SECOND FIVE-YEAR REVIEW REPORT FOR
SHPACK LANDFILL SUPERFUND SITE
TOWN OF NORTON AND CITY OF ATTLEBORO
BRISTOL COUNTY, MASSACHUSETTS

Prepared by

U.S. Environmental Protection Agency
Region 1
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8/21/23

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LIST OF ABBREVIATIONS & ACRONYMS

ALI	Attleboro Landfill, Inc.
ALM	Adult Lead Methodology
ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
ATV	All-Terrain Vehicle
AWQC	Ambient Water Quality Criteria
BLL	Blood Lead Level
CASRN	Chemical Abstracts Service Registry Number
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
COC	Contaminant of Concern
DCE	Dichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DOE	Department of Energy
EPA	United States Environmental Protection Agency
ERM	ERM Consulting & Engineering, Inc.
FS	Feasibility Study
FUSRAP	Formerly Utilized Sites Remedial Action Program
FYR	Five-Year Review
HFPO-DA	Hexafluoropropylene Oxide Dimer Acid (Gen-X)
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
ICs	Institutional Controls
IRIS	Integrated Risk Information System
LOAEL	Lowest Observed Adverse Effects Level
LOED	Lowest Observed Effects Dose
MassDEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MCP	Massachusetts Contingency Plan
µg/dL	Micrograms per Deciliter
µg/L	Micrograms per Liter
mg/kg	Milligrams per Kilogram
mg/m^3	Milligrams per Cubic Meter
MMCL	Massachusetts Maximum Contaminant Level
MRL	Minimal Risk Level
NAUL	Notice of Activity and Use Limitation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ng/L	Nanograms per Liter
NPL	National Priorities List
NOAEL	No Observed Adverse Effects Level
NRC	Nuclear Regulatory Commission
O&M	Operation and Maintenance
OHHRRAF	OLEM's Human Health Regional Risk Assessment Forum
OLEM	Office of Land and Emergency Management
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
pCi/g	Picocurie per Gram
PFAS	Per- and Polyfluoroalkyl Substances

PFBA	Perfluorobutanoic Acid
PFBS	Perfluorobutanesulfonic Acid
PFDA	Perfluorodecanoic Acid
PFHpA	Perfluoroheptanoic Acid
PFHxA	Perfluorohexanoic Acid
PFHxS	Perfluorohexane Sulfonate
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
ppb	Parts per Billion
ppm	Parts per Million
PPRTV	Provisional Peer Reviewed Toxicity Value
ppt	Parts per Trillion
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RfC	Reference Concentration
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
SL	Screening Level
SSC	Shpack Steering Committee
SVOC	Semi-Volatile Organic Compound
TBC	To Be Considered
TEQ	Toxicity Equivalent
USACE	United States Army Corps of Engineers
UU/UE	Unlimited Use and Unrestricted Exposure
VISL	Vapor Intrusion Screening Level
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 FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

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

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

The Site consists of a single operable unit (OU1) that addresses the sitewide cleanup. This FYR addresses OU1.

EPA remedial project manager (RPM) Christopher Kelly led the FYR. Additional participants included EPA community involvement coordinator (CIC) Ashlin Brooks, EPA risk assessors Courtney Carroll and Ayana Cunningham, Garry Waldeck from the Massachusetts Department of Environmental Protection (MassDEP) and Jill Billus and Kirby Webster from EPA FYR contractor Skeo. The City of Attleboro, the performing settling party, was notified of the initiation of the FYR. The review began on 8/31/2022.

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

Site Background

The 9.4-acre Site is in the Town of Norton and City of Attleboro in Bristol County, Massachusetts (Figure 1). The Site is a former landfill that operated from about 1946 through 1970. It received domestic and industrial wastes, including low-level radioactive waste. Landfill operations contaminated soil, sediment and groundwater with hazardous chemicals and substances. EPA added the Site to the Superfund program's National Priorities List (NPL) in June 1986.

The Town of Norton currently owns most of the property that comprises the Site, with the remainder owned by Attleboro Landfill, Inc. (ALI) and a private party.[1] The Site consists mostly of restored or created wetlands, with some upland areas. The Site is partially surrounded by a chain-link fence. An electrical utility easement with overhead distribution and transmission lines traverses the Site.

Peckham Street (Attleboro) and Union Road (Norton) are northwest and north of the Site (Figure 1). An electrical substation and the town of Norton's Conservation Garage are north of Union Road. A 55-acre municipal and industrial landfill owned by ALI abuts the Site to the west and southwest. A wetland area known as Chartley Swamp is southeast, east and northeast of the Site. Chartley Swamp drains under Union Road to Chartley Pond north of the Site.

Groundwater beneath the Site occurs in an overburden aquifer and bedrock aquifer. The overburden aquifer is monitored at the Site.[2] General flow direction in the overburden aquifer is from the ALI property to the north/northeast toward Chartley Swamp. The primary discharge location for shallow and deep overburden

[1] Except for an approximately 3-acre parcel that EPA is addressing as part of the Site, ALI's landfill is regulated by MassDEP's solid waste landfill program.

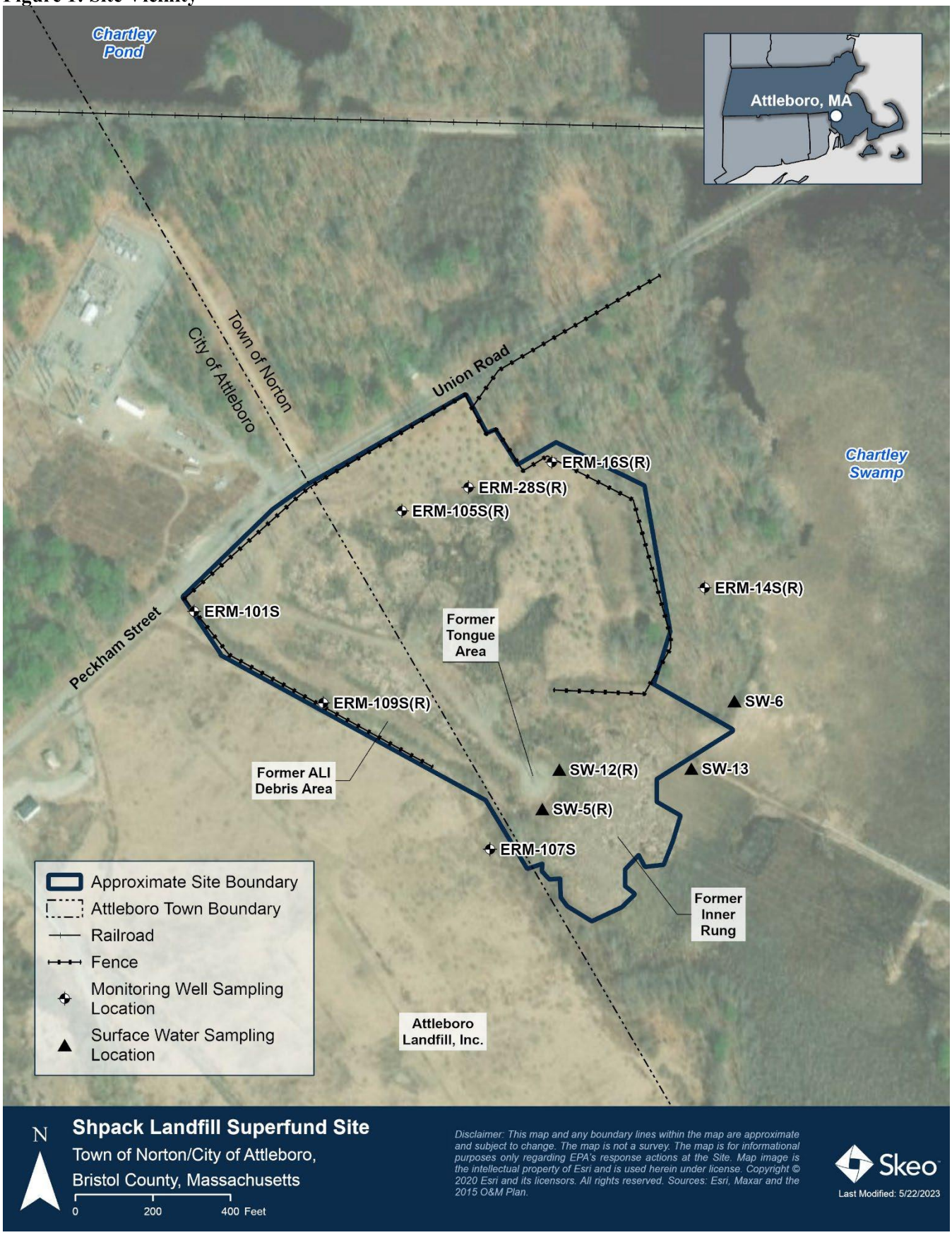
[2] The Site's Phase IB remedial investigation (RI) determined upward vertical gradients observed at the bedrock-overburden interface served to inhibit vertical migration of constituents into bedrock for transport.

groundwater is Chartley Pond and its adjacent wetlands. Some homes near the Site rely on private wells. The closest private well is 0.5 miles west of the Site. Sampling of private wells in 2002 and 2003 did not find site-related impacts, except for Union Road House 1 and Union Road House 2, which have since been demolished and private wells decommissioned. A public water supply line was also extended to within 500 feet of the Site as part of the Site's remedy. In November 2013, MassDEP designated the Site's groundwater as a low use and value aquifer. The aquifer is not considered a current or future water supply under the Massachusetts Contingency Plan (MCP).

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Shpack Landfill		
EPA ID: MAD980503973		
Region: 1	**State:** MA	**City/County:** Attleboro and Norton/Bristol
SITE STATUS		
NPL Status: Deleted		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name: Christopher Kelly		
Author affiliation: EPA		
Review period: 8/31/2022 – 8/29/2023		
Date of site inspection: 4/27/2023		
Type of review: Statutory		
Review number: 2		
Triggering action date: 8/29/2018		
Due date *(five years after triggering action date)*: 8/29/2023		

Figure 1: Site Vicinity



II. RESPONSE ACTION SUMMARY

Basis for Taking Action and Response Actions

In 1978, the Nuclear Regulatory Commission (NRC) conducted radiological surveys at the Site, after being contacted by a concerned citizen. The NRC's investigation identified radioactive materials in the landfill. In 1980, the United States Department of Energy (DOE) added the Site to its Formerly Utilized Sites Remedial Action Program (FUSRAP). In October 1981, the DOE installed a security fence around the Site to prevent unauthorized access.

In 1982 and 1984, DOE conducted more investigations and found volatile organic compounds (VOCs) and metals in groundwater. In 1984, EPA evaluated the Site and confirmed the contamination. EPA added the Site to the Superfund program's NPL in June 1986.

In 1990, the Shpack Steering Committee (SSC), a group of potentially responsible parties (PRPs), entered into an Administrative Order on Consent with EPA to conduct a remedial investigation (RI) and feasibility study (FS) at the Site. The SSC conducted the RI/FS from 1993 to 2004. The United States Army Corps of Engineers (USACE), which took over FUSRAP responsibility from DOE, studied radiological contamination at the Site in 2000 and 2002.

Surface water, groundwater, sediment, and air were evaluated in the Site's RI, which was completed in 2004. The primary contaminants identified were radium, uranium, VOCs, heavy metals, dioxin, polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs). Affected areas of the Site included the Tongue Area, the ALI Landfill Debris Area and the Inner Rung (Figure 1).

The Site's baseline human health risk assessment (HHRA), included in the RI, found unacceptable carcinogenic risk (10^{-4} excess risk) and noncarcinogenic hazard (hazard index [HI] of 1 or greater) for a future young child and adult recreational user potentially exposed to contaminated surface water, sediment, and surface soil. It also found unacceptable risks for an on-site resident and adjacent resident drinking contaminated groundwater or contacting contaminated surface and subsurface soil, and for a construction worker exposed to contaminated subsurface soil. Exposures to lead in on-site soil were estimated to result in an exceedance of the blood lead level (BLL) goal for a future construction worker and future on-site adult and young child resident. In addition, several compounds detected in groundwater exceeded federal maximum contaminant levels (MCLs).

An ecological risk assessment, included in the RI, also found potentially unacceptable ecological risks, primarily associated with sediment in Chartley Swamp and the on-site seasonal wetlands. In Chartley Swamp, risk to semi-aquatic mammals, waterfowl, bottom dwelling fish and benthic macroinvertebrates was associated with concentrations of inorganics. In the on-site seasonal wetlands, risk to small mammals, wetland songbirds and benthic invertebrates was associated with concentrations of semi-volatile organic compounds (SVOCs), pesticides/PCBs and inorganics.

Tables 1 through 3 in the Remedial Action section of this FYR Report include the final contaminants of concern (COC) requiring cleanup.

Remedial Action

EPA selected the Site's remedy in the Site's 2004 Record of Decision (ROD). The ROD encompassed two response actions: one managed by USACE under FUSRAP and the other managed by EPA under CERCLA. EPA is responsible for the non-radiological contamination at the Site.

The ROD identified both media-specific source control and management of migration remedial action objectives (RAOs) for the Site's remedy:

Source Control

Soil

- Prevent ingestion/direct contact with soil having noncarcinogens in excess of an HI of 1 or with soil having carcinogens posing excess cancer risk above 10^{-4} to 10^{-6} and meet applicable or relevant and appropriate requirements (ARARs).
- Prevent inhalation of carcinogens posing excess cancer risk levels above 10^{-4} to 10^{-6} or an HI of 1 and meet ARARs.
- Prevent exposure to contaminants in soil that present an unacceptable risk to the environment.

Sediment

- Prevent exposure to sediment having carcinogens posing excess cancer risk above 10^{-4} to 10^{-6} or an HI of 1.
- Prevent exposure to contaminants in sediment that present an unacceptable risk to the environment.

Surface Water

- Prevent migration of contamination from the Site to surface water to reduce to the extent practicable the contribution of contamination from the Site to surface waters of contamination that presents an unacceptable risk to human health and the environment.

Management of Migration

- Prevent ingestion of groundwater having carcinogens in excess of MCLs, non-zero maximum contaminant level goals (MCLGs), and a total excess cancer risk for all contaminants in groundwater greater than 10^{-4} to 10^{-6}.
- Prevent ingestion of groundwater having non-carcinogens in excess of MCLs or non-zero MCLGs or an HI of 1.
- Prevent exposure to contaminants in groundwater that present an unacceptable risk to the environment.

The Site's remedy selected in the 2004 ROD included excavation and off-site disposal of material exceeding cleanup levels selected in the ROD. Primary remedy components included:

- Connection of two residences next to the Site (Union Road House 1 and Union Road House 2) to public water.
- Installation of a temporary chain-link fence around the Site, with access gates to secure the Site during the design and construction phases of the cleanup.
- Excavation and off-site disposal of soil and sediment exceeding radiological and chemical cleanup levels including dioxin and PCBs (presented in Tables 1 and 3 of this FYR Report).
- Excavation and off-site disposal of sediment from the Inner Rung exceeding the cleanup levels listed in Table 2 of this FYR Report.
- Placement of clean fill in excavated areas to grade and/or wetlands restoration or replication, as appropriate.
- Preparation and implementation of a surface water, sediment and groundwater monitoring program.
- Implementation of institutional controls to restrict future use of the property and groundwater.[3]

The 2004 ROD did not require cleanup of contaminated groundwater. As described in Section D of the 2004 ROD, EPA's decision was based on correspondence with MassDEP that indicated that, following the remedial action (connection to the public water supply system, elimination of the private drinking water wells and implementation of institutional controls prohibiting groundwater use), MassDEP would reclassify the aquifer to a

[3] The 2004 ROD clarified that restrictions would be placed on the Site to prevent residential use or other uses that present unacceptable risk in the future. Groundwater restrictions would also be necessary on the Site and for Union Road House 1 and Union Road House 2 in the form of deed restrictions. These restrictions will be enforced by the appropriate government entity.

low use and value aquifer.[4] The aquifer would no longer be considered a current or future water supply under the MCP.

Further, based on site-specific conditions, the FS concluded that groundwater remediation was infeasible at the time the FS was prepared from a cost, effectiveness, and implementability perspective based on the proximity to a significant off-site source and the high probability for potential COC partitioning (the majority of contaminant mass was likely adsorbed onto aquifer solids, limiting the effectiveness of groundwater restoration). In addition, EPA determined that groundwater will not be used in the future for drinking water. As a result, groundwater cleanup alternatives were not addressed in the detailed analysis of the FS.

Cleanup Levels

The 2004 ROD selected soil cleanup levels based on protection of human health, assuming exposure by a resident who lives next to the landfill (adjacent resident) and whose home is connected to a public water supply and therefore does not consume groundwater (Table 1). It also defined sediment cleanup levels based on protection of environmental receptors in Chartley Swamp and the Interior Wetlands (Table 2 and Table 3).

Table 1: Soil Cleanup Levels

COC	Cleanup Level	Basis[a]
Dioxin toxicity equivalent (TEQ)	1 ppb	EPA Directive 9200.4-26
Radium 226	3.1 pCi/g	10^{-5} excess cancer risk
Uranium 234	220 pCi/g	10^{-5} excess cancer risk
Uranium 235	52 pCi/g	10^{-5} excess cancer risk
Uranium 238	110 pCi/g	10^{-5} excess cancer risk
Arsenic	12 ppm	10^{-5} excess cancer risk
Benzo(a)anthracene	28 ppm	10^{-5} excess cancer risk
Benzo(a)pyrene	2.8 ppm	10^{-5} excess cancer risk
Benzo(b)fluoranthene	28 ppm	10^{-5} excess cancer risk
Dibenz(a,h)anthracene	2.8 ppm	10^{-5} excess cancer risk
Lead	1,400 ppm	Adult lead model
Nickel	7,000 ppm	HI = 1
Total Uranium	1,100 ppm	HI = 1
Notes: a) Risk levels based on dermal contact and incidental ingestion. ppb = parts per billion pCi/g = picocuries per gram ppm = parts per million *Source:* Table L-1 of the Site's 2004 ROD.		

Table 2: Sediment Cleanup Levels for the Inner Rung, Chartley Swamp

COC	Cleanup Level (mg/kg)	Basis
Arsenic	8.4	Food chain model, LOED
Cadmium	6.2	Food chain model, LOED
Copper	41	Food chain model, LOED
Chromium	2,769	Food chain model, LOAEL
Lead	32	Food chain model, LOED
Mercury	0.89	Food chain model, LOED
Silver	0.89	Food chain model, LOED
Beryllium	45	Food chain model, NOAEL
Zinc	1,591	Food chain model, NOAEL
Notes: mg/kg = milligrams per kilogram LOED = lowest observed effects dose		

[4] A low use and value determination here means that EPA does not consider this groundwater suitable as a drinking water source.

COC	Cleanup Level (mg/kg)	Basis
LOAEL = lowest observed adverse effects level NOAEL = no observed adverse effects level *Source:* Table L-2 of the Site's 2004 ROD.		

Table 3: Sediment Cleanup Levels for On-Site Seasonal Wetlands[5]

COC	Cleanup Level (mg/kg)	Basis
Benzo(a)anthracene	1.2	Food chain model, LOAEL
Benzo(a)pyrene	1.3	Food chain model, LOAEL
Benzo(b)fluoranthene	1.3	Food chain model, LOAEL
Benzo(k)fluoranthene	1.3	Food chain model, LOAEL
Chrysene	1.3	Food chain model, LOAEL
Dibenz(a,h)anthracene	1.3	Food chain model, LOAEL
Indeno(1,2,3)pyrene	1.3	Food chain model, LOAEL
Aroclor 1254	0.27	Food chain model, LOAEL
Arsenic	188	Food chain model, LOAEL
Barium	853	Food chain model, NOAEL
Vanadium	448	Food chain model, LOAEL
Dichlorodiphenyltrichloroethane (DDT)	0.027	Food chain model, LOAEL
Antimony	39	Food chain model, LOAEL
Beryllium	5	Food chain model, NOAEL
Cadmium	103	Food chain model, LOAEL
Chromium	427	Food chain model, LOAEL
Copper	122	Food chain model, LOAEL
Lead	551	Food chain model, LOAEL
Mercury	0.26	Food chain model, LOAEL
Nickel	7,943	Food chain model, LOAEL
Silver	187	Food chain model, NOAEL
Zinc	437	Food chain model, LOAEL
Notes: mg/kg = milligrams per kilogram LOED = lowest observed effects dose LOAEL = lowest observed adverse effects level NOAEL = no observed adverse effects level *Source:* Table L-3 of the Site's 2004 ROD.		

