SIXTH FIVE-YEAR REVIEW REPORT FOR
SAEGERTOWN INDUSTRIAL AREA SUPERFUND SITE
CRAWFORD COUNTY, PENNSYLVANIA

AUGUST 2022

Prepared by

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Table of Contents

LIST OF ABBREVIATIONS & ACRONYMS....2
I. INTRODUCTION....3
Site Background....3
FIVE-YEAR REVIEW SUMMARY FORM....4
II. RESPONSE ACTION SUMMARY....4
Basis for Taking Action....4
Response Actions....5
Status of Implementation....6
Institutional Control Review....7
Systems Operations/Operation & Maintenance (O&M)....9
III. PROGRESS SINCE THE PREVIOUS REVIEW....9
IV. FIVE-YEAR REVIEW PROCESS....10
Community Notification, Involvement & Site Interviews....10
Data Review....10
Site Inspection....16
V. TECHNICAL ASSESSMENT....18
QUESTION A: Is the remedy functioning as intended by the decision documents?....18
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?....19
QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?....20
VI. ISSUES/RECOMMENDATIONS....20
OTHER FINDINGS....20
VII. PROTECTIVENESS STATEMENT....21
VIII. GOVERNMENT PERFORMANCE AND RESULTS ACT MEASURES....21
IX. NEXT REVIEW....21
APPENDIX A – REFERENCE LIST....A-1
APPENDIX B – SITE CHRONOLOGY....B-1
APPENDIX C – SITE MAPS....C-1
APPENDIX D – DETAILED ARARs REVIEW TABLE....D-1
APPENDIX E – DATA ANALYSIS FIGURES....E-1
APPENDIX F – DETAILED TOXICITY REVIEW....F-1

LIST OF ABBREVIATIONS & ACRONYMS

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
COC	Contaminant of Concern
DCE	Dichloroethylene
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five-Year Review
GATX	General American Transportation Corporation
HQ	Hazard Quotient
IC	Institutional Control
IUR	Inhalation Unit Risk
LORD	LORD Corporation (aka Parker LORD)
µg/L	Micrograms per Liter
mg/kg	Milligrams per Kilogram
MCL	Maximum Contaminant Level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PA DEP	Pennsylvania Department of Environmental Protection
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethylene (aka, “perchloroethylene”)
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RSL	Regional Screening Level
RZ	Reactive Zone
SCI	Spectrum Controls Incorporated
SMC	Saegertown Manufacturing Corporation
SDWA	Safe Drinking Water Act
TBC	To-Be-Considered
TCA	Trichloroethane
TCE	Trichloroethylene
VOC	Volatile Organic Compound
UU/UE	Unlimited Use and Unrestricted Exposure

I. INTRODUCTION

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

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

This is the sixth FYR for the Saegertown Industrial Area Superfund Site (Site). The triggering action for this statutory review is the completion date of the previous FYR, August 28, 2017. The FYR has been prepared because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

The Site consists of one operable unit (OU1). The LORD Corporation (LORD) property is a portion of OU1 and is the focus of this FYR. The other original portions of the Site included the General American Transportation Corporation (GATX) property, the Saegertown Manufacturing Corporation (SMC) property, and the Spectrum Controls Incorporated (SCI) property. GATX completed the remedial action on its property in July 1997. EPA determined that the releases from the SMC and the SCI properties posed no significant threat to human health or the environment and selected no action for those properties. The GATX, SMC, and SCI properties were removed from National Priorities List (NPL) in 1997 through a partial deletion (Appendix C, Figure C-2) and are not being assessed in this FYR.

The FYR was led by EPA's Remedial Project Manager (RPM) and assisted by EPA's Hydrologist, Risk Assessor, Biologist, and Community Involvement Coordinator. The Pennsylvania Department of Environmental Protection also assisted EPA in the development of this FYR. The RPM notified LORD of the start of this FYR which was initiated on September 15, 2021.

Appendix A includes a list of documents reviewed for this FYR. Appendix B includes a Site chronology. Appendix C includes Site figures.

Site Background

The Site is in Saegertown, Crawford County, Pennsylvania (Appendix C, Figure C-1) and consists of the LORD property (Figures 1 and C-2) located at 601 South Street. The LORD facility produces adhesives, urethane coatings and rubber chemicals (Figure C-1). Railroad tracks, a commercial property, and French Creek are to the west of the Site. The Borough of Saegertown's Fire department facilities, wetlands, vacant land, and industrial properties border the Site to the north and south. Woodcock Creek is south of the Site. Vacant land and open space border the Site to the east.

The Site originally consisted of about 100 acres and included properties owned by four separate companies: the LORD Corporation; GATX; SMC; and SCI. Past operations at these facilities contaminated groundwater, soil, and sediment with hazardous chemicals. The previous FYRs and the 1993 Record of Decision (ROD) contain additional background information on the GATX, SMC, and SCI properties which were removed through partial deletion.

Groundwater at the Site is present in the alluvial aquifer in three zones: shallow, intermediate, and deep. Groundwater in both aquifers flows west-southwest with shallow groundwater flowing toward French Creek and deeper groundwater flowing beneath the creek. Groundwater is the sole source of drinking water in western Crawford County. Saegertown residents receive potable water from seven public supply wells, five of which are

located within one mile of the Site. These wells are upgradient of the Site. Testing of the Saegertown public supply wells includes Site-related constituents and none of these constituents have been detected in the wells during this five-year review period with the most recent data reported by the Borough being 2018 through 2020. There are private drinking water wells west of French Creek which had been routinely monitored until 2018 when EPA determined that monitoring was no longer necessary due to the lack of detection of Site-related contaminants at or above cleanup standards for the Site.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Saegertown Industrial Area		
EPA ID: PAD980692487		
Region: 3	**State:** Pennsylvania	**City/County:** Saegertown/Crawford
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name: Stephen Tyahla and Kenneth Champagne		
Author affiliation: EPA Region 3		
Review period: 9/15/2021 – 8/28/2022		
Date of Site inspection: 4/13/2022		
Type of review: Statutory		
Review number: 6		
Triggering action date: 8/28/2017		
Due date *(five years after triggering action date)*: 8/28/2022		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

EPA listed the Site on the NPL in 1990 and the Site's PRPs - LORD, SMC, SCI and GATX - signed an Administrative Order on Consent (AOC) with EPA to conduct a Remedial Investigation/Feasibility Study (RI/FS). EPA concluded that groundwater at the LORD property posed an unacceptable risk to future on-site residents via ingestion, inhalation, and dermal contact. EPA also concluded that the former GATX pond, sludge bed and lagoon areas posed an unacceptable risk to future on-site residents through ingestion of soil contaminants.

Table 1: COC by Media - Site COCs were identified during the RI and presented in the 1993 ROD.

COC	Media
VOCs PCBs Metals PAHs	Sludge and soil
TCE PCE 1,2-DCE Vinyl Chloride	Groundwater
Notes: PCB = polychlorinated biphenyl TCE = trichloroethene PCE = tetrachloroethene (aka, "perchloroethylene") DCE = dichloroethene Source: 1993 ROD, page 37	

Response Actions

EPA selected the Site's remedy in a 1993 ROD, and later modified it with two Explanations of Significant Differences (ESDs) in 1995 and 1996, and a ROD Amendment in 2002 and consist of the following components:

- Excavation and off-site incineration of the contaminated sludge and soil from the lagoon, sludge bed and pond areas on the former GATX property. *(completed and deleted)*
- Restoration or replacement of the pond and wetland area on the former GATX property. *(completed and deleted)*
- Long-term groundwater monitoring on the former GATX property. *(completed and deleted)*
- Delineation of the groundwater plume in the vicinity of the LORD property.
- Enhanced bioremediation of VOCs in groundwater using a molasses-based carbon source and analysis of bioattenuation parameters and water quality to monitor performance at the LORD property.
- Ongoing operation and maintenance of the PW7 domestic well treatment system. *(completed)*
- A provision for additional residential treatment systems, if determined necessary.
- Institutional controls, in the form of safety and health management planning and groundwater use restrictions at the LORD property.

The Remedial Action Objectives (RAOs) provided in the 1993 ROD and the 2002 ROD Amendment included:

- Provide adequate protection against:
    1) human consumption of water containing carcinogens and non-carcinogens in excess of the Safe Drinking Water Act (SDWA) MCLs.
    2) a total cancer risk for all carcinogens greater than 1×10^{-4}; and
    3) a total hazard index greater than 1.
- Restore aquifer to conform to Applicable or Relevant and Appropriate Requirements (ARARs).
- Prevent migration of contaminated groundwater to French and Woodcock Creeks.
- Reduce or eliminate migration of subsurface contaminants to groundwater.

The 2002 ROD Amendment updated the groundwater cleanup standards to SDWA MCLs and slightly revised the list of Site groundwater COCs. Preliminary Remediation Goals (PRGs) were established for several contaminants at levels below the SDWA MCLs to ensure the risk does not exceed EPA guidelines (cancer risk more than 1×10^{-4} or a Hazard Index greater than 1). The groundwater COCs and associated cleanup standards established by the 2002 ROD Amendment are provided in Table 2.

Table 2: Groundwater COC Cleanup Standards

Groundwater COC	2002 ROD Amdt. Cleanup Standard (µg/L)
1,1-DCE	3[b]
Cis-1,2-DCE	50[b]
Trans-1,2-DCE	100[a]
Ethylbenzene	100[b]
Toluene	100[b]
TCE	5[a]
PCE	5[a]
Vinyl Chloride	2[a]
2-Chlorotoluene	200[c]

Notes:
µg/L = micrograms per liter
a = SDWA MCL
b = PRG established below SDWA MCL to ensure risk does not exceed EPA guidelines
c = A performance standard was established at 200 µg/L to ensure a Hazard Index (HI) of less than 1. No federal or state ARAR exists for this COC.

Status of Implementation

LORD completed the remedial action on its property in September 2003. Construction activities included:

- Installation of 22 carbon source introduction wells within three reactive zones (RZs).
- Construction of two additional monitoring wells.
- Abandonment of 13 monitoring wells/piezometers.
- Construction of a trailer-mounted carbon source solution introduction system.

The location of the three reactive zones (RZ-1, RZ-2, and RZ-3) (Figure 2) were determined based on the groundwater flow at the Site and the location of source areas.

Two modifications were made in 2005 including:

- Installation of four additional introduction wells.
- Adjustment of the concentration and volume of molasses solution to achieve the maximum distribution of carbon-source solution in the subsurface environment.

LORD performed molasses solution introductions about nine times per year after implementation of the full-scale remedial system in November 2003. Injections in RZ-2 and RZ-3 were discontinued in June 2010; injections at RZ-1 were discontinued in December 2010 (Figure 2).

In 1996 and 1997, prior to the issuance of the 2002 ROD Amendment, LORD conducted a Pre-Remedial Design investigation to evaluate site hydrogeology and assess groundwater quality. During this investigation, private well PW7, west of French Creek, was found to contain vinyl chloride above the MCL. Two other private wells west of French Creek were also found to contain vinyl chloride, but at levels below the MCL. LORD immediately began providing bottled water to the affected residence, installed a domestic treatment system at PW7, and began monitoring the three private wells, as required by the Unilateral Administrative Order issued by EPA in February 1997. The PW7 treatment system effectively operated from May 1997 through January 2018 as groundwater performance standards (MCLs) were met at this well.

On November 18, 2021, EPA agreed with the conclusions and recommendations of LORD's "2020 Annual Groundwater Monitoring Report, Saegertown, PA" submitted to EPA on July 26, 2021, that called for continued semi-annual and annual groundwater quality monitoring to assess the effectiveness of the bioremediation.

LORD was acquired by Parker Hannifin Corporation in October 2019 and LORD now operates as Parker LORD Corporation, a subsidiary of Parker Hannifin Corp. Throughout this report, LORD refers to Parker LORD.

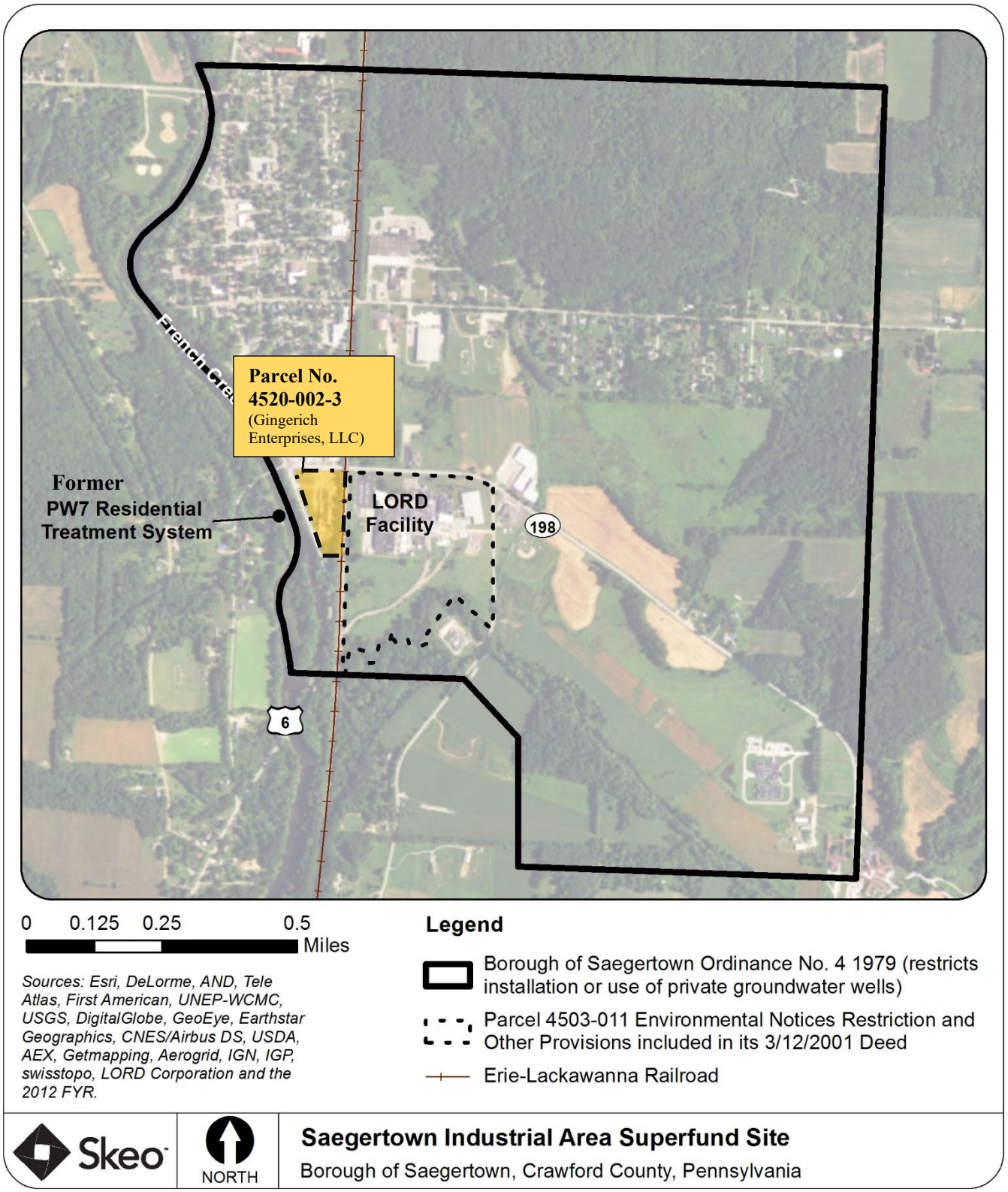
Institutional Control Review

The institutional controls required by the 2002 ROD Amendment have been implemented through the use of a health and safety program, the Borough of Saegertown's Ordinance, and deed restrictions. Table 3 summarizes the institutional controls for the Site.

