3,880	--	3,490	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Sulfate (as SO4)	--	--	--	--	--	--	--	14,600	12,500	--	10,700	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Sulfide	--	--	--	--	--	--	--	580 U	--	--	1,000 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Notes
Bold = analyte detected above laboratory reporting limit or method detection limit
 = result exceeds the MCL
 = result exceeds the RSL (THQ = 0.1)
 = result exceeds the RSL (THQ = 1.0 and THQ = 0.1)
 -- = indicates no MCL or RSL for compound or not analyzed
 µg/L = micrograms per liter
 AWC = Artesian Water Company
 CaCO3 = calcium carbonate
 D = Indicates sample results are obtained from a dilution
 J = Result is less than the RL but greater than or equal to the MDL and the concentration is an
 MCL = Maximum Contaminant Level
 MDL = Method Detection Limit
 Q = Indicates Qualifier Flag
 RL = Reporting Limit
 RSL = Regional Screening Level
 U = Indicates the analyte was analyzed for but not detected.
 USEPA = United States Environmental Protection Agency

¹ MCL = Primary drinking water standard as specified in Sampling and Analysis Plan (RAI, 2019a)
² RSL = May 2023 Resident Tapwater (THQ = 1.0) - Secondary drinking water standard as specified in Sampling and Analysis Plan (RAI, 2019a)
³ RSL = May 2023 Resident Tapwater (THQ = 0.1) - Secondary drinking water standard as specified in Sampling and Analysis Plan (RAI, 2019a)
 RAI, 2019a, Army Creek Landfill - New Castle County, Delaware, Revision 2 - Work Plan for Additional Investigation, July 15.

Table 4
Groundwater Sampling Results Summary
Artesian Water Company (AWC) Wells - August 2019 through July 2023
Army Creek Landfill, New Castle, Delaware

Compound	AWC Well			AWC-G3R																						
	Sample ID	Well G3	Well G3	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R	AWC-G3R			
	Sampling Date	8 Aug 2019	19 Dec 2019	9 Jan 2020	8 April 2020	14 April 2021	4 April 2022	12 April 2022	9 June 2022	9 September 2022	5 October 2022	5 December 2022	4 Jan 2023	18 Jan 2023	2 Feb 2023	2 March 2023	13 April 2023	20 April 2023	4 May 2023	5 June 2023	7 July 2023	17 July 2023	26 July 2023			
	USEPA MCLs ¹	USEPA RSL THQ = 1.0 ²	USEPA RSL THQ = 0.1 ³	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q		
VOLATILE ORGANIC COMPOUNDS																										
1,4-Dioxane (P-Dioxane)	--	0.46	0.46	--	--	--	--	--	21	--	--	24	--	--	15	--	--	--	13	--	--	--	18	--		
SEMI-VOLATILE ORGANIC COMPOUNDS																										
bis(2-chloroethyl)ether	--	0.014	0.014	--	--	--	--	--	1.8 D	--	--	2.1 D	--	--	2.2 D	--	--	--	2.0 D	--	--	--	--	1.8 D		
TOTAL METALS																										
Cobalt	--	6	0.6	--	4	3	3.6 J	4.3	5	--	--	5	--	--	5	--	--	--	5	--	--	--	5	--		
Iron	--	14,000	1,400	100 U	610	100 U	150 U	120 U	100 U	--	0.2 U	100 U	--	100 U	100 U	--	100 U	100 U	--	100 U	100 U	100 U	100 U	--		
Manganese	--	430	43	140	156	86	93	123	157	--	174	232	241	28	187	--	191	196	196	241	193	215	234	--		
CATIONS / ANIONS																										
Calcium	--	--	--	--	18,700	17,900	19,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Magnesium	--	--	--	--	7,710	7,430	8,070	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Potassium	--	--	--	--	2,620	2,590	2,660	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Sodium	--	--	--	--	27,100	31,300	34,700	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
DISSOLVED METALS																										
Cobalt	--	0.6	0.6	--	3.4 J	3.6 J	3.6 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Iron	--	1,400	1,400	--	150 U	150 U	150 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Manganese	--	43	43	--	99.1	79.5	79.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
GENERAL CHEMISTRY																										
Alkalinity, Bicarbonate (as CaCO3)	--	--	--	--	46,000	--	38,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Alkalinity, Carbonate (as CaCO3)	--	--	--	--	--	--	5,000 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Chloride (as Cl)	--	--	--	--	52,300	--	71,800	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Nitrite (as N)	1,000	2,000	200	--	120 U	--	160 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Nitrogen, Ammonia (as N)	--	--	--	--	--	270	340	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Nitrogen, Nitrate (as N)	10,000	32,000	3,200	--	720	--	1,290	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Sulfate (as SO4)	--	--	--	--	13,500	--	12,300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Sulfide	--	--	--	--	--	--	1,000 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Notes
Bold = analyte detected above laboratory reporting limit or method detection limit
 = result exceeds the MCL
 = result exceeds the RSL (THQ = 0.1)
 = result exceeds the RSL (THQ = 1.0 and THQ = 0.1)
-- = indicates no MCL or RSL for compound or not analyzed
µg/L = micrograms per liter
AWC = Artesian Water Company
CaCO3 = calcium carbonate
D = Indicates sample results are obtained from a dilution
J = Result is less than the RL but greater than or equal to the MDL and the concentration is an
MCL = Maximum Contaminant Level
MDL = Method Detection Limit
Q = Indicates Qualifier Flag
RL = Reporting Limit
RSL = Regional Screening Level
U = Indicates the analyte was analyzed for but not detected.
USEPA = United States Environmental Protection Agency

¹ MCL = Primary drinking water standard as specified in Sampling and Analysis Plan (RAI, 2019a)
² RSL = May 2023 Resident Tapwater (THQ = 1.0) - Secondary drinking water standard as specified in Sampling and Analysis Plan (RAI, 2019a)
³ RSL = May 2023 Resident Tapwater (THQ = 0.1) - Secondary drinking water standard as specified in Sampling and Analysis Plan (RAI, 2019a)
RAI, 2019a. Army Creek Landfill - New Castle County, Delaware, Revision 2 - Work Plan for Additional Investigation. July 15.