Status of Implementation

The remedial action was implemented in two parts. The FUSRAP remedial action, completed by USACE, addressed radiological contamination first. The CERCLA remedial action addressed non-radiological contamination. Work completed under each part is described below.

FUSRAP Remedial Action

USACE repaired or replaced portions of the existing fence around the Site prior to beginning the removal. From 2005 to 2011, USACE contractors excavated 57,805 cubic yards of material from the landfill interior. About 51,000 cubic yards of the excavated material were transported off site to the Energy Solutions disposal facility in Clive, Utah, a facility licensed for disposal of low-level radioactive waste and mixed wastes. USACE constructed a soil stockpile consisting of about 2,500 cubic yards of excavated soil that did not exceed the radiological cleanup levels but contained chemical constituents. This stockpile, referred to as the Chemical-Only Soil Stockpile, was subsequently transported off site for disposal during the CERCLA remedial action (addressed in

[5] The Final Remedial Construction Report states, on PDF page 15, that "due to the destruction of most of the on-site seasonal wetlands and the removal of surface soil/sediment in those areas during the FUSRAP activities, the cleanup levels for sediments in the on-site seasonal wetlands were not applicable to the remedial action activities described in this report."

the next section). An additional 4,400 cubic yards of excavated material was determined to be below ROD cleanup levels and was reused as backfill at the Site. Confirmation samples from the excavations confirmed that the cleanup levels for radiological contaminants were met.

On-site waste management and transport of radioactive material was performed in accordance with applicable local, state and federal regulations for handling, labeling, storage and transport of radioactive wastes. Truck traffic was managed during remedial activities in accordance with the traffic control plan developed by USACE with input from local and state authorities.

The remedial actions are described further in the USACE contractor's May 2012 Remedial Action Completion Report, Final, Operable Unit 1 – Radiological Remediation.

CERCLA Remedial Action

In January 2009, 14 PRPs entered into a remedial design/remedial action Consent Decree to complete the rest of the Site's cleanup of chemical wastes and other contaminants. From July 2012 to July 2014, PRP contractors performed the following remedial actions at the Site:

- Extension of the city of Attleboro water supply line about 2,600 feet along Peckham Street to a point within 500 feet of the Site (October 2012), to meet ROD and MassDEP requirements. Connections to Union Road Houses 1 and 2 were not made because both houses previously were razed in 2007 and 2012, respectively, and the two private water supply wells properly abandoned.[6]
- Excavation, transportation, and off-site disposal of 27,120 tons of contaminated soils and sediment, including the Chemical-Only Soil Stockpile generated during the FUSRAP remedial action. Excavation occurred in several areas of the Site, including the Inner Rung, Tongue Area, and the ALI Landfill Debris Area. The areas were dewatered as needed.
- Placement of clean fill in excavated areas to grade and/or wetlands restoration/replication. This included restoration and construction of 5.3 acres of wetlands, which is 14% more wetland area than the pre-construction condition.
- Relocation of electrical transmission structures to accommodate the removal of contaminated materials in the Tongue Area.
- Installation of new storm water infrastructure to improve drainage on Union Road.
- Implementation of institutional controls to prevent exposure to contaminated soil and groundwater (completed November 2016).

In November 2013, MassDEP revised its Groundwater Use and Value Determination to a low use and value aquifer. With the determination, EPA considers the groundwater not suitable as a drinking water source.

EPA conducted a final site inspection in September 2014 and determined that all components of the remedy were constructed in general accordance with EPA-approved plans and specifications. EPA signed the Preliminary Close Out Report in September 2014. The remedial actions are described further in EPA's November 2016 Final Closeout Report and the PRP's April 2015 Final Remedial Construction and Demonstration of Compliance Report.

Long-term groundwater and surface water monitoring began at the Site in 2014 to ensure that recontamination is not occurring. Routine site inspections and monitoring of the newly created wetlands also began at that time.

EPA deleted the Site from the NPL in September 2017.

[6] The April 2015 Final Remedial Construction and Demonstration Compliance Report notes that as part of the public engagement process and in consultation with EPA and MassDEP, it was decided that the two residences would be demolished and the water line extended to a point within 500 feet from the western boundary of the Site. Based on the town of Norton parcel mapper, both properties are now owned by the town of Norton.

Institutional Controls

The 2004 ROD required institutional controls to restrict future use of the property and to prohibit use of groundwater. Institutional controls in the form of Notice of Activity and Use Limitations (NAULs) were recorded for four parcels in November 2016 in the Bristol County Northern District Registry of Deeds. The NAULs restrict certain land uses and extraction of groundwater (Table 4). The NAULs also clarify uses that are consistent with the remedy, which include recreational use, commercial use, industrial use, educational walking trails, and some types of routine maintenance and repair work. The City of Attleboro is responsible for monitoring compliance with and enforcement of the institutional controls, and for preparing and submitting annual reports to EPA and MassDEP regarding the status of the institutional controls. The City of Attleboro's environmental contractor, ERM Consulting & Engineering, Inc. [ERM]), conducts semiannual compliance monitoring inspections. The 2019 through 2022 reports indicate that no activities in violation of the institutional controls were observed.

All required institutional controls are in place and preventing exposures to contamination effectively. Figure 2 shows the areas subject to the NAULs. In addition, a soil management plan is prepared if contact with deeper and potentially residually contaminated soil is proposed in the utility right-of-way.

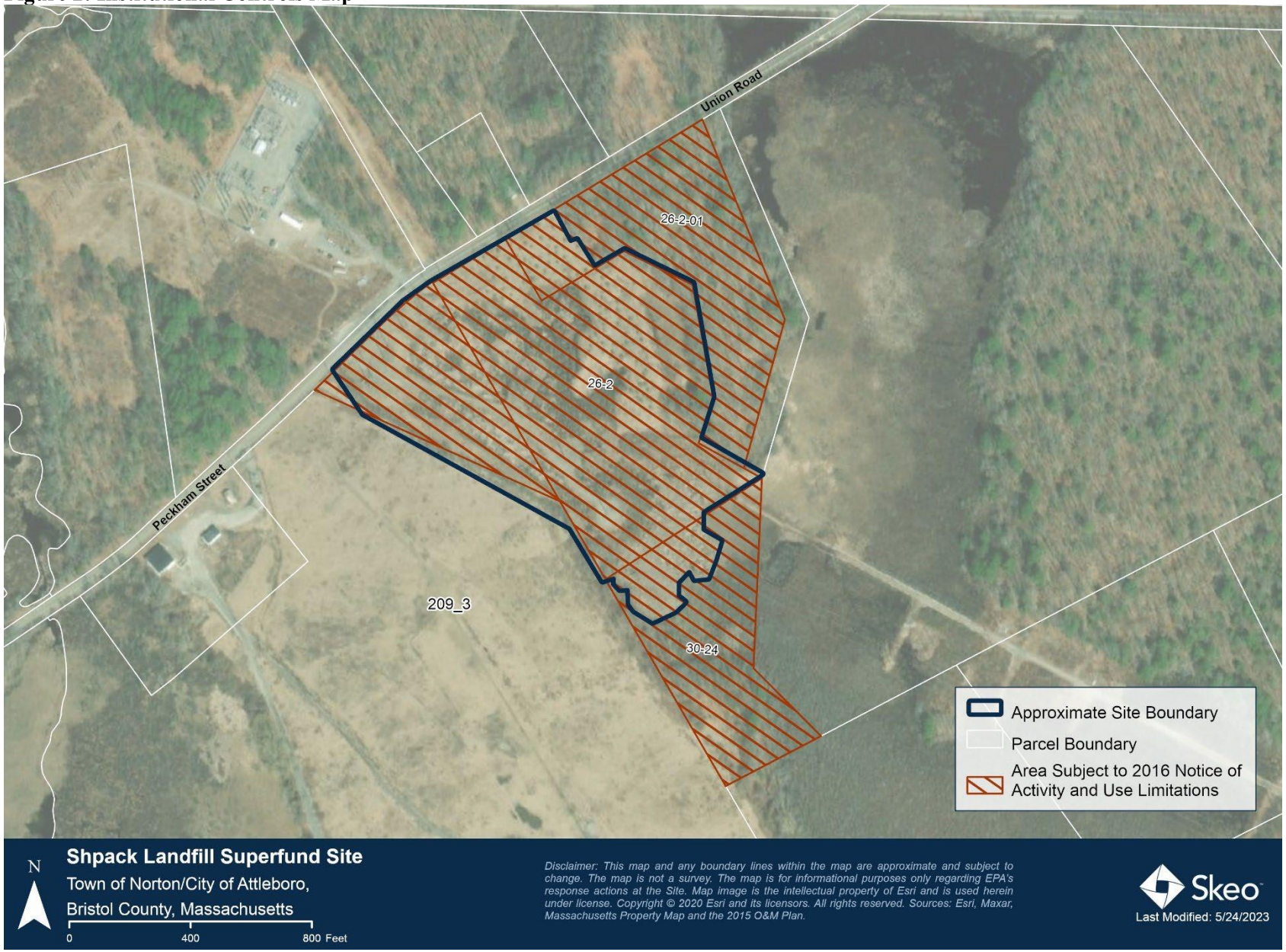
Table 4: Summary of Planned and/or Implemented Institutional Controls (ICs)

Media, Engineered Controls, and Areas That Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	IC Objective	Impacted Parcel(s)	Title of IC Instrument Implemented and Date (or planned)
Soil, sediment, groundwater, remedial components	Yes	Yes	• Restrict excavation of soil and/or sediment below the seasonal high water table or elevation 104.00 feet above mean sea level, whichever is greater, except when performed in strict compliance with plans/protocols, as submitted to and pre-approved by EPA and MassDEP. • Restrict extraction of groundwater for any purpose other than monitoring, except if pre-approved by EPA and MassDEP. • Restrict agricultural use, residential use, use as a daycare or hotel/motel. • Restrict construction of enclosed structures, unless approved by EPA and MassDEP. • Restrict any activity that is likely to interfere with the remedial components.	ALI-owned part of Site Attleboro Plat 209, Lot 4A[a]	NAUL Book 23381, Page 60 November 2016
				Town of Norton-owned part of Site Norton Map 26, Lots 26-2 and 26-2-01	NAUL Book 23380, Page 235 November 2016
				Parcel owned by a private party Norton Map 30, Lot 30-24	NAUL Book 23381, Page 1 November 2016

Notes:

a) Attleboro Plat 209, Lot 4A appears as part of larger ALI-owned parcel 209_3 on the Massachusetts Interactive Property Map, accessed 4/13/2023 and as shown on Figure 2.

Figure 2: Institutional Controls Map



Systems Operations/Operation & Maintenance (O&M)

The City of Attleboro is responsible for the Site's O&M and long-term monitoring activities. The Site's 2015 Operations and Maintenance Plan, Revision 1 (O&M Plan) identifies the O&M activities and monitoring requirements for the Site. They include wetland monitoring, institutional controls monitoring, perimeter fence inspection and maintenance, and environmental monitoring.

The O&M Plan required semiannual wetland inspections from 2014 to 2020 to occur in late spring and late summer. The wetlands were to be inspected for potential erosion or disturbance of soils and evidence of hydrology, wildlife browsing and invasive species as well as vegetation coverage and richness, vernal pools, and hydric soils. The City of Attleboro submitted annual reports to EPA with the results of the wetland monitoring. The Data Review section of this FYR Report presents the results from the most recent and final inspection in 2020.

The O&M Plan specifies semiannual institutional control monitoring, which includes a site walk to look for evidence of activities that violate the institutional controls. The City of Attleboro submits the results in annual reports to EPA.

The O&M Plan specifies annual perimeter fence inspections, which include inspecting the fence and gates for evidence of damage from fallen trees or human activities. If damage is discovered, repairs are required within a reasonable timeframe. The fence is not required as part of the completed remedial action, but it remains in place to discourage illegal dumping and to protect the restored wetland areas.

Long-term environmental monitoring at the Site includes semiannual groundwater and surface water monitoring. Seven groundwater monitoring wells and four surface water monitoring locations near Chartley Swamp are included in the monitoring program. Groundwater samples are to be analyzed for the Site's soil COCs listed in Table 1. Surface water samples are to be analyzed for the sediment COCs in Table 2. In response to a recommendation in the 2018 FYR Report, dissolved metals analysis was added to the surface water monitoring program in 2019. Calcium and magnesium were also added to the list of metals analyzed in surface water to calculate hardness, in response to an EPA recommendation following a May 2019 site visit. The 2004 ROD required a sediment monitoring program. However, the FUSRAP and CERCLA remedial actions addressed soil and sediment above applicable cleanup levels. Because soil and sediment exceeding the cleanup levels prescribed by the ROD were excavated and disposed of off Site, monitoring for these media is not included in the 2015 O&M Plan.

In 2021, the City of Attleboro's environmental contractor (ERM) requested a reduction in sampling frequency to annual. However, EPA and MassDEP indicated that sampling should continue semiannually until the next FYR period (meaning this current FYR period, 2023) due to concerns related to higher concentrations of radium 226 in several wells in the May 2018 and May 2019 sampling events. The Data Review section of this FYR Report presents recent results from the semiannual monitoring events.

III. PROGRESS SINCE THE PREVIOUS REVIEW

Table 5 includes the protectiveness determinations and statements from the 2018 FYR Report. No issues were identified during the 2018 FYR that affected the protectiveness of the remedy.

Table 5: Protectiveness Determinations/Statements from the 2018 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The remedy is considered protective of human health and the environment. There are no current exposures of Site-related waste to humans or the environment at concentrations that would represent a health concern. The ICs, abandonment of private wells, and the municipal water line that was installed have eliminated groundwater use in areas impacted by the Site. MassDEP reclassified site groundwater in 2013 as GW-3 and of low value as a drinking water source. The ICs prohibit consumption of groundwater and prevent any land use that would result in exposures to Site-related contaminants. Routine inspections and maintenance will continue to be performed at the Site to ensure Site use complies with the ICs. Wetland restoration monitoring will continue until September 2020. Groundwater and surface water sampling will continue to be performed to evaluate the long-term protectiveness of the remedy.
Sitewide	Protective	The remedy is considered protective of human health and the environment. There are no current exposures of Site-related waste to humans or the environment at concentrations that would represent a health concern. The ICs, abandonment of private wells, and the municipal water line that was installed have eliminated groundwater use in areas impacted by the Site. MassDEP reclassified site groundwater in 2013 as GW-3 and of low value as a drinking water source. The ICs prohibit consumption of groundwater and prevent any land use that would result in exposures to Site-related contaminants. Routine inspections and maintenance will continue to be performed at the Site to ensure Site use complies with the ICs. Wetland restoration monitoring will continue until September 2020. Groundwater and surface water sampling will continue to be performed to evaluate the long-term protectiveness of the remedy.

Although there were no issues or recommendations in the 2018 FYR Report, EPA recommended the following modifications to the surface water monitoring program to improve the evaluation of surface water data: 1) evaluate surface water data by plotting the cumulative mean with two standard deviations of the mean to facilitate trend analysis; and 2) analyze surface water for total and dissolved metals to determine whether the occasional higher concentrations are due to suspended sediments captured in the sample. The 2022 Annual Report states that ERM has collected dissolved metals at all surface locations (in addition to total metals) since January 2019. ERM also conducted statistical trend analyses for surface water data in the spring 2022 report.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Community Involvement and Site Interviews

EPA issued an online news release in January 2022 to announce that the FYR was underway. A copy of the news release is included in Appendix C. The results of the review and the completed FYR Report will be made available at EPA's site profile page at http://www.epa.gov/superfund/shpack.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The results of these interviews are summarized below. Appendix D includes the completed interview forms.

Garry Waldeck, the MassDEP project manager for the Site, noted that the project is a success and the wetlands have recovered well. Reuse is limited due to the wetlands. He indicated that the remedy is operating as expected. The state is comfortable with the status of institutional controls at the Site. He is not aware of changes to state laws that might affect the Site, or of changes in projected land use.

James DiLisio, the acting mayor of Attleboro, is well-informed regarding the Site's activities and remedial progress because the City of Attleboro is implementing the Site's O&M Plan. He noted that there have been no issues with vandalism or trespassing at the Site. The fence was repaired about three years ago after it was damaged. He is not aware of any changes to state or local regulations that might affect the remedy. He is unaware of any changes in projected land use at the Site.

Quintin Nel from ERM, the City of Attleboro's contractor, noted that the project is meeting the requirements of the Site's O&M Plan. He noted that there are no groundwater and surface water quality performance standards for the Site, but sample results are consistent with historical levels and there are no current risks to human health or the environment. ERM is not aware of any complaints or inquiries about the Site. He recommended that groundwater sampling be decreased to annually.

Michael Unitis, acting mayor of the town of Norton, is well-informed regarding the Site. He is unaware of changes to local regulations that might affect the Site, or of changes in projected land use. He is not aware of vandalism, trespassing or other unexpected activities at the Site. He noted that EPA can provide site-related information in the future by posting on the town website.

John Thomas, Director of the Conservation Department – Norton Stormwater Agent, is well-informed about the remedial progress at the Site. He is unaware of any emergency response, vandalism or trespassing at the Site. He is not aware of any changes in local regulations that might affect the Site but did note that the former Shpack property is subject to activity and use limitations. There are no changes in projected land uses in 2023 for the Site.

Data Review

Long-term groundwater and surface water monitoring began at the Site in 2014. The long-term monitoring well network includes seven groundwater monitoring wells and four surface water locations (Figure 2). Samples are collected semiannually (typically May and November) and the results are discussed in semiannual Shpack Environmental Monitoring and Inspection Reports prepared by the PRP's contractor, ERM. Groundwater samples are analyzed for the radionuclides, metals, SVOCs and dioxins listed in Table 1. Surface water samples are analyzed for the metals listed in Table 2, as well as calcium and magnesium. Data reviewed for this FYR include groundwater and surface water data from 2018 through October 2022. The 2020 Wetland Report was also reviewed.

The Site's 2004 ROD required long-term surface water and groundwater monitoring, but it did not establish site-specific cleanup levels for these media. However, the ROD identified federal ambient water quality criteria (AWQC) as ARARs. Notwithstanding, the remedial design/remedial action scope of work in the Consent Decree required long-term groundwater and surface water sampling as a means of tracking long-term trends in contaminant concentrations in those media.

Groundwater and surface water analytical results from 2018 to 2022 are generally low or not detected above laboratory reporting limits, consistent with historical concentration ranges. Mann-Kendall trend analyses conducted using surface water data from 2019 through spring 2022 indicated stable or decreasing trends for metals in surface water. See Appendix E for data summary tables, historical summary statistics (minimum, average and maximum detections) and results of the Mann-Kendall trend analyses. [7]

For the wetlands, all performance goals have been achieved, the total wetland constructed is commensurate with the approved remedial action requirements, and the Site is anticipated to function as a self-sustaining ecosystem in the future.

More information on the data reviewed is below.

[7] The October 2022 Monitoring & Inspection Report indicates that the historical dataset used for the simplified statistics included data from the RI/FS, data collected by USACE between 2005 and 2012, and data collected by ERM during the 2013 remedial action.

Groundwater
Groundwater generally flows to the north/northeast toward Chartley Swamp (Figure E-1 in Appendix E). A review of groundwater sampling data provided in the 2018 to 2022 monitoring and inspection reports, and included in Appendix E of this FYR Report, indicates the following:

- Dioxin is generally not detected or detected at low concentrations several orders of magnitude below the historical sitewide mean concentration.
- Radionuclide detections are generally consistent with historical concentration ranges except for an increase by about an order of magnitude in 2018/2019 in several wells, including ERM-105S(R), ERM-107S and ERM-109S(R). Data through October 2022 show that radionuclide concentrations in these wells have returned to levels consistent with historical ranges since that time.
- Metals detections (arsenic, lead and nickel) are generally consistent with historical concentration ranges for these constituents.
- SVOC detections are generally not detected or detected at low concentrations (below 0.5 micrograms per liter [µg/L]). When detected, concentrations are consistent with or below historical concentration ranges.

Surface Water
The 2018 FYR reported that while the overall metals concentrations in surface water appear to be declining since the completion of the remedial action and the beginning of the O&M phase in 2014, the surface water data showed considerable variability from one sampling event to the next. For example, in two locations, metals concentrations ranged from non-detect to concentrations that could exceed ecological risk aquatic screening values, which complicates trend analysis and determination of long-term protectiveness. In the 2018 FYR Report, EPA recommended that future data be plotted as a cumulative mean with two standard deviations of the mean to facilitate trend analysis, in order to better evaluate if concentrations are approaching AWQCs (now known as National Recommended Water Quality Criteria). EPA also recommended analyzing surface water for dissolved metals to determine whether the occasional higher concentrations are due to suspended sediments captured in the sample.