Table 3: Summary of Implemented Institutional Controls (ICs)

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date
Groundwater	Yes	Yes	4503-011 (LORD property)	Prohibits use of site groundwater for any purpose without PA DEP approval	Environmental Notices, Restriction and Other Provisions in Deed (2001)
				Ensure proper supervision, monitoring and use of personal protective equipment is used during excavation activities where groundwater could be encountered	LORD Site-Specific Health and Safety Plan (2008)
			4520-002-3 (Gingerich Enterprises, LLC Property)	Prohibits the construction, drilling, operation or maintenance of private water wells or systems within the Borough of Saegertown	Borough of Saegertown Ordinance Number 4, Series (1979)
Soil	Yes	Yes	4503-011 (LORD Property)	Prohibits residential use and limits land use to industrial. Prohibits excavation or disturbance of surface or subsurface soils, unless under the conditions of an approved health and site safety plan.	Environmental Notices, Restriction and Other Provisions in Deed (2001)

Figure 1: 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 (O&M)

LORD's contractor, Arcadis, performs semi-annual and annual groundwater monitoring. Samples are analyzed for COCs and biogeochemical parameters necessary for evaluation of the bioremediation. In 2017, EPA approved a reduction in the required maintenance frequency of the PW7 water treatment system to quarterly and in 2018 EPA determined that performance standards had been met at PW7 and treatment was no longer required. Additionally in 2017, EPA approved the discontinuation of monitoring at private wells PW20A and PW19 (Figure 2).

III. PROGRESS SINCE THE PREVIOUS REVIEW

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

Table 4: Protectiveness Determinations/Statements from the 2017 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Short-term Protective	The remedy at the Site currently protects human health and the environment because soil contamination has been removed, groundwater remediation and monitoring are ongoing and there is no exposure to groundwater contamination. However, in order for the remedy to be protective over the long-term, the remedy's performance should be monitored and optimized as needed. Optimization may include, but not be limited to, additional substrate (molasses) injections.

Table 5: Status of Recommendation from the 2017 FYR

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date
1	Certain COCs remain above remedy performance standards in nine groundwater monitoring wells located on LORD's property (GM-12S, GM-13S, GM-13D, GM-14S, GM-23S, GM-11D, W11S, W8S and GM-17S) and two groundwater monitoring wells located downgradient (GM-15D and GM-20D).	The remedy's performance should be monitored and optimized as needed. Optimization may include, but not be limited to, additional substrate (molasses) injections.	Completed	LORD continues to monitor COCs in the groundwater wells at the Site. Based on progress observed of the remedy's performance, no additional substrate injections were deemed necessary.	11/18/2021

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On April 1, 2022, EPA published a public notice in the Meadville Tribune stating that there was a FYR and inviting the public to submit comments to EPA. No comments were received. The results of the review and this report will be made available at the Site's information repository, located at Saegertown Area Library, 325 Broad Street, Saegertown, Pennsylvania.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy**.** The results of these interviews are summarized below.

PA DEP representative John Morettini indicated the PA DEP is satisfied with the progress and current status of the Site. Mr. Morettini identified per- and polyfluoroalkyl substances (PFAS) contamination in two of the Borough of Saegertown's public water supply wells. PA DEP is working closely with EPA and the Borough to investigate the extent and source of the PFAS contamination. Overall, he is pleased with LORD's work and communications with the Borough.

Charles Lawrence, Borough manager, feels very well informed of the site status and cleanup. Mr. Lawrence indicated he is vigilant of the institutional controls and groundwater use restrictions within the Borough. He is not aware of current community concerns related to the Site. The most important environmental issue that Borough is currently working on is identifying the source of PFAS contamination in one of the Borough drinking water wells. The Borough is working with PA DEP on the drinking water well sampling. Mr. Lawrence indicated that the best way to communicate with the community is through the monthly community newsletter.

Data Review

This data review section summarizes groundwater data from 2017 - 2021 for monitoring wells located on and off the LORD property. Arcadis, on behalf of LORD, submits monitoring reports to EPA annually. Arcadis submitted the most recent annual report summarizing the 2021 groundwater data on June 1, 2022 (Arcadis, 2022).

Semi-annual and Annual Groundwater Monitoring

During this FYR period, the PRP contractor collected annual and semi-annual groundwater data from on-site and off-site monitoring wells.

The PRP's contractor, Arcadis, monitors groundwater quality in two aquifer zones: shallow/intermediate and deep. The semi-annual event targets nine shallow wells and five deep wells. The annual event targets the same fourteen wells and an additional five wells, which includes one off-site downgradient shallow/intermediate well (GM-20I) and four additional deep monitoring wells. Samples from these monitoring wells are analyzed for COCs and field parameters.

Shallow Monitoring Wells

Generally, exceedances were observed for PCE, TCE, cis-1,2-DCE, and vinyl chloride. In the shallow portion of the aquifer (well depths above 15 feet bgs), COC concentrations in seven out of ten wells exceeded the cleanup standards during this FYR period (Table 6). Wells GM-12S, W8S, and GM-15S did not have exceedances. Well GMT-1, an on-site well, had exceedances for vinyl chloride in 2018 and 2019 but was found to be silted in during the 2020 sampling and no longer serviceable. On May 24, 2022, Arcadis abandoned GMT-1, on the Lord property in compliance with abandonment procedures approved by EPA and PA DEP on November 29, 2021. GM-15S is a downgradient off-site well located on the Gingerich Enterprises, LLC property (Figure 2). GM-15S had no exceedances of cleanup standards during this FYR period.

During this FYR period, the shallow wells with the highest VOC concentrations were GM-17S, W11S, GM-13S, GM-23S, and GM-14S. Wells GM-13S (at the western property boundary) and W11S (RZ-2 area) have the highest concentrations of cis-1,2-DCE and vinyl chloride, which are degradation products of PCE and TCE. After the cessation of the molasses injections in 2010, cis-1,2-DCE and vinyl chloride concentrations increased and have remained elevated in these wells indicating ongoing degradation of PCE and TCE.

Wells GM-23S (located at the western property boundary) and GM-14S (located at the southwestern property boundary) have the highest consistent concentrations of PCE during this FYR period. PCE and TCE concentrations at wells W11S and GM-13S were not detected; however, detection limits were sometimes above the cleanup standards. Monitoring well GM-15S, located on the Gingerich Enterprises, LLC property, is downgradient of well GM-23S and GM-15S has concentrations below cleanup goals for all COCs. Well W8S, the most southern well, had no exceedances of cleanup goals during this FYR period and the only detections of significance were of PCE with the highest detection being 4.4 µg/L in 2017; the 2020 detection of PCE was 2.0 µg/L and estimated 2021 detection of PCE was 2.4 µg/L.

Table 6: Annual Maximum Detected Concentrations in Shallow Aquifer Zone (2017-2021)

Well Location		Sample Date	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)	Vinyl Chloride (µg/L)
Cleanup Standard			5	5	50	2
On site – RZ-1 Area	GM-12S	2017	< 1.0	< 1.0	< 0.40J	< 1.0
		2018	< 1.0	< 1.0	0.68 J	< 1.0
		2019	< 1.0	< 1.0	< 1.0	0.75 J
		2020	0.45 J	0.34 J	0.17 J	< 1.0
		2021	< 5.0	< 5.0	< 5.0	< 5.0
	GM-17S (Well abandoned on 10/28/2019 for plant expansion.)	2017	< 1.0	< 1.0	5.5	< 1.0
		2018	< 20	17 J	**390**	**130**
		2019	**5.6**	**12**	33	**10**
		2020	NS	NS	NS	NS
		2021	NS	NS	NS	NS
On site – RZ-2 Area	GMT-1 (Well abandoned on 5/24/2022 due to silted-in pump.)	2017	< 1.0	< 1.0	< 1.0	1.2
		2018	< 1.0	< 1.0	0.84 J	**6.3**
		2019	< 1.0	< 1.0	< 1.0	**6.3**
		2020	NS	NS	NS	NS
		2021	NS	NS	NS	NS
	W11S	2017	< 20	< 20	**1,500**	**510**
		2018	< 100	< 100	**1,600**	**300**
		2019	< 67	< 67	**1,600**	**780**
		2020	< 67	< 67	**1,000**	**720**
		2021	< 83	< 83	**1,800**	**170**
Western Property Boundary - RZ-3 Area	W7S	2017	0.79 J	< 1.0	**57**	**14**
		2018	0.37 J	< 1.0	9.7	1.3
		2019	0.27 J	< 1.0	15	1.4
		2020	< 10	< 10	**190**	**20**
		2021	< 10	< 10	**53**	**4.9**
	GM-13S	2017	< 1.0	< 1.0	5.2	**22**
		2018	< 1.0	< 1.0	13	**35**

Well Location		Sample Date	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)	Vinyl Chloride (µg/L)
		2019	< 10	< 10	**200**	**120**
		2020	< 1.0	< 1.0	3.6	**15**
		2021	< 10	< 10	**330**	**200**
	GM-23S	2017	**57**	**19**	**80**	1.8 J
		2018	**36**	**15**	**68**	< 5.0
		2019	3.7	1.4	7.5	0.44 J
		2020	**13**	3.1	5.3	< 1.0
		2021	NS	NS	NS	NS
Side-gradient Property Boundary	W8S	2017	4.4	1.2	1.1	< 1.0
		2018	2.4	< 1.0	< 1.0	< 1.0
		2019	1.7	< 1.0	< 1.0	< 1.0
		2020	2.0	< 1.0	< 1.0	< 1.0
		2021	2.4 J	0.49 J	0.85 J	< 5.0
	GM-14S	2017	**14**	1.3	4.2	< 1.0
		2018	**8.7**	0.82 J	1.1	< 1.0
		2019	**9.6**	< 1.0	< 1.0	< 1.0
		2020	**10**	0.85 J	4.0	< 1.0
		2021	**10**	0.95 J	< 5.0	< 5.0
Off-site Downgradient (East of French Creek)	GM-15S	2017	< 1.0	< 1.0	0.78 J	< 1.0
		2018	0.48 J	< 1.0	< 1.0	< 1.0
		2019	0.30 J	< 1.0	< 1.0	< 1.0
		2020	< 1.0	< 1.0	< 1.0	< 1.0
		2021	0.49 J	< 5.0	< 5.0	< 5.0

Notes:
ND = Not detected, detection limit not specified
NS = Not sampled
J = Estimated concentration
Bold = Exceeds the cleanup standard

Intermediate Monitoring Well

In the intermediate portion of the aquifer (well depths between 15 and 40 feet bgs), there have been no exceedances of the cleanup standards in monitoring well GM-20I for this FYR period (Table 7).

Table 7: Annual Maximum Detected Concentrations in Intermediate Aquifer Zone (2017-2021)

Well Location		Sample Date	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)	Vinyl Chloride (µg/L)
		Cleanup Standard	5	5	50	2
Off site (West of French Creek)	GM-20I	2017	< 1.0	< 1.0	< 1.0	< 1.0
		2018	< 1.0	< 1.0	< 1.0	< 1.0
		2019	< 1.0	< 1.0	< 1.0	< 1.0
		2020	< 1.0	< 1.0	< 1.0	< 1.0
		2021	< 5.0	< 5.0	< 5.0	< 5.0

Well Location	Sample Date	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)	Vinyl Chloride (µg/L)
Notes: ND = Not detected, detection limit not specified NS = Not sampled (e.g., well inaccessible or dry / abandoned) J = Estimated concentration F1 = MS and/or MSD recovery is outside acceptance limits **Bold** = Exceeds the cleanup standard					

Deep Monitoring Wells

In the deep portion of the aquifer (well depths deeper than 40 feet bgs or screened at the bedrock interface), COC concentrations in four out of nine wells exceeded the cleanup standards during this FYR period (Table 8). Wells GM-12D, W7D, GM-23D, W8D, and GM-14D did not have exceedances. On-site well GM-11D had exceedances for cis-1,2-DCE and vinyl chloride. Well GM-13D (at the western property boundary) had exceedances for PCE, TCE, cis-1,2-DCE and vinyl chloride in each year during this FYR period. Well GM-15D (located off-site and downgradient) was non-detect for PCE but exceeded cleanup goals to the degradation products (TCE, cis-1,2-DCE, and vinyl chloride). On the western side of French Creek, well GM-20D exceeded cleanup goals only for vinyl chloride with concentrations ranging from 6.1 to 8.9 µg/L.