Table 4
Groundwater Sampling Results Summary
Artesian Water Company (AWC) Wells - August 2019 through July 2023
Army Creek Landfill, New Castle, Delaware

Compound	AWC Well		AWC-6R													AWC-7															
	Sample ID	Well 6R	Well 6R	Well 6R	Well 6	AWC-6R_110719	AWC-6R	AWC-6R	AWC-6R	AWC-6R	AWC-6R	AWC-6R	AWC-6R	AWC-6R	Well 7	Well 7	Well 7	AWC-7	AWC-7	AWC-7	AWC-7	AWC-7	AWC-7	AWC-7	AWC-7	AWC-7	AWC-7	AWC-7			
	Sampling Date	8 Aug 2019	6 Sept 2019	31 Oct 2019	5 Dec 2019	7 Nov 2019	4 Jan 2023	2 March 2023	13 April 2023	20 April 2023	5 June 2023	17 July 2023	17 July 2023	8 Aug 2019	6 Sept 2019	19 Dec 2019	9 Jan 2020	8 April 2020	14 April 2021	4 April 2022	12 April 2022	9 June 2022	9 Sept 2022	5 Oct 2022	5 Dec 2022	18 Jan 2023	2 Feb 2023	4 May 2023	5 June 2023	7 July 2023	
	USEPA MCLs ¹	USEPA RSL THQ = 1.0 ²	USEPA RSL THQ = 0.1 ³	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	
VOLATILE ORGANIC COMPOUNDS																															
1,4-Dioxane (P-Dioxane)	--	0.46	0.46	--	--	--	0.88	--	--	--	--	--	--	--	--	--	--	--	--	--	4.2	--	--	1.8	--	2.5	--	--	--	--	
SEMIVOLATILE ORGANIC COMPOUNDS																															
bis(2-chloroethyl)ether	--	0.014	0.014	--	--	--	--	--	0.0078 J	--	--	--	--	0.019 U	--	--	--	--	--	--	0.35	--	--	0.17	--	0.29	--	--	--	--	
TOTAL METALS																															
Cobalt	--	6	0.6	--	4	--	--	9	8	--	9	--	--	--	3	3	3.4 J	3.2 J	3	--	--	--	3	--	3	--	3	--	3	3	
Iron	--	14,000	1,400	100 U	100 U	100 U	100 U	100 U	100 U	100 U	10 U	--	100 U	100 U	100 U	100 U	150 U	120 U	100 U	--	200 U	100 U	100 U	100 U	100 U	100 U	100 U	131	100 U	100 U	
Manganese	--	430	43	27	26	27	29	--	226	170	175	--	177	204	81	78	62	65	96.2	87.2	83	--	94	82	84	84	88	99	99	102	
CATIONS / ANIONS																															
Calcium	--	--	--	--	--	--	16,900	--	--	--	--	--	--	--	--	--	13,800	14,200	14,800	--	--	--	--	--	--	--	--	--	--	--	
Magnesium	--	--	--	--	--	--	7,650	--	--	--	--	--	--	--	--	--	6,110	6,590	6,790	--	--	--	--	--	--	--	--	--	--	--	
Potassium	--	--	--	--	--	--	2,540	--	--	--	--	--	--	--	--	--	2,860	2,960	2,750	--	--	--	--	--	--	--	--	--	--	--	
Sodium	--	--	--	--	--	--	20,600	--	--	--	--	--	--	--	--	--	17,500	19,600	20,100	--	--	--	--	--	--	--	--	--	--	--	
DISSOLVED METALS																															
Cobalt	--	0.6	0.6	--	--	--	3.5 J	--	--	--	--	--	--	--	--	--	2.9 J	5.4 J	5.4 J	--	--	--	--	--	--	--	--	--	--	--	
Iron	--	1,400	1,400	--	--	--	150 U	--	--	--	--	--	--	--	--	--	150 U	150 U	150 U	--	--	--	--	--	--	--	--	--	--	--	
Manganese	--	43	43	--	--	--	30.1	--	--	--	--	--	--	--	--	--	76.5	132	132	--	--	--	--	--	--	--	--	--	--	--	
GENERAL CHEMISTRY																															
Alkalinity, Bicarbonate (as CaCO3)	--	--	--	--	--	--	18,300	--	--	--	--	--	--	--	--	--	29,800	--	27,900	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, Carbonate (as CaCO3)	--	--	--	--	--	--	5,000 U	--	--	--	--	--	--	--	--	--	--	--	5,000 U	--	--	--	--	--	--	--	--	--	--	--	
Chloride (as Cl)	--	--	--	--	--	--	52,300 D	--	--	--	--	--	--	--	--	--	37,900	--	44,300	--	--	--	--	--	--	--	--	--	--	--	
Nitrite (as N)	1,000	2,000	200	--	--	--	76 U	--	--	--	--	--	--	--	--	--	120 U	--	160 U	--	--	--	--	--	--	--	--	--	--	--	
Nitrogen, Ammonia (as N)	--	--	--	--	--	--	140	--	--	--	--	--	--	--	--	--	--	590	--	--	--	--	--	--	--	--	--	--	--	--	
Nitrogen, Nitrate (as N)	10,000	32,000	3,200	--	--	--	4,260	--	--	--	--	--	--	--	--	--	1,340	--	2,180	--	--	--	--	--	--	--	--	--	--	--	
Sulfate (as SO4)	--	--	--	--	--	--	18,900	--	--	--	--	--	--	--	--	--	13,200	--	14,000	--	--	--	--	--	--	--	--	--	--	--	
Sulfide	--	--	--	--	--	--	580 U	--	--	--	--	--	--	--	--	--	--	--	1,000 U	--	--	--	--	--	--	--	--	--	--	--	

Notes
Bold = analyte detected above laboratory reporting limit or method detection limit
 = result exceeds the MCL
 = result exceeds the RSL (THQ = 0.1)
 = result exceeds the RSL (THQ = 1.0 and THQ = 0.1)
 -- = indicates no MCL or RSL for compound or not analyzed
 µg/L = micrograms per liter
 AWC = Artesian Water Company
 CaCO3 = calcium carbonate
 D = Indicates sample results are obtained from a dilution
 J = Result is less than the RL but greater than or equal to the MDL and the concentration is an
 MCL = Maximum Contaminant Level
 MDL = Method Detection Limit
 Q = Indicates Qualifier Flag
 RL = Reporting Limit
 RSL = Regional Screening Level
 U = Indicates the analyte was analyzed for but not detected.
 USEPA = United States Environmental Protection Agency

¹ MCL = Primary drinking water standard as specified in Sampling and Analysis Plan (RAI, 2019a)
² RSL = May 2023 Resident Tapwater (THQ = 1.0) - Secondary drinking water standard as specified in Sampling and Analysis Plan (RAI, 2019a)
³ RSL = May 2023 Resident Tapwater (THQ = 0.1) - Secondary drinking water standard as specified in Sampling and Analysis Plan (RAI, 2019a)
 RAI, 2019a. Army Creek Landfill - New Castle County, Delaware, Revision 2 - Work Plan for Additional Investigation. July 15.