The current Environmental Monitoring and Inspection Reports include historical statistics for each sampling location, as well as a comparison to historical statistics for sitewide surface water. These statistics include the number of detections, minimum, maximum and mean concentrations for both sample sets. The values are not being compared to the National Recommended Water Quality Criteria in the reports.[8] It is important to compare the data to current standards to ensure the remedy is protective. In the most recent dataset available for review (October 2022), several metals exceeded the water quality criteria protective of aquatic life. For example, total cadmium (1.71 µg/L) and total lead (2.8 µg/L) exceeded the chronic aquatic life criteria (0.72 µg/L and 2.8 µg/L) at SW-5(R) and SW-13, respectively. Total zinc also exceeded both the acute and chronic criteria (both 120 µg/L) at SW-5(R) (5,850 µg/L) and SW-6 (128 µg/L). Detected concentrations, however, are within historical ranges.

Since 2019, the surface water samples have been analyzed for dissolved metals in addition to total metals. In some instances, the detected concentration in the dissolved sample is lower than the concentration in the total sample, but in other samples, total and dissolved concentrations are very similar. For example, at SW-5(R) the total chromium concentration was estimated (J) at 5.67 micrograms per liter (µg/L) in January 2019 while the dissolved concentration was <3 µg/L. However, at the same location in October 2022, total chromium was 7.67 J µg/L while dissolved chromium was 7.71 J µg/L. There does not appear to be a clear pattern between total and dissolved concentrations. The spring 2022 report notes that it does not appear that suspended sediments are substantially interfering with surface water analytical results.

In spring 2022, the PRPs conducted Mann-Kendall analyses on the dissolved surface water data collected since 2019. The analysis indicated stable or decreasing trends for arsenic, cadmium, calcium, copper, lead, magnesium and zinc at all four surface sample locations where enough detections of contaminants had occurred to meet the

[8] National Recommended Water Quality Criteria are available at https://www.epa.gov/wqc.

data requirements of conducting the Mann-Kendall. See Appendix E for the Mann-Kendall analyses results. Appendix E also includes graphs which plot surface water data against the cumulative mean with two standard deviations.

Wetlands

Implementation of the remedial action required disturbance to jurisdictional wetland areas. The impacts were mitigated by restoration as well as creation of new wetlands within the Site. Construction of the wetlands was completed in December 2013. The newly restored and created wetlands were required to be monitored for seven years, based on the 2015 O&M Plan, for vegetation coverage, vegetation richness, hydrology indicators, survivability, and vernal pools. The 2020 Wetland Report concludes the monitoring program for the Site. It states that all performance goals have been achieved, the total wetland constructed is commensurate with the approved remedial action requirements, and the Site is anticipated to function as a self-sustaining ecosystem in the future. The performance goals and year of goal achievement are summarized in the 2020 Wetland Report and below in Table 6. EPA approved the 2020 Wetland Report on January 10, 2023.

Table 6: Wetland Mitigation Performance Goal Status

Category	Performance Goal	Performance Goal Status
Vegetation Coverage	75% coverage before the end of October 2015.	Achieved in 2015
Vegetation Richness	Two native volunteer wetland species added to list of observed species in the 2015, 2016, and 2018 growing seasons.	Achieved in 2018
Hydrology Indicators*	One primary or two secondary indicators of hydrology in at least three of the first 5 years of post-construction monitoring.	Achieved in 2016
Survivability**	80% survival of the baseline quantity of each of the approved planted woody species in the PFO in Year 5.	Achieved in 2018
Vernal Pools	At least 8,500 square feet of vernal pool habitat created.	Achieved in 2015

Notes:
** Primary and secondary indicators used will be from the list in the most recent Regional Supplement to the Corps of Engineers Wetland Delineation Manual (USACE, 2012).*

*** The Survivability performance goal was modified in Rev. 1 of the O&M Plan from 80% survival of each planted woody species in Year 5 to the current language. See Section 2.4.*

Site Inspection

The site inspection was conducted on 4/27/2023. In attendance were EPA RPM Christopher Kelly, Dave Buckley from MassDEP, Nick Wyllie and Chris Farewell from the City of Attleboro, Clementine Dulieu with the City of Attleboro's contractor ERM and Jill Billus and Kirby Webster from EPA's FYR support contractor Skeo. The purpose of the inspection was to assess the protectiveness of the remedy. Appendix F includes the completed site inspection checklist. Appendix G includes photographs from the site inspection.

Site inspection participants met at the parking area across from the Site for a general safety briefing. While there is signage at the Site entrance, none of it pertains to the status of the Site as a Superfund site. The City of Attleboro posted signage accurately labeling the property as a Superfund site in May 2023. The fence along Union Road is adequate and in place, although it is not required by the ROD. There does not appear to be intentional vandalism or trespassing through the fence. Site inspection participants walked down the access road for the National Grid utility easement to the former Tongue Area. The road is in good condition. Participants viewed a surface water sampling location and the Former Inner Rung area. The wetlands are well vegetated. All-terrain vehicle (ATV) tracks were observed at the junction of the Site with the ALI landfill. However, with the condition of the property and vegetation, it does not appear that ATV use on the Site is heavy or impacts the

remedy. Participants viewed the Site from the neighboring ALI property. The Site is well vegetated. Monitoring wells ERM-107S and ERM-101S were both locked and labeled. Both of the currently sampled wells appear to be in a cluster with other groundwater wells that are no longer monitored. One well, next to ERM-101S was unlocked. It is adjacent to the road and the Attleboro Landfill. It may be beneficial for long-term protectiveness to locate and decommission groundwater wells that are no longer needed for the sampling program. Site inspection participants visited the town of Norton's Conservation Garage located across from the Site to ensure the garage did not have a potable water source. The garage appeared to be abandoned with no signs of water usage. Site inspection participants also discussed the planned use of solar panels on the neighboring ALI property, which is expected to begin in the near future.

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 Site's 2004 ROD, as discussed below.

Remedial Action Performance
The remedial action included excavation and off-site disposal of nearly 51,000 cubic yards of low-level radioactive material and mixed wastes as part of the USACE-led action completed in 2011. An additional 27,120 tons of non-radiological material (soils and sediment above cleanup levels) were excavated and transported off-site for disposal in 2014. A public water supply line was installed, although there are no connections to the extension since the homes that required a potable water source were demolished instead. Wetlands have been appropriately restored or constructed. Following cleanup, EPA deleted the Site from the NPL in 2017. FYRs will continue to be conducted to ensure the remedy remains protective of human health and the environment.

System Operations/O&M
The City of Attleboro implements O&M and long-term monitoring activities at the Site, which began in 2014. These activities included wetlands monitoring, institutional controls monitoring, perimeter fence inspection and maintenance, and environmental monitoring. No issues of concern were identified. Groundwater and surface water analytical results from 2018 to 2022 are generally low or not detected above laboratory reporting limits, consistent with historical concentration ranges. The final wetlands monitoring event took place in 2020. All wetlands mitigation performance goals have been achieved. Long-term monitoring of institutional controls, groundwater and surface water is ongoing. The 2004 ROD required a sediment monitoring program. However, the FUSRAP and CERCLA remedial actions addressed soil and sediment above applicable cleanup levels. Because soil and sediment exceeding the cleanup levels prescribed by the ROD were excavated and disposed of off Site, monitoring for these media is not included in the 2015 O&M Plan.

Implementation of Institutional Controls and Other Measures
Institutional controls in the form of NAULs have been implemented at the Site and have proven to be effective at limiting human exposure to affected groundwater, soil, and sediment. The City of Attleboro inspects the Site annually to determine if there is evidence that activities have been, or are being, conducted at or on land that is in violation of the institutional controls. The 2019 through 2022 semiannual reports indicate that no activities in violation of the institutional controls were observed.

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

Question B Summary:
No. There have been changes in exposure assumptions and toxicity data since the 2004 ROD was issued as discussed below. However, the changes are not expected to alter the protectiveness of the remedy because there are no current human exposures to contaminated groundwater, soil, or sediment. Contaminated soil and sediment were excavated and sent off-site for disposal, and the Site was backfilled and restored with clean fill. No one is

using contaminated groundwater on or near the Site. A public water supply line was extended to within 500 feet of the Site property. Institutional controls are in place to prevent future exposure to contaminated groundwater, to limit land and groundwater use and to address the potential for vapor intrusion should an enclosed structure be proposed on Site.

EPA considers per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane to be emerging contaminants of concern. Due to the Site's historical use as a landfill, further evaluation of PFAS and 1,4-dioxane may be recommended.

Changes in Standards and To Be Considered Criteria (TBCs)

New standards (federal or state statutes and/or regulations), as well as new TBC guidance, should be considered during the FYR process as part of the protectiveness determination. Under the NCP, if a new federal or state statute and/or regulation is promulgated or a new TBC guidance is issued after the ROD is signed, and, as part of the FYR process it is determined that the standard needs to be attained or new guidance procedures followed to ensure that the remedy is protective of human health and the environment, then the FYR should recommend that a future decision document be issued that adds the new standard as an ARAR or guidance as a TBC to the remedy.

EPA guidance states:

> "Subsequent to the initiation of the remedial action new standards based on new scientific information or awareness may be developed and these standards may differ from the cleanup standards on which the remedy was based. These new…[standards] should be considered as part of the review conducted at least every five years under CERCLA §121I for sites where hazardous substances remain on-site. The review requires EPA to assure that human health and the environment are being protected by the remedial action. Therefore, the remedy should be examined in light of any new standards that would be applicable or relevant and appropriate to the circumstances at the site or pertinent new [standards], in order to ensure that the remedy is still protective. In certain situations, new standards or the information on which they are based may indicate that the site presents a significant threat to health or environment. If such information comes to light at times other than at the five-year reviews, the necessity of acting to modify the remedy should be considered at such times." (See CERCLA Compliance with Other Laws Manual: Interim Final (Part 1) EPA/540/G-89/006 August 1988, pp. 1-56.)

Although the 2004 ROD did not require groundwater cleanup, the federal MCLs and MCLGs are identified in the Site's RAOs, to prevent ingestion of groundwater that exceeds MCLs and non-zero MCLGs. The 2004 ROD only identified the MCLs for arsenic (10 µg/L), cadmium (5 µg/L), lead (15 µg/L) and antimony (6 µg/L) in residential wells, although it mentions that several other constituents in groundwater exceeded the MCLs in effect at that time (without identifying the specific values). The MCLs for arsenic, cadmium, lead and antimony listed in the 2004 ROD have not changed.

The 2004 ROD, Appendix B also identifies federal AWQCs as ARARs for the Site but does not identify the standards in effect at that time. It noted that the criteria "will be used to determine if other activities minimize the contribution of contaminants from the site to surface water." The 2018 FYR Report indicated that the AWQCs that are applicable to the Site include the fresh water criteria maximum concentration and fresh water criteria continuous concentrations for the protection of aquatic life. Current AWQCs, now National Recommended Water Quality Criteria, can be found at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#table. The PRP's semiannual monitoring reports should compare surface water data to the applicable surface water criteria.

PFAS (Federal)
In May 2022, EPA issued updated noncancer reference dose (RfD) values for several PFAS compounds which result in the following regional screening levels (RSLs) at HQ target 0.1:

- Perfluorooctanoic acid (PFOA): 6 nanograms per liter (ng/L) (equivalent to parts per trillion [ppt])

- Perfluorooctane sulfonic acid (PFOS): 4 ng/L
- Perfluorononanoic acid (PFNA): 6 ng/L
- Perfluorohexane sulfonate (PFHxS): 40 ng/L
- Hexafluoropropylene oxide dimer acid (HFPO-DA) (Gen-X): 6 ng/L

The RfD values for PFOA, PFOS, PFNA and PFHxS are based on Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs) for ingestion exposure.

The RfD value for HFPO-DA (Gen-X) is based on a chronic oral RfD from EPA Office of Water which is 3E-06.

In May 2021, EPA issued an updated noncancer RfD for perfluorobutanesulfonic acid (PFBS). PFBS has a chronic oral RfD of 3E-04. The RSL for PFBS is 600 ng/L.

In December 2022, EPA released a new oral RfD of 1.0E-03 milligrams per kilogram per day (mg/kg-day) for perfluorobutanoic acid (PFBA) based on a new Integrated Risk Information System (IRIS) value. Previously, no RfD was available for PFBA. The RSL for PFBA is 1,800 ng/L.

In April 2023, EPA released a new oral RfD of 5.0E-04 mg/kg-day for perfluorohexanoic acid (PFHxA) based on a new IRIS value. Previously, no RFD was available for PFHxA. The RSL for PFHxA is 990 ng/L.

PFAS (State)
On October 2, 2020, the state promulgated Massachusetts Maximum Contaminant Levels (MMCLs) for drinking water for the sum of six PFAS compounds into the state's drinking water regulations (310 Code of Massachusetts Regulations 22.00). The MMCL is 20 ng/L (ppt) for the sum of six PFAS compounds:

- PFOS
- PFOA
- PFHxS
- PFNA
- Perfluoroheptanoic acid (PFHpA)
- Perfluorodecanoic acid (PFDA)

At this time EPA has made no determination of whether these state standards will need to be added as an ARAR for this Site. They should, however, be used as screening values for PFAS compounds, along with the RSLs.

PFAS (Summary)
Samples from the Site have not been analyzed for PFAS. However, due to the unknown nature of waste disposed of in the landfill, sampling for PFAS in groundwater may be recommended. The lack of PFAS data does not affect current protectiveness of the remedy because no one is exposed to contaminated groundwater and institutional controls are in place to prevent future exposures.

1,4-Dioxane (Federal)
Using 2013 updated IRIS toxicity information and the standard Superfund risk assessment approach, EPA's carcinogenic risk range of 10^{-6} to 10^{-4} for 1,4-dioxane equates to a concentration range of 0.46 µg/L to 46 µg/L (ppb).

Samples at the Site have not been analyzed for 1,4-dioxane. Due to the unknown nature of waste disposed of in the landfill, sampling for 1,4-dioxane in groundwater may be recommended. The lack of 1,4-dioxane data does not affect current protectiveness of the remedy. No one is exposed to contaminated groundwater and institutional controls are in place and effective for preventing future exposures.

Floodplain
Federal regulations at 40 CFR Part 6, Appendix A identified in the 2004 ROD were withdrawn. Furthermore, these regulations, and therefore the current CERCLA remedy, only addressed potential floodplain impacts up to the 100-year flood elevation. Current federal floodplain regulations at 40 CFR Part 9 require a greater assessment of potential floodplain impacts, including preventing the release of contamination from waste management units and other remedial infrastructure up to the 500-year floodplain elevation.

EPA has assessed potential floodplain impacts from a 500-year flood event on the Site. Except for monitoring wells, there is no other remedial infrastructure in the floodplain. Contaminated soil and sediment were removed as part of the remedial action, and a large portion of the Site is wetland habitat.

Changes in Toxicity and Other Contaminant Characteristics

2023 PFHxA Noncancer Toxicity Value
In April 2023, EPA released a new oral RfD of 5.0E-04 mg/kg-day for PFHxA based on a new IRIS value. Previously, no RfD was available for PFHxA.

Samples from the Site have not been analyzed for PFAS. Due to the unknown nature of waste disposed of in the landfill, sampling for PFAS in groundwater may be recommended. The lack of PFAS data does not affect current protectiveness of the remedy because no one is exposed to contaminated groundwater and institutional controls are in place to prevent future exposures.

2022 cis-1,2-Dichloroethylene (cis-1,2-DCE) Noncancer Toxicity Value
In October 2022, EPA released a noncancer reference concentration (RfC) of 4.00E-02 milligrams per cubic meter (mg/m^3) for cis-1,2-DCE, based on a provisional peer reviewed toxicity value (PPRTV) screening value. Previously, no RfC was available for cis-1,2-DCE.

Cis-1,2-DCE is not included in the Site's long-term monitoring program, so there are no recent results for cis-1,2-DCE. The Site's 2004 ROD (Table G-5) notes that cis-1,2-DCE concentrations ranged from 0.71 µg/L to 5,000 µg/L at that time. The lack of recent cis-1,2-DCE data does not affect current protectiveness of the remedy because no one is exposed to contaminated groundwater and institutional controls are in place to prevent future exposures. In addition, the institutional controls also require assessment of vapor intrusion if an enclosed structure is proposed on site.

2022 PFBA Noncancer Toxicity Value
In December 2022, EPA released a new oral RfD of 1.0E-03 mg/kg-day for PFBA based on a new IRIS value. Previously, no RfD was available for PFBA.

Samples from the Site have not been analyzed for PFAS. Due to the unknown nature of waste disposed of in the landfill, sampling for PFAS in groundwater may be recommended. The lack of PFAS data does not affect current protectiveness of the remedy because no one is exposed to contaminated groundwater and institutional controls are in place to prevent future exposures.

2022 PFOA Noncancer Toxicity Value
In May 2022, EPA released an updated oral RfD of 3E-06 mg/kg-day for PFOA, based on the ATSDR MRL. The new value indicates that PFOA is more toxic from noncancer health effects and would result in an increased noncancer risk.

Samples from the Site have not been analyzed for PFAS. Due to the unknown nature of waste disposed of in the landfill, sampling for PFAS in groundwater may be recommended. The lack of PFAS data does not affect current protectiveness of the remedy because no one is exposed to contaminated groundwater and institutional controls are in place to prevent future exposures.

2022 PFOS Noncancer Toxicity Value
In May 2022, EPA released an updated oral RfD of 2E-06 mg/kg-day for PFOS, based on the ATSDR MRL. The new value indicates that PFOS is more toxic from noncancer health effects and would result in an increased noncancer risk.

Samples from the Site have not been analyzed for PFAS. Due to the unknown nature of wastes disposed of in the landfill, sampling for PFAS in groundwater may be recommended. The lack of PFAS data does not affect current protectiveness of the remedy because no one is exposed to contaminated groundwater and institutional controls are in place to prevent future exposures.

2022 PFNA Noncancer Toxicity Value
In May 2022, EPA released an oral RfD of 3E-06 mg/kg-day for PFNA, based on the ATSDR MRL. Previously, no RfD was available for PFNA.

Samples from the Site have not been analyzed for PFAS. Due to the unknown nature of waste disposed of in the landfill, sampling for PFAS in groundwater may be recommended. The lack of PFAS data does not affect current protectiveness of the remedy because no one is exposed to contaminated groundwater and institutional controls are in place to prevent future exposures.

2022 PFHxS Noncancer Toxicity Value
In May 2022, EPA released an oral RfD of 2.0E-05 mg/kg-day for PFHxS, based on the ATSDR MRL. Previously, no RfD was available for PFHxS.

Samples from the Site have not been analyzed for PFAS. Due to the unknown nature of waste disposed of in the landfill, sampling for PFAS in groundwater may be recommended. The lack of PFAS data does not affect current protectiveness of the remedy because no one is exposed to contaminated groundwater and institutional controls are in place to prevent future exposures.

2021 PFBS Noncancer Toxicity Value
In May 2021, EPA released an oral RfD of 3E-04 mg/kg-day, based on an EPA PPRTV (USEPA, 2021a). The new value indicates that PFBS is more toxic from noncancer health effects and would result in an increased noncancer risk.

Samples from the Site have not been analyzed for PFAS. Due to the unknown nature of waste disposed of in the landfill, sampling for PFAS in groundwater may be recommended. The lack of PFAS data does not affect current protectiveness of the remedy because no one is exposed to contaminated groundwater and institutional controls are in place to prevent future exposures.

2021 Updated Recommendations on the Use of Chronic or Subchronic Noncancer Values
In 2021, a memorandum was released from the Office of Land and Emergency Management (OLEM) regarding the use of subchronic toxicity values rather than the chronic noncancer value for 19 chemicals. This recommendation is based on OLEM's Human Health Regional Risk Assessment Forum's (OHHRRAF) Toxicity Workgroup evaluation of the toxicity of 32 chemicals. The OHHRRAF Toxicity Workgroup identified 21 oral and 11 inhalation noncancer toxicity values where a subchronic toxicity value was lower than its corresponding chronic toxicity value. After reviewing relevant information, the OHHRRAF recommended use of the subchronic toxicity value rather than the chronic value for 19 of the 32 chemicals, as follows below.