Table 8: Annual Maximum Detected Concentrations in Deep Aquifer Zone (2017-2021)

Well Location		Sample Date	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)	Vinyl Chloride (µg/L)
Cleanup Standard			5	5	50	2
On site	GM-11D	2017	< 1.0	< 1.0	**92**	**100**
		2018	< 6.7	< 6.7	**70**	**110**
		2019	< 1.0	< 1.0	14	**22**
		2020	< 6.7	< 6.7	**120**	**150**
		2021	< 33	< 33	**240**	**280**
	GM-12D	2017	< 1.0	< 1.0	< 1.0	< 1.0
		2018	< 1.0	< 1.0	0.27 J	< 1.0
		2019	< 1.0	< 1.0	< 0.50	< 1.0
		2020	< 1.0	< 1.0	0.34 J	< 1.0
		2021	< 5.0	< 5.0	< 5.0	< 5.0
Western Property Boundary	GM-13D	2017	**9.7**	**12**	**180**	< 3.3
		2018	**21**	**23**	**170**	< 6.7
		2019	**10**	**13**	**120**	**6.5 J**
		2020	**26**	**18**	**110**	< 6.7
		2021	**30**	**17**	**87**	< 13
	W7D	2017	< 1.0	< 1.0	< 1.0	< 1.0
		2018	< 1.0	< 1.0	< 1.0	< 1.0
		2019	< 1.0	< 1.0	< 1.0	< 1.0
		2020	< 1.0	< 1.0	< 1.0	< 1.0
		2021	< 5.0	< 5.0	< 5.0	< 5.0

Well Location		Sample Date	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)	Vinyl Chloride (µg/L)
	GM-23D	2017	< 1.0	< 1.0	< 1.0	< 1.0
		2018	< 1.0	< 1.0	< 1.0	< 1.0
		2019	< 1.0	< 1.0	< 1.0	< 1.0
		2020	< 1.0	< 1.0	< 1.0	< 1.0
		2021	< 5.0	< 5.0	< 5.0	< 5.0
Southern Property Boundary	W8D	2017	< 1.0	2.6	10	< 1.0
		2018	< 1.0	3.2	9.8	< 1.0
		2019	< 1.0	2.4	7.8	< 0.50
		2020	< 1.0	2.7	14	0.41 J
		2021	< 5.0	3.3 J	24	< 5.0
	GM-14D	2017	< 1.0	< 1.0	< 1.0	< 1.0
		2018	< 1.0	< 1.0	< 1.0	< 1.0
		2019	< 1.0	< 1.0	< 1.0	< 0.50
		2020	< 1.0	< 1.0	< 1.0	< 1.0
		2021	< 5.0	< 5.0	< 5.0	< 5.0
Off site (West of French Creek)	GM-15D	2017	< 6.7	**27**	**200 F1**	**64 F1**
		2018	< 6.7	**28 F1**	**130**	**59**
		2019	< 6.7	**16**	**170**	**48**
		2020	< 1.7	**8.4**	**83**	**34**
		2021	< 17	**22**	**120**	**33**
	GM-20D	2017	< 1.0	< 1.0	4.5	**8.7**
		2018	< 1.0	< 1.0	5.0	**6.1**
		2019	NS	NS	NS	NS
		2020	< 1.0	< 1.0	4.9	**8.9**
		2021	< 5.0	< 5.0	4.8 J	**7.4**

Notes:
ND = Not detected, detection limit not specified
NS = Not sampled (e.g., well inaccessible or dry / abandoned)
J = Estimated concentration
F1 = MS and/or MSD recovery is outside acceptance limits
Bold = Exceeds the cleanup standard

Biogeochemical Monitoring

During the semiannual and annual monitoring events, four monitoring wells (W7S, W11S, GM-12S, and GM-13S) were sampled to evaluate the biogeochemical conditions of groundwater in the reactive zones. The biogeochemical parameters monitored are used to evaluate whether the groundwater conditions at the Site continue to be conducive to reductive dechlorination processes. The key findings, as summarized in the 2021 Annual Report, indicate that conditions remain mildly reducing. TOC concentrations remain low and, in conjunction with the elevated levels of VOC, indicate additional substrate may be required to sustain the anaerobic treatment zone. Methane concentrations are well below the desirable level of 1.0 mg/L. The low levels of methane and accumulation of cis-1,2-DCE, and vinyl chloride indicate additional substrate may be required to increase reducing conditions into an environment suitable for reduction of these COCs. Sulfate concentrations at wells W11S and GM-13S are well above the desirable level of < 20 mg/L. The high level of sulfate in conjunction

with the low concentrations of TOC indicate additional substrate may be required to promote anaerobic degradation. Detections of ethane and ethene in the groundwater indicate that the biological reductive dechlorination process is continuing.

Private Well and Treatment System Monitoring

On January 23, 2017, in response to LORD's request of December 20, 2016, EPA approved a reduced sampling and maintenance schedule for the PW7 private well from monthly to quarterly and the discontinuation of sampling for the other two private wells. On May 3, 2018, after a statistical review of the latest 20 rounds of groundwater quality monitoring data for PW7 (obtained from October 1, 2015, through January 17, 2018) EPA concluded that the ongoing remedial action of groundwater by LORD led to the attainment of the performance standards specified in the ROD at well PW7. LORD removed the treatment system at PW7 after the property owner declined continued operation of the system.

Groundwater Monitoring Summary and Trends

In the 2021 Annual Groundwater Monitoring Report, VOC data from 19 wells were analyzed for trends. Ten of the wells were designated shallow or intermediate wells and nine were deep wells. The shallow and intermediate monitoring wells included nine shallow wells listed in Table 6 and intermediate well GM-20I. The deep wells included the four wells in Table 7, and W7D, GM-12D, GM-23D, W8D, and GM-14D (which were all non-detect or below cleanup standards for the COCs). The analytes selected for trend analysis were PCE, TCE, cis-1,2-DCE, and vinyl chloride.

Based on 2021 groundwater data, concentrations of COCs, specifically PCE and TCE, decreased significantly in the source areas. While the pace has decreased, biological dechlorination continues to reduce constituent concentrations in the groundwater. Concentrations of COCs that remain above performance standards were found in seven groundwater monitoring wells located on LORD's property (GM-11D, GM-13S, GM-13D, GM-14S, GM-23S, W7S, and W11S) and two groundwater monitoring wells located downgradient (GM-15D and GM-20D).

The Mann-Kendall test was run for 44 datasets (58 percent of the 76 available datasets). The 32 datasets not analyzed using the Mann-Kendall test were composed entirely of non-detections. The majority of the data sets did not exhibit a statistically significant trend or were composed of non-detections, which is indicative of the success of the remediation effort in reducing the level of contamination and of a generally stable plume. Table E-1 in Appendix E summarizes the results of the statistical analysis. There were 29 instances (66 percent of the tests) in which a statistically significant trend was not identified. Eight decreasing trends were found. Four increasing trends for reductive dichlorination degradation products cis-1,2-DCE and vinyl chloride were also found.

Increasing trends were identified for: cis-1,2-DCE and vinyl chloride in GMT-1; vinyl chloride in GM-11D and W-7S; PCE and TCE in GM-13D; and TCE in W8D. While an increasing trend in TCE concentration was identified at well W8D, concentrations of TCE at this well are below the MCL of 5 µg/L.

Decreasing trends were identified for: PCE and TCE in W8S; PCE, TCE, and cis-1,2-DCE in GM-12S; PCE in GM-14S; and cis-1,2-DCE in GM-13D and GM-15D.

Regarding the increasing trends observed in well GM-13D, no increasing trend for PCE or TCE was identified downgradient of GM-13D at GM-15D, indicating stability of PCE and TCE in the deep zone. Additionally, cis-1,2-DCE is significantly decreasing in GM-15D. It should be noted that PCE and TCE concentrations in well GM-13D are within historical ranges. Finally, consistent with historical sampling, PCE was non-detect in downgradient well GW-15D, and TCE concentrations were slightly greater than the MCL of 5 µg/L (concentrations of 14 and 22 µg/L detected in 2021).

Trend charts for select monitoring wells are provided in Appendix E for GM-12S, GM-17S, GMT-1, W11S and GM-23S (Figures E-2 through E-6).

One of the RAOs for the Site is to prevent migration of contaminated groundwater to French and Woodcock Creeks. In addition to ensuring stable populations of aquatic biota, the remedy needs to protect individual endangered mussels which are present in both creeks near the Site. As shown on Figures 2 and E-1, no monitoring wells exist on the western side of the railroad tracks in the southwest direction of shallow groundwater flow. For further evaluation of this RAO, EPA compared the most recent maximum groundwater concentrations in wells on the east side of the railroad tracks (i.e., GM-23S, GM-13S, W7S, GM-14S, and W8S) to ecological screening values for surface water. The 2021 maximum concentrations in the five wells on the east side of the railroad tracks would not pose a risk to aquatic biota.

Site Inspection

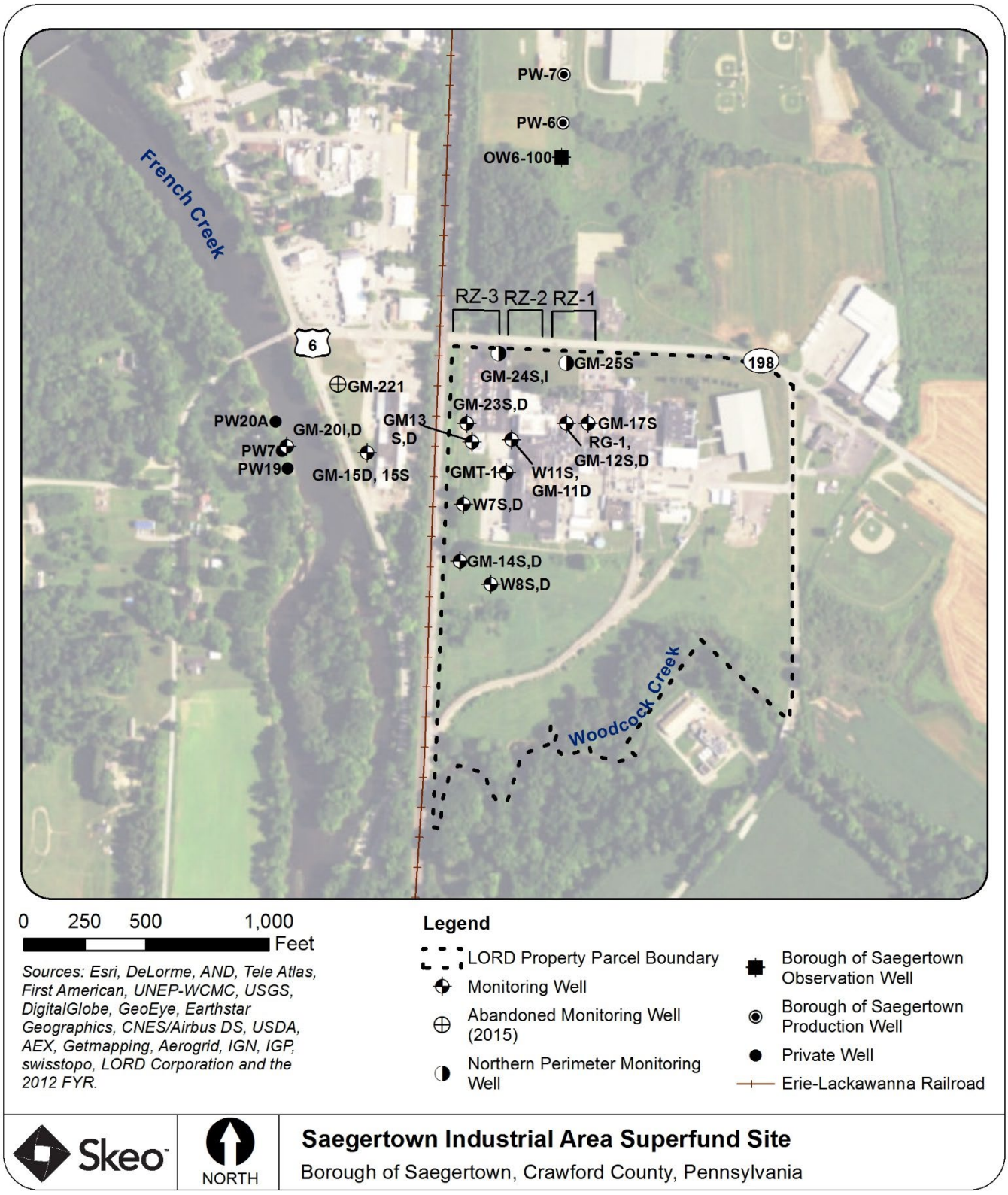
The site inspection took place on April 13, 2022. In attendance were two EPA RPMs, EPA Hydrogeologist; a representative from PA DEP; three representatives form LORD; and three representatives from Arcadis (LORD contractor). The purpose of the inspection was to assess the protectiveness of the remedy.

Site inspection participants met in the LORD plant conference room at the start of the inspection. Arcadis and LORD representatives gave an overview of the history of the Site, preliminary 2021 monitoring results, and current conditions at the Site. Site inspection participants then met with LORD EH&S Managers, for a general tour of the facility after a site safety briefing session. Observations of monitoring wells and injection wells began in the Courtyard Tank Farm (abandoned well GM-17S and GM-12S,D) and then in the Western Tank Farm (W11S, abandoned well GMT-1, and GMT-2). Tanks and concrete containment sumps appeared to be in good condition. The on-site monitoring wells observed are located below grade beneath a steel cover and appeared in good condition. The Site is surrounded by a security fence that was observed to be in good condition. The site tour concluded with the observation of the Northern Perimeter Monitoring Well (GM-24S,I). The Site inspection participants then returned to the LORD plant conference room to close out the site inspection.

On April 14, 2022, EPA representatives met with Borough of Saegertown Manager and Borough consultants from Groundwater Resources LLC. at the Saegertown Municipal Building, which is located on the GATX portion of the Site. EPA provided an update on the FYR progress, and the Borough Manager provided an update on the operation of the Borough's public drinking water system, well restriction ordinance, and PFAS sampling results in the Borough's public supply wells PW-6 and PW-7. The Borough Manager stated that the Borough is working closely with PADEP on the PFAS results in the public drinking water supply, including quarterly monitoring, public notifications (when levels are above the EPA's Combined Lifetime Health Advisory Level), and investigation into the source of the PFAS. See Question C below for additional information on the response actions to the PFAS.

EPA CICs confirmed that site-related records and instructions on accessing the Administrative Record are in place at the site repository at the Saegertown Area Library.

Figure 2: Detailed Site Map



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

V. TECHNICAL ASSESSMENT

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

Question A Summary:

Yes, the remedy is functioning as intended by the 1993 ROD, 1995 and 1996 ESDs, and 2002 ROD Amendment based on review of documents, ARARs, risk assumptions, and the results of the Site inspection. The primary objective of the remedial action is to protect human health and the environment by reducing the principal threats posed at the Site: sludge and soil contamination on the former GATX property and ground water contamination in the vicinity of the Lord Corporation property. There are no complete exposure pathways at the Site. Routine O&M is conducted regularly at the Site. The following remedy components are applicable to the LORD Property:

Enhanced Bioremediation and Long-Term Groundwater Monitoring

The 2002 ROD amendment modified the remedy for the LORD property to require enhanced bioremediation of VOCs in groundwater through introduction of a molasses-based carbon source. Potential health threats posed by contaminants in groundwater through exposure pathways (i.e., direct contact, ingestion of contaminated ground water, and inhalation of ambient air) are addressed through the enhanced bioremediation system. LORD constructed the bioremediation system in 2003 and performed molasses introductions about nine times per year from November 2003 through June 2010. LORD monitors groundwater quality annually and semi-annually through a network of shallow/intermediate and deep wells on-site and off-site. LORD has collected groundwater data from 2004 -2021. Based on 2021 groundwater data, concentrations of COCs, specifically PCE and TCE, decreased significantly in the source areas. However, the pace of biological dechlorination has decreased since the last molasses injection in 2010. Concentrations of COCs that remain above performance standards were found in nine groundwater monitoring wells located on LORD's property and two groundwater monitoring wells located downgradient. Since exceedances of PCE, TCE, cis-1,2-DCE, and vinyl chloride above performance standards are still occurring and the biogeochemical parameters indicate mildly reducing conditions, the effectiveness and pace of the bioremediation should be evaluated to determine if optimization measures are needed to ensure continued progress in restoring the aquifer.