Table 5
Summary of Surface-Water Quality Data for Army Creek and Army Pond
October 27, 2022

Parameter	BTAG Screening Level µg/l	DNREC Screening Level µg/l	SWA	SWA DUP	SWB	SWC	SWD	SWE	SWF	SWG	Rinsate Blank
Non-Halogenated VOCs (µg/l)											
Benzene			--	--	--	--	--	--	--	--	--
Toluene			--	--	--	--	--	--	--	--	--
Ethylbenzene			--	--	--	--	--	--	--	--	--
Xylene (total)			--	--	--	--	--	--	--	--	--
2-Butanone			--	--	--	--	--	--	--	--	--
Acetone			--	--	--	--	--	--	--	--	--
Carbon Disulfide			--	--	--	--	--	--	--	--	--
Cyclohexane			--	--	--	--	--	--	--	--	--
Isopropylbenzene			--	--	--	--	--	--	--	--	--
Methy-tert-butyl ether			--	--	--	--	--	--	--	--	--
Methylcyclohexane			--	--	--	--	--	--	--	--	--
4-Methy-2-pentanone			--	--	--	--	--	--	--	--	--
Halogenated VOCs (µg/l)											
Bromofom			--	--	--	--	--	--	--	--	--
Bromodichloromethane			--	--	--	--	--	--	--	--	--
Carbon Tetrachloride			--	--	--	--	--	--	--	--	--
Chlorobenzene			--	--	--	--	--	--	--	--	--
Chlorofom			--	--	--	--	--	--	--	--	--
Dibromochloromethane			--	--	--	--	--	--	--	--	--
1,2-Dichloroethane			--	--	--	--	--	--	--	--	--
1,1-Dichloroethane			--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene			--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene			--	--	--	--	--	--	--	--	--
1,1-Dichloroethene			--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene			--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene			--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene			--	--	--	--	--	--	--	--	--
Chloroethane			--	--	--	--	--	--	--	--	--
Tetrachloroethene			--	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane			--	--	--	--	--	--	--	--	--
Trichloroethene			--	--	--	--	--	--	--	--	--
Vinyl Chloride			--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene			--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene			--	--	--	--	--	--	--	--	--
Methylene Chloride			--	--	--	--	--	--	--	--	--
Trichlorofluoromethane			--	--	--	--	--	--	--	--	--
Semi-Volatiles (µg/l)											
1,1'-Biphenyl	14		0.14 U	0.15 U	0.15 U	0.15 U	0.14 U	0.14 U	0.14 U	0.15 U	0.15 U
2,2'-oxybis (1-Chloropropane)			0.058 U	0.063 U	0.060 U	0.056 U	0.056 U	0.058 U	0.063 U	0.063 U	0.063 U
2,4-Dimethylphenol			0.17 UJ	0.18 UJ	0.17 U	0.17 U	0.16 U	0.16 U	0.17 U	0.18 U	0.18 U
2,4-Dinitrophenol		5300	1.5 U	1.7 U	1.6 U	1.6 U	1.5 U	1.5 U	1.7 U	1.7 U	1.7 U
2,6-Dinitrotoluene	81		0.17 U	0.19 U	0.18 U	0.18 U	0.17 U	0.17 U	0.17 U	0.19 U	0.19 U
2-Methylnaphthalene	4.7	850	0.062 UJ	0.067 UJ	0.065 U	0.065 U	0.060 U	0.060 U	0.067 U	0.067 U	0.067 U
2-Methylphenol	13		0.30 UJ	0.33 UJ	0.31 U	0.31 U	0.29 U	0.29 U	0.30 U	0.33 U	0.33 U
4,6-Dinitro-2-methylphenol			1.5 U	1.6 U	1.5 U	1.5 U	1.4 U	1.4 U	1.5 U	1.6 U	1.6 U
4-Methylphenol	543		0.37 UJ	0.40 UJ	0.39 U	0.39 U	0.36 U	0.36 U	0.37 U	0.40 U	0.40 U
Acetophenone			0.16 UJ	0.17 UJ	0.17 U	0.17 U	0.15 U	0.15 U	0.16 U	0.17 U	0.17 U
Atrazine	1.8		0.63 UJ	0.69 UJ	0.66 U	0.66 U	0.61 U	0.61 U	0.63 U	0.69 U	0.69 U
Benzaldehyde			0.54 U	0.58 U	0.56 U	0.56 U	0.52 U	0.52 U	0.54 U	0.58 U	0.58 U
Benzo (a) pyrene	0.015	0.018	0.053 UJ	0.058 UJ	0.055 U	0.055 U	0.051 U	0.051 U	0.053 U	0.058 U	0.058 U
Benzo (b) Fluoranthene		0.18	0.097 U	0.11 U	0.10 U	0.10 U	0.093 U	0.093 U	0.097 U	0.11 U	0.11 U
Benzo (g,h,i) Perylene			0.069 U	0.075 U	0.072 U	0.072 U	0.066 U	0.066 U	0.069 U	0.075 U	0.075 U
Benzo (k) Fluoranthene			0.088 UJ	0.096 UJ	0.092 U	0.092 U	0.085 U	0.085 U	0.088 U	0.096 U	0.096 U
Bis(2-chloroethyl)Ether		0.53	0.040 U	0.043 U	0.042 U	0.042 U	0.038 U	0.038 U	0.040 U	0.043 U	0.043 U
Bis(2-ethylhexyl)phthalate	16	2.2	6.2 U	6.8 U	6.5 U	6.5 U	6.0 U	6.0 U	6.8 U	6.8 U	6.8 U
Caprolactam			1.3 J	0.51 UJ	0.49 U	0.86 J	0.58 J	0.45 U	0.47 J	0.51 U	0.51 U
Di-n-butyl phthalate	19	4500	10 J+	1.5 U	1.2 J+	1.2 J+	8.8 J+	9.7 J+	1.4 U+	1.4 U	1.9 U
Di-n-octyl phthalate	22		0.69 U	0.74 U	0.71 U	0.71 U	0.66 U	0.66 U	0.69 U	0.74 U	0.74 U
1,4-Dioxane			0.19 U	0.21 U	0.20 U	0.20 U	0.19 U	0.19 U	0.21 U	0.21 U	0.21 U
Dibenzo (a,h) Anthracene		0.018	0.072 U	0.078 U	0.075 U	0.075 U	0.069 U	0.069 U	0.072 U	0.078 U	0.078 U
Diethylphthalate	210	44000	0.57 UJ	0.62 UJ	0.59 U	0.59 U	0.55 U	0.55 U	0.57 U	0.62 U	0.62 U
Hexachlorocyclopentadiene		5500	0.50 UJ	0.54 UJ	0.52 U	0.52 U	0.48 U	0.48 U	0.50 UJ	0.54 UJ	0.54 UJ
Indeno (1,2,3-cd) Pyrene		0.18	0.085 U	0.092 U	0.089 U	0.089 U	0.082 U	0.082 U	0.085 U	0.092 U	0.092 U
N-Nitrosodiphenylamine	210	6	0.12 UJ	0.13 UJ	0.12 U	0.12 U	0.11 U	0.11 U	0.12 U	0.13 U	0.13 U
Naphthalene	1.1		0.059 UJ	0.064 UJ	0.061 U	0.061 U	0.057 U	0.057 U	0.059 U	0.064 U	0.064 U
Phenol	4	86000	0.49 UJ	0.53 UJ	0.51 U	0.51 U	0.47 U	0.47 U	0.49 U	0.53 U	0.53 U
Field Parameters											
Temperature (Degrees Celcius)			16.1	--	14.7	14.9	13.4	12.3	13.1	13.4	--
Conductivity (µs/cm)			237	--	273	264	280	278	286	284	--
pH (standard units)	6.5 - 9		6.87	--	6.57	6.63	6.82	7.01	6.98	6.96	--
Dissolved Oxygen (mg/l)			3.31	--	0.00	0.67	1.47	3.32	2.80	9.94	--
ORP (mV)			42	--	-26	-20	29	-15	19	21	--