- Subchronic inhalation RfC selected for the following chemicals (Chemical Abstracts Service Registry Number [CASRN]):
    - Acrylic acid (79-10-7)
    - 2-Ethoxyethanol (110-80-5)
    - Ethyl-chloride (75-00-3)
    - 2-Methoxyethanol (109-86-4)
    - Vinyl chloride (75-01-4)

- Subchronic oral RfD selected for the following chemicals (CASRN):
    - Acrylonitrile (107-13-1)
    - Allyl alcohol (107-18-6)
    - Atrazine (1912-24-9)
    - Bromodichloromethane (75-27-4)
    - Cadmium (7440-43-9)
    - p-Chloroaniline (106-47-8)
    - p-Cresol (106-44-5)
    - Ethyl acetate (141-78-6)
    - Ethylbenzene (100-41-4)
    - Ethylene glycol (107-21-1)
    - Heptachlor (76-44-8)
    - Hexachlorobenzene (118-74-1)
    - Hexachlorocyclohexane, gamma (58-89-9)
    - 1,2,4,5-Tetrachlorobenzene (95-94-3)

OHHRRAF recommended the chronic inhalation noncancer value for the following chemicals: ammonia, chlordane, 1,1-dichloroethylene, methyl tert-butyl ether, nitromethane and vinyl acetate.

OHHRRAF recommended the chronic oral noncancer value for the following chemicals: acrylamide, acrylic acid, 1,1-biphenyl, cyclohexanone, endosulfan, ethylene glycol monobutyl ether and pentachlorophenol.

The changes listed above no longer apply to vinyl chloride due to a May 2023 RSL update (a subchronic RfD is no longer available). Cadmium is typically below detection. Human receptors are not using contaminated groundwater on site, and institutional controls are in place to prevent future exposures. Therefore, the changes in toxicity values do not affect protectiveness of the remedy.

Lead in Soil Cleanups

EPA continues to examine the science around lead exposure. Updated scientific information indicates that adverse health effects are associated with BLLs at less than 10 micrograms per deciliter (µg/dL). Several studies have observed "clear evidence of cognitive function decrements in young children with mean or group BLLs between 2 and 8 µg/dL."

Based on this updated scientific information, EPA is including an evaluation of potential lead risks with a goal to limit exposure to residential and commercial soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% of the population exceeding a 5 µg/dL BLL. This is based on evidence indicating cognitive impacts at BLLs below 10 µg/dL. A target BLL of 5 µg/dL reflects current scientific literature on lead toxicology and epidemiology that provides evidence that the adverse health effects of lead exposure do not have a threshold.

EPA's 2017 OLEM memorandum "Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters" (OLEM Directive 9285.6-56) provides updates on the default baseline blood lead concentration and default geometric standard deviation input parameters for the Adult Lead Methodology (ALM). These updates are based on the analysis of the National Health and Nutrition Examination Survey 2009-2014 data, with recommended updated values for baseline blood lead concentration being 0.6 µg/dL and geometric standard deviation being 1.8.

Using updated default Integrated Exposure Uptake Biokinetic Model and ALM parameters at a target BLL of 5 µg/dL, site-specific lead soil screening levels (SLs) of 200 parts per million (ppm) and 1,000 ppm are developed for residential and commercial/industrial exposures, respectively.

Given the ongoing review of information, the above SLs are considered in this FYR for informational purposes.

The soil cleanup level of 1,400 mg/kg presented in Table L-1 of the ROD and developed based on previous BLL of 10 µg/dL exceeds the SL of 1,000 ppm developed for commercial/industrial exposures and may not be protective. Following the soil/sediment removal, results of waste characterization of soil to be removed off site show that lead concentrations in the Tongue Area and Inner Rung averaged 189 mg/kg and 35 mg/kg, based on the 2015 Final Remedial Construction and Demonstration of Compliance Report. In addition, institutional controls are in place that restrict excavation of soil and sediment on site without EPA and MassDEP approval, and a soil management plan is put in place if contact with deeper soil is proposed. Since there are no complete exposure pathways to contaminants, the remedy remains protective.

Changes in Risk Assessment Methods

There have been no changes in risk assessment methods since the previous FYR that affect the protectiveness of the remedy.

Changes in Exposure Pathways

The 2004 HHRA evaluated potential exposures to contaminants in groundwater, soil, surface water, sediment, outdoor air and indoor air. Potential receptors evaluated included residents, construction workers, recreational users, landfill workers and trespassers. The HHRA identified cancer risks and noncancer health hazards at levels exceeding EPA and state risk management criteria based on future residential exposures to groundwater as drinking water at the Union Road residences, including the former Shpack resident on site. The HHRA identified cancer risks and noncancer health hazards at levels exceeding risk management criteria based on future on-site and adjacent residential exposures to soil and future recreational exposures to soil, sediment and surface water.

Appendix H provides a review of the 2004 ROD soil cleanup levels based on protection of human health. The review shows that the cleanup levels for uranium are outside of EPA's acceptable risk range of 10^{-4} to 10^{-6} or above the hazard quotient (HQ) of 1 for a worker scenario (institutional controls prohibit residential use of the Site). However, this is not a current protectiveness issue because radiologically-impacted soils and sediments were excavated and removed from the Site for disposal under FUSRAP. A soils management plan is in place, and any soil removal must be coordinated with EPA and MassDEP. Adjacent homes have been demolished, and a locked gate surrounds the Site. Trespassing does not appear to be a current concern based on the FYR site inspection. The Site mostly consists of wetlands that are not easily accessible. Table H-2 in Appendix H also shows that cancer slope factors for the uranium isotopes have not changed since the 2004 ROD.

After remedy construction, there are no current exposure pathways to contaminated groundwater, soil, sediment and surface water. A public water line was extended to within 500 feet of the Site if development were to take place in the future. The Site is not currently in use. Wetlands cover most of the Site; future commercial/industrial use of the Site is unlikely due to the wetlands as well as the utility easement.

The 2004 baseline ecological risk assessment focused on the on-site seasonal wetlands, hardwood forest, Chartley Swamp and Chartley Pond using dietary exposure models. No ecological risks were identified in Chartley Pond. Doses were modeled from soil, sediment and surface water concentrations. The following indicator species were evaluated, a short-tailed shrew (small mammal), an American robin (songbird), a muskrat (semi-aquatic mammal), a marsh wren (wetland songbird), a mallard (water fowl), and brown bullhead (fish). Risk to benthic invertebrates were considered for the Inner Rung of Chartley Swamp and the on-site seasonal wetlands. Unacceptable risks to ecological receptors exposed to soil and sediment were also found in the Inner Rung of Chartley Swamp and the on-site seasonal wetlands. These areas were remediated during the FUSRAP and CERCLA remedial actions. Therefore, the ecological-based sediment cleanup levels, based on food chain model threshold effects levels, remain protective.

Vapor Intrusion

Although VOCs were detected in site groundwater during the RI, the HHRA did not evaluate a vapor intrusion pathway. There are no buildings on or near the Site, so the vapor intrusion pathway is currently incomplete. In addition, if an enclosed structure is proposed to be constructed on site, vapor intrusion potential must be evaluated as required by an EPA-approved plan.

2018 EPA Vapor Intrusion Screening Level (VISL) Calculator
In February 2018, EPA launched an online VISL calculator which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas and indoor air. The VISL calculator uses the same database as the RSLs for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. The User's Guide provides further details on how to use the VISL calculator: https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator.

The vapor intrusion pathways is currently incomplete.

Expected Progress Towards Meeting RAOs
The Site has met the source control and management of migration RAOs for the Site. There are no current exposures to contamination. EPA deleted the Site from the NPL in 2017.

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

The expected impacts of climate change in New England pose increasing risks to contaminated sites. Increases in air and water temperature, precipitation, flooding, and periods of drought may result in altered fate and transport pathways and exposure assumptions, impaired aquatic habitats, dispersal of contaminants, damage to remediation related structures and ultimately, ineffective remedies. At coastal sites, saltwater impacts made more likely by sea-level rise may cause corrosion of remediation equipment and impair restoration efforts. Increased frequency of extreme weather events may cause damage or releases at sites, impairing remedial efforts where remedies have not been adequately designed to protect against these risks.

The risks posed by climate change in New England are not expected to alter the protectiveness of the remedy at the Shpack Landfill Site because there is a low risk of flooding in the area, and remedial components are constructed at elevations above the 500-year floodplain.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues and Recommendations Identified in the FYR:
None

Issues and Recommendations Identified in the FYR:

OU(s): OU1 (Sitewide)	**Issue Category: Monitoring**			
	Issue: PFAS compounds and 1,4-dioxane have not been analyzed for at the Site.			
	Recommendation: Due to the unknown nature of wastes disposed of in the landfill, sample groundwater for PFAS and 1,4-dioxane.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/30/2024

Other Findings

In addition, the following are recommendations that were identified during the FYR, but do not affect current or future protectiveness:

- The 2009 Consent Decree required long-term groundwater and surface water sampling as a means of tracking long-term trends in contaminant concentrations in those media. Although summary statistics of historical data are provided in each sampling report, the reports do not consistently include discussion of long-term trends at the Site. Consider conducting Mann-Kendall trend analyses or other statistical trend analyses on a regular basis (or at least every five years in support of the FYR) to track long-term trends in contaminant concentrations in both surface water and groundwater. The performing settling party shall document this reporting requirement in an O&M Plan modification.

- The 2004 ROD identified the AWQCs as ARARs for the Site. Compare surface water results to the AWQCs (now referred to as the National Recommended Water Quality Criteria) in site monitoring reports to assist in the evaluation of the protectiveness of the remedy. The performing settling party shall document this reporting requirement in an O&M Plan modification.

- A review of available groundwater and surface water data supports the possibility of reducing monitoring and reporting obligations for the performing settling party.

VII. PROTECTIVENESS STATEMENT

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The remedy at the Site currently protects human health and the environment because there are no completed exposure pathways to remaining contamination. In order to ensure the long-term protectiveness of the remedy, the following action needs to be taken: due to the unknown nature of wastes disposed of in the landfill, sample groundwater for PFAS and 1,4-dioxane.

VIII. NEXT REVIEW

The next FYR for the Shpack Landfill Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

ATSDR. 2021. Toxicological Profile for Perfluoroalkyls. https://www.atsdr.cdc.gov/toxprofiles/tp200.pdf.

EPA. 1988. CERCLA Compliance with Other Laws Manual: Interim Final (Part 1). EPA/540/G-89/006. August 1988.

EPA. 2004. Shpack Landfill Superfund Site Record of Decision Summary. September 2004.

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EPA. 2017. Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters Memorandum, May 17, 2017. OLEM Directive 9285.6-56.

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EPA. 2018. First Five-Year Review Report for Shpack Landfill Superfund Site, Attleboro/Norton, Massachusetts. August 2018.

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EPA. 2021. Recommendations on the Use of Chronic or Subchronic Noncancer Values for Superfund Human Health Risk Assessments Memorandum, May 26, 2021. Office of Land and Emergency Management, Washington, DC. 2021.

EPA. 2021. Human Health Toxicity Values for Hexafluoropropylene Oxide (HFPO) Dimer Acid and Its Ammonium Salt (CASRN 13252-13-6 and CASRN 62037-80-3) Also Known as "Gen-X Chemicals." Office of Water, Health and Ecological Criteria Division, Washington, DC, October 2021.

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EPA. Regional Screening Level Tables. Available at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables.

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ERM. 2018. Shpack 2018 Wetland Report, Attleboro and Norton, Massachusetts. December 2018.

ERM. 2020. Shpack 2020 Final Wetland Report, Attleboro and Norton, Massachusetts. December 2020.

ERM 2019. Shpack Environmental Monitoring & Inspection Report. January and May 2019. Attleboro, Massachusetts. June 28, 2019.

ERM 2020. Shpack Environmental Monitoring & Inspection Report. October 2019. Attleboro, Massachusetts. March 31, 2020.

ERM 2021. Shpack Environmental Monitoring & Inspection Report. October 2020. Attleboro, Massachusetts. March 19, 2021.

ERM. 2021. Shpack Environmental Monitoring & Inspection Report. October 2021. Attleboro, Massachusetts. March 10, 2022.

ERM. 2021. Shpack Environmental Monitoring & Inspection Report. May 2021. Attleboro, Massachusetts. September 8, 2021.

ERM. 2022. Shpack Environmental Monitoring & Inspection Report. April 2022. Attleboro, Massachusetts. July 11, 2022.

ERM. 2022. Shpack Environmental Monitoring & Inspection Report. October 2022. Attleboro, Massachusetts. January 11, 2023.

M. Grippo, J. Hayse, I. Hlohowskyj, and K. Picel. 2021. Derivation of PFAS Ecological Screening Values, Environmental Science Division, Argonne National Laboratory, September 2021.

USACE. 2016. Final Site Closeout Report for Operable Unit 1 Radiological Remediation, Shpack Landfill FUSRAP Superfund Site, Norton/Attleboro, Massachusetts, December 2016.

APPENDIX B – SITE CHRONOLOGY

Table B-1: Site Chronology

Event	Date
Landfill operations took place on site	1946 to 1970
The NRC conducted radiological surveys at the Site	1978
The DOE added to the Site to the FUSRAP	1980
The DOE installed a security fence around the Site	1981
EPA evaluated the Site and confirmed contamination	1984
EPA added the Site to the NPL	June 1986
The SSC, as PRPs, entered into an Administrative Order on Consent with EPA to conduct the RI/FS	1990
The SSC led the RI/FS	1993 to 2004
EPA selected the Site's remedy in a ROD	2004
USACE conducted the FUSRAP remedial action	2005 to 2011
14 PRPs entered into a Consent Decree with EPA to conduct the non-radiological (CERCLA) cleanup	January 2009
The PRPs started the CERCLA remedial action	July 2012
MassDEP revised its Groundwater Use and Value Determination for the Site to a low use and value aquifer	November 2013
The PRPs completed the CERCLA remedial action; long-term monitoring began	July 2014
EPA determined the remedy at the Site is construction complete	September 18, 2014
Institutional controls as NAULs are implemented at four site properties	2016
The Site achieved Sitewide Ready for Anticipated Use designation	December 1, 2016
EPA deleted the Site from the NPL	September 2017
EPA completed the Site's first FYR Report	August 2018
EPA approved the final wetlands monitoring report	January 2023

APPENDIX C – PRESS RELEASE

News Releases: Region 01 <https://epa.gov/newsreleases/search/press_office/region-01-226161>

CONTACT US <https://epa.gov/newsreleases/forms/contact-us>

EPA to Review Cleanups at 14 New England Superfund Sites this Year

January 19, 2022

Contact Information
Mikayla Rumph (rumph.mikayla@epa.gov)
(617) 918-1016

BOSTON (Jan. 19, 2022) – The U.S. Environmental Protection Agency (EPA) will conduct comprehensive reviews of completed cleanup work at 14 National Priority List (NPL) Superfund sites, including three federal facilities, in New England this year. The sites, located in Connecticut, Maine, Massachusetts, New Hampshire, and Rhode Island, will undergo a legally required Five-Year Review to ensure that previous remediation efforts at the sites continue to protect public health and the environment.

"Ensuring completed Superfund site cleanup work remains protective of human health and the environment is a priority for EPA," **said EPA New England Acting Regional Administrator Deb Szaro.** "By completing reviews of the cleanups every five years, EPA fulfills its duty to remain vigilant so that these communities continue to be protected."

The Superfund Sites where EPA will conduct Five-Year Reviews in 2022 are listed below. The web links provide detailed information on site status as well as past assessment and cleanup activity. Once the Five-Year Review is complete, its findings will be posted

to the website in a final report.

Five-Year Reviews of Superfund sites in New England to be completed in 2022:

Auburn Road Landfill, Londonderry, New Hampshire
www.epa.gov/superfund/auburnroad <https://epa.gov/superfund/auburnroad>

Beede Waste Oil, Plaistow, New Hampshire
www.epa.gov/superfund/beede <https://epa.gov/superfund/beede>

Dover Municipal Landfill, Dover, New Hampshire
www.epa.gov/superfund/dover <https://epa.gov/superfund/dover>

Gallup's Quarry, Plainfield, Connecticut
www.epa.gov/superfund/gallup <https://epa.gov/superfund/gallup>

Kellogg-Deering Well Field, Norwalk, Connecticut
www.epa.gov/superfund/kellogg <https://epa.gov/superfund/kellogg>

O'Connor Co., Augusta, Maine
www.epa.gov/superfund/oconnor <https://epa.gov/superfund/oconnor>

Peterson/Puritan, Inc., Lincoln/Cumberland, Rhode Island
www.epa.gov/superfund/peterson <https://epa.gov/superfund/peterson>

Union Chemical Co., Inc., South Hope, Maine
www.epa.gov/superfund/union <https://epa.gov/superfund/union>

Winthrop Landfill, Winthrop, Maine
www.epa.gov/superfund/winthrop <https://epa.gov/superfund/winthrop>

Federal Facilities

Hanscom Field/Hanscom Air Force Base, Bedford, Massachusetts
www.epa.gov/superfund/hanscom <https://epa.gov/superfund/hanscom>

Natick Laboratory Army Research, Development and Engineering Center, Natick, Massachusetts
www.epa.gov/superfund/naticklab <https://epa.gov/superfund/naticklab>

Portsmouth Naval Shipyard, Kittery, Maine
www.epa.gov/superfund/portsmouth <https://epa.gov/superfund/portsmouth>

Five-Year Reviews of Superfund sites in New England to start in 2022 and to be completed in 2023:

Fletcher's Paint Works & Storage, Milford, New Hampshire
www.epa.gov/superfund/fletcher <https://epa.gov/superfund/fletcher>

Shpack Landfill, Norton/Attleboro, Massachusetts
www.epa.gov/superfund/shpack <https://epa.gov/superfund/shpack>

Background

Throughout the process of designing and constructing a cleanup at a hazardous waste site, EPA's primary goal is to make sure the remedy will be protective of public health and the environment. At many sites, where the remedy has been constructed, EPA continues to ensure it remains protective by requiring reviews of cleanups every five years. It is important for EPA to regularly check on these sites to ensure the remedy is working properly. These reviews identify issues (if any) that may affect the protectiveness of the completed remedy and, if necessary, recommend action(s) necessary to address them.

There are many phases of the Superfund cleanup process including considering future use and redevelopment at sites and conducting post cleanup monitoring of sites. EPA must ensure the remedy is protective of public health and the environment and any redevelopment will uphold the protectiveness of the remedy into the future.

The Superfund program, a federal program established by Congress in 1980, investigates and cleans up the most complex, uncontrolled or abandoned hazardous waste sites in the country and endeavors to facilitate activities to return them to productive use. In total, there are 123 Superfund sites across New England.

More information:

Superfund and other cleanup sites in New England:
https://www.epa.gov/cleanups/cleaning-new-england <https://epa.gov/cleanups/cleaning-new-england>

APPENDIX D – INTERVIEW FORMS

SHPACK LANDFILL SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Shpack Landfill	
EPA ID: MAD980503973	
Interviewer name: Ashlin Brooks	**Interviewer affiliation:** EPA
Subject name: James DiLisio	**Subject affiliation:** Acting Mayor - City of Attleboro
Subject contact information: mayor@cityofattleboro.us, p: 508.223.2222 x3223 | 508-455-7990	
Interview date: Sent 1/18/23	**Interview time:** Sent 1/18/23
Interview location: Online	
Interview format (select one): In Person Phone Mail **Email** Other:	
Interview category: Local Government	

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

   Yes, I am.

2. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?

   I am aware that there were extensive discussions amongst the then Administration, town of Norton municipal officials, our legal team that represented Attleboro and Norton, and the many EPA professionals (legal and scientific) and that the City of Attleboro is the lead agency implementing the Site's annual operating and maintenance plan with our environmental engineering company ERM. My staff, the Department of Planning and Development that is charged with overseeing the OMP implementation and coordination with ERM and EPA, is I believe is doing a commendable job of keeping me well-informed regarding the Site's activities and remedial progress.

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

   Not to my knowledge. Staff explained to me that approximately three years ago the fencing that encircles the Site was somewhat compromised; but that it was immediately and satisfactorily addressed.

4. Are you aware of any changes to state laws or local regulations that might affect the protectiveness of the Site's remedy?

   No, I am not. Neither is my staff.

5. Are you aware of any changes in projected land use(s) at the Site?

   No, I am not. Neither is my staff.

6. 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?

Yes, according to my staff. I am aware that ERM, EPA and my staff have maintained and continue to maintain communication.

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

   No, not at this time.

8. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?

   Yes, I do. I would also refer my staff.