Private Well Treatment and Monitoring

The 2002 ROD amendment required the installation and monitoring of a domestic well treatment system and monitoring of two private residential wells. LORD conducted monitoring of these private residential wells from 1997 to 2018. In 2018, EPA concluded that the ongoing remedial action of groundwater by LORD led to the attainment of the MCLs for these private residential wells and achieved the remedial objective of preventing human consumption of contaminated water. No further treatment or monitoring of private wells is required.

Institutional Controls

The institutional controls required by the 2002 ROD Amendment are in place at the Site and include deed restrictions on the Site property and Borough ordinances to restrict private water wells. The ordinance to restrict private well installation is in place and active; however, there is no protocol in place to prevent well installation. While not considered an official institutional control for the site, the 2003 Borough ordinance (Ordinance Number 01- 2003) makes it mandatory to connect to the public water supply system and further prohibits well installation. The layered nature of the institutional controls in place have achieved the remedial objective of preventing human consumption of contaminated 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?

Question B Summary:

Yes, the exposure pathways, cleanup levels, and RAOs used at the time of the remedy selection are still valid. Although the toxicity values for some COCs have changed, these changes do not affect the protectiveness of the cleanup goals for groundwater as described below. Vinyl chloride concentrations at some on-site wells have increased and a vapor intrusion screening level risk assessment, performed as part of this FYR and discussed below, indicates that COCs are not likely present at concentrations that would pose a current risk for vapor intrusion at the LORD facility.

Changes in Toxicity and Other Contaminant Concentrations

This FYR included a screening-level risk evaluation of the groundwater cleanup goals by comparing the goals to residential Regional Screening Levels (RSLs) to determine whether they remain valid (Appendix F). Except for vinyl chloride, all cancer risks are within EPA's acceptable risk range. The cleanup goal for vinyl chloride is the MCL, which is equivalent to a cancer risk of 1.1×10^{-4} which is slightly above EPA's upper boundary for excess lifetime cancer risk of 1×10^{-4}. In addition, except for cis-1,2-DCE, trans-1,2-DCE, and TCE, all non-cancer hazard quotients (HQs) are below the non-cancer cumulative hazard index (HI) of 1.0. The cleanup goals for cis-1,2-DCE, trans-1,2-DCE, and TCE exceed the acceptable non-cancer HQ of 1 with HQs of 1.4, 1.5, and 1.8 respectively. (Appendix F, Table F-1).

The Site is still within the long-term monitoring period and there are eleven wells that exceed the cleanup goals for PCE, TCE, cis-1,2-DCE, and vinyl chloride. As the groundwater quality improves and approaches cleanup goals, cleanup goals will be reassessed to ensure the site-wide risk does not exceed EPA guidelines (cancer risk more than 1×10^{-4} or a Hazard Index greater than 1).

In 2010, EPA published a memo to the file pertaining to vapor intrusion at the former industrial building identified as the Knuth property (now the Gingerich Enterprises, LLC property as of April 30, 2019) located immediately west of the LORD facility and at the LORD facility. Vapor intrusion is not expected to be a concern at the residential properties west of French Creek because contamination in that area is limited to the deep zone. Based on the groundwater monitoring data and indoor air monitoring at the LORD facility at that time, EPA concluded that further action for vapor intrusion was not warranted. Since 2010, some on-site groundwater COC concentrations have increased, such as vinyl chloride.

Using the most current groundwater monitoring data, a vapor intrusion screening-level risk assessment was performed as part of this FYR. The assessment focused on two areas: the Gingerich Enterprises property and the LORD facility. The screening-level risk assessment for the LORD facility indicated that current concentrations of vinyl chloride (2021) in shallow groundwater in monitoring well W11S, near but downgradient of the buildings, do not pose a potential risk for vapor intrusion (Table F-2, Figure F-1), however, the vinyl chloride concentrations in this well have been fluctuating. The levels of vinyl chloride levels in monitoring well W11S have fluctuated over the past 10 years (the highest of 780 µg/L in 2019 and the lowest of 170 µg/L in 2021; however, it is anticipated that there will be a decreasing trend for vinyl chloride concentrations in well W11S. The screening-level risk assessment for the Gingerich Enterprises property indicated that shallow groundwater that underlies the building also does not currently exhibit Site-related COC concentrations at levels of concern for vapor intrusion (Table F-3). While groundwater quality is expected to improve, data collected from the ongoing groundwater monitoring program will continue to be reviewed for changes that may affect the potential for vapor intrusion.

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

In October 2020, the PADEP collected water samples from Saegertown Borough's public water supply system and analyzed samples for PFAS. The results detected a concentration of 187.1 nanograms per liter (ng/L) of perfluorooctane sulfonate (PFOS) and 5.5 ng/L of perfluorooctanoic acid (PFOA) for a total sum of 192.6 ng/L of PFAS. The sum of these PFAS results exceed EPA's Combined Lifetime Health Advisory Level (HAL) for PFOS and PFOA.[1] Due to this discovery, in November 2020, the PADEP requested follow-up sampling and analysis by the Borough and continued quarterly monitoring and public notifications in accordance with the PADEP's Safe Drinking Water regulations (Pa. Code Title 25, Chapter 109).

PADEP is planning to further investigate the PFAS contamination by sampling groundwater wells near the location of the Borough's supply wells. The most recent sampling of the PFAS-impacted supply well was on April 6, 2022, and the detected total PFOA and PFOS was 22.4 ng/L. The Borough's supply wells with PFAS detections are believed to be hydraulically upgradient of the LORD Facility. EPA and PADEP are working together to investigate the extent and source of the PFAS contamination.

VI. ISSUES/RECOMMENDATIONS

Issues and Recommendations Identified in the FYR:

OU(s): 1	Issue Category: Remedy Performance			
	Issue: Exceedances of PCE, TCE, cis-1,2-DCE, and vinyl chloride above performance standards are still occurring and the biogeochemical parameters indicate mildly reducing conditions.			
	Recommendation: The effectiveness and pace of the bioremediation should be evaluated to determine if optimization measures are needed to ensure progress in restoring the aquifer.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	12/31/2022

OTHER FINDINGS

The following recommendations were identified during the FYR, but do not affect current or future protectiveness.

- Due to fluctuating levels of vinyl chloride in monitoring well W11S over the past 10 years, it is recommended the vapor intrusion evaluation that was first completed in 2010 be periodically performed to ensure the information (site and operating conditions) used in the determination continues to remain valid.
- PFAS has been detected in the Saegertown Borough public water supply wells at levels which exceed EPA's HAL for PFOS and PFOA. It is recommended for LORD to submit a workplan to sample wells in the Site's groundwater monitoring program for PFOS and PFOA.

[1] Drinking Water Health Advisories for PFOA an PFOS: https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
Operable Unit: 1	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The remedy at the Site currently protects human health and the environment because soil contamination has been removed, groundwater remediation and monitoring are ongoing and there is no exposure to groundwater contamination. However, for the remedy to be protective over the long-term, the remedy's performance should be monitored and optimized as needed. Optimization may include, but not be limited to, additional substrate (molasses) injections. Additionally, due to detection of PFAS in the municipal supply well, additional sampling at the Site will be conducted to assist PADEP with their investigation.	

VIII. GOVERNMENT PERFORMANCE AND RESULTS ACT MEASURES

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

Environmental Indicators
Human Health: Human Exposure Controlled and Protective Remedy in Place
Groundwater Migration: Contaminated Groundwater Migration Under Control

Sitewide Ready for Anticipated Use (SWRAU)
The Site achieved SWRAU (7/30/2010).

IX. NEXT REVIEW

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

APPENDIX A – REFERENCE LIST

Arcadis. 2003. *2003 Remedial Design/Work Plan, LORD Corporation, Saegertown Industrial Area Superfund Site, Saegertown, Pennsylvania*. September.

Arcadis. 2018. *2017 Annual Groundwater Monitoring Report, Saegertown, Pennsylvania*. July.

Arcadis. 2019. *2018 Annual Groundwater Monitoring Report, Saegertown, Pennsylvania*. March.

Arcadis. 2020. *2019 Annual Groundwater Monitoring Report, Saegertown, Pennsylvania*. July.

Arcadis. 2021. *2020 Annual Groundwater Monitoring Report, Saegertown, Pennsylvania.* July.

Arcadis. 2022. *2021 Annual Groundwater Monitoring Report, Saegertown, Pennsylvania*. June.

Borough of Saegertown, County of Crawford, Commonwealth of Pennsylvania, Ordinance No. 4, 1979.

Borough of Saegertown, County of Crawford, Commonwealth of Pennsylvania, Ordinance No. 01-2003.

EPA. 1993. *Superfund Record of Decision, Saegertown Industrial Area, EPA ID: PAD980692487 OU 01, Saegertown, PA*. January 29.

EPA. 1995. *Explanation of Significant Differences, Saegertown Industrial Area Site*. March 9.

EPA. 2002. *Superfund Record of Decision Amendment: Saegertown Industrial Area, EPA ID: PAD980692487, OU 01, Saegertown, PA*. September 30.

EPA. 2004. *Superfund Preliminary Close Out Report, Saegertown Industrial Area Superfund Site, Saegertown, Crawford County, Pennsylvania*. March 15.

EPA. 2010. *Memo to file regarding vapor intrusion evaluation for Saegertown Industrial Area Site*, from Mitch Cron, EPA RPM. September 13.

EPA. 2017. *Fifth Five-Year Review Report for Saegertown Industrial Area Superfund Site, Crawford County, Pennsylvania*. August 28.

PADEP. 2020. Letter to Saegertown Borough WTP, PWS ID# 6200043, *Re: Exceedance of Drinking Water Health Advisory Level*. November 3.

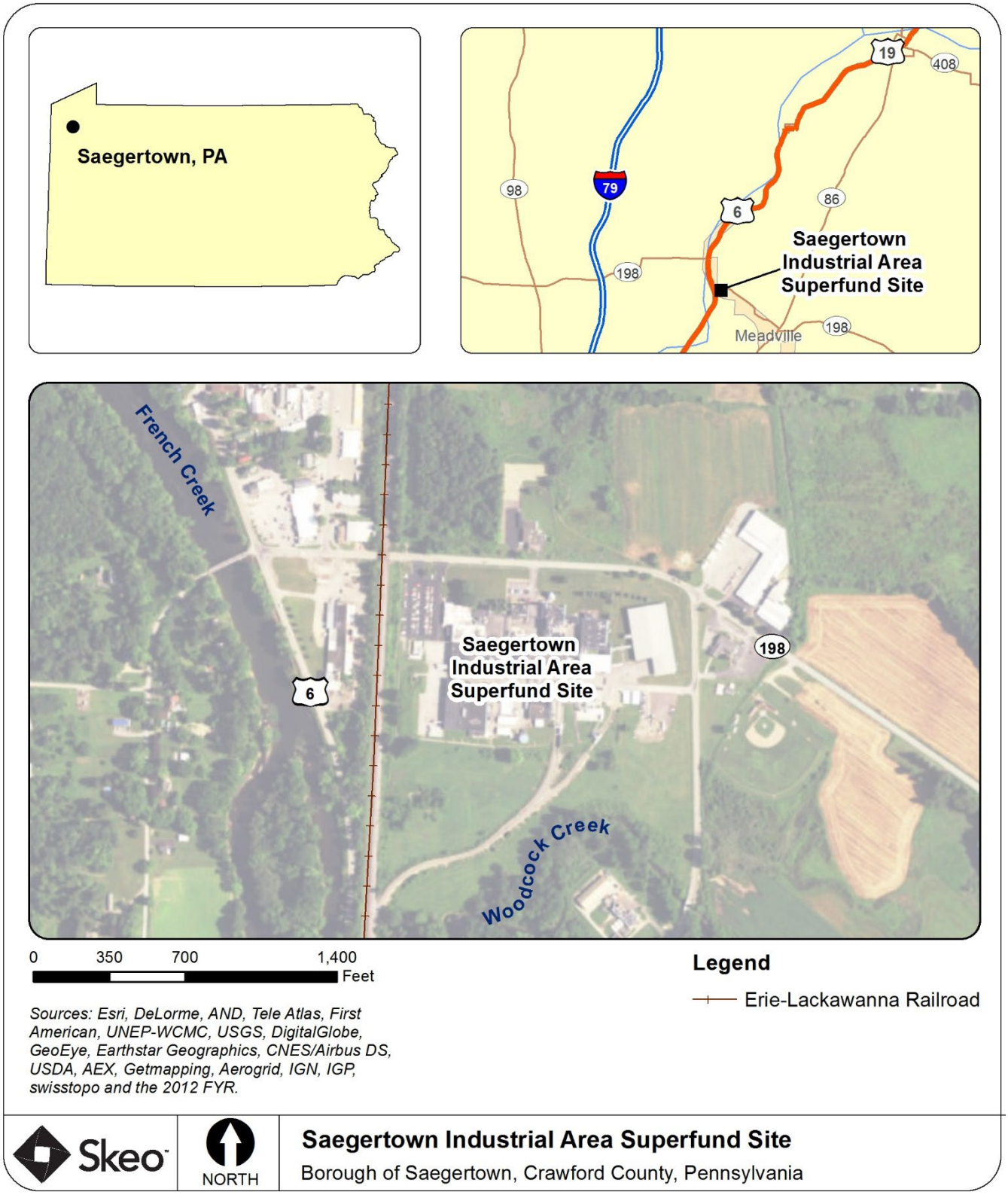
APPENDIX B – SITE CHRONOLOGY

Table B-1: Site Chronology

Event	Date
Initial discovery of groundwater contamination	June 1980
State analysts discovered VOCs in a Saegertown Municipal Water Authority well (Well #2)	July 1980
EPA performed Site Inspection: testing identified VOCs and PAHs in on-site pond sediments and soil	July 1984
Site proposed to the NPL	June 24, 1988
LORD, SMC, SCI and GATX signed an AOC with EPA to conduct a RI/FS	January 31, 1990
EPA listed the Site on the NPL	February 21, 1990
EPA completed the RI/FS	October 13, 1992
EPA signed the ROD	January 29, 1993
EPA issued Consent Decree	March 15, 1994
PRP started Remedial Design for GATX property	September 27, 1994
EPA issued first ESD	March 9, 1995
EPA issued Consent Decree	July 31, 1995
PRP completed Remedial Design for GATX property PRP started Remedial Action for GATX property	August 8, 1995
EPA issued second ESD	March 1, 1996
EPA issued Unilateral Administrative Order requiring LORD to install a domestic well treatment system	February 13, 1997
PRP completed Remedial Action for GATX property	July 8, 1997
EPA issued the first FYR	August 6, 1997
Notice of Partial Deletion for SMC, SCI and GATX properties	October 6, 1997
EPA issued the second FYR	September 19, 2002
EPA issued a ROD Amendment for the Site's LORD property	September 30, 2002
PRP completed construction of the physical features of the in situ groundwater bioremediation system at the LORD property	September 2003
EPA issued a Preliminary Closeout Report	March 15, 2004
PRP installed four additional introduction wells at the LORD property and discontinued use of subsurface "Courtyard Area Lateral" pipes (located downgradient from the Courtyard Tank Farm) as carbon source solution introduction points	July 2005
PRP adjusted concentration and volumes of molasses solution to achieve maximum distribution of carbon-source solution in the subsurface environment	October 2005
EPA issued the third FYR	September 18, 2007
PRP discontinued in situ molasses solution injections on two reactive zones (RZ-2 and RZ-3)	June 2010
PRP discontinued in situ molasses solution injections on the last reactive zone (RZ-1)	December 2010
EPA issued the fourth FYR	September 12, 2012
EPA issued the fifth FYR	August 28, 2017
EPA determined that cleanup goals had been attained at PW7; no further action required at that location	May 3, 2018