U - Analyte was not detected above the MDL.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

UJ - The analyte was analyzed for but was not detected. The reported limit is approximate and may or may not be precise

JN - The analysis indicates the presence of any analyte that has been "tentatively identified" and the associated numerical value represent its approximate quantity

R - The data are unusable. The sample results are rejected due to serious deficiencies in meeting the Quality Control (QC) criteria. The analyte may or may not be present in the sample

-- Not analyzed

J+ - Analyte present. May be biased High.

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D - Analyte concentration is from diluted analysis

Table 5
 Summary of Surface-Water Quality Data for Army Creek and Army Pond
 October 27, 2022

Parameter	BTAG Screening Level µg/l	DNREC Screening Level µg/l	SWA	SWA DUP	SWB	SWC	SWD	SWE	SWF	SWG	Rinsate Blank
Dissolved Inorganics (µg/l)											
Aluminum	87		12 U	12 U	12 U	12 U	12 U	12 U	12 U	12 U	13 J
Antimony	30	1600	0.31 J	0.28 J	0.21 U	0.21 U	0.23 J	0.21 U	0.21 U	0.21 U	0.21 U
Arsenic	5		0.70 U	0.70 U	0.70 U	0.75 J	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Barium	4		59	62 J+	68	99	77	81	88	95	0.77 U
Beryllium	0.66	0.024	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
Cadmium	0.25	31	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
Calcium	116000		15000	16000	16000	16000	19000	19000	19000	19000	170
Chromium	85		0.34 U	0.34 U	0.34 U	0.34 U	0.42 J	0.34 U	0.48 J	0.89 J	0.34 U
Cobalt	23		0.55	0.52 U	0.57	7.8	0.56	0.22 J	0.16 J	0.52 U	0.16
Copper	9		1.2	1.2	0.47 J	1.8	1.5	1.1	1.1	1.2	0.37 U
Iron	300		110	130	510	930	170	210	190	340	21 U
Lead	2.5		0.073 U	0.073 U	0.073 U	0.11 J	0.073 U	0.073 U	0.073 U	0.078 J	0.073 U
Magnesium	82000		5700	6300 J	6800	7400	7700	7900	7800	7800	24 J
Manganese	120		120	130	110	2100	160	62	50	51	0.98 U
Mercury	0.026		0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
Nickel	52	1700	0.71 J	0.41 U	0.41 U	3.6	0.43 J	0.75 J	1.0	1.7	0.41 U
Potassium	53000		3400	3600 J	4500	7900	3600	3300	3300	3300	67 U
Selenium	1	4200	0.42 J	0.29 U	0.29 U	0.29 U	0.80 J	0.87 J	1.3	1.3	0.29 U
Silver	3.2	40000	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Sodium	680000		26000	26000	31000	27000	30000	29000	30000	25000	330
Thallium	0.8	18	0.13 J	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
Vanadium	20		0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U
Zinc	120	26000	4.1 U	4.1 U	4.1 U	7.2 J	8.3 J	13	17	20	4.1 U
Pesticides/Herbicides (µg/l)											
4,4'-DDD	0.011	0.00022	0.00052 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.00053 U	0.00051 U	0.00051 U
4,4'-DDE		0.00022	0.00029 U	0.00028 U	0.00028 U	0.00028 U	0.00028 U	0.00028 U	0.00030 U	0.00028 U	0.00028 U
4,4'-DDT	0.0005		0.00067 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00069 U	0.00066 U	0.00066 U
Aldrin	3		0.00035 U	0.00034 U	0.00034 U	0.00034 U	0.00034 U	0.00034 U	0.00036 U	0.00034 U	0.00034 U
alpha-BHC		0.0048	0.00023 U	0.00023 U	0.00023 U	0.00023 U	0.00023 U	0.00023 U	0.00024 U	0.00023 U	0.00023 U
Alpha-Chlordane		0.00081	0.00036 U	0.00035 U	0.00035 U	0.00035 U	0.00035 U	0.00035 U	0.00037 U	0.00035 U	0.00035 U
beta-BHC		0.017	0.00036 U	0.00035 U	0.00035 U	0.00035 U	0.00035 U	0.00035 U	0.00037 U	0.00035 U	0.00035 U
delta-BHC	141		0.00062 U	0.00062 U	0.00061 U	0.00062 U	0.00062 U	0.00062 U	0.00064 U	0.00061 U	0.00062 U
Dieldrin	0.056	0.00054	0.00027 U	0.00026 U	0.00026 U	0.00026 U	0.00026 U	0.00026 U	0.0049 J	0.0028	0.00026 U
Endosulfan I	0.051	89	0.00067 U	0.00066 U	0.00065 U	0.00066 U	0.00066 U	0.00066 U	0.00069 U	0.00065 U	0.00066 U
Endosulfan II	0.051	89	0.00031 U	0.00030 U	0.00030 U	0.00030 U	0.00030 U	0.00030 U	0.00032 U	0.00030 U	0.00030 U
Endosulfan sulfate		89	0.00062 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00064 U	0.00061 U	0.00061 U
Endrin	0.036	0.3	0.00022 U	0.00022 U	0.00022 U	0.00022 U	0.00022 U	0.00022 U	0.00023 U	0.00022 U	0.00022 U
Endrin Aldehyde		0.3	0.00050 U	0.00050 U	0.00049 U	0.00050 U	0.00050 U	0.00050 U	0.00052 U	0.00049 U	0.00050 U
Endrin Ketone			0.00038 U	0.00038 U	0.00038 U	0.00038 U	0.00038 U	0.00038 U	0.00040 U	0.00038 U	0.00038 U
gamma-BHC (Lindane)	0.01	0.23	0.00028 U	0.00028 U	0.00028 U	0.00028 U	0.00028 U	0.00028 U	0.00029 U	0.00028 U	0.00028 U
gamma-Chlordane		0.00081	0.00040 U	0.00039 U	0.00039 U	0.00039 U	0.00039 U	0.00039 U	0.00041 U	0.00039 U	0.00039 U
Heptachlor	0.0019	0.000079	0.00044 U	0.00043 U	0.00043 U	0.00043 U	0.00043 U	0.00043 U	0.00045 U	0.00043 U	0.00043 U
Heptachlor Epoxide	0.0019	0.000039	0.00033 U	0.00033 U	0.00032 U	0.00033 U	0.00033 U	0.00033 U	0.00034 U	0.00032 U	0.00033 U
Methoxychlor	0.019		0.00075 U	0.00075 U	0.00074 U	0.00075 U	0.00075 U	0.00075 U	0.00078 U	0.00074 U	0.00075 U
Toxaphene	0.0002	0.00028	0.048 U	0.047 U	0.047 U	0.047 U	0.047 U	0.047 U	0.049 U	0.047 U	0.047 U
Pentachlorophenol	0.5	0.9	0.027 U	0.026 U	0.026 U	0.026 U	0.026 U	0.026 U	0.026 U	0.026 U	0.026 U