   Gary Ayrassian, Director of Planning and Development
   Nicholas Wyllie, Environmental Planner/Conservation Agent

SHPACK LANDFILL SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Shpack Landfill	
EPA ID: MAD980503973	
Interviewer name: Ashlin Brooks	**Interviewer affiliation:** U.S EPA
Subject name: Quintin Nel	**Subject affiliation:** Senior Consultant- ERM
Subject contact information: quintin.nel@erm.com	
Interview date: Sent 1/18/23	**Interview time:** Sent 1/18/23
Interview location: Online	
Interview format (circle one): In Person Phone Mail **Email** Other:	
Interview category: Potentially Responsible Party (PRP)	

**Please note all responses below attain to the Second Five-Year Review (First five-year review 2018), and respond to activities completed since the first five year review process.*

1. What is your overall impression of the remedial activities at the Site?
It is ERMs impression that the project Site is consistent with the requirements of the Operations and Management (O&M) Plan

A1: It is ERMs impression that the project Site at this time is consistent with the requirements of the Operations and Management (O&M) Plan for post Remedial Action activities. This includes the goals established for the restoration of the site, particularly the wetland areas.

The Wetlands investigation has closed in 2020[1] (EPA Approval[2] January 2023)

There are no groundwater and surface water quality performance standards for the site; however sample results collected since commencement of the O&M phase are consistent with historical levels.
There is no current risk identified to human health or to the environment at the site.

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

A2: ERM is not aware of any effects of this Site on the surrounding community related to this 5-year review.

3. What is your assessment of the current performance of the remedy in place at the Site?

A3: Based on site inspection and analytical groundwater data, the site remains compliant with the Institutional Controls Plan (ICP, Appendix C of the O&M Plan Revision 1 dated 23 July 2015) since completion of the Remedial Action in 2014. Semi-annual IC monitoring and perimeter fence monitoring has been conducted since commencement of Site O&M.

4. **Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?**

A4: ERM is not aware of any complaints or enquiries regarding environmental issues or the remedial action from residents.

5. **Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?**

A5: Yes, all finalized O&M plan documentation is submitted to the EPA and available on the website[3]

6. **Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?**

A6: As suggested in the RD/RA SOW, Section VI.E.2c, we recommend that the groundwater sampling frequency be decreased to annually until the next 5-year review.

7. **Do you consent to have your name included along with your responses to this questionnaire in the FYR report?**

A7: John D'Agostino is the ERM representative for the site (Partner in Charge).

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3 https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.scs&id=0100655&doc=Y&colid=31869&region=01&type=SC

SHPACK LANDFILL SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Shpack Landfill	
EPA ID: MAD980503973	
Interviewer name: Ashlin Brooks	**Interviewer affiliation:** EPA
Subject name: John Thomas	**Subject affiliation:** Director, Conservation Department - Norton Stormwater Agent
Subject contact information: jthomas@nortonmaus.com, 508-285-0275	
Interview date: Sent 3/23/23	**Interview time:** Sent 3/23/23
Interview location: Online	
Interview format (select one): In Person Phone Mail **Email** Other:	
Interview category: Local Government	

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

   I am aware of the cleanup process and progress at Norton Assessor's Map 26 Parcels 2 and 2-01 (Shpack site).

2. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?

   The EPA has effectively kept the Town of Norton apprised of the remedial progress.

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

   I am unaware of any emergency response, vandalism or trespassing at the Shpack Site.

4. Are you aware of any changes to state laws or local regulations that might affect the protectiveness of the Site's remedy?

   As it pertains to restrictions, the Shpack property is subject to activity use limitations and institutional controls.

5. Are you aware of any changes in projected land use(s) at the Site?

   There are no new projected land uses planned in 2023 for the Shpack site.

6. 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?

   I have not received any calls or inquiries regarding the site since my hire in 2021; therefore, it seems the available EPA online resources surrounding the Shpack site are effective.

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

   None at this time.

8. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?

   Yes, please feel free to add my name to the 2023 report.

SHPACK LANDFILL SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Shpack Landfill	
EPA ID: MAD980503973	
Interviewer name: Ashlin Brooks	**Interviewer affiliation:** EPA
Subject name: Garry Waldeck	**Subject affiliation:** MassDEP - Project Manager
Subject contact information: garry.waldeck@mass.gov	
Interview date: Sent 1/18/23	**Interview time:** Sent 1/18/23
Interview location: Online	
Interview format (select one): In Person Phone Mail **Email** Other:	
Interview category: State Agency	

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   The project was a success and the wetlands have recovered well. Reuse is limited as it is a wetland.

2. What is your assessment of the current performance of the remedy in place at the Site?

   The remedy is operating as expected.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities from residents in the past five years?

   I have not received any complaints or inquiries in the past five years.

4. Has your office conducted any site-related activities or communications in the past five years? If so, please describe the purpose and results of these activities.

   MassDEP participated in a site inspection related to this five-year review.

5. Are you aware of any changes to state laws that might affect the protectiveness of the Site's remedy?

   No.

6. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

   Yes, the institutional controls seem to be working.

7. Are you aware of any changes in projected land use(s) at the Site?

   No.

8. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

   No.

9. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?

   Yes.

SHPACK LANDFILL SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Shpack Landfill	
EPA ID: MAD980503973	
Interviewer name: Ashlin Brooks	**Interviewer affiliation:** EPA
Subject name: Michael Yunits	**Subject affiliation:** Acting Mayor – Town of Norton
Subject contact information: myunits@nortonmaus.com, 508-285-0210	
Interview date: Sent 2/13/23	**Interview time:** Sent 2/13/23
Interview location: Online	
Interview format (select one): In Person Phone Mail **Email** Other:	
Interview category: Local Government	

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

   Yes.

2. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?

   Yes.

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

   No.

4. Are you aware of any changes to state laws or local regulations that might affect the protectiveness of the Site's remedy?

   No.

5. Are you aware of any changes in projected land use(s) at the Site?

   No.

6. 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?

   Yes. Town website postings.

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

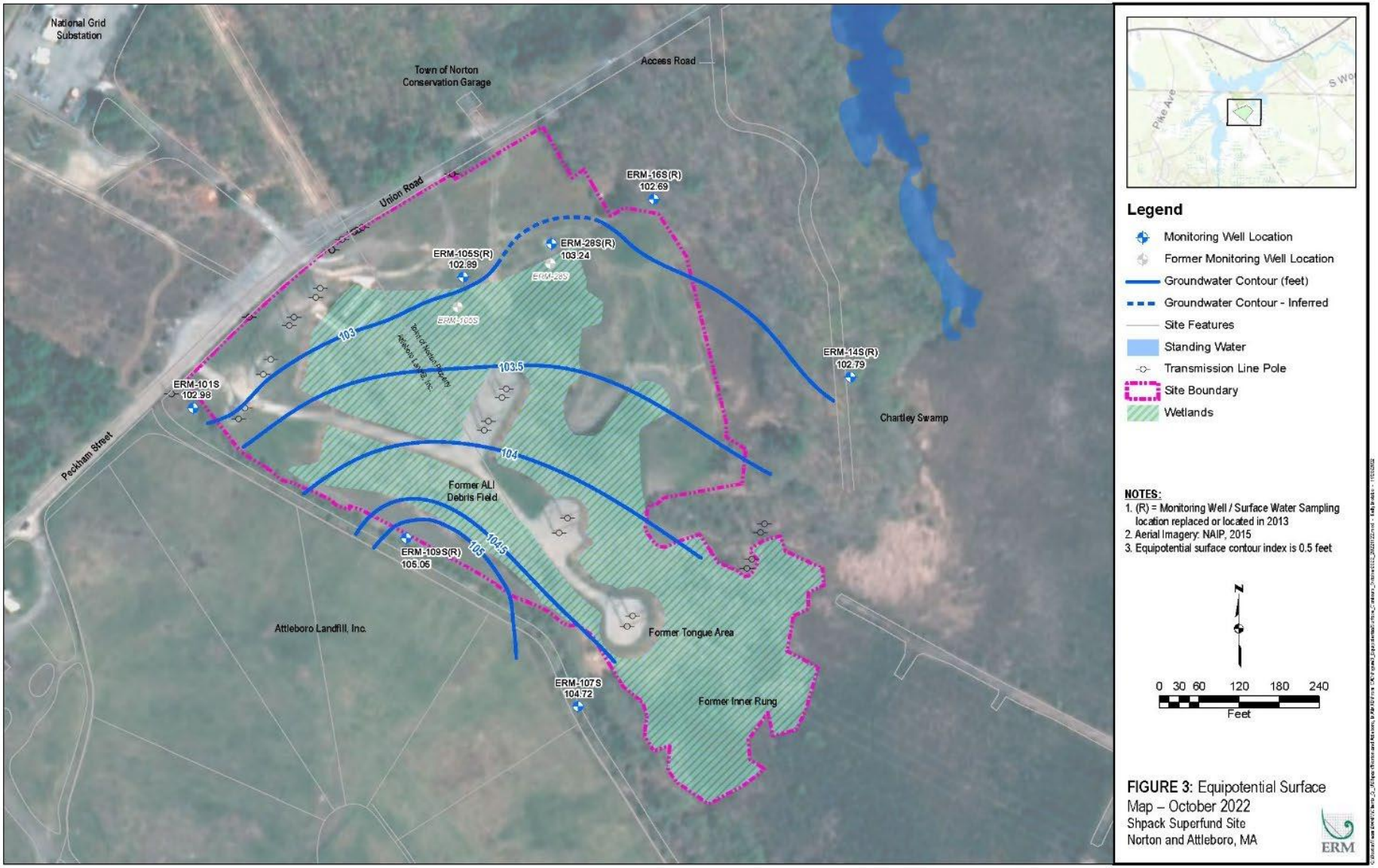
   No.

8. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?

   Yes.

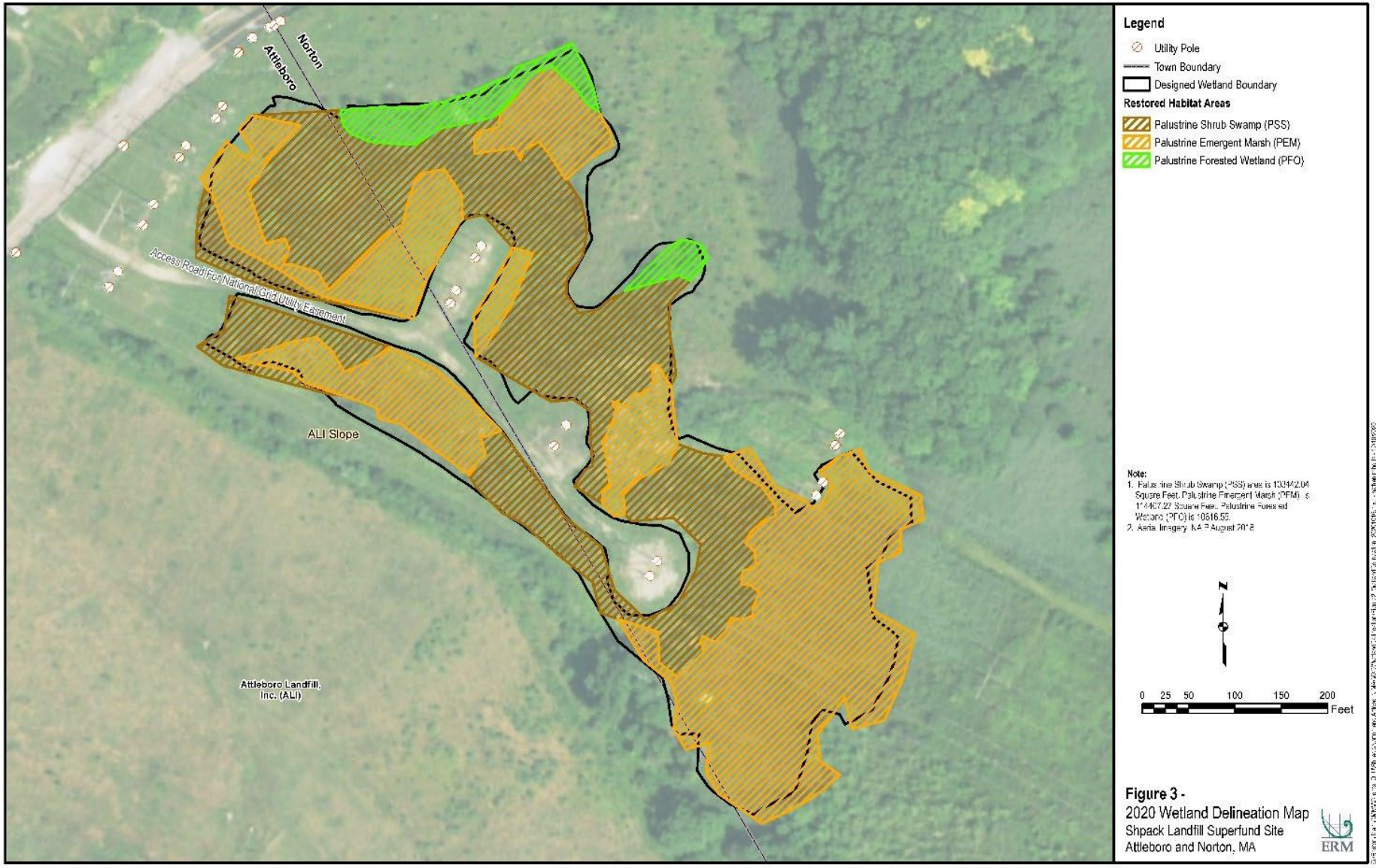
APPENDIX E – DATA FIGURES AND TABLES

Figure E-1: October 2022 Potentiometric Map



Source: Figure 3 from the October 2022 Monitoring & Inspection Report.

Figure E-2: 2020 Wetland Delineation Map



Source: Figure 3 from the Shpack 2020 Final Wetland Report.

Table E-1: Groundwater and Surface Water Data

Table 4a
Groundwater Analytical Summary - ERM-101S
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Unit	ERM-101S 8-Jul-14	ERM-101S 5-Nov-14	ERM-101S 28-May-15	ERM-101S 5-Nov-15	ERM-101S 3-May-16	ERM-101S 1-Nov-16	ERM-101S 1-May-17	ERM-101S 10-May-17	ERM-101S 1-Nov-17
Dioxins											
Dioxins (TEQ)		µg/L	ND	ND	ND	ND	ND	2.60E-09		5.31E-08	1.66E-07
Radiological Analytes											
Radium 226		pCi/L	*0.682*	1.06	0.917*	1.60*	0.712	1.10 J	0.292		0.680
Uranium 234		µg/L									
Uranium 234		pCi/L	*0.0111*	0.270	0.0985	*0.0244*	0.0461	0.0673	0.176		0.280
Uranium 235		µg/L									
Uranium 235		pCi/L	*0.000429*	*0.0477*	*-0.00701*	*-0.0000985*	0.0390	0.0848	0.0403		0.052
Uranium 238		µg/L									
Uranium 238		pCi/L	*0.00556*	0.216	0.128	*-0.00506*	0.121	0.0744	0.141		0.236
Total Uranium*		µg/L	0.0167	0.664	0.381	*0.00000392*	0.377	0.260	0.438		0.725
Polycyclic Aromatic Hydrocarbons (PAHs)											
Benzo(a)anthracene		µg/L	*< 0.200*	*< 0.175*	*< 0.0909*	*< 0.100*	*< 0.0877*	*< 0.100*		*< 0.100*	*< 0.100*
Benzo(a)pyrene		µg/L	*< 0.200*	*< 0.175*	*< 0.0909*	*< 0.100*	*< 0.0877*	*< 0.100*		*< 0.100*	*< 0.100*
Benzo(k)fluoranthene		µg/L	*< 0.200*	*< 0.175*	*< 0.0909*	*< 0.100*	*< 0.0877*	*< 0.100*		*< 0.100*	*< 0.100*
Dibenzo(a,h)anthracene		µg/L	*< 0.200*	*< 0.175*	*< 0.0909*	*< 0.100*	*< 0.0877*	*< 0.100*		*< 0.100*	*< 0.100*
*Metals, Dissolved***											
Arsenic		µg/L									
Lead		µg/L									
Nickel		µg/L									
Metals, Total											
Arsenic		µg/L	*< 1.70*	4.74 J	*< 1.70*	2.69 J	*< 1.70*	4.97 J	*< 2*		3.97 J
Lead		µg/L	4.08	12.3	3.06	2.81	2.56	8.41	2.88		3.26
Nickel		µg/L	13.1	50.5	27.4	39.5	17.1	69.9	29.3		97.1

Notes:
Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Source: All Table E-1 tables are from the October 2022 Monitoring & Inspection Report (Tables 4a-g and 5a-d).

Table 4a
Groundwater Analytical Summary - ERM-101S
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	ERM-101S 3-May-18	ERM-101S 9-Jan-19	ERM-101S 15-May-19	ERM-101S 28-Oct-19	ERM-101S 12-May-20	ERM-101S 27-Oct-20	ERM-101S 7-May-21	ERM-101S 13-Oct-21	ERM-101S 27-Apr-22	ERM-101S 12-Oct-22
Dioxins											
Dioxins (TEQ)	µg/L	5.36E-08	0	0	9.17E-08	1.2E-09	0	2.0E-09	5.82E-07	0	0
Radiological Analytes											
Radium 226	pCi/L	0.321	0.265	3.85	1.23	0.583	1.53	0.687	0.721	0.975	0.555
Uranium 234	µg/L										
Uranium 234	pCi/L	0.270	0.0494	0.083	0.0359	0.00612	0.0239	-0.0423	0.00115	0.0125	-0.0148
Uranium 235	µg/L										
Uranium 235	pCi/L	0.0119	0.0321	0.0142	0.0662	-0.00263	-0.0236	-0.0044	0.0185	0.00716	-0.00710
Uranium 238	µg/L										
Uranium 238	pCi/L	0.278	0.0471	0.0539	0.0421	0.0392	0.00587	-0.00438	0.0647	0.00947	-0.00708
Total Uranium*	µg/L	0.831	0.155	0.167	0.156	0.117	0.0175	0	0.201	0.0315	0
Polycyclic Aromatic Hydrocarbons (PAHs)											
Benzo(a)anthracene	µg/L	*< 0.0971*	*< 0.0885*	*< 0.0893*	*< 0.100*	*< 0.100*	*< 0.100*	*< 0.0949*	*< 0.0955*	*< 0.0946 J*	*< 0.105 J*
Benzo(a)pyrene	µg/L	*< 0.0971*	*< 0.0885*	*< 0.0893*	*< 0.100*	*< 0.100*	*< 0.100*	*< 0.0949*	*< 0.0955*	*< 0.0946 J*	*< 0.105 J*
Benzo(k)fluoranthene	µg/L	*< 0.0971*	*< 0.0885*	*< 0.0893*	*< 0.100*	*< 0.100*	*< 0.100*	*< 0.0949*	*< 0.0955*	*< 0.0946 J*	*< 0.105 J*
Dibenzo(a,h)anthracene	µg/L	*< 0.0971*	*< 0.0885*	*< 0.0893*	*< 0.100*	*< 0.100*	*< 0.100*	*< 0.0949*	0.134	*< 0.0946 J*	*< 0.105 J*
*Metals, Dissolved***											
Arsenic	µg/L									2.06 J	8.47
Lead	µg/L									1.08 J	*< 0.5*
Nickel	µg/L									9.31	6.43
Metals, Total											
Arsenic	µg/L	*< 2.00*	*< 2.00*	2.33 J	2.87 J	*< 2.00*	4.59 J	*< 2.00*	2.30 J		
Lead	µg/L	7.62	*< 0.500*	1.05 J	2.40	3.11	5.80	4.61	2.65		
Nickel	µg/L	43.7	10.2	13.5	12.1	10.6	33.1	24.0	11.3		

Notes:

Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4a
Groundwater Analytical Summary - ERM-101S
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Historical Statistics for ERM-101S No. of Analyses	No. of Detects	Min	Mean	Max	Historical Statistics for Site GW No. of Analyses	No. of Detects	Min	Mean	Max
Dioxins											
Dioxins (TEQ)	µg/L	6	1	0.0024	0.0024	0.0024	25	5	0.477	0.221	3.395
Radiological Analytes											
Radium 226	pCi/L	6	4	0.51	0.75	1.64	25	19	0.308	0.891	2.04
Uranium 234	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 234	pCi/L	5	0	ND	ND	ND	2	2	0.056	0.113	0.170
Uranium 235	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 235	pCi/L	5	0	ND	ND	ND	1	1	0.120	0.120	0.120
Uranium 238	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 238	pCi/L	10	1	1.05	1.05	1.05	56	14	-0.263	0.043	1.050
Total Uranium*	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (PAHs)											
Benzo(a)anthracene	µg/L	5	0	ND	ND	ND	27	2	0.10	11	22
Benzo(a)pyrene	µg/L	5	0	ND	ND	ND	26	1	14	14	14
Benzo(k)fluoranthene	µg/L	5	0	ND	ND	ND	27	2	0.13	9.6	19
Dibenzo(a,h)anthracene	µg/L	5	0	ND	ND	ND	26	1	1.0	1.0	1.0
*Metals, Dissolved***											
Arsenic	µg/L										
Lead	µg/L										
Nickel	µg/L										
Metals, Total											
Arsenic	µg/L	10	6	0.85	3.9	7.0	86	71	0.65	13.6	69.6
Lead	µg/L	10	4	6.2	125	474	70	43	0.767	209	1,930
Nickel	µg/L	11	11	10.8	136	442	100	100	1.1	4,790	209,000

Notes:

Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4b
Groundwater Analytical Summary - ERM-105S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Units	ERM-105S(R) 9-Jul-14	ERM-105S(R) 9-Jul-14 FD	ERM-105S(R) 5-Nov-14	ERM-105S(R) 27-May-15	ERM-105S(R) 4-Nov-15	ERM-105S(R) 4-May-16	ERM-105S(R) 1-Nov-16	ERM-105S(R) 1-May-17	ERM-105S(R) 10-May-17
Dioxins											
Dioxins (TEQ)		µg/L	ND	ND	ND	ND	ND	ND	ND		1.66E-07
Radiological Analytes											
Radium 226		pCi/L	0.915	1.10	0.887	1.45*	0.731*	0.413	0.340	0.449	
Uranium 234		µg/L									
Uranium 234		pCi/L	0.0994	0.164	0.170	0.470	0.121	0.165	0.167	0.255	
Uranium 235		µg/L									
Uranium 235		pCi/L	*0.0254*	*-0.00711*	0.0072	*0.00374*	*0.000*	0.101	0.0139	0.0526	
Uranium 238		µg/L									
Uranium 238		pCi/L	0.113	0.0916	0.148	0.560	0.110	0.161	0.104	0.193	
Total Uranium*		µg/L	0.347	0.269	0.445	1.67	0.327	0.524	0.317	0.597	
Polycyclic Aromatic Hydrocarbons (PAHs)											
Benzo(a)anthracene		µg/L	*< 0.189*	*< 0.189*	*< 0.187*	*< 0.0943*	*< 0.0943*	*< 0.0935*	*< 0.0943*		*< 0.0962*
Benzo(a)pyrene		µg/L	*< 0.189*	*< 0.189*	*< 0.187*	*< 0.0943*	*< 0.0943*	*< 0.0935*	*< 0.0943*		*< 0.0962*
Benzo(k)fluoranthene		µg/L	*< 0.189*	*< 0.189*	*< 0.187*	*< 0.0943*	*< 0.0943*	*< 0.0935*	*< 0.0943*		*< 0.0962*
Dibenzo(a,h)anthracene		µg/L	*< 0.189*	*< 0.189*	*< 0.187*	*< 0.0943*	*< 0.0943*	*< 0.0935*	*< 0.0943*		*< 0.0962*
*Metals, Dissolved***											
Arsenic		µg/L									
Lead		µg/L									
Nickel		µg/L									
Metals, Total											
Arsenic		µg/L	2.55 J	*< 1.70*	3.31 J	*< 1.70*	3.68 J	2.85 J	4.42 J	10.4	
Lead		µg/L	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.5*	*< 0.500*	*< 0.5*	
Nickel		µg/L	2.68	2.69	3.52	1.60 J	2.33	3.06	28.9	2.55	

Notes:
Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4b
Groundwater Analytical Summary - ERM-105S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Unit	ERM-105S(R) 31-Oct-17	ERM-105S(R) 3-May-18	ERM-105S(R) 10-Jan-19	ERM-105S(R) 15-May-19	ERM-105S(R) 29-Oct-19	ERM-105S(R) 12-May-20	ERM-105S(R) 27-Oct-20	ERM-105S(R) 6-May-21	ERM-105S(R) 14-Oct-21	ERM-105S(R) 27-Apr-22	ERM-105S(R) 13-Oct-22
Dioxins													
Dioxins (TEQ)		µg/L	8.78E-07	4.82E-08	0	0	4.57E-07	1.2E-09	0	0	2.13E-06	0	5.5E-09
Radiological Analytes													
Radium 226		pCi/L	1.05	3.65	0.229	3.44	0.589	0.269	1.25	0.0976	0.624	0.159	1.17
Uranium 234		µg/L											
Uranium 234		pCi/L	0.289	0.199	0.206	0.137	0.218	0.0671	0.0466	0.0507	0.118	0.0322	0.157
Uranium 235		µg/L											
Uranium 235		pCi/L	0.0362	0.0567	0.016	-0.00558	0.0495	0.0224	0.00774	0.0139	0.0319	0.0159	-0.0123
Uranium 238		µg/L											
Uranium 238		pCi/L	0.225	0.117	0.186	0.0815	0.201	0.0757	0.054	0.0485	0.0715	0.0205	0.166
Total Uranium*		µg/L	0.687	0.375	0.561	0.242	0.622	0.236	0.164	0.151	0.227	0.0683	0.493
Polycyclic Aromatic Hydrocarbons (PAHs)													
Benzo(a)anthracene		µg/L	*< 0.0943*	*< 0.0926*	*< 0.0943*	*< 0.0943*	*< 0.104*	*< 0.0952*	*< 0.105*	NA	*< 0.0962*	*< 0.0952 J*	*< 0.104 J*
Benzo(a)pyrene		µg/L	*< 0.0943*	*< 0.0926*	*< 0.0943*	*< 0.0943*	*< 0.104*	*< 0.0952*	*< 0.105*	NA	*< 0.0962*	*< 0.0952 J*	*< 0.104 J*
Benzo(k)fluoranthene		µg/L	*< 0.0943*	*< 0.0926*	*< 0.0943*	*< 0.0943*	*< 0.104*	*< 0.0952*	*< 0.105*	NA	*< 0.0962*	*< 0.0952 J*	*< 0.104 J*
Dibenzo(a,h)anthracene		µg/L	*< 0.0943*	*< 0.0926*	*< 0.0943*	*< 0.0943*	*< 0.104*	0.0476 J	*< 0.105*	NA	*< 0.0962*	*< 0.0952 J*	*< 0.104 J*
*Metals, Dissolved***													
Arsenic		µg/L										14.9	30.4
Lead		µg/L										*< 0.500*	*< 0.500*
Nickel		µg/L										0.637 J	0.944 J
Metals, Total													
Arsenic		µg/L	6.88	5.99	16.3	19.0	18.4	13.6	14.2	19.4	31.8		
Lead		µg/L	*< 0.5*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*		
Nickel		µg/L	4.12	2.71	1.11 J	1.35 J	1.64 J	1.03 J	1.72 J	0.807 J	0.791 J		

Notes:
Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4b
Groundwater Analytical Summary - ERM-105S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Historical Statistics for ERM-105S No. of Analyses	No. of Detects	Min	Mean	Max	Historical Statistics for Site GW No. of Analyses	No. of Detects	Min	Mean	Max
Dioxins											
Dioxins (TEQ)	µg/L	0	0	NA	NA	NA	25	5	0.477	0.221	3.395
Radiological Analytes											
Radium 226	pCi/L	1	0	ND	ND	ND	25	19	0.308	0.891	2.04
Uranium 234	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 234	pCi/L	1	0	ND	ND	ND	2	2	0.056	0.113	0.170
Uranium 235	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 235	pCi/L	1	0	ND	ND	ND	1	1	0.120	0.120	0.120
Uranium 238	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 238	pCi/L	1	0	ND	ND	ND	56	14	-0.263	0.043	1.050
Total Uranium*	µg/L	1	0	NA	NA	NA	0	0	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (PAHs)											
Benzo(a)anthracene	µg/L	2	2	0.1	12	22	27	2	0.10	11	22
Benzo(a)pyrene	µg/L	1	1	14	14	14	26	1	14	14	14
Benzo(k)fluoranthene	µg/L	1	1	0.13	9.5	19	27	2	0.13	9.6	19
Dibenzo(a,h)anthracene	µg/L	1	1	1	1	1	26	1	1.0	1.0	1.0
*Metals, Dissolved***											
Arsenic	µg/L										
Lead	µg/L										
Nickel	µg/L										
Metals, Total											
Arsenic	µg/L	1	1	15.7	15.7	15.7	86	71	0.65	13.6	69.6
Lead	µg/L	1	1	1,360	1,360	1,360	70	43	0.767	209	1,930
Nickel	µg/L	2	2	155	11,001	22,000	100	100	1.1	4,790	209,000

Notes:
Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4c
Groundwater Analytical Summary - ERM-107S
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Unit	ERM-107S 9-Jul-14	ERM-107S 5-Nov-14	ERM-107S 28-May-15	ERM-107S 5-Nov-15	ERM-107S 3-May-16	ERM-107S 1-Nov-16	ERM-107S 1-May-17	ERM-107S 10-May-17
Dioxins										
Dioxins (TEQ)		µg/L	ND	ND	1.44E-09 J	ND	2.49E-07	3.32E-08		0
Radiological Analytes										
Radium 226		pCi/L	1.19	0.921	1.11*	0.720*	1.21	0.775	0.338	
Uranium 234		µg/L								
Uranium 234		pCi/L	*0.0184*	0.0600	0.0772	*0.00472*	0.0393	0.0331	0.0298	
Uranium 235		µg/L								
Uranium 235		pCi/L	*0.00567*	0.0475	-0.00411	*-0.00853*	0.0279	0.0213	0.0358	
Uranium 238		µg/L								
Uranium 238		pCi/L	*0.0361*	0.0664	0.013	*0.00331*	0.0577	0.0299	0.048	
Total Uranium*		µg/L	*0.110*	0.219	0.0386	*0.00984*	0.184	0.0989	0.159	
Polycyclic Aromatic Hydrocarbons (PAHs)										
Benzo(a)anthracene		µg/L	*< 0.189*	*< 0.187*	*< 0.0943*	*< 0.0935*	*< 0.0935*	*< 0.0935*		*< 0.0952*
Benzo(a)pyrene		µg/L	*< 0.189*	*< 0.187*	*< 0.0943*	*< 0.0935*	*< 0.0935*	*< 0.0935*		*< 0.0952*
Benzo(k)fluoranthene		µg/L	*< 0.189*	*< 0.187*	*< 0.0943*	*< 0.0935*	*< 0.0935*	*< 0.0935*		*< 0.0952*
Dibenzo(a,h)anthracene		µg/L	*< 0.189*	*< 0.187*	*< 0.0943*	*< 0.0935*	*< 0.0935*	*< 0.0935*		*< 0.0952*
*Metals, Dissolved***										
Arsenic		µg/L								
Lead		µg/L								
Nickel		µg/L								
Metals, Total										
Arsenic		µg/L	3.51 J	8.39	< 1.70	*< 1.70*	*< 1.7*	3.56 J	2.44 J	
Lead		µg/L	0.721 J	6.96	0.898 J	0.910 J	0.618 J	0.821 J	0.636 J	
Nickel		µg/L	41.2	77.4	24.0	33.7	19.9	42.3	14.6	

Notes:

Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4c
Groundwater Analytical Summary - ERM-107S
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Unit	ERM-107S 1-Nov-17	ERM-107S 3-May-18	ERM-107S 9-Jan-19	ERM-107S 15-May-19	ERM-107(S) 29-Oct-19	ERM-107S 12-May-20	ERM-107S 27-Oct-20	ERM-107S 7-May-21	ERM-107S 13-Oct-21	ERM-107S 27-Apr-22	ERM-107S 12-Oct-22
Dioxins													
Dioxins (TEQ)		µg/L	1.66E-07	4.77E-07	1.15E-09	0	8.93E-07	9.27E-08	3.8E-09	0	1.84E-08	3.0E-09	4.5E-09
Radiological Analytes													
Radium 226		pCi/L	0.530	0.684	0.343	4.02	0.923	0.721	1.61	0.267	0.424	1.58	0.188
Uranium 234		µg/L											
Uranium 234		pCi/L	0.0504	0.060	0.0275	0.099	0.0815	-0.0130	0.0357	-0.00875	0.0411	-0.000856	0.0144
Uranium 235		µg/L											
Uranium 235		pCi/L	0.0253	0.0454	0.0166	0.0197	0.0415	0.00192	0.022	0	0.0351	0.0159	0
Uranium 238		µg/L											
Uranium 238		pCi/L	0.0111	0.0323	0.0151	0.0834	0.0313	-0.0105	0.0157	0.0084	0.0234	0.00775	-0.0161
Total Uranium*		µg/L	0.0447	0.117	0.0524	0.257	0.112	0.000887	0.0568	0.025	0.0857	0.0304	2.32E-06
Polycyclic Aromatic Hydrocarbons (PAHs)													
Benzo(a)anthracene		µg/L	*< 0.0943*	*< 0.0926*	*< 0.0935*	*< 0.0952*	*< 0.0999*	*< 0.0935*	*< 0.0952*	*< 0.0964 J*	0.0957	*< 0.481 J*	*< 0.103 J*
Benzo(a)pyrene		µg/L	*< 0.0943*	*< 0.0926*	*< 0.0935*	*< 0.0952*	*< 0.0999*	*< 0.0935*	*< 0.0952*	*< 0.0964 J*	0.191	*< 0.481 J*	*< 0.103 J*
Benzo(k)fluoranthene		µg/L	*< 0.0943*	*< 0.0926*	*< 0.0935*	*< 0.0952*	*< 0.0999*	*< 0.0935*	*< 0.0952*	*< 0.0964 J*	0.325	*< 0.481 J*	*< 0.103 J*
Dibenzo(a,h)anthracene		µg/L	*< 0.0943*	*< 0.0926*	*< 0.0935*	*< 0.0952*	*< 0.0999*	*0.0561 J*	*< 0.0952*	*< 0.0964 J*	0.670	*< 0.481 J*	*< 0.103 J*
*Metals, Dissolved***													
Arsenic		µg/L										2.65 J	2.59 J
Lead		µg/L										*< 0.500*	0.631 J
Nickel		µg/L										7.23	4.68
Metals, Total													
Arsenic		µg/L	*< 2*	*< 2.00*	2.60 J	2.54 J	2.23 J	< 2.00	3.32 J	*< 2.00*	2.36 J		
Lead		µg/L	*< 0.5*	*< 0.500*	*< 0.500*	*< 0.500*	0.668 J	0.582 J	*< 0.500*	0.927 J	0.524 J		
Nickel		µg/L	20.8	13.4	8.48	8.00	12.1	9.90	17.9	7.57	8.07		

Notes:
Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4c
Groundwater Analytical Summary - ERM-107S
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Historical Statistics for ERM-107S No. of Analyses	No. of Detects	Min	Mean	Max	Historical Statistics for Site GW No. of Analyses	No. of Detects	Min	Mean	Max
Dioxins											
Dioxins (TEQ)	µg/L	6	3	0.477	0.483	2.060	25	5	0.477	0.221	3.395
Radiological Analytes											
Radium 226	pCi/L	6	6	0.308	0.88	2.54	25	19	0.308	0.891	2.04
Uranium 234	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 234	pCi/L	6	2	-0.181	-0.104	-0.027	2	2	0.056	0.113	0.170
Uranium 235	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 235	pCi/L	6	2	-0.076	-0.064	-0.052	1	1	0.120	0.120	0.120
Uranium 238	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 238	pCi/L	6	3	-0.041	0.006	0.08	56	14	-0.263	0.043	1.050
Total Uranium*	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (PAHs)											
Benzo(a)anthracene	µg/L	5	0	ND	ND	ND	27	2	0.10	11	22
Benzo(a)pyrene	µg/L	5	0	ND	ND	ND	26	1	14	14	14
Benzo(k)fluoranthene	µg/L	5	0	ND	ND	ND	27	2	0.13	9.6	19
Dibenzo(a,h)anthracene	µg/L	5	0	ND	ND	ND	26	1	1.0	1.0	1.0
*Metals, Dissolved***											
Arsenic	µg/L										
Lead	µg/L										
Nickel	µg/L										
Metals, Total											
Arsenic	µg/L	8	7	2.11	3.52	5.24	86	71	0.65	13.6	69.6
Lead	µg/L	8	3	0.767	20.3	59.1	70	43	0.767	209	1,930
Nickel	µg/L	10	9	12.1	54.9	107	100	100	1.1	4,790	209,000

Notes:
Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4d
Groundwater Analytical Summary - ERM-109S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	ERM-109S(R) 8-Jul-14	ERM-109S(R) 5-Nov-14	ERM-109S(R) 27-May-15	ERM-109S(R) 4-Nov-15	ERM-109S(R) 3-May-16	ERM-109S(R) 2-Nov-16	ERM-109S(R) 1-May-17	ERM-109S(R) 10-May-17
Dioxins									
Dioxins (TEQ)	µg/L	ND	ND	ND	ND	ND	ND		7.11E-07
Radiological Analytes									
Radium 226	pCi/L	1.05	0.494	0.860*	0.551*	0.534	0.732	0.343	
Uranium 234	µg/L								
Uranium 234	pCi/L	0.117	0.119	0.0712	*0.0230*	0.163	0.0940	0.0691	
Uranium 235	µg/L								
Uranium 235	pCi/L	*0.00757*	*0.0306*	*0.000*	*0.0193*	-0.00658	0.0476	0.0134	
Uranium 238	µg/L								
Uranium 238	pCi/L	*0.0285*	0.0948	0.0774	*0.0230*	0.00477	0.0496	0.0355	
Total Uranium*	µg/L	*0.0883*	0.296	0.230	*0.0774*	0.0142	0.170	0.112	
Polycyclic Aromatic Hydrocarbons (PAHs)									
Benzo(a)anthracene	µg/L	*< 0.192*	*< 0.179*	*< 0.0935*	*< 0.0935*	*< 0.0935*	*< 0.0943*		*< 0.0962*
Benzo(a)pyrene	µg/L	*< 0.192*	*< 0.179*	*< 0.0935*	*< 0.0935*	*< 0.0935*	*< 0.0943*		*< 0.0962*
Benzo(k)fluoranthene	µg/L	*< 0.192*	*< 0.179*	*< 0.0935*	*< 0.0935*	*< 0.0935*	*< 0.0943*		*< 0.0962*
Dibenzo(a,h)anthracene	µg/L	*< 0.192*	*< 0.179*	*< 0.0935*	*< 0.0935*	*< 0.0935*	0.0472 J		*< 0.0962*
*Metals, Dissolved***									
Arsenic	µg/L								
Lead	µg/L								
Nickel	µg/L								
Metals, Total									
Arsenic	µg/L	*< 1.70*	2.59 J	*< 1.70*	1.89 J	*< 1.7*	2.29 J	2.16 J	
Lead	µg/L	1.67 J	2.26 J	2.15	< 0.500	1.94 J	*< 0.500*	2.8	
Nickel	µg/L	14.3	10.5 J	10.8	9.15	9.67	10.9	8.79	

Notes:

Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4d
Groundwater Analytical Summary - ERM-109S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Unit	ERM-109S(R) 1-Nov-17	ERM-109S(R) 3-May-18	ERM-109S(R) 10-Jan-19	ERM-109S(R) 15-May-19	ERM-109S(R) 30-Oct-19	ERM-109S(R) 12-May-20	ERM-109S(R) 28-Oct-20	ERM-109S(R) 7-May-21	ERM-109S(R) 14-Oct-21	ERM-109S(R) 27-Apr-22	ERM-109S(R) 12-Oct-22
Dioxins													
Dioxins (TEQ)		µg/L	1.66E-07	0.000000	0	0	1.01E-08	1.87E-08	0	0	2.72E-07	0	1.71E-07
Radiological Analytes													
Radium 226		pCi/L	0.526	0.662	0.142	3.60	0.756	0.704	1.07	0.296	0.577	0.666	0.241
Uranium 234		µg/L											
Uranium 234		pCi/L	0.197	0.0349	0.0591	-0.00137	0.0252	0.00844	-0.0486	0.0172	0.0302	0.0371	-0.00297
Uranium 235		µg/L											
Uranium 235		pCi/L	0.0457	0.0231	0.021	0.00129	0.0212	0.0208	-0.015	-0.00411	0.0293	0.0198	-0.00277
Uranium 238		µg/L											
Uranium 238		pCi/L	0.116	0.0461	0.021	-0.0239	0.041	0.0283	-0.00747	0.0902	0.0402	0.0549	0.0193
Total Uranium*		µg/L	0.367	0.148	0.072	0.000596	0.132	0.0938	0	0.268	0.133	0.172	0.0575
Polycyclic Aromatic Hydrocarbons (PAHs)													
Benzo(a)anthracene		µg/L	*< 0.0943*	*< 0.0926*	*< 0.0943*	*< 0.0962*	*< 0.0968*	*< 0.0935*	*< 0.0949*	*< 0.100*	*< 0.0862*	*< 0.0909 J*	*< 0.0954 J*
Benzo(a)pyrene		µg/L	*< 0.0943*	*< 0.0926*	*< 0.0943*	*< 0.0962*	*< 0.0968*	*< 0.0935*	*< 0.0949*	*< 0.100*	*< 0.0862*	*< 0.0909 J*	*< 0.0954 J*
Benzo(k)fluoranthene		µg/L	*< 0.0943*	*< 0.0926*	*< 0.0943*	*< 0.0962*	*< 0.0968*	*< 0.0935*	*< 0.0949*	*< 0.100*	*< 0.0862*	*< 0.0909 J*	*< 0.0954 J*
Dibenzo(a,h)anthracene		µg/L	*< 0.0943*	*< 0.0926*	*< 0.0943*	*< 0.0962*	*< 0.0968*	*< 0.0935*	*< 0.0949*	*< 0.100*	*< 0.0862*	*< 0.0909 J*	*< 0.0954 J*
*Metals, Dissolved***													
Arsenic		µg/L										2.44 J	3.19 J
Lead		µg/L										*< 0.500*	*< 0.5*
Nickel		µg/L										2.42	3.25
Metals, Total													
Arsenic		µg/L	6.52	*< 2.00*	2.61 J	2.47 J	2.87 J	*< 2.00*	4.03 J	*< 2.00*	2.21 J		
Lead		µg/L	1.72 J	0.657 J	1.01 J	*< 0.500*	1.08 J	0.972 J	*< 0.500*	0.524 J	0.535 J		
Nickel		µg/L	8.14	7.50	4.47	3.37	5.08	3.67	5.81	2.11	2.25		

Notes:
Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4d
Groundwater Analytical Summary - ERM-109S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Historical Statistics for ERM-109S No. of Analyses	No. of Detects	Min	Mean	Max	Historical Statistics for Site GW No. of Analyses	No. of Detects	Min	Mean	Max
Dioxins											
Dioxins (TEQ)	µg/L	0	0	NA	NA	NA	25	5	0.477	0.221	3.395
Radiological Analytes											
Radium 226	pCi/L	0	0	NA	NA	NA	25	19	0.308	0.891	2.04
Uranium 234	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 234	pCi/L	0	0	NA	NA	NA	2	2	0.056	0.113	0.170
Uranium 235	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 235	pCi/L	0	0	NA	NA	NA	1	1	0.120	0.120	0.120
Uranium 238	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 238	pCi/L	0	0	NA	NA	NA	56	14	-0.263	0.043	1.050
Total Uranium*	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (PAHs)											
Benzo(a)anthracene	µg/L	1	0	ND	ND	ND	27	2	0.10	11	22
Benzo(a)pyrene	µg/L	1	0	ND	ND	ND	26	1	14	14	14
Benzo(k)fluoranthene	µg/L	1	0	ND	ND	ND	27	2	0.13	9.6	19
Dibenzo(a,h)anthracene	µg/L	1	0	ND	ND	ND	26	1	1.0	1.0	1.0
*Metals, Dissolved***											
Arsenic	µg/L										
Lead	µg/L										
Nickel	µg/L										
Metals, Total											
Arsenic	µg/L	2	2	0.73	16.07	31.40	86	71	0.65	13.6	69.6
Lead	µg/L	1	1	1,390	1,390	1,390	70	43	0.767	209	1,930
Nickel	µg/L	2	2	116	653	1,190	100	100	1.1	4,790	209,000

Notes:

Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4e
Groundwater Analytical Summary - ERM-14S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type		ERM-14S(R) 8-Jul-14	ERM-14S(R) 4-Nov-14	ERM-14S(R) 27-May-15	ERM-14S(R) 5-Nov-15	ERM-14S(R) 3-May-16	ERM-14S(R) 2-Nov-16	ERM-14S(R) 1-May-17	ERM-14S(R) 10-May-17	ERM-14S(R) 31-Oct-17
Dioxins											
Dioxins (TEQ)	µg/L		ND	ND	ND	ND	ND	ND		5.64E-08	1.66E-07
Radiological Analytes											
Radium 226	pCi/L		2.54	1.18	0.270*	0.435*	0.0946	0.236	0		0.957
Uranium 234	µg/L										
Uranium 234	pCi/L		0.0595	*0.0436*	*0.0286*	0.0612	0.155	0.0969	0.0383		0.126
Uranium 235	µg/L										
Uranium 235	pCi/L		*0.0118*	*-0.000135*	*0.0107*	*0.0140*	0.0304	0.0486	-0.00592		0.0633
Uranium 238	µg/L										
Uranium 238	pCi/L		0.0575	0.0911	0.0808	0.0856	0.206	0.0696	0.0172		0.0268
Total Uranium*	µg/L		0.176	0.271	0.245	0.261	0.625	0.230	0.0511		0.109
Polycyclic Aromatic Hydrocarbons (PAHs)											
Benzo(a)anthracene	µg/L		*< 0.189*	*< 0.187*	*< 0.0935*	*< 0.100*	*< 0.0935*	*< 0.0935*		*< 0.0943*	*< 0.0943*
Benzo(a)pyrene	µg/L		*< 0.189*	*< 0.187*	*< 0.0935*	*< 0.100*	*< 0.0935*	*< 0.0935*		*< 0.0943*	*< 0.0943*
Benzo(k)fluoranthene	µg/L		*< 0.189*	*< 0.187*	*< 0.0935*	*< 0.100*	*< 0.0935*	*< 0.0935*		*< 0.0943*	*< 0.0943*
Dibenzo(a,h)anthracene	µg/L		*< 0.189*	*< 0.187*	*< 0.0935*	*< 0.100*	*< 0.0935*	*< 0.0935*		*< 0.0943*	*< 0.0943*
*Metals, Dissolved***											
Arsenic	µg/L										
Lead	µg/L										
Nickel	µg/L										
Metals, Total											
Arsenic	µg/L		7.02	8.45	6.54	9.59	8.93	11.3	7.47		10.8
Lead	µg/L		*< 0.500*	0.742 J	*< 0.500*	*< 0.500*	*< 0.5*	*< 0.500*	*< 0.5*		*< 0.5*
Nickel	µg/L		2.05	2.67	1.86 J	2.48	2.66	2.82	1.46 J		2.57

Notes:
Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4e
Groundwater Analytical Summary - ERM-14S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	ERM-14S(R) 2-May-18	ERM-14S(R) 10-Jan-19	ERM-14S(R) 16-May-19	ERM-14S(R) 30-Oct-19	ERM-14S(R) 13-May-20	ERM-14S(R) 28-Oct-20	ERM-14S(R) 7-May-21	ERM-14S(R) 14-Oct-21	ERM-14S(R) 28-Apr-22	ERM-14S(R) 13-Oct-22
Dioxins											
Dioxins (TEQ)	µg/L	9.55E-08	0	0	0	0	0	1.05E-04	4.48E-06	0 J	9.4E-09
Radiological Analytes											
Radium 226	pCi/L	1.31	0.314	0.713	0.394	0.396	0.408	0.68	0.289	0.126	0.286
Uranium 234	µg/L										
Uranium 234	pCi/L	0.115	0.0744	0.0694	0.0746	0.0163	0.0158	0.0216	0.0397	0.000389	-0.00648
Uranium 235	µg/L										
Uranium 235	pCi/L	0.146	0.00782	0.0353	0.0638	-0.0193	0.00907	0.00369	0.0267	0.0402	-0.0192
Uranium 238	µg/L										
Uranium 238	pCi/L	0.0571	0.0496	0.0453	0.0828	0.00551	0.00302	0.0405	0.0343	0.0402	0.0191
Total Uranium*	µg/L	0.237	0.151	0.151	0.276	0.0164	0.0132	0.122	0.114	0.138	0.0568
Polycyclic Aromatic Hydrocarbons (PAHs)											
Benzo(a)anthracene	µg/L	*< 0.0943*	0.0849 J	*< 0.0962*	*< 0.0941*	*< 0.0943*	*< 0.102*	*< 0.0986 J*	*< 0.0981*	*< 0.100*	*< 0.0954*
Benzo(a)pyrene	µg/L	*< 0.0943*	0.0755 J	*< 0.0962*	*< 0.0941*	*< 0.0943*	*< 0.102*	*< 0.0986 J*	*< 0.0981*	*< 0.100*	*< 0.0954*
Benzo(k)fluoranthene	µg/L	*< 0.0943*	0.123	*< 0.0962*	*< 0.0941*	*< 0.0943*	*< 0.102*	*< 0.0986 J*	*< 0.0981*	*< 0.100*	*< 0.0954*
Dibenzo(a,h)anthracene	µg/L	*< 0.0943*	0.132	*< 0.0962*	*< 0.0941*	*< 0.0943*	*< 0.102*	*< 0.0986 J*	*< 0.0981*	*< 0.100*	*< 0.0954*
*Metals, Dissolved***											
Arsenic	µg/L										12.8
Lead	µg/L										*< 0.500*
Nickel	µg/L										1.48 J
Metals, Total											
Arsenic	µg/L	8.43	9.52	7.51	12.8	9.08	13.8	7.95	14.0	10.9	
Lead	µg/L	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	
Nickel	µg/L	1.44 J	1.76 J	1.26 J	1.69 J	1.21 J	2.91	0.776 J	1.06 J	0.823 J	

Notes:
Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4e
Groundwater Analytical Summary - ERM-14S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Historical Statistics for ERM-14S: No. of Analyses	No. of Detects	Min	Mean	Max	Historical Statistics for Site GW: No. of Analyses	No. of Detects	Min	Mean	Max
Dioxins											
Dioxins (TEQ)	µg/L	0	0	NA	NA	NA	25	5	0.477	0.221	3.395
Radiological Analytes											
Radium 226	pCi/L	0	0	NA	NA	NA	25	19	0.308	0.891	2.04
Uranium 234	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 234	pCi/L	0	0	NA	NA	NA	2	2	0.056	0.113	0.170
Uranium 235	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 235	pCi/L	0	0	NA	NA	NA	1	1	0.120	0.120	0.120
Uranium 238	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 238	pCi/L	0	0	NA	NA	NA	56	14	-0.263	0.043	1.050
Total Uranium*	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (PAHs)											
Benzo(a)anthracene	µg/L	0	0	NA	NA	NA	27	2	0.10	11	22
Benzo(a)pyrene	µg/L	0	0	NA	NA	NA	26	1	14	14	14
Benzo(k)fluoranthene	µg/L	0	0	NA	NA	NA	27	2	0.13	9.6	19
Dibenzo(a,h)anthracene	µg/L	0	0	NA	NA	NA	26	1	1.0	1.0	1.0
*Metals, Dissolved***											
Arsenic	µg/L										
Lead	µg/L										
Nickel	µg/L										
Metals, Total											
Arsenic	µg/L	0	0	NA	NA	NA	0	0	0.65	13.6	69.6
Lead	µg/L	0	0	NA	NA	NA	0	0	0.767	209	1,930
Nickel	µg/L	0	0	NA	NA	NA	0	0	1.1	4,790	209,000

Notes:
Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
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J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4f
Groundwater Analytical Summary - ERM-16S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	ERM-16S(R) 8-Jul-14	ERM-16S(R) 5-Nov-14	ERM-16S(R) 28-May-15	ERM-16S(R) 5-Nov-15	ERM-16S(R) 4-May-16	ERM-16S(R) 2-Nov-16	ERM-16S(R) 1-May-17	ERM-16S(R) 10-May-17	ERM-16S(R) 31-Oct-17
Dioxins										
Dioxins (TEQ)	µg/L	ND	ND	ND	ND	ND	1.08E-08		0	1.66E-07
Radiological Analytes										
Radium 226	pCi/L	4.36	0.660	0.676*	1.25*	0.958	1.22	0.207		2.07
Uranium 234	µg/L									
Uranium 234	pCi/L	0.0552	0.311	0.0411	0.0890	0.133	0.170	0.039		0.0968
Uranium 235	µg/L									
Uranium 235	pCi/L	*0.00528*	0.0309	0.0206	*0.0110*	0.0352	0.0798	0.023		0.0441
Uranium 238	µg/L									
Uranium 238	pCi/L	0.0445	0.311	0.0713	0.103	0.265	0.188	0.0329		0.0469
Total Uranium*	µg/L	0.135	0.938	0.222	0.313	0.805	0.597	0.108		0.160
Polycyclic Aromatic Hydrocarbons (PAHs)										
Benzo(a)anthracene	µg/L	*< 0.189*	*< 0.187*	*< 0.0943*	*< 0.0952*	*< 0.0935*	*< 0.0943*		*< 0.0952*	*< 0.0943*
Benzo(a)pyrene	µg/L	*< 0.189*	*< 0.187*	*< 0.0943*	*< 0.0952*	*< 0.0935*	*< 0.0943*		*< 0.0952*	*< 0.0943*
Benzo(k)fluoranthene	µg/L	*< 0.189*	*< 0.187*	*< 0.0943*	*< 0.0952*	*< 0.0935*	*< 0.0943*		*< 0.0952*	*< 0.0943*
Dibenzo(a,h)anthracene	µg/L	*< 0.189*	*< 0.187*	*< 0.0943*	*< 0.0952*	*< 0.0935*	*< 0.0943*		*< 0.0952*	*< 0.0943*
*Metals, Dissolved***										
Arsenic	µg/L									
Lead	µg/L									
Nickel	µg/L									
Metals, Total										
Arsenic	µg/L	*< 1.70*	1.96 J	*< 1.70*	*< 1.70*	*< 1.7*	*< 1.70*	*< 2*		*< 2*
Lead	µg/L	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.5*	*< 0.500*	*< 0.5*		*< 0.5*
Nickel	µg/L	1.27 J	2.47	2.79	2.33	1.85 J	5.42	1.09 J		2.94

Notes:

Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4f
Groundwater Analytical Summary - ERM-16S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	ERM-16S(R) 3-May-18	ERM-16S(R) 10-Jan-19	ERM-16S(R) 15-May-19	ERM-16S(R) 29-Oct-19	ERM-16S(R) 13-May-20	ERM-16S(R) 28-Oct-20	ERM-16S(R) 7-May-21	ERM-16S(R) 13-Oct-21	ERM-16S(R) 27-Apr-22	ERM-16S(R) 12-Oct-22
Dioxins											
Dioxins (TEQ)	µg/L	0	0	0	0	0	0	0	4.68E-08	0	0
Radiological Analytes											
Radium 226	pCi/L	1.66	0.381	3.36	0.591	0.544	2.5	0.495	1.24	0.545	0.537
Uranium 234	µg/L										
Uranium 234	pCi/L	0.108	0.0743	0.0504	-0.00434	0.0151	-0.00456	-0.033	0.0871	-0.00319	0.0157
Uranium 235	µg/L										
Uranium 235	pCi/L	0.0809	0.089	0.0189	0.0287	0.00884	0.00676	0.0043	0.0187	0.014	-0.00246
Uranium 238	µg/L										
Uranium 238	pCi/L	0.0702	0.0369	0.0482	0.0429	0.0147	0.0236	0.00429	0.041	0.0308	0.0319
Total Uranium*	µg/L	0.246	0.151	0.152	0.141	0.0478	0.0733	0.0147	0.131	0.0982	0.0947
Polycyclic Aromatic Hydrocarbons (PAHs)											
Benzo(a)anthracene	µg/L	*< 0.0935*	*< 0.0935*	*< 0.0926*	*< 0.101*	*< 0.0943*	*< 0.101*	0.150	*< 0.0947*	*< 0.0949 J*	*< 0.0978*
Benzo(a)pyrene	µg/L	*< 0.0935*	*< 0.0935*	*< 0.0926*	*< 0.101*	*< 0.0943*	*< 0.101*	0.150	*< 0.0947*	*< 0.0949 J*	*< 0.0978 J*
Benzo(k)fluoranthene	µg/L	*< 0.0935*	*< 0.0935*	*< 0.0926*	*< 0.101*	*< 0.0943*	*< 0.101*	0.206	*< 0.0947*	*< 0.0949 J*	*< 0.0978*
Dibenzo(a,h)anthracene	µg/L	*< 0.0935*	*< 0.0935*	*< 0.0926*	*< 0.101*	*< 0.0943*	*< 0.101*	0.281 J	*< 0.0947*	0.0664 J	< 0.0978 J
*Metals, Dissolved***											
Arsenic	µg/L									*< 2.00*	*<2*
Lead	µg/L									*< 0.500*	*<0.5*
Nickel	µg/L									0.719 J	1.16 J
Metals, Total											
Arsenic	µg/L	*< 2.00*	*< 2.00*	*< 2.00*	*< 2.00*	*< 2.00*	2.71 J	*< 2.00*	*< 2.00*		
Lead	µg/L	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*		
Nickel	µg/L	0.756 J	0.667 J	2.98	0.805 J	< 0.600	2.33	*< 0.600*	1.38 J		

Notes:
Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4f
Groundwater Analytical Summary - ERM-16S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Historical Statistics for ERM-16S: No. of Analyses	No. of Detects	Min	Mean	Max	Historical Statistics for Site GW: No. of Analyses	No. of Detects	Min	Mean	Max
Dioxins											
Dioxins (TEQ)	µg/L	0	0	NA	NA	NA	25	5	0.477	0.221	3.395
Radiological Analytes											
Radium 226	pCi/L	0	0	NA	NA	NA	25	19	0.308	0.891	2.04
Uranium 234	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 234	pCi/L	0	0	NA	NA	NA	2	2	0.056	0.113	0.170
Uranium 235	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 235	pCi/L	0	0	NA	NA	NA	1	1	0.120	0.120	0.120
Uranium 238	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 238	pCi/L	0	0	NA	NA	NA	56	14	-0.263	0.043	1.050
Total Uranium*	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (PAHs)											
Benzo(a)anthracene	µg/L	0	0	NA	NA	NA	27	2	0.10	11	22
Benzo(a)pyrene	µg/L	0	0	NA	NA	NA	26	1	14	14	14
Benzo(k)fluoranthene	µg/L	0	0	NA	NA	NA	27	2	0.13	9.6	19
Dibenzo(a,h)anthracene	µg/L	0	0	NA	NA	NA	26	1	1.0	1.0	1.0
*Metals, Dissolved***											
Arsenic	µg/L										
Lead	µg/L										
Nickel	µg/L										
Metals, Total											
Arsenic	µg/L	0	0	NA	NA	NA	0	0	0.65	13.6	69.6
Lead	µg/L	0	0	NA	NA	NA	0	0	0.767	209	1,930
Nickel	µg/L	0	0	NA	NA	NA	0	0	1.1	4,790	209,000

Notes:

Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
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Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4g
Groundwater Analytical Summary - ERM-28S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	ERM-28S(R) 8-Jul-14	ERM-28S(R) 5-Nov-14	ERM-28S(R) 5-Nov-14 FD	ERM-28S(R) 27-May-15	ERM-28S(R) 27-May-15 FD	ERM-28S(R) 4-Nov-15	ERM-28S(R) 4-Nov-15 FD	ERM-28S(R) 4-May-16
Dioxins									
Dioxins (TEQ)	µg/L	ND	ND	ND	ND	2.33E-08 J	ND	1.30E-09	ND
Radiological Analytes									
Radium 226	pCi/L	4.87	1.03	0.780	1.13*	1.21*	0.499	0.427*	0.696
Uranium 234	µg/L								
Uranium 234	pCi/L	0.203	0.0604	0.204	0.552	0.0755	0.415	0.363	0.456
Uranium 235	µg/L								
Uranium 235	pCi/L	*0.00154*	*0.00901*	*0.0179*	*-0.00312*	*-0.0155*	*0.0100*	0.0640	0.127
Uranium 238	µg/L								
Uranium 238	pCi/L	0.148	0.103	0.168	0.588	0.0378	0.332	0.275	0.384
Total Uranium*	µg/L	0.440	0.310	0.508	1.75	0.112	0.992	0.847	1.20
Polycyclic Aromatic Hydrocarbons (PAHs)									
Benzo(a)anthracene	µg/L	*< 0.190*	*< 0.187*	*< 0.187*	*< 0.0943*	*< 0.0935*	*< 0.0962*	*< 0.100*	*< 0.0935*
Benzo(a)pyrene	µg/L	*< 0.190*	*< 0.187*	*< 0.187*	*< 0.0943*	*< 0.0935*	*< 0.0962*	*< 0.100*	*< 0.0935*
Benzo(k)fluoranthene	µg/L	*< 0.190*	*< 0.187*	*< 0.187*	*< 0.0943*	*< 0.0935*	*< 0.0962*	*< 0.100*	*< 0.0935*
Dibenzo(a,h)anthracene	µg/L	*< 0.190*	*< 0.187*	*< 0.187*	*< 0.0943*	*< 0.0935*	*< 0.0962*	*< 0.100*	*< 0.0935*
*Metals, Dissolved***									
Arsenic	µg/L								
Lead	µg/L								
Nickel	µg/L								
Metals, Total									
Arsenic	µg/L	*< 1.70*	*< 1.70*	*< 1.70*	*< 1.70*	*< 1.70*	*< 1.70*	*< 1.70*	*< 1.7*
Lead	µg/L	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.5*
Nickel	µg/L	1.89 J	3.85	1.63 J	3.85	3.77	1.15 J	1.16 J	2.81