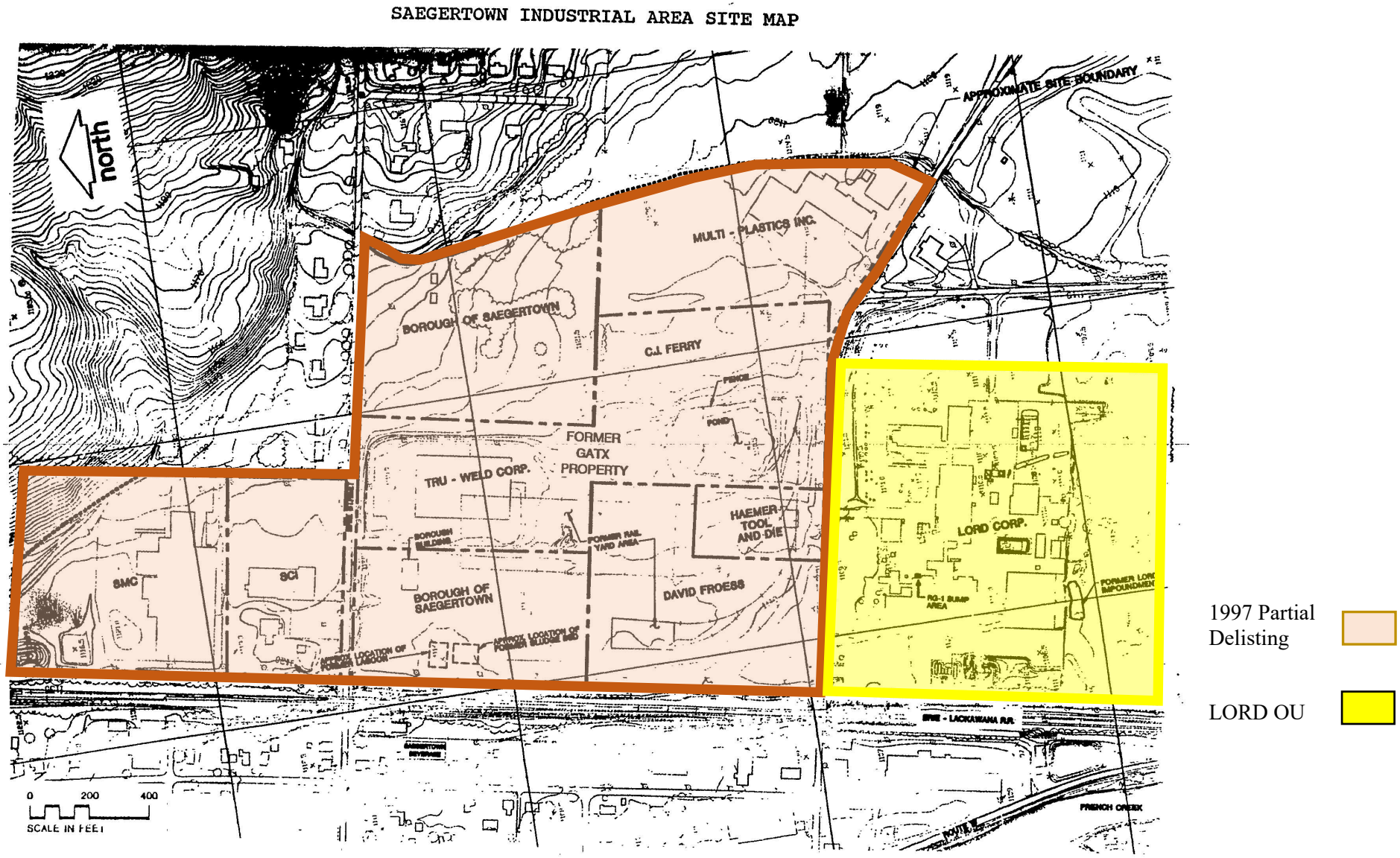
APPENDIX C – SITE MAPS

Figure C-1: Site Vicinity Map



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

Figure C-2: Historic Site Properties[2]



[2] Derived from 1993 ROD, Figure 3

APPENDIX D – DETAILED ARARs REVIEW TABLE

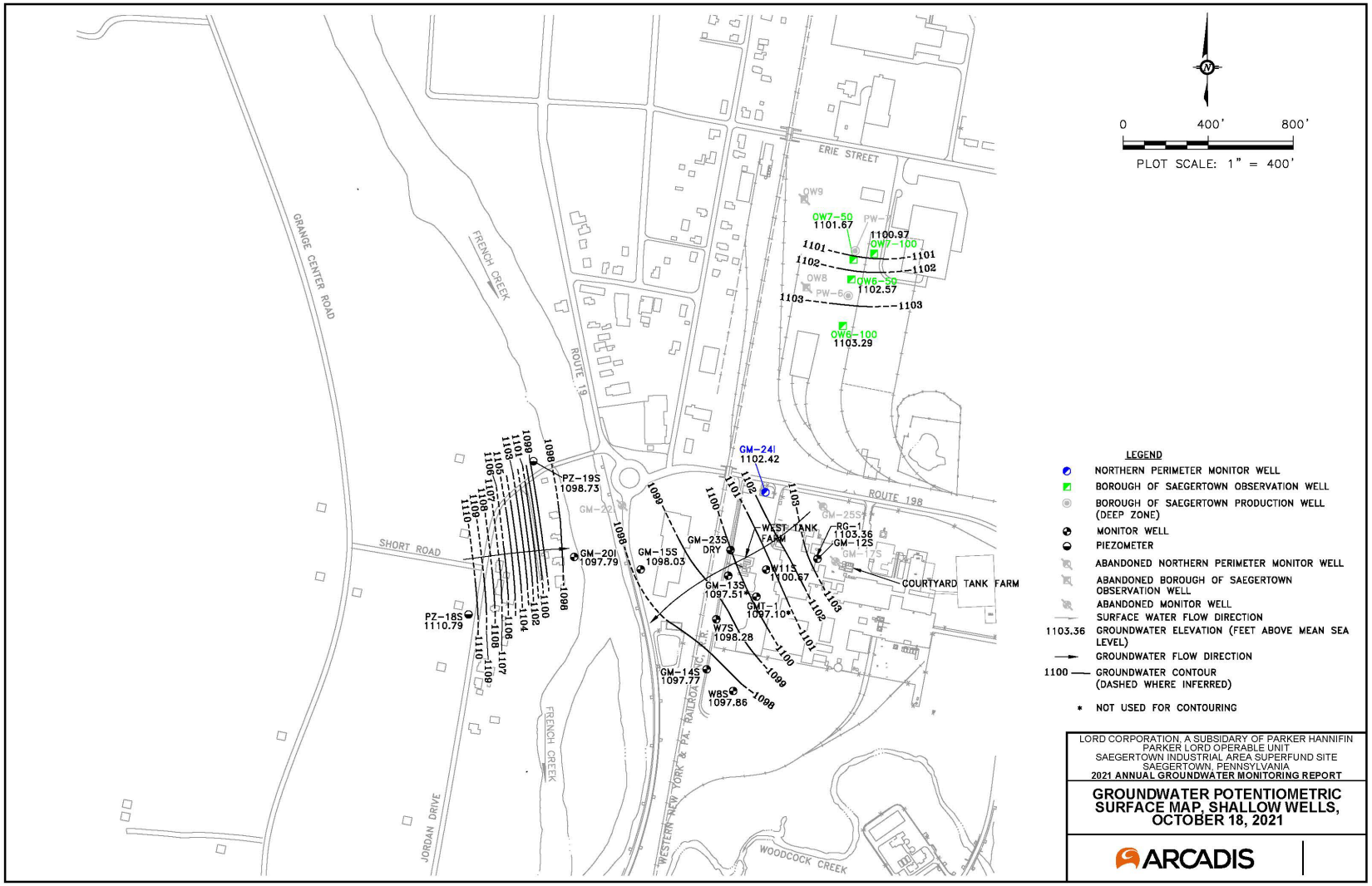
Table D-1: Groundwater COC ARARs Review

Groundwater COC [a]	2002 SDWA MCL (µg/L)	2002 ROD Amendment Performance Standard (µg/L)	Current MCL [b] (µg/L)
1,1-DCE	7	3	7
Cis-1,2-DCE	70	50	70
Trans-1,2-DCE	100	100	100
Ethylbenzene	700	100	700
Toluene	1,000	100	1,000
TCE	5	5	5
PCE	5	5	5
Vinyl chloride	2	2	2
2-Chlorotoluene	--	200	--

Notes:
a = Groundwater COC list established by the 2002 ROD Amendment.
b = EPA National Primary Drinking Water Regulations MCL obtained from: https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations#Organic (accessed 3/16/2022)
-- ARAR not established/no MCL.
µg/L = micrograms per liter

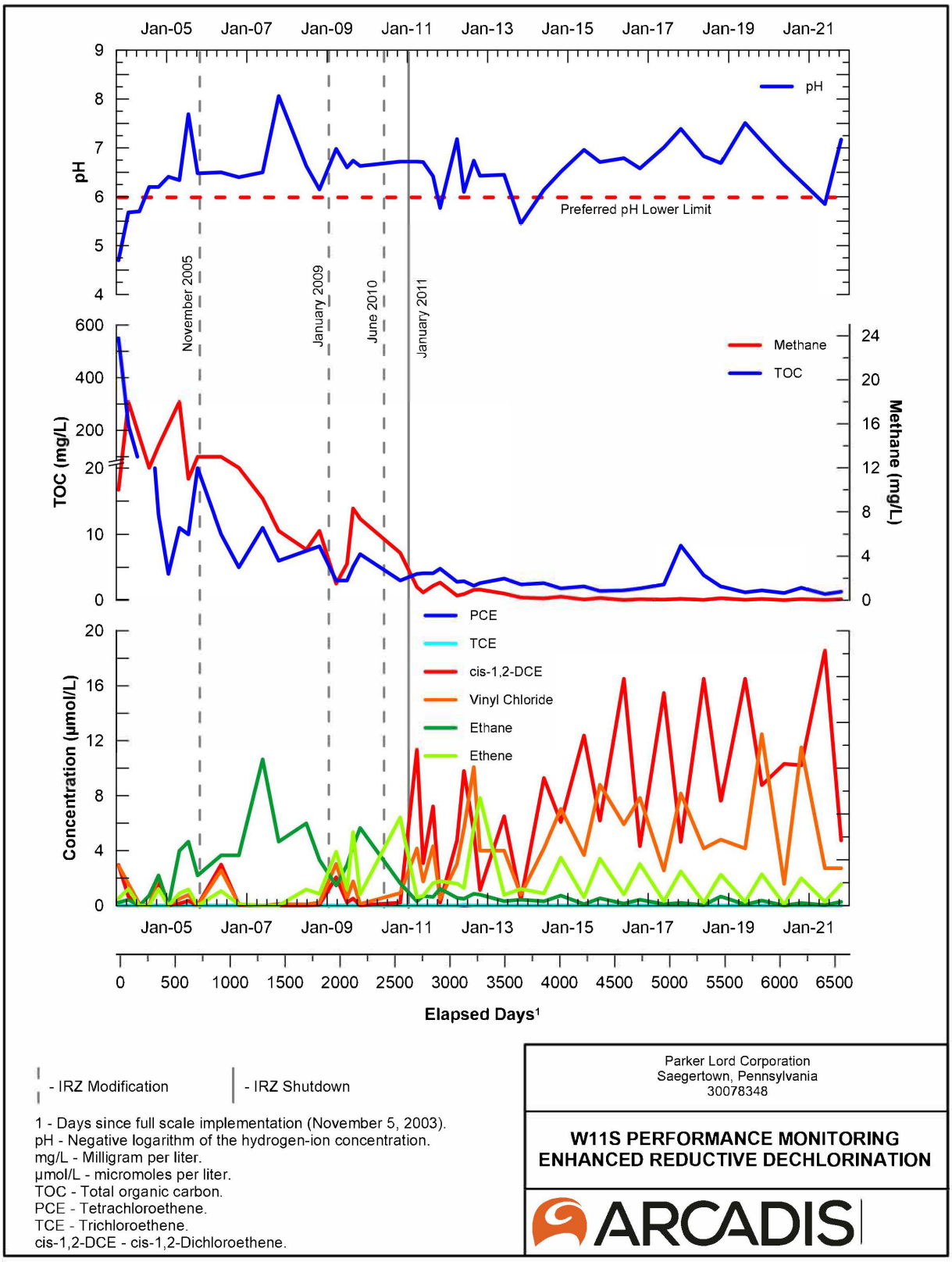
APPENDIX E – DATA ANALYSIS FIGURES[3]