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Table 5
 Summary of Sediment Data for Army Creek and Army Pond
 October 27, 2022

Parameter	BTAG Screening Level µg/kg	SEDA	SEDA DUP	SEDB	SEDC	SEDD	SEDE	SEDF	SEDG
Semi-Volatiles (µg/kg)									
1,1'-Biphenyl	1220	29 UJ	31 UJ	44 UJ	34 UJ	440 UJ	370 UJ	330 UJ	300 UJ
2,2'-oxybis (1-Chloropropane)		34 U	37 U	52 U	40 U	520 U	450 U	390 U	360 U
2,4-Dimethylphenol	29	29 UJ	31 UJ	44 UJ	34 UJ	440 UJ	370 UJ	330 UJ	300 UJ
2,4-Dinitrophenol		290 UJ	310 UJ	440 U	340 U	4400 U	3700 U	3300 U	3000 U
2,6-Dinitrotoluene		29 UJ	31 UJ	44 UJ	34 UJ	440 UJ	370 UJ	330 UJ	300 UJ
2-Methylnaphthalene	20.2	8.6 UJ	18 J-	13 UJ	10 UJ	130 UJ	110 UJ	98 UJ	91 UJ
2-Methylphenol		34 UJ	37 UJ	52 UJ	40 UJ	520 UJ	450 UJ	390 UJ	300 UJ
4,6-Dinitro-2-methylphenol		290 R	310 R	440 U	340 U	4400 U	3700 U	3300 U	3000 U
4-Methylphenol	670	29 UJ	31 UJ	71 J-	34 UJ	440 UJ	370 UJ	330 UJ	300 UJ
Acetophenone		29 UJ	870 J-	44 J-	34 UJ	440 UJ	370 UJ	330 UJ	300 UJ
Atrazine	6.62	110 UJ	120 UJ	170 U	130 U	1700 U	1500 U	1300 U	1200 U
Benzaldehyde		57 UJ	2800 J-	220 J-	120 J-	870 UJ	750 UJ	660 UJ	610 UJ
Benzo (a) anthracene	108	6.4 J-	12 J-	22 J-	17 J-	360 J-	160 J-	630 J-	290 J-
Benzo (a) pyrene	150	13 J-	19 J-	38 J-	32 J-	770 J-	240 J-	780 J-	370 J-
Benzo (b) Fluoranthene	27.2*	23 J-	42 J-	57 J-	52 J-	1400 J-	410 J-	1400 J-	600 J-
Benzo (g,h,i) Perylene	170	5.7 UJ	16 J-	38 J-	35 J-	690 J-	250 J-	660 J-	330 J-
Benzo (k) Fluoranthene	27.2*	9.2 J-	17 J-	18 J-	17 J-	440 J-	130 J-	420 J-	180 J-
Bis(2-chloroethyl)Ether		29 UJ	31 UJ	44 UJ	34 UJ	440 UJ	370 UJ	330 UJ	300 UJ
Bis(2-ethylhexyl)phthalate	180	110 UJ	120 UJ	170 UJ	130 UJ	1700 UJ	1500 UJ	1300 UJ	1200 UJ
Caprolactam		57 UJ	62 UJ	87 UJ	67 UJ	870 UJ	750 UJ	660 UJ	610 UJ
Di-n-butyl phthalate	6470	110 UJ	120 UJ	170 UJ	130 UJ	1700 UJ	1500 UJ	1300 UJ	1200 UJ
Di-n-octyl phthalate		110 UJ	120 UJ	170 UJ	130 UJ	1700 UJ	1500 UJ	1300 UJ	1200 UJ
1,4-Dioxane		57 UJ	62 UJ	87 UJ	67 UJ	870 UJ	750 UJ	660 UJ	610 UJ
Dibenzo (a,h) Anthracene	33	11 UJ	12 UJ	17 UJ	13 UJ	170 J-	150 UJ	160 J-	120 UJ
Diethylphthalate	603	110 UJ	120 UJ	170 UJ	130 UJ	1700 UJ	1500 UJ	1300 UJ	1200 UJ
Hexachlorocyclopentadiene		290 R	310 R	440 U	340 U	4400 U	3700 U	3300 U	3000 U
Indeno (1,2,3-cd) Pyrene	17	15 J-	15 J-	28 J-	26 J-	690 J-	210 J-	580 J-	270 J-
N-Nitrosodiphenylamine	2680	29 UJ	31 UJ	44 UJ	34 UJ	440 UJ	370 UJ	330 UJ	300 UJ
Naphthalene		11 UJ	23 J-	17 UJ	13 UJ	170 UJ	150 UJ	130 UJ	120 UJ
Pentachlorophenol	504	110 U	120 U	170 U	130 U	1700 U	1500 U	1300 U	1200 U
Phenol	420	29 UJ	53 J-	44 UJ	67 J-	440 UJ	370 UJ	330 UJ	300 UJ
Chrysene	166	18 J-	37 J-	51 J-	35 J-	930 J-	280 J-	1100 J-	460 J-
Fluoranthene	423	22 J-	25 J-	62 J-	45 J-	1300 J-	460 J-	1600 J-	700 J-
Phenanthrene	204	12 J-	23 J-	10 UJ	8.1 UJ	320 J-	150 J-	480 J-	230 J-
Carbazole		29 UJ	31 UJ	44 UJ	34 UJ	440 UJ	370 UJ	330 UJ	300 UJ
Pyrene	195	19 J-	28 J-	58 J-	41 J-	990 J-	420 J-	1400 J-	600 J-