Notes:
Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4g
Groundwater Analytical Summary - ERM-28S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	ERM-28S(R) 4-May-16 FD	ERM-28S(R) 1-Nov-16	ERM-28S(R) 1-Nov-16 FD	ERM-28S(R) 2-May-17	ERM-28S(R) 2-May-17 FD	ERM-28S(R) 10-May-17	ERM-28S(R) 10-May-17 FD	ERM-28S(R) 1-Nov-17	ERM-28S(R) 1-Nov-17 FD
Dioxins										
Dioxins (TEQ)	µg/L	1.66E-07	2.20E-08	3.34E-08			1.78E-06	1.98E-07	1.09E-07	0.00E+00
Radiological Analytes										
Radium 226	pCi/L	0.609	0.591	0.422	0.767	0.263			0.888	0.663
Uranium 234	µg/L									
Uranium 234	pCi/L	0.290	0.317	0.319	0.317	0.218			0.428	0.327
Uranium 235	µg/L									
Uranium 235	pCi/L	0.102	0.0431	0.0661	0.00617	0.0349			0.0739	0.0556
Uranium 238	µg/L									
Uranium 238	pCi/L	0.247	0.237	0.290	0.318	0.208			0.169	0.205
Total Uranium*	µg/L	0.781	0.725	0.892	0.950	0.636			0.537	0.635
Polycyclic Aromatic Hydrocarbons (PAHs)										
Benzo(a)anthracene	µg/L	*< 0.0935*	*< 0.0952*	*< 0.0935*			*< 0.0943*	*< 0.0943*	*< 0.0962*	*< 0.0943*
Benzo(a)pyrene	µg/L	*< 0.0935*	*< 0.0952*	*< 0.0935*			*< 0.0943*	*< 0.0943*	*< 0.0962*	*< 0.0943*
Benzo(k)fluoranthene	µg/L	*< 0.0935*	*< 0.0952*	*< 0.0935*			*< 0.0943*	*< 0.0943*	*< 0.0962*	*< 0.0943*
Dibenzo(a,h)anthracene	µg/L	*< 0.0935*	*< 0.0952*	*< 0.0935*			*< 0.0943*	*< 0.0943*	*< 0.0962*	*< 0.0943*
*Metals, Dissolved***										
Arsenic	µg/L									
Lead	µg/L									
Nickel	µg/L									
Metals, Total										
Arsenic	µg/L	*< 1.7*	*< 1.70*	*< 1.70*	*< 2*	*< 2*			*< 2*	*< 2*
Lead	µg/L	*< 0.5*	*< 0.500*	*< 0.500*	*< 0.5*	*< 0.5*			*< 0.5*	*< 0.5*
Nickel	µg/L	2.93	2.62	2.64	1.78 J	1.54 J			1.09 J	1.12 J

Notes:

Blank cell = compound not analyzed.
FD = Field duplicate sample.
TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
*Method Detectable Concentration above prescribed Reporting Limit
Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4g
Groundwater Analytical Summary - ERM-28S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Unit	ERM-28S(R) 2-May-18	ERM-28S(R) 2-May-18 FD	ERM-28S(R) 10-Jan-19	ERM-28S(R) 10-Jan-19 FD	ERM-28S(R) 15-May-19	ERM-28S(R) 15-May-19 FD	ERM-28S(R) 29-Oct-19	ERM-28S(R) 29-Oct-19 FD	ERM-28S(R) 12-May-20	ERM-28S(R) 12-May-20 FD
Dioxins												
Dioxins (TEQ)		µg/L	0.000000200	0.000000141	0	1.18E-09	0	0	0	0	0	2.4E-09
Radiological Analytes												
Radium 226		pCi/L	1.89		0.364	0.388	0.601	0.638	0.332	0.269	0.248	0.223
Uranium 234		µg/L										
Uranium 234		pCi/L	3.26	0.234	0.206	0.218	0.234	0.315	0.261	0.242	0.159	0.171
Uranium 235		µg/L										
Uranium 235		pCi/L	0.332	0.0471	0.0802	0.0266	0.033	0.0168	0.0123	0.0388	0.0209	0.0364
Uranium 238		µg/L										
Uranium 238		pCi/L	0.896	0.185	0.130	0.190	0.174	0.230	0.226	0.232	0.174	0.182
Total Uranium*		µg/L	2.82	0.571	0.423	0.577	0.531	0.692	0.678	0.709	0.527	0.557
Polycyclic Aromatic Hydrocarbons (PAHs)												
Benzo(a)anthracene		µg/L	*< 0.0952*	*< 0.0935*	*< 0.0952*	*< 0.0935*	0.0577 J	*< 0.0943*	*< 0.101*	*< 0.0961*	*< 0.100*	*< 0.100*
Benzo(a)pyrene		µg/L	*< 0.0952*	*< 0.0935*	*< 0.0952*	*< 0.0935*	*< 0.0962*	*< 0.0943*	*< 0.101*	*< 0.0961*	*< 0.100*	*< 0.100*
Benzo(k)fluoranthene		µg/L	*< 0.0952*	*< 0.0935*	*< 0.0952*	*< 0.0935*	0.0673 J	*< 0.0943*	*< 0.101*	*< 0.0961*	*< 0.100*	*< 0.100*
Dibenzo(a,h)anthracene		µg/L	*< 0.0952*	*< 0.0935*	*< 0.0952*	*< 0.0935*	0.0769 J	*< 0.0943*	*< 0.101*	*< 0.0961*	*< 0.100*	*< 0.100*
*Metals, Dissolved***												
Arsenic		µg/L										
Lead		µg/L										
Nickel		µg/L										
Metals, Total												
Arsenic		µg/L	2.31 J	2.44 J	2.43 J	2.35 J	2.40 J	2.65 J	2.64 J	2.76 J	3.79 J	3.86 J
Lead		µg/L	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*
Nickel		µg/L	1.59 J	1.61 J	1.61 J	1.57 J	1.41 J	1.92 J	1.10 J	1.08 J	0.966 J	2.18

Notes:

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TEQ = Toxicity equivalents.
pg/L = Picograms per liter.
pCi/L = Picocuries per liter.
µg/L = micrograms per liter.
NA = Not applicable, compound not historically analyzed
Dissolved metals analyzed in place of total metals. Turbidity stabilized below 10 NTU.

ND = Not detected or No historical detections of this compound
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J = Estimated value, see data validation report.
Italics = Result reported is below Minimum Detectable Concentration.
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Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4g
Groundwater Analytical Summary - ERM-28S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID	ERM-28S(R)	ERM-28S(R)	ERM-28S(R)	ERM-28S(R)	ERM-28S(R)	ERM-28S(R)	ERM-28S(R)	ERM-28S(R)	ERM-28S(R)	ERM-28S(R)
	Sample Date	27-Oct-20	27-Oct-20	7-May-21	7-May-21	13-Oct-21	13-Oct-21	27-Apr-22	27-Apr-22	12-Oct-22	12-Oct-22
	Sample Type		FD		FD		FD		FD		FD
Dioxins											
Dioxins (TEQ)	µg/L	0	0	8.8E-05 J	3.21E-08 J	1.99E-07 J	2.68E-08 J	0	0	4.8E-09	2.2E-09
Radiological Analytes											
Radium 226	pCi/L	1.43	1.15	0.583	0.521	0.999	1.02	0.375 J	1.69 J	0.678	0.491
Uranium 234	µg/L										
Uranium 234	pCi/L	0.159	0.148	0.122 J	0.0395 J	0.297	0.313	0.256	0.223	0.131	0.199
Uranium 235	µg/L										
Uranium 235	pCi/L	0.00812	0.0291	0.0228 J	0.0079 J	0.0236	0.0294	0.0244 J	0.00781 J	-0.00385	0.00358
Uranium 238	µg/L										
Uranium 238	pCi/L	0.085	0.138	0.172	0.15	0.231	0.201	0.243	0.229	0.134	0.118
Total Uranium*	µg/L	0.256	0.424	0.522	0.449	0.699	0.61	0.735	0.685	0.399	0.352
Polycyclic Aromatic Hydrocarbons (PAHs)											
Benzo(a)anthracene	µg/L	*< 0.107*	*< 0.100*	*< 0.0953 J*	*< 0.0938*	*< 0.0955*	0.0663 J	*< 0.105 J*	*< 0.0991 J*	*< 0.0948*	*< 0.0948*
Benzo(a)pyrene	µg/L	*< 0.107*	*< 0.100*	*< 0.0953 J*	*< 0.0938*	*< 0.0955*	0.0568 J	*< 0.105 J*	*< 0.0991 J*	*< 0.0948 J*	*< 0.0948 J*
Benzo(k)fluoranthene	µg/L	*< 0.107*	*< 0.100*	*< 0.0953 J*	*< 0.0938*	*< 0.0955 J*	0.208 J	0.158 J	0.0595 J	< 0.0948	< 0.0948
Dibenzo(a,h)anthracene	µg/L	*< 0.107*	*< 0.100*	*< 0.0953 J*	*< 0.0938*	*< 0.0955 J*	0.360 J	0.158 J	0.0496 J	< 0.0948 J	< 0.0948 J
*Metals, Dissolved***											
Arsenic	µg/L									3.76 J	3.65 J
Lead	µg/L									*<0.5*	*< 0.5*
Nickel	µg/L									0.769 J	0.765 J
Metals, Total											
Arsenic	µg/L	4.81 J	4.55 J	4.38 J	4.30 J	7.86	7.93	3.82 J	3.81 J		
Lead	µg/L	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*		
Nickel	µg/L	1.84 J	1.79 J	0.839 J	0.800 J	1.09 J	1.19 J	0.809 J	0.750 J		

Notes:
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**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 4g
Groundwater Analytical Summary - ERM-28S(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Historical Statistics for ERM-28S No. of Analyses	No. of Detects	Min	Mean	Max	Historical Statistics for Site GW No. of Analyses	No. of Detects	Min	Mean	Max
Dioxins											
Dioxins (TEQ)	µg/L	0	0	NA	NA	NA	25	5	0.477	0.221	3.395
Radiological Analytes											
Radium 226	pCi/L	0	0	NA	NA	NA	25	19	0.308	0.891	2.04
Uranium 234	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 234	pCi/L	0	0	NA	NA	NA	2	2	0.056	0.113	0.170
Uranium 235	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 235	pCi/L	0	0	NA	NA	NA	1	1	0.120	0.120	0.120
Uranium 238	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Uranium 238	pCi/L	0	0	NA	NA	NA	56	14	-0.263	0.043	1.050
Total Uranium*	µg/L	0	0	NA	NA	NA	0	0	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (PAHs)											
Benzo(a)anthracene	µg/L	0	0	NA	NA	NA	27	2	0.10	11	22
Benzo(a)pyrene	µg/L	0	0	NA	NA	NA	26	1	14	14	14
Benzo(k)fluoranthene	µg/L	0	0	NA	NA	NA	27	2	0.13	9.6	19
Dibenzo(a,h)anthracene	µg/L	0	0	NA	NA	NA	26	1	1.0	1.0	1.0
*Metals, Dissolved***											
Arsenic	µg/L										
Lead	µg/L										
Nickel	µg/L										
Metals, Total											
Arsenic	µg/L	0	0	NA	NA	NA	0	0	0.65	13.6	69.6
Lead	µg/L	0	0	NA	NA	NA	0	0	0.767	209	1,930
Nickel	µg/L	0	0	NA	NA	NA	0	0	1.1	4,790	209,000

Notes:
Blank cell = compound not analyzed.
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Uranium isoptope results presented for Nov-16 are averages of two analyses run on the same set of samples.
**Dissolved metals analyzed in place of total metals for sample locations that stabilized at a turbidity of over 10 NTU.

Table 5a
Surface Water Analytical Summary - SW-5(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type											
	Location ID	SW-5(R)	SW-5(R)	SW-5(R)	SW-5(R)	SW-5(R)	SW-5(R)	SW-5(R)	SW-5(R)	SW-5(R)	SW-5(R)	SW-5(R)
	Sample Date	8-Jul-14	4-Nov-14	27-May-15	4-Nov-15	3-May-16	1-Nov-16	1-Nov-16 FD	1-May-17	1-May-17 FD	31-Oct-17	31-Oct-17 FD
Metals, Total	µg/L											
Arsenic	µg/L	3.02 J	2.92 J	2.04 J	3.38 J	*< 1.7*	3.48 J	*< 1.70*	12.8	14.2	2.47 J	< 2
Beryllium	µg/L	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.2*	*< 0.200*	*< 0.200*	*< 0.2*	*< 0.2*	*< 0.2*	*< 0.2*
Cadmium	µg/L	*< 0.110*	*< 0.110*	*< 0.110*	*< 0.110*	*< 0.11*	*< 0.300*	*< 0.300*	*< 0.3*	*< 0.3*	*< 0.3*	*< 0.3*
Calcium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	µg/L	*< 2.00*	*< 2.00*	*< 2.00*	*< 2.00*	*< 2*	*< 3.00*	*< 3.00*	*< 3*	*< 3*	*< 3*	*< 3*
Copper	µg/L	2.44	3.62	1.08	2.95	1.43	6.62	6.48	3.45 J	4.35 J	4.43	4.69
Lead	µg/L	4.03	*< 0.500*	*29.7*	0.871 J	*< 0.5*	*< 0.500*	*< 0.500*	2.78	4.39	0.515 J	0.58 J
Magnesium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	µg/L	*< 0.067*	*< 0.067*	*< 0.067 J*	*< 0.067*	*< 0.067*	0.186 J	0.180 J	*NA*	*NA*	*< 0.067*	*< 0.067*
Silver	µg/L	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.100*	*< 0.2*	*< 0.400*	*< 0.400*	0.426 J	0.394 J	*< 0.3*	*< 0.3*
Zinc	µg/L	14.9	24.1	9.66 J	4.86 J	6.66 J	11.4	9.78 J	16.9 J	28 J	118	109
Metals, Dissolved	µg/L											
Arsenic	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
FD = Field duplicate sample.
NA = Not analyzed or not applicable, compound not historically analyzed
µg/L = micrograms per liter.
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.

Table 5a
Surface Water Analytical Summary - SW-5(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Unit	SW-5(R) 2-May-18	SW-5(R) 2-May-18 FD	SW-5(R) 9-Jan-19	SW-5(R) 16-May-19	SW-5(R) 16-May-19 FD	SW-5(R) 30-Oct-19	SW-5(R) 30-Oct-19 FD	SW-5(R) 13-May-20	SW-5(R) 13-May-20 FD	SW-5(R) 6-May-21	SW-5(R) 14-Oct-21	SW-5(R) 28-Apr-22	SW-5(R) 28-Apr-22 FD	SW-5(R) 13-Oct-22
Metals, Total																
Arsenic		µg/L	9.06	10.2	6.49	12.4	11.9	3.32 J	3.32 J	29.2	30.2	5.23	22.6	3.15 J	3.08 J	8.08
Beryllium		µg/L	*< 0.200*	*< 0.200*	0.201 J	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	1.07
Cadmium		µg/L	0.493 J	1.00	0.335 J	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	1.71
Calcium		µg/L	NA	NA	NA	118,000	121,000	177,000	163,000	262,000	285,000	102,000	187,000	123,000	122,000	78,200
Chromium		µg/L	*< 3.00*	*< 3.00*	5.67 J	< 3.00	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*3.28 J*	*< 3.00*	*< 3.00*	7.67 J
Copper		µg/L	3.99	5.88	11.7	1.35 J	1.27 J	1.60 J	1.42 J	3.78	3.46	2.43	6.95	0.542 J	0.354 J	2.83
Lead		µg/L	3.29	8.59	30.7	1.03 J	0.775 J	*< 0.500*	*< 0.500*	*7.35*	*5.38*	1.05 J	*18.2*	*< 0.500*	*< 0.500*	*< 0.500*
Magnesium		µg/L	NA	NA	NA	8,660	8,660	8,870	8,720	16,100	16,900	4,930	5,410	6,790	7,140	6,030
Mercury		µg/L	0.082 J	0.102 J	*< 0.067*	*< 0.067*	*< 0.067*	*< 0.067*	*< 0.067*	*< 0.0670*	*< 0.0670*	*< 0.0670*	*< 0.0670*	*< 0.0670*	*< 0.0670*	*< 0.0670*
Silver		µg/L	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*
Zinc		µg/L	68.8	122	57.2	5.55 J	3.40 J	10.8 J	10.3 J	91.7	66.6	11.4 J	33.6	4.19 J	*< 3.30*	5,850
Metals, Dissolved		µg/L														
Arsenic		µg/L	NA	NA	4.35 J	11.0	10.7	3.49 J	3.81 J	7.91	8.08	5.52	16.6	3.15 J	3.08 J	11.1
Beryllium		µg/L	NA	NA	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	0.812
Cadmium		µg/L	NA	NA	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	1.22
Calcium		µg/L	NA	NA	NA	*115,000*	117,000	175,000	173,000	276,000	266,000	99,200	178,000	123,000	122,000	79,300
Chromium		µg/L	NA	NA	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	7.71 J
Copper		µg/L	NA	NA	2.59	1.04 J	1.07 J	1.51 J	2.51	0.818 J	0.595 J	3.24	0.731 J	0.542 J	0.354 J	1.53 J
Lead		µg/L	NA	NA	*< 0.500*	0.510 J	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*
Magnesium		µg/L	NA	NA	NA	8,550	8,470	8,750	8,850	17,200	16,700	4,840	4,930	6,790	7,140	6,200
Mercury		µg/L	NA	NA	*< 0.067*	*< 0.067*	*< 0.067*	*< 0.067*	*< 0.067*	*< 0.0670*	*< 0.0670*	*< 0.0670*	*< 0.0670*	*< 0.0670*	*< 0.0670*	*< 0.0670*
Silver		µg/L	NA	NA	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*
Zinc		µg/L	NA	NA	16.1	*< 3.30*	*< 3.30*	10.6 J	10.3 J	5.79 J	5.13 J	9.95 J	4.21 J	4.19 J	*< 3.30*	5,290

Notes:
FD = Field duplicate sample.
NA = Not analyzed or not applicable, compound not historically analyzed
µg/L = micrograms per liter.
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.

Table 5a
Surface Water Analytical Summary - SW-5(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Historical Statistics for SW-5 No. of Analyses	No. of Detects	Min	Mean	Max	Historical Statistics for Site SW No. of Analyses	No. of Detects	Min	Mean	Max
Metals, Total											
Arsenic	µg/L	2	2	3	7	11	16	16	0.500	5.16	31.4
Beryllium	µg/L	2	2	51	766	1,480	12	12	0.460	135	1,480
Cadmium	µg/L	2	2	69	95	121	18	18	0.470	21.6	121
Calcium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	µg/L	2	2	744	7,022	13,300	23	23	0.570	661	13,300
Copper	µg/L	2	2	258	2,239	4,220	24	24	1.40	275	4,220
Lead	µg/L	2	2	55	461	868	28	28	0.300	60.5	868
Magnesium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	µg/L	2	2	1	21	41	9	9	0.160	5.14	41.1
Silver	µg/L	2	2	4	20	36	17	17	1.30	9.08	35.9
Zinc	µg/L	2	2	11,400	30,650	49,900	26	26	9.70	3,628	49,900
Metals, Dissolved	µg/L										
Arsenic	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
FD = Field duplicate sample.