Figure E-1: Groundwater Potentiometric Surface Map, Shallow Wells, October 2021



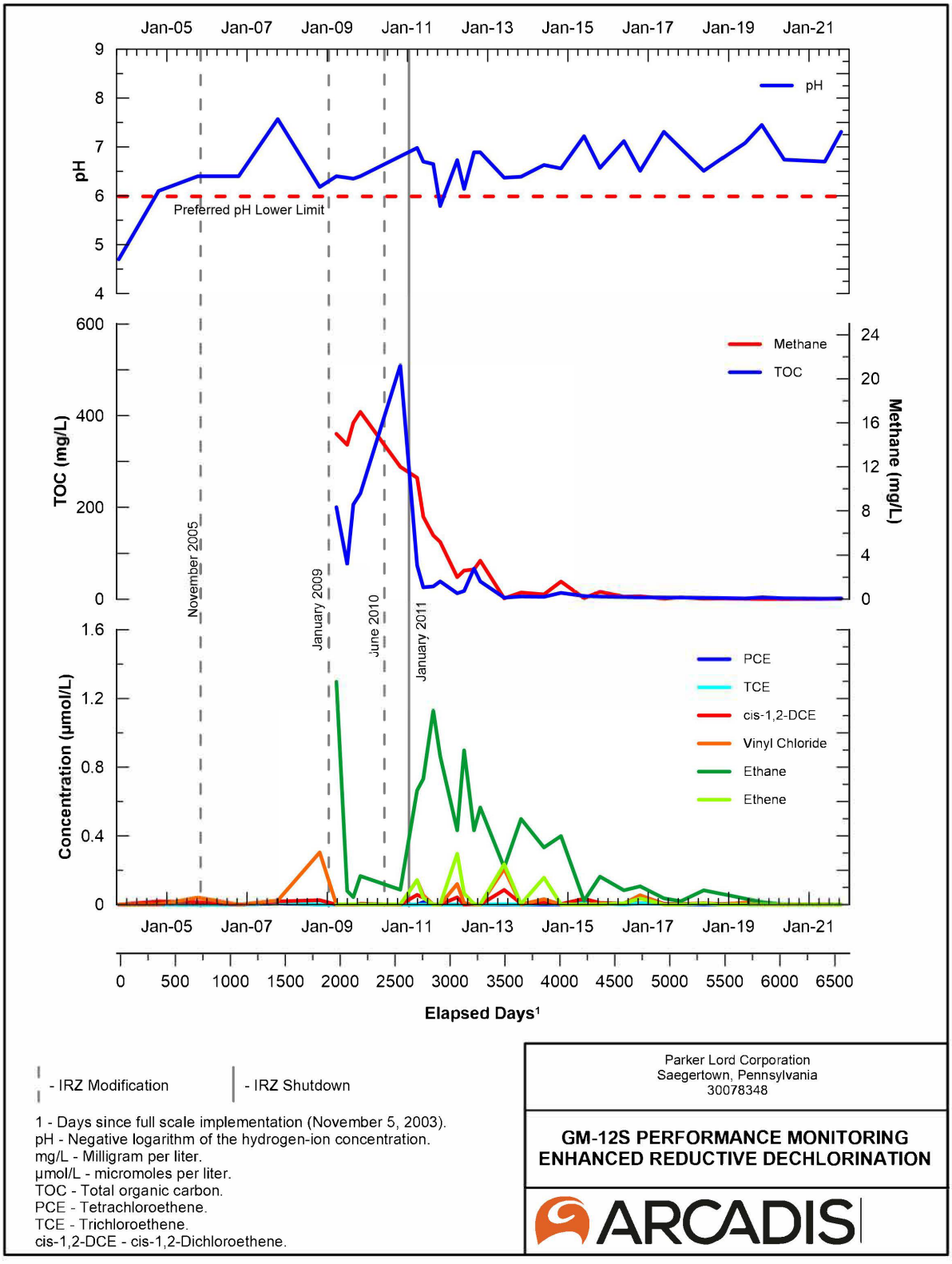
[3] Source: 2021 Annual Groundwater Monitoring Report (Arcadis, June 1, 2022)

Figure E-2: W11S Performance Monitoring Enhanced Reductive Dechlorination[4]



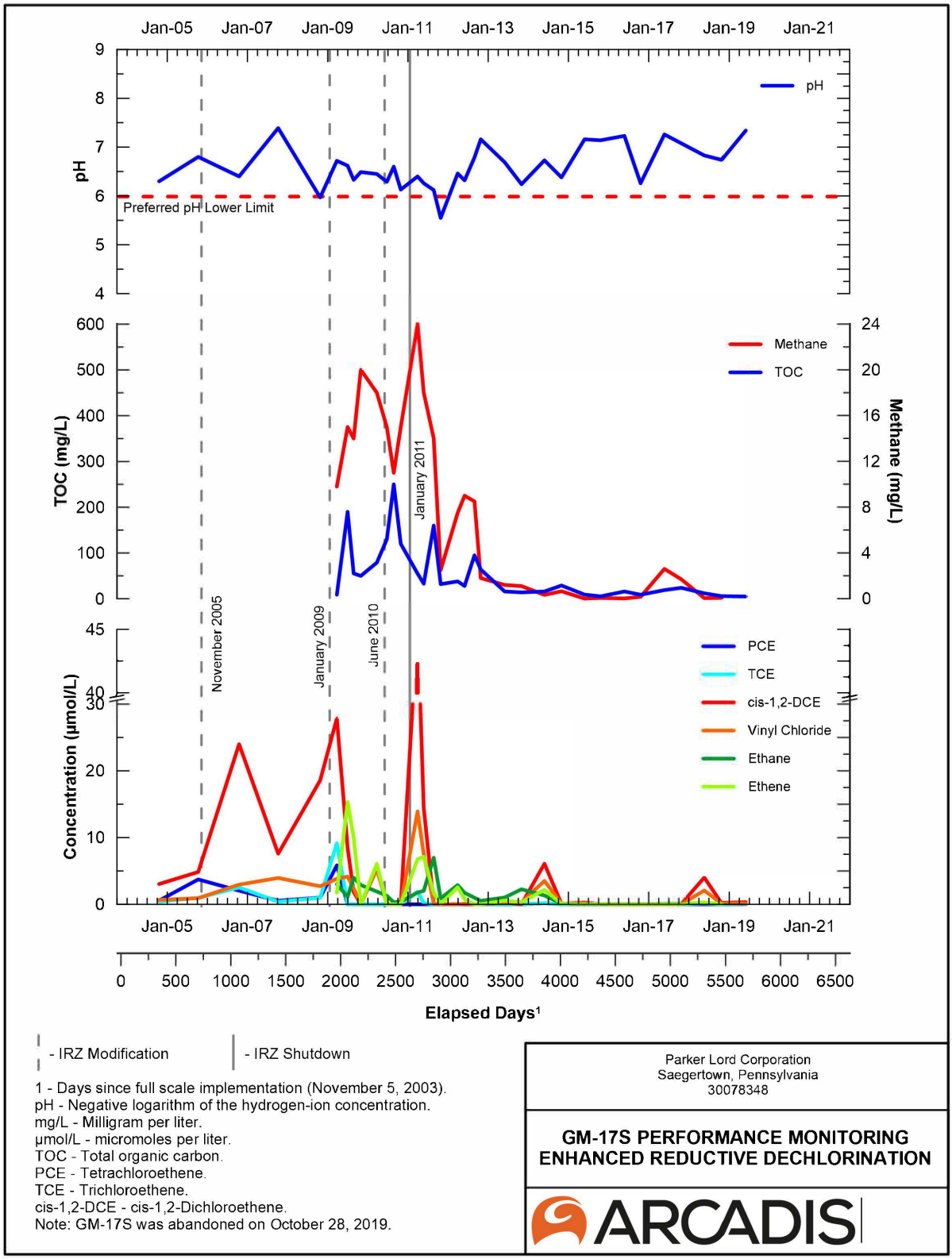
[4] Source: 2021 Annual Groundwater Monitoring Report (Arcadis, June 1, 2022)

Figure E-3: GM-12S Performance Monitoring Enhanced Reductive Dechlorination[5]



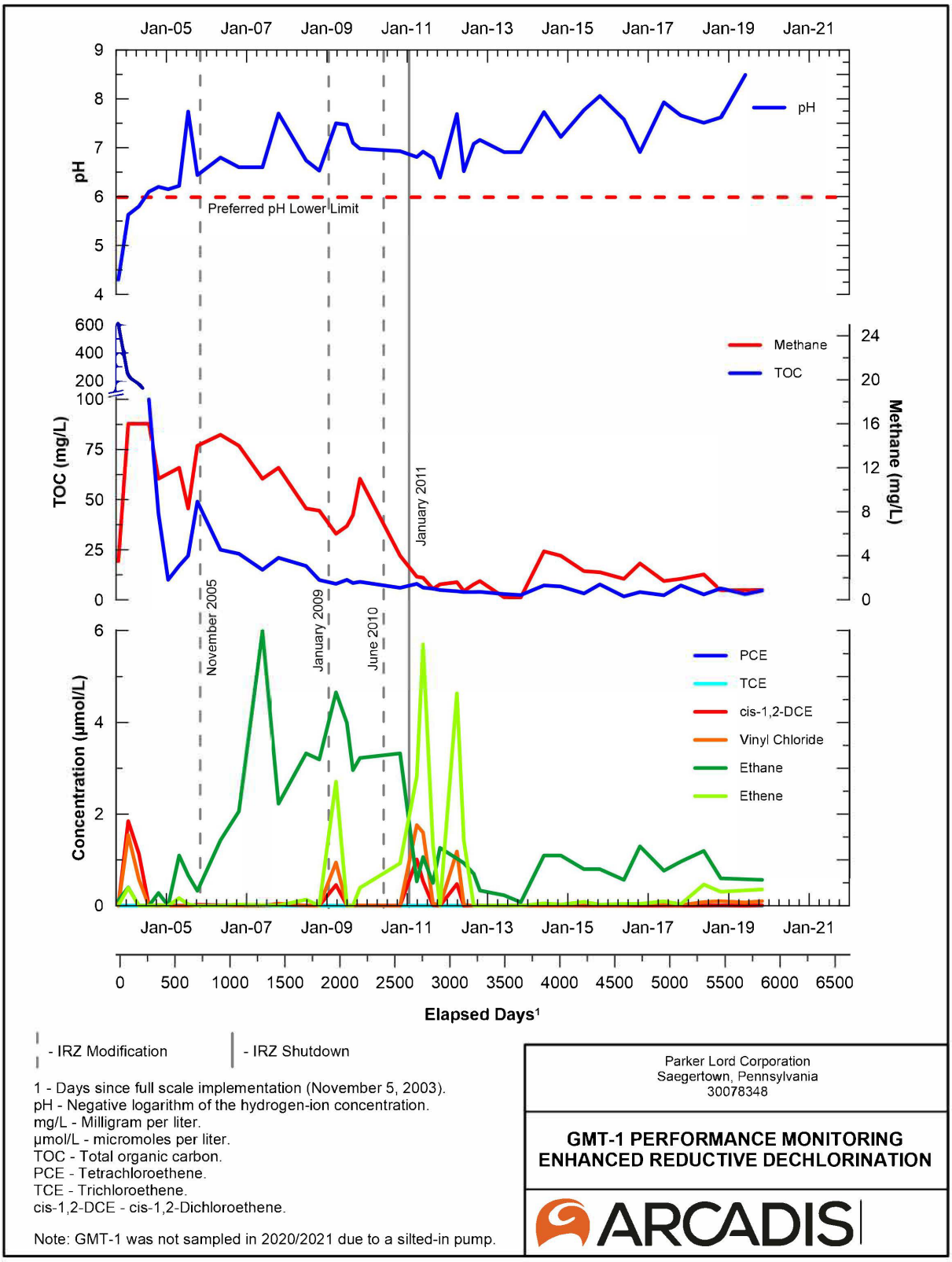
[5] Source: 2021 Annual Groundwater Monitoring Report (Arcadis, June 1, 2022)

Figure E-4: GM-17S Performance Monitoring Enhanced Reductive Dechlorination[6]



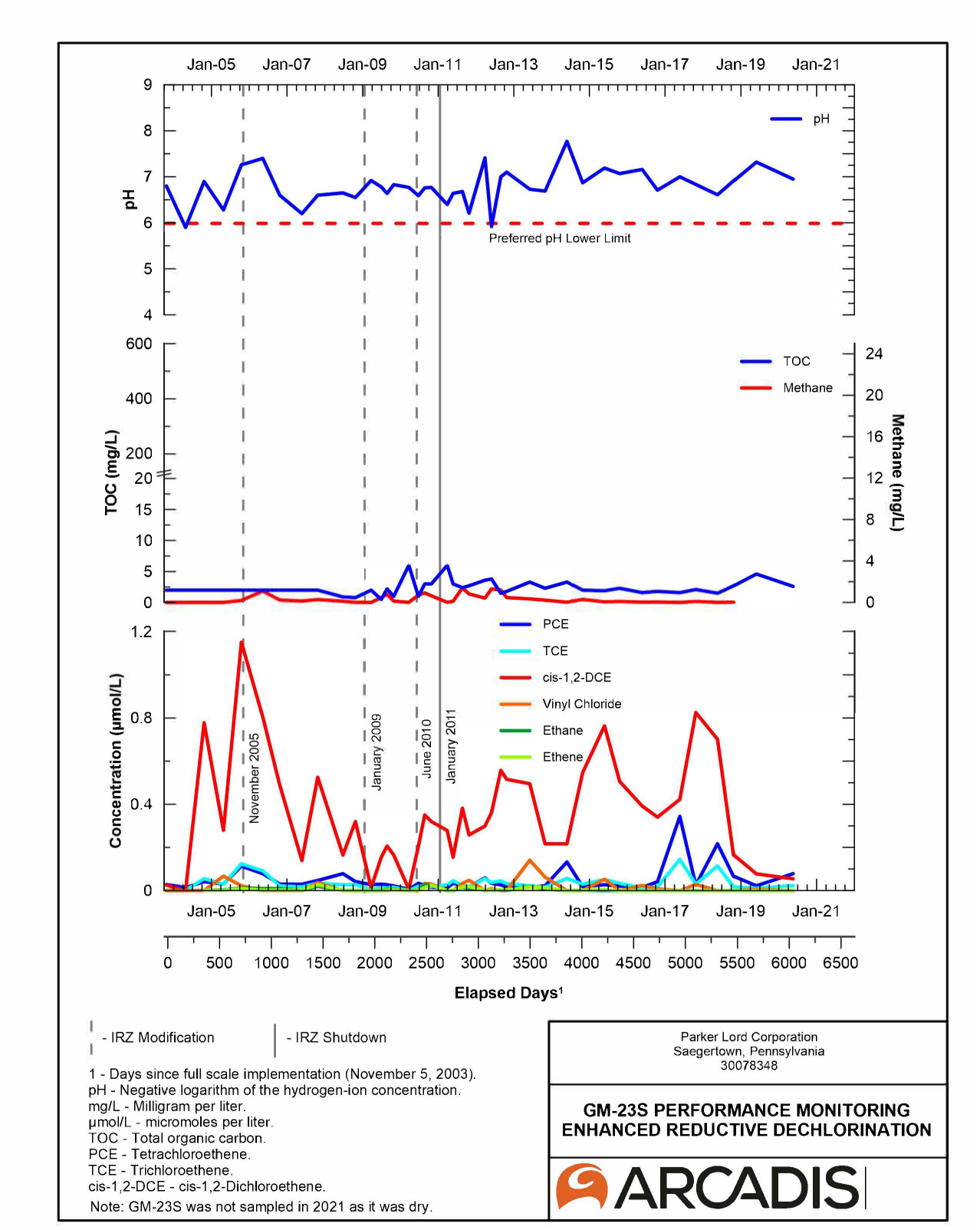
[6] Source: 2021 Annual Groundwater Monitoring Report (Arcadis, June 1, 2022)