U - Analyte was not detected above the MDL.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

UJ - The analyte was analyzed for but was not detected. The reported limit is approximate and may or may not be precise

JN - The analysis indicates the presence of any analyte that has been "tentatively identified" and the associated numerical value represent its approximate quantity

R - The data are unusable. The sample results are rejected due to serious deficiencies in meeting the Quality Control (QC) criteria. The analyte may or may not be present in the sample

+ - Value is for Benzo(b) fluoranthene and Benzo(k)fluoranthene

-- Not analyzed

J+ - Analyte present. May be biased High.

J- - Analyte present. May be biased low

D - Analyte concentration is from diluted analysis

Table 5
Summary of Sediment Data for Army Creek and Army Pond
October 27, 2022

Parameter	BTAG Screening Level	SEDA	SEDA DUP	SEDB	SEDC	SEDD	SEDE	SEDF	SEDG
Inorganics (mg/kg)									
Aluminum		43000	49000	12000	22000	16000	19000	11000	8900
Antimony	2	0.39 J	0.40 J	0.57	0.23 J	0.84	0.43	0.95	0.56
Arsenic	9.8	9.2	9.7	2.2	5.3	6.5	7.6	4.9	3.8
Barium		120 J+	170 J+	160	120	140	140	110	73
Beryllium		2.1	2.4	0.74	1.1	0.87	1.1	0.70	0.53
Cadmium	0.99	0.42	0.50	0.32	0.31	0.57	0.73	0.36	0.34
Calcium		1200	1700	5900	1400	3300	1800	4000	1800
Chromium	43.4	30	41	14	19	28	26	25	20
Cobalt	50	54	53	6.5	23	11	11	6.8	4.9
Copper	31.6	25	29	18	13	29	28	28	19
Iron	20000	59000	61000	23000	43000	60000	8300	19000	13000
Lead	35.8	93	120	30	25	49	93	38	44
Magnesium		2200 J	2500 J	1900	1200	2200	2400	2700	1500
Manganese	460	440	460	410	1300	810	250	370	330
Mercury	0.18	0.12	0.16	0.074 J	0.076 J	0.14 J	0.11 J	0.056 J	0.062 J
Nickel	22.7	30	32	14	22	21	22	16	16
Potassium		1400 J	1800 J	850	700	990	1100	880	500
Selenium	2	0.74	0.85	0.73 J	0.44 J	0.71 J	0.95	0.74	0.69
Silver	1.0	0.053 J	0.073 U	0.079 U	0.059 U	0.084 U	0.092 J	0.061 J	0.052 U
Sodium		150	160	180	95	140	160	140	83
Thallium		0.27	0.31	0.15 J	0.29	0.20 J	0.22	0.12 J	0.094 J
Vanadium		88	94	24	40	39	51	34	25
Zinc	121	130 J	140 J	92	77	210	180	220	140
Pesticides (µg/kg)									
4,4'-DDD	4.88	2.1 J	1.8 J	0.86 U	0.67 U	8.7 U	3.7 U	13 U	3.1 J+
4,4'-DDE	3.16	2.4 J	2.2 J	0.86 U	0.67 U	8.7 U	3.7 U	13 U	2.0 J+
4,4'-DDT	4.16 ^a	1.4 U	1.5 U	2.1 U	1.6 U	21 U	8.9 U	31 U	1.4 U
Aldrin	2	0.29 U	0.31 U	0.45 U	0.34 U	4.5 U	1.9 U	6.7 U	0.31 U
alpha-BHC	6	0.29 U	0.31 U	0.45 U	0.34 U	4.5 U	1.9 U	6.7 U	0.31 U
Alpha-Chlordane		1.6 J	1.1 J	0.45 U	0.34 U	4.5 U	1.9 U	6.7 U	3.6 J
beta-BHC	5	0.76 U	0.81 U	1.2 U	0.89 U	12 U	5.0 U	17 U	0.81 U
delta-BHC	6400	0.78 U	0.83 U	1.2 U	0.91 U	12 U	5.1 U	18 U	0.83 U
Dieldrin	1.9	0.57 U	0.61 U	0.86 U	0.67 U	8.7 U	3.7 U	13 U	0.61 U
Endosulfan I	2.9	0.38 U	0.41 U	0.58 U	0.45 U	5.8 U	2.5 U	8.7 U	0.40 U
Endosulfan II	14	1.9 U	2.0 U	2.9 U	2.2 U	29 U	12 U	43 U	2.0 U
Endosulfan sulfate	5.4	0.68 U	0.73 U	1.0 U	0.80 U	10 U	4.4 U	16 U	0.72 U
Endrin	2.22	1.2 U	1.3 U	1.8 U	1.4 U	18 U	7.7 U	27 U	1.2 U
Endrin Aldehyde		1.1 J	0.71 U	1.0 U	0.78 U	10 U	4.3 U	15 U	0.70 U
Endrin Ketone		1.0 U	1.1 U	1.6 U	1.2 U	16 U	6.8 U	24 U	1.1 U
gamma-BHC (Lindane)	2.37	1.4 JN	0.39 JN	0.55 U	0.43 U	5.5 U	2.4 U	8.3 U	1.5 U
gamma-Chlordane		0.80 J	0.81 J	0.65 U	0.51 U	6.6 U	2.8 U	9.9 U	5.0
Heptachlor	68	0.54 U	0.57 U	0.81 U	0.63 U	8.2 U	3.5 U	12 U	0.57 U
Heptachlor Epoxide	2.47	0.29 U	0.31 U	0.45 U	0.34 U	4.5 U	1.9 U	6.7 U	0.31 U
Methoxychlor	18.7	4.4 U	4.7 U	6.7 U	5.2 U	67 U	29 U	100 U	4.7 U
Toxaphene	0.1	24 U	61 U	37 U	28 U	370 U	160 U	550 U	26 U

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J+ - Analyte present. May be biased High.