Figure E-5: GMT-1 Performance Monitoring Enhanced Reductive Dechlorination[7]



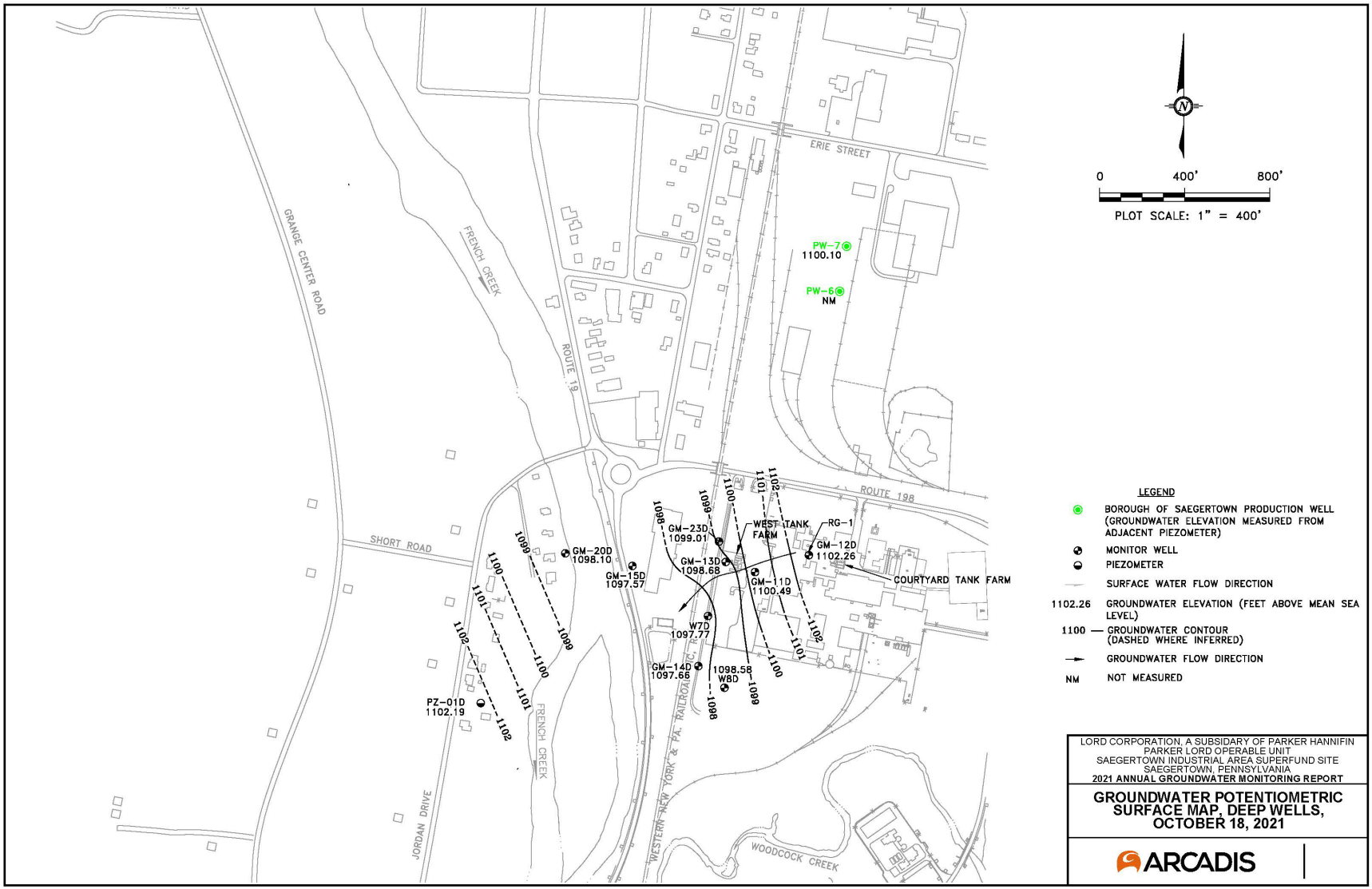
[7] Source: 2021 Annual Groundwater Monitoring Report (Arcadis, June 1, 2022)

Figure E-6: GM-23S Performance Monitoring Enhanced Reductive Dechlorination[8]



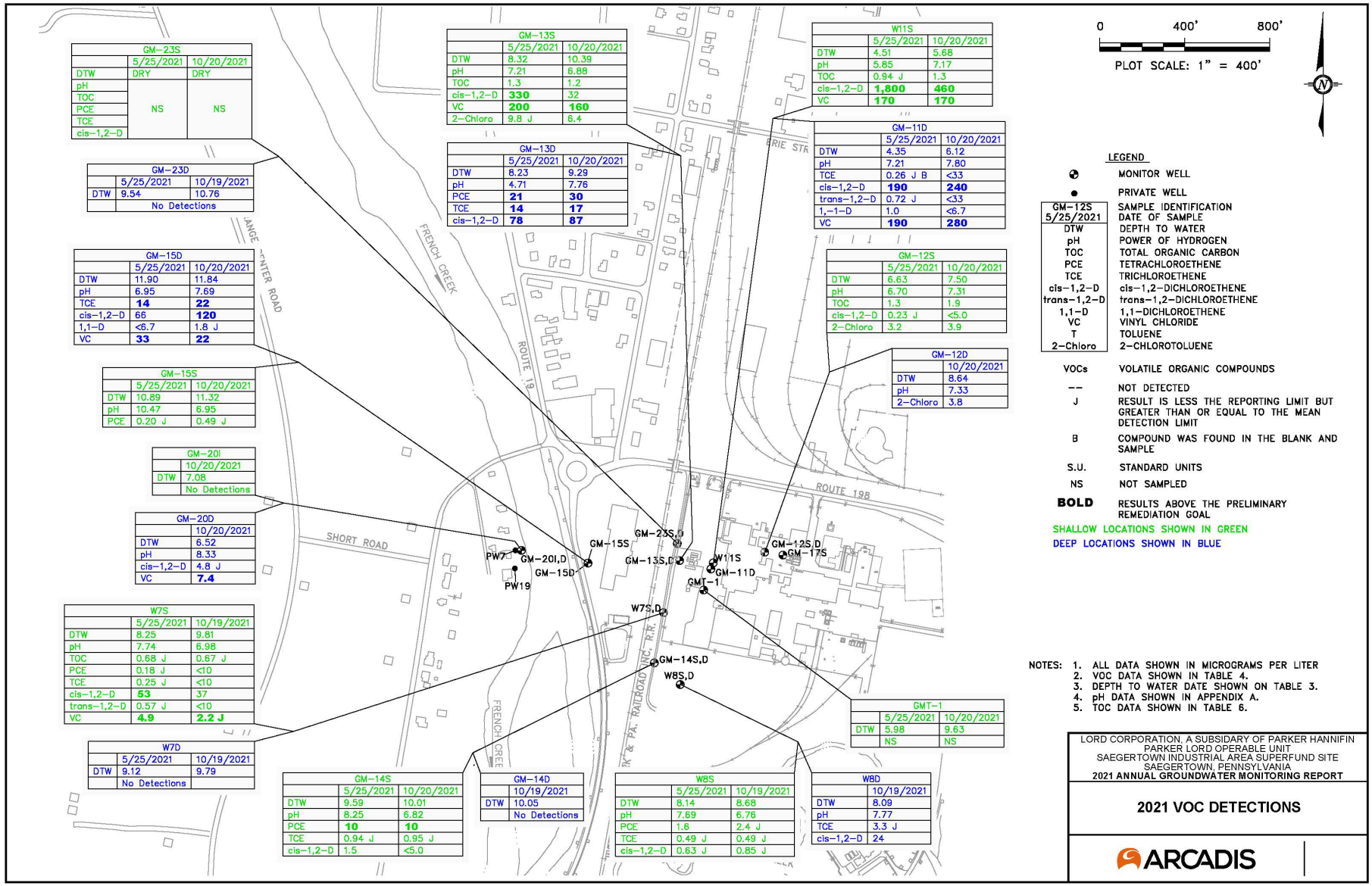
[8] Source: 2021 Annual Groundwater Monitoring Report (Arcadis, June 1, 2022)

Figure E-7: Groundwater Potentiometric Surface Map, Deep Wells, October 2021[9]



[9] Source: 2021 Annual Groundwater Monitoring Report (Arcadis, June 1, 2022)

Figure E-8: 2020 VOC Detections and Quarterly Private Well Results[10]



[10] Source: 2021 Annual Groundwater Monitoring Report (Arcadis, June 1, 2022)

Table E-9 Summary Statistics and Trend Results (2021 Annual Groundwater Report)

ARCADIS

TABLE A-1
Summary Statistics and Trend Results
Parker Land Corporation
2021

Well ID			Analyte	PEQ	Data Range	FOD	Detected Results Summary				Mann-Kendall Test			
							Range	Mean	Median	Mean + 2SD	Result	MK Result Note	P-Value	S Value
GM-R10	RZ-2	Deep	PCE	5	06/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R10	RZ-2	Deep	TCE	5	06/16 - 10/21	1/12	0.26 - 0.26	0.26	0.26	--	NST	Bc	0.121	5
GM-R10	RZ-2	Deep	cis-1,2-DCE	50	06/16 - 10/21	12/12	0.36 - 240	70	66.5	Yes	NST	--	0.036	23
GM-R10	RZ-2	Deep	VC	2	06/16 - 10/21	12/12	0.53 - 280	93.1	56	Yes	UP	--	0.037	27
GM-R20	RZ-1	Deep	PCE	5	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R20	RZ-1	Deep	TCE	5	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R20	RZ-1	Deep	cis-1,2-DCE	50	10/16 - 10/21	7/12	0.28 - 1	0.5	0.34	--	NST	--	0.528	6
GM-R20	RZ-1	Deep	VC	2	10/16 - 10/21	2/12	0.26 - 0.69	0.52	0.52	--	NST	Bc	0.413	3
GM-R25	RZ-1	Shallow	PCE	5	10/16 - 10/21	6/12	0.22 - 1.2	0.66	0.645	--	DWN	--	0.029	-27
GM-R25	RZ-1	Shallow	TCE	5	10/16 - 10/21	6/12	0.34 - 0.94	0.54	0.525	--	DWN	--	0.045	-24
GM-R25	RZ-1	Shallow	cis-1,2-DCE	50	10/16 - 10/21	10/12	0.17 - 5.2	0.96	0.535	--	DWN	--	0.007	-37
GM-R25	RZ-1	Shallow	VC	2	10/16 - 10/21	6/12	0.32 - 3.4	1.1	0.84	Yes	NST	--	0.062	21
GM-R30	RZ-3	Deep	PCE	5	06/16 - 10/21	12/12	5.3 - 30	13.8	12.5	Yes	UP	--	0.007	37
GM-R30	RZ-3	Deep	TCE	5	06/16 - 10/21	12/12	5.3 - 23	13.6	13.5	Yes	UP	--	0.008	36
GM-R30	RZ-3	Deep	cis-1,2-DCE	50	06/16 - 10/21	12/12	78 - 180	118	104.5	Yes	DWN	--	0.038	-25
GM-R30	RZ-3	Deep	VC	2	06/16 - 10/21	2/12	6.5 - 6.7	6.6	6.6	Yes	NST	Bc	0.413	-6
GM-R35	RZ-3	Shallow	PCE	5	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R35	RZ-3	Shallow	TCE	5	10/16 - 10/21	1/12	0.13 - 0.13	0.13	0.13	--	NST	Bc	0.500	2
GM-R35	RZ-3	Shallow	cis-1,2-DCE	50	10/16 - 10/21	12/12	0.36 - 530	93.4	44	Yes	NST	--	0.205	13
GM-R35	RZ-3	Shallow	VC	2	10/16 - 10/21	10/12	1 - 380	71.9	26	Yes	NST	--	0.094	25
GM-R40	NA	Deep	PCE	5	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R40	NA	Deep	TCE	5	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R40	NA	Deep	cis-1,2-DCE	50	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R40	NA	Deep	VC	2	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R45	NA	Shallow	PCE	5	10/16 - 10/21	12/12	6.1 - 14	10.6	10	Yes	DWN	--	0.040	-25
GM-R45	NA	Shallow	TCE	5	10/16 - 10/21	12/12	0.31 - 1.3	0.71	0.665	--	NST	--	0.070	22
GM-R45	NA	Shallow	cis-1,2-DCE	50	06/16 - 10/21	7/12	0.33 - 4.2	1.9	1.1	--	NST	--	0.219	10
GM-R45	NA	Shallow	VC	2	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R50	RZ-3	Deep	PCE	5	06/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R50	RZ-3	Deep	TCE	5	06/16 - 10/21	12/12	6.4 - 26	16.9	16	Yes	NST	--	0.108	-19
GM-R50	RZ-3	Deep	cis-1,2-DCE	50	06/16 - 10/21	12/12	46 - 200	123	125	Yes	DWN	--	0.031	-28
GM-R50	RZ-3	Deep	VC	2	06/16 - 10/21	12/12	15 - 84	37	30	Yes	NST	--	0.291	-8
GM-R55	RZ-3	Shallow	PCE	5	10/16 - 10/21	6/12	0.10 - 0.55	0.36	0.48	--	NST	--	0.418	-4
GM-R55	RZ-3	Shallow	TCE	5	10/16 - 10/21	5/12	0.12 - 1.3	2.9	0.42	Yes	NST	--	0.226	-11
GM-R55	RZ-3	Shallow	cis-1,2-DCE	50	10/16 - 10/21	4/12	0.3 - 0.79	0.44	0.33	--	NST	--	0.162	-12
GM-R55	RZ-3	Shallow	VC	2	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R60	RZ-3	Deep	PCE	5	10/16 - 10/21	0/11	--	--	--	--	--	--	--	--
GM-R60	RZ-3	Deep	TCE	5	10/16 - 10/21	0/11	--	--	--	--	--	--	--	--
GM-R60	RZ-3	Deep	cis-1,2-DCE	50	10/16 - 10/21	11/11	3.9 - 6.6	4.9	4.9	--	NST	--	0.150	16
GM-R60	RZ-3	Deep	VC	2	10/16 - 10/21	11/11	4 - 11	8.7	8.1	Yes	NST	--	0.179	13
GM-R09	NA	Shallow	PCE	5	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R09	NA	Shallow	TCE	5	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R09	NA	Shallow	cis-1,2-DCE	50	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R09	NA	Shallow	VC	2	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R30	RZ-3	Deep	PCE	5	10/16 - 10/21	0/10	--	--	--	--	--	--	--	--
GM-R30	RZ-3	Deep	TCE	5	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R30	RZ-3	Deep	cis-1,2-DCE	50	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R30	RZ-3	Deep	VC	2	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
GM-R35	RZ-3	Shallow	PCE	5	06/14 - 05/20	12/12	3.4 - 57	13.6	5.65	Yes	NST	--	0.226	10
GM-R35	RZ-3	Shallow	TCE	5	06/14 - 05/20	12/12	1.4 - 19	5.9	3.9	Yes	NST	--	0.136	-17
GM-R35	RZ-3	Shallow	cis-1,2-DCE	50	06/14 - 05/20	12/12	0.3 - 90	40.6	39.5	Yes	NST	--	0.070	-22
GM-R35	RZ-3	Shallow	VC	2	06/14 - 05/20	8/12	0.44 - 3.2	1.5	1.3	Yes	NST	--	0.378	-8
UNIT-1	RZ-2	Shallow	PCE	5	06/14 - 10/19	0/12	--	--	--	--	--	--	--	--
UNIT-1	RZ-2	Shallow	TCE	5	06/14 - 10/19	0/12	--	--	--	--	--	--	--	--
UNIT-1	RZ-2	Shallow	cis-1,2-DCE	50	06/14 - 10/19	3/12	0.24 - 1	0.6	0.47	--	UP	--	0.007	28
UNIT-1	RZ-2	Shallow	VC	2	06/14 - 10/19	12/12	0.75 - 6.3	2.6	1.15	Yes	UP	--	0.005	38
MW-R15	RZ-2	Shallow	PCE	5	06/16 - 10/21	0/12	--	--	--	--	--	--	--	--
MW-R15	RZ-2	Shallow	TCE	5	06/16 - 10/21	0/12	--	--	--	--	--	--	--	--
MW-R15	RZ-2	Shallow	cis-1,2-DCE	50	06/16 - 10/21	12/12	430 - 1600	1000	936	Yes	NST	--	0.391	5
MW-R15	RZ-2	Shallow	VC	2	06/16 - 10/21	12/12	99 - 700	367	360	Yes	NST	--	0.269	10
MW-R70	RZ-3	Deep	PCE	5	06/14 - 10/21	0/10	--	--	--	--	--	--	--	--
MW-R70	RZ-3	Deep	TCE	5	06/16 - 10/21	0/12	--	--	--	--	--	--	--	--
MW-R70	RZ-3	Deep	cis-1,2-DCE	50	06/16 - 10/21	0/12	--	--	--	--	--	--	--	--
MW-R70	RZ-3	Deep	VC	2	06/16 - 10/21	0/12	--	--	--	--	--	--	--	--
MW-R75	RZ-3	Shallow	PCE	5	10/16 - 10/21	6/12	0.19 - 0.79	0.46	0.48	--	NST	--	0.052	-19
MW-R75	RZ-3	Shallow	TCE	5	10/16 - 10/21	4/12	0.19 - 1.2	0.66	0.5	--	NST	--	0.202	-8
MW-R75	RZ-3	Shallow	cis-1,2-DCE	2	10/16 - 10/21	12/12	0.47 - 190	39.7	8	Yes	NST	--	0.152	16
MW-R75	RZ-3	Shallow	VC	50	10/16 - 10/21	6/12	0.44 - 28	6.7	4.7	--	UP	--	0.040	26
MW-R80	NA	Deep	PCE	5	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
MW-R80	NA	Deep	TCE	5	10/16 - 10/21	12/12	1.7 - 3.5	2.5	2.45	--	UP	--	0.005	39
MW-R80	NA	Deep	cis-1,2-DCE	50	10/16 - 10/21	12/12	7.9 - 24	12.5	11.5	--	NST	--	0.224	-12
MW-R80	NA	Deep	VC	2	10/16 - 10/21	0/12	--	--	--	--	--	--	--	--
MW-R85	NA	Shallow	PCE	5	06/16 - 10/21	10/12	0.15 - 5.2	2.6	2.4	Yes	DWN	--	0.042	-26
MW-R85	NA	Shallow	TCE	50	06/16 - 10/21	9/12	0.26 - 1.2	0.67	0.66	--	DWN	--	0.035	-27
MW-R85	NA	Shallow	cis-1,2-DCE	5	06/16 - 10/21	6/12	0.34 - 1.1	0.77	0.775	--	NST	--	0.131	-17
MW-R85	NA	Shallow	VC	2	06/16 - 10/21	0/12	--	--	--	--	--	--	--	--

Abbreviations
-- = insufficient data for calculating statistics (n < 4) or not available
FOD = frequency of detection (# detects / # samples)
mean = arithmetic mean
SD = standard deviation

NST = no significant trend
NT = no trend
DWN = downward trend
UP = upward trend

Notes
1. All analytical results are in µg/L. Result values less than 10 are reported to 2 significant figures; values greater than 10 are reported to 3 significant figures.
P-values are reported to 3 decimal places.
2. Trend results are presented when at least four samples and one detected value are available. Significance of trends evaluated at 95% confidence (alpha = 0.05).
3. Non-detects were assigned a common value less than the minimum detected value, equal to half the minimum reporting limit (RL) in the dataset (USEPA, 2009).
If half the minimum RL was greater than the minimum detected value, then half the minimum detect was assigned.
4. Statistically significant trend defined as having p-value ≤ 0.05, or 95% confidence.
5a. MK and Sen's Trend results for datasets with fewer than 8 data pairs may not be reliable and should be treated with caution.
5b. MK Trend results for datasets with an FOD <= 20% may not be reliable and should be treated with caution.

References
USEPA. 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance. EPA/530/R-09/007, 2009.

APPENDIX F – DETAILED TOXICITY REVIEW

Table F-1: Screening-Level Risk Evaluation of Groundwater Cleanup Goals

COC[a]	2002 ROD Amdt. Performance Standard (µg/L)	EPA Residential Tapwater RSL[b] (µg/L)			Residential	
		1 x 10^{-6} Risk	HQ=1	Target Organ	Cancer Risk[d]	Non-cancer HQ[e]
1,1-DCE	3	NA	280	Liver	NA	0.03
Cis-1,2-DCE	50	NA	36	Kidney	NA	**1.4**
Trans-1,2-DCE	100	NA	68	Blood	NA	**1.5**
Ethylbenzene	100	1.5	500	Liver/Kidney	6.7 x 10^{-5}	0.2
Toluene	100	NA	1,100	Kidney	NA	0.09
TCE	5	0.49	2.8	Heart	1.0 x 10^{-5}	**1.8**
PCE	5	11	41	Nerves	4.5 x 10^{-7}	0.12
Vinyl Chloride	2	0.019	44	Liver	**1.1 x 10^{-4}**	0.04
2-Chlorotoluene	200	NA	240	Body weight	NA	0.83

Notes:

a. Groundwater COCs established by the 2002 ROD Amendment.

b. Current RSLs, dated November 2021, are available at http://www.epa.gov/risk/risk-based-screening-table-generic-tables (accessed 3/16/2022).

c. Non-cancer target organ effects for oral exposure were obtained from the EPA's Integrated Risk Information System and filtering for target organ effects at https://cfpub.epa.gov/ncea/iris/search/ (accessed 6/12/17)

d. Screening-level cancer risks were calculated using the following equation, based on the fact that RSLs are derived based on 1 x 10^{-6} risk:
Cancer risk = (remedial goal ÷ cancer RSL) × 10^{-6}

e. The screening-level non-cancer HQ was calculated using the following equation:
HQ = (remedial goal ÷ non-cancer RSL)

Bold = Cancer risk exceeds 1 x 10^{-4} or HQ greater than or equal to 1.

NA = COC has not been classified as a carcinogen.

Table F-2: Screening-Level Vapor Intrusion Risk Evaluation Using Maximum Current Detected Groundwater Concentrations at W11S, GM-17S (LORD Facility)

Contaminant	Current Maximum Detected Groundwater Concentrations (Shallow Wells) (µg/L)	Commercial / Industrial[a]	
		Cancer Risk	Non-cancer HQ
PCE	5.7 (GM-17S 2020)	4.1×10^{-8}	0.01
TCE	12 (GM-17S 2020)	8.5×10^{-7}	0.29
cis-1,2-DCE	1,800 (W11S 2021)	N/A	N/A
Vinyl chloride	170 (W11S 2021)	4.9×10^{-5}	0.39

Notes:
Only COCs detected in 2019 and 2021 are shown
N/A = No screening level available for this constituent

a. June 2022 version online VISL calculator at: https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls (accessed 6/15/22). Groundwater data evaluated at temperature of 11C.
b. Last sample from GM-17S was from 2019 as well was unserviceable in 2020. Sample from W11S was from 2021.

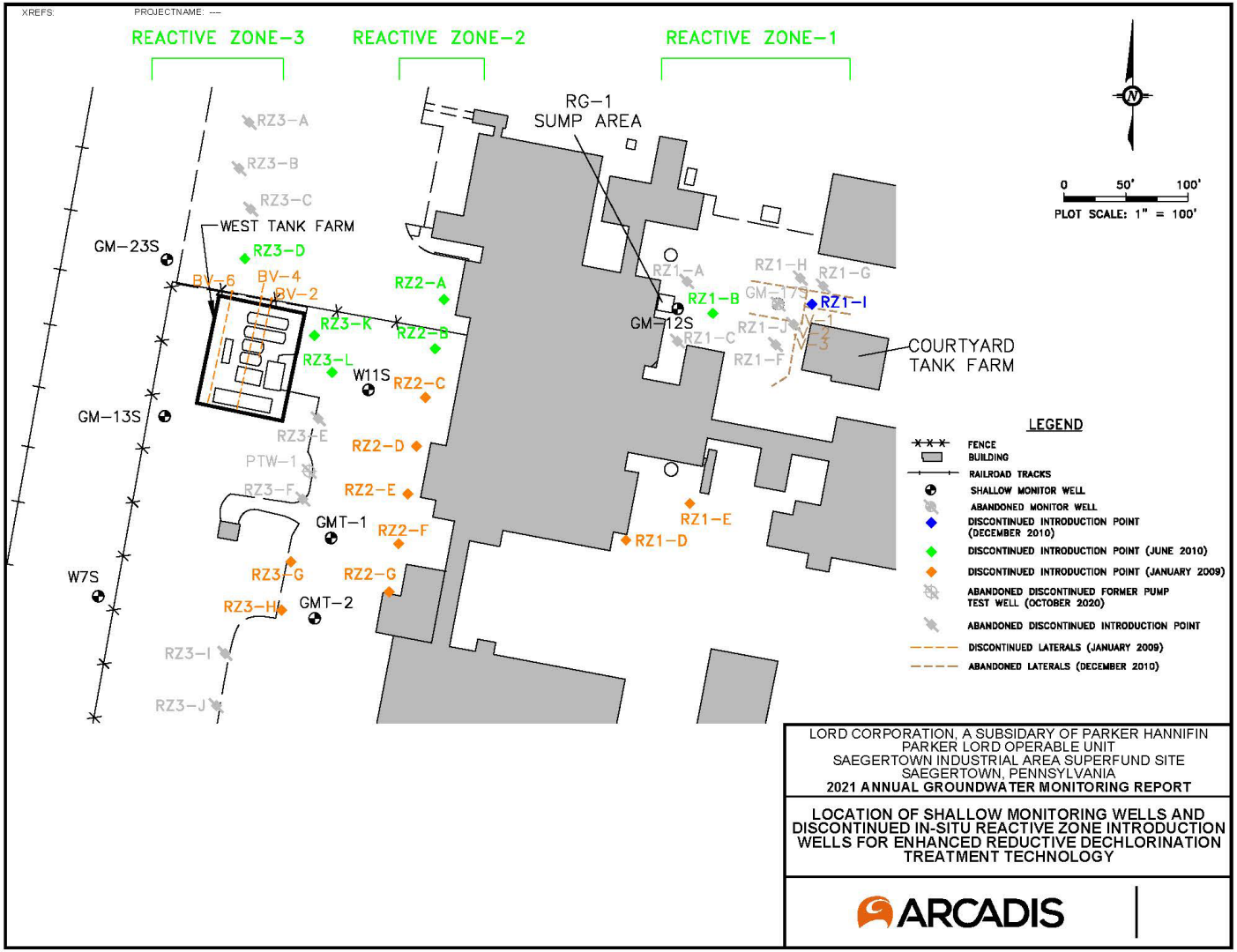
Table F-3: Screening-Level Vapor Intrusion Risk Evaluation Using Maximum Current Detected Groundwater Concentrations at GM-15S and GM-23S (Gingerich Enterprises, LLC Property – formerly the Knuth property)

Contaminant	Current Maximum Detected Groundwater Concentrations (Shallow Wells) (µg/L)[b]	Commercial/Industrial[a]	
		Cancer Risk	Non-cancer HQ
PCE	13 (GM-23S)	9.5×10^{-8}	0.026
TCE	3.1 (GM-23S)	2.2×10^{-7}	0.075
cis-1,2-DCE	5.3 (GM-23S)	N/A	N/A
Vinyl chloride	<1.0 (GM-23S)	$<2.9 \times 10^{-7}$	<0.002

Notes:
Only COCs detected in 2020 are shown
N/A = No screening level available for this constituent

a. June 2022 version online VISL calculator at: https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls (accessed 6/23/22). Groundwater data evaluated at temperature of 11C.
b. Last sample from GM-23S was from 2020 as well was not sampled in 2021. GM-15S was sampled in 2021, but COC concentrations were less than GM-23S 2020 values.

Figure F-1: Well Locations for Screening Level Vapor Intrusion Risk Evaluation[11]



[11] Source: 2021 Annual Groundwater Monitoring Report (Arcadis, June 1, 2022)