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D - Analyte concentration is from diluted analysis



REGION 3 ADMINISTRATOR

PHILADELPHIA, PA 19103

June 17, 2024

MEMORANDUM

SUBJECT: Army Creek
6th Five Year Review
Risk Assessment Results for April 2021 and July 2023 Groundwater Results

FROM: Linda R. Watson
Toxicologist/Risk Assessor
SEMD Technical Support Section

TO: Kaitlin Hess, RPM
Remedial Project Manager

I have reviewed the Army Creek, 6th Five Year review and have incorporated my comments in the Word document for review ease.

All contaminants provided in Table 1 and 2 were screened using EPA's RSL values (HI=0.1) for the most current groundwater data (April 2021 and *May 2023* and July 2023) which were included in this document review request. Risks were calculated for the Residential scenario using EPA's Risk Calculator and default exposure assumptions. Below are the risk results. Bold denotes an exceedance of EPA's acceptable risk criteria.

Upper Sand

MW-22NU (4-14-2021)

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
PFOS	0.014	7.0	4.2	7.1E-06
PFOA	0.073	122	73	2.7E-02
PFHxS	0.058	1.5E-01	8.9E-02	-
PFNA	0.028	4.8E-01	2.9E-01	-
Cobalt	0.097	1.6E-04	9.7E-05	
Total Risks		129	78	2.7E-02

Upper Sand

P-4 (4-13-2021)

	Concentration (ug/L)	Child Resident HI	Adult Resident HI	Lifetime Cancer Risk
PFOS	0.030	15	9	1.5E-05
PFOA	0.160	266	160	5.9E-02
PFHxS	0.130	3.3E-01	2.0E-01	-
PFNA	0.039	6.6E-01	4.6E-01	-
1,2-DCA	13	1.0	9.6E-01	-
Cobalt	275	45.8	27.5	-
Iron	78900	5.7	3.4	-
Manganese	3760	8.7	5.4	-
Total Risks		343	207	5.9E-02

Upper Sand

WL-1U (4-13-2021)

	Concentration (ug/L)	Child Resident HI	Adult Resident HI	Lifetime Cancer Risk
PFOS	0.0088	4.4	2.6	4.5E-06
PFOA	0.037	62	37	1.4E-02
1,4-dioxane	3	5.3E-02	5.1E-02	6.5E-06
Benzene	1.7	5.1E-02	4.2E-02	3.7E-06
Cobalt	15.3	2.6	1.5	-
Iron	19400	1.4	8.4E-01	-
Manganese	258	6.0E-01	3.7E-01	-
Total Risks		70.6	42.5	1.4E-02

Upper Sand

WL-2U (4-15-2021)

	Concentration (ug/L)	Child Resident HI	Adult Resident HI	Lifetime Cancer Risk
PFOS	0.0067	3.3	2.0	3.4E-06
PFOA	0.030	49.9	30	1.1E-02
chloroform	0.51	1.3E-01	1.3E-01	2.3E-06
Total Risks		53.4	32.2	1.1E-02

Risk Summary for Upper Sand for April 2023 Data

Risk exceeds EPA's noncancer threshold (HI=1) at all four above upper sand locations due to PFOS and PFOA. Non-cancer risk also exceeds the non-cancer threshold at well P-4 due to cobalt, iron and manganese and at well WL-1U due to cobalt and iron. Cancer risk exceeds EPA's criteria at all four sampling locations due to PFOA.

Lower Sand

MW-22N (4-14-2021)

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
PFOS	0.0064	3.2	1.9	3.2E-06
PFOA	0.033	5.5	3.3	1.2E-02
PFNA	0.009	1.5E-01	9.2E-02	-
Cobalt	0.8	1.3E-01	8.0E-02	-
Total Risks		58.4	35	1.2E-02

Lower Sand

P-4L (4-14-21)

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
PFOS	0.0065	3.2	2.0	3.3E-06
PFOA	0.043	71.6	43	1.6E-02
1,2-DCA	0.91	7.0E-02	6.7E-02	5.3E-06
Cobalt	387	6.4	3.9	-
Iron	1870	1.3E-01	8.1E-02	-
Manganese	550	1.3	7.8E-01	-
Total Risks		82.7	49.8	1.6E-02

Lower Sand

RW-10 (4-14-21)

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
PFOS	0.0064	3.2	1.9	3.2E-06
PFOA	0.063	105	63	2.4E-02
PFHxS	0.042	1.1E-01	6.4E-02	-
PFNA	0.94	2.4E-01	1.4E-01	-
Cobalt	25.4	4.2	2.5	-
Iron	22200	1.6	9.6E-01	-
Manganese	1140	2.6	1.6	-
Total Risks		117	70.3	2.4E-02

Lower Sand

WL-1L (4-13-21)

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
PFOA	0.0082	13.7	8.2	3.1E-03
Cobalt	165	27.5	16.5	-
Iron	47900	3.4	2.1	-
Manganese	1750	4.0	8.2	-
Total Risks		48.6	29.3	3.1E-03

Lower Sand

WL-2L (4-15-21)

	Concentration (ug/L)	Child Resident HI	Adult Resident HI	Lifetime Cancer Risk
PFOS	0.0062	3.1	1.9	3.1E-06
PFOA	0.027	45	27	1.0E-02
Chloroform	0.4	1.0E-01	1.0E-01	1.8E-06
Cobalt	8.2	1.4	8.2E-01	-
Iron	359	2.6E-02	1.6E-02	-
Manganese	145	3.3E-01	2.1E-01	-
Total Risks		49.9	30	1.0E-02

Risk Summary for Lower Sand for April 2023 Data

Risk exceeds EPA's noncancer threshold (HI=1) at all four above upper sand locations due to PFOS and PFOA. The non-cancer risk threshold is also exceeded at wells P-4L due to cobalt, well RW-10 due to cobalt, iron and manganese, well WL-1L due to cobalt, iron and manganese, and well WL-2L due to cobalt.

In addition, to evaluating the April 2021 groundwater data, I also calculated risk for the July 2023 data which only included VOC and metal analysis. PFAS's results were not provided for this sampling date. Risk results are only provided at the locations where risk is exceeded.

MW-54 (7-25-2023)

	Concentration (ug/L)	Child Resident HI	Adult Resident HI	Lifetime Cancer Risk
Cobalt	15	2.5	1.5	-
Manganese	292	6.7E-01	4.2E-01	-
Total Risks		3.2	1.9	-

MW-54 (4-26-23)

	Concentration (ug/L)	Child Resident HI	Adult Resident HI	Lifetime Cancer Risk
Cobalt	14	2.3	1.4	-
Manganese	247	5.7E-01	3.5E-01	-
Total Risks		2.9	1.8	-

MW-56 (7-25-23)

	Concentration (ug/L)	Child Resident HI	Adult Resident HI	Lifetime Cancer Risk
Cobalt	25.2	4.2	2.5	-
Chloroform	0.37	9.3E-02	9.2E-02	-
Total Risks		4.3	2.6	-

MW-56 (4-26-23)

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
Cobalt	25.3	4.2	2.5	-
Manganese	48	1.1E-01	6.8E-02	-
Chloroform	0.35	8.8E-02	8.7E-02	1.6E-06
Total Risks		4.4	2.7	1.6E-06

MW-58 (7-25-23)

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
Cobalt	10.7	1.8	1.1	-
Manganese	226	5.2E-01	3.2E-01	-
PCE	7.1	1.8E-01	1.4E-01	6.3E-07
Total Risks		2.5	1.5	6.3E-07

Upper Sand

P-4, Upper Sand (7-26-23)

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
1,2-DCA	5.6	4.3E-01	4.1E-01	3.3E-05
Cobalt	186	31	18.6	-
Iron	55400	4.0	2.4	-
Manganese	2720	6.3	3.9	-
Total Risks		41.6	25.3	3.3E-05

WL-1U, Upper Sand (7-26-23)

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
1,4-dioxane	1.9	3.4E-02	3.2E-02	4.1E-06
Benzene	1.2	3.6E-02	3.0E-02	2.6E-06
Cobalt	13.9	2.3	1.4	
Iron	21700	1.6	9.3E-01	
Manganese	248	5.7E-01	3.5E-01	
Total Risks		4.5	2.7	6.8E-06

WL-2U, Upper Sand (7-26-23)

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
Chloroform	0.36	9.1E-02	8.9E-02	1.6E-06
Total Risks		9.1E-02	8.9E-02	1.6E-06

WL-3U, Upper Sand (7-26-23) – below screening levels

WL-4U, Upper Sand (7-26-23) – below screening levels

WL-5U, Upper Sand (5-01-23)

	Concentration (ug/L)	Child Resident HI	Adult Resident HI	Lifetime Cancer Risk
Chloroform	0.36	9.1E-02	9.0E-02	1.6E-06
Cobalt	4.6	7.7E-01	4.6E-01	-
Iron	6020	4.3E-01	2.6E-01	-
Manganese	48.4	1.1E-01	7.0E-02	-
Total Risks		1.4	8.8E-01	1.6E-06

WL-5U, Upper Sand (7-26-23)

	Concentration (ug/L)	Child Resident HI	Adult Resident HI	Lifetime Cancer Risk
Cobalt	2.7	4.5E-01	2.7E-01	-
Iron	94.6	6.8E-03	4.1E-03	-
Manganese	23	5.3E-02	3.3E-02	-
Total Risks		5.1E-01	3.1E-01	-

Lower Sand

WL-1L, Lower Sand (7-26-23)

	Concentration (ug/L)	Child Resident HI	Adult Resident HI	Lifetime Cancer Risk
Cobalt	138	23	13.8	-
Iron	39600	2.8	1.7	-
Manganese	1510	3.5	2.2	-
Total Risks		29.3	17.7	-

WL-2L, Lower Sand (7-26-23)

	Concentration (ug/L)	Child Resident HI	Adult Resident HI	Lifetime Cancer Risk
Chloroform	0.38	9.6E-02	9.5E-02	1.7E-06
Total Risks		9.6E-02	9.5E-02	1.7E-06

WL-3L, Lower Sand (7-26-23)

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
1,2-DCA	6.7	5.2E-01	4.9E-01	3.9E-05
Cobalt	136	22.6	13.6	-
Iron	1500	1.1E-01	6.5E-02	-
Manganese	5440	12.5	7.7	-
Total Risks		35.8	21.9	3.9E-05

P-4L, Lower Sand (7-26-23)

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
1,2-DCA	0.65	5.0E-02	4.8E-02	3.8E-06
Cobalt	76.7	12.8	7.7	-
Manganese	1000	2.3	1.4	-
Total Risks		15.1	9.2	3.8E-06

WL-5L, Lower Sand (5-1-23)

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
1,2-DCA	3.6	2.8E-01	8.7E-01	2.1E-05
Cobalt	8.7	1.5	2.7E-01	-
Manganese	412	9.5E-01	5.9E-01	-
Total Risks		2.7	1.7	2.1E-05

WL-5L, Lower Sand (7-26-23)

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
1,2-DCA	2.4	1.9E-01	1.8E-01	1.4E-05
Cobalt	10.6	1.8	1.1	-
Manganese	420	9.7E-01	6.0E-01	-
Total Risks		2.9	1.8	1.4E-05

Risk Summary for Wells for 7-26-23 and 5-1-23 Data

All wells exceed EPA's non-cancer threshold of HI<1 at all wells with the exception of well WL-2L, WL-2U, WL-5U. Risk is primarily due to cobalt with a lesser extent manganese. Iron only exceeds non-cancer risk WL-1L, Lower Sand. Cancer risk is within EPA's acceptable risk criteria for 1,2-dichloroethane.

Please note, data was not provided for PFAS's during this sampling event.

Artesian Water Company – Table 3

Data were screened using EPA’s tap water RSL’s and the following should be noted:

- AWC-2 (July 2023) – Below screening
- AWC-G3R (July 2023) – BCEE detected at 1.8D (which indicates the sample was diluted) The RSL for BCEE is 1.4E-02 ug/L. Therefore, this detection exceeds its RSL.

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
BCEE	1.8	-	-	1.3E-04

Cancer risk for BCEE is at EPA’s acceptable risk criteria (1E-04) since EPA guidance states risk should be reported using one significant figure.

- AWC-6R (July 2023) – cobalt (9 ug/L) and Manganese (204 ug/L) exceed there RSL values.

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
Cobalt	9	1.5	9.0E-01	-
Manganese	204	4.7E-01	2.9E-01	-
Total Risks		1.9	1.2	-

Non-cancer risk exceeds EPA’s acceptable threshold of HI<1 for the Child Resident due to cobalt. Non-cancer risk for the Adult Resident is at EPA’s acceptable threshold when round to one significant figure.

- AWC-7 – cobalt (3 ug/L) and manganese (102 ug/L) exceed there RSL values.

	<i>Concentration (ug/L)</i>	<i>Child Resident HI</i>	<i>Adult Resident HI</i>	<i>Lifetime Cancer Risk</i>
Cobalt	3	5.0E-01	3.0E-01	-
Manganese	102	2.4E-01	1.5E-01	-
Total Risks		7.4E-01	4.5E-01	-

Non-cancer risk is below EPA’s acceptable threshold of HI<1.

If you have any questions regarding this review, please contact me and/or my Supervisor, Cathleen Kennedy during my absence.

cc: R3_TSBCComment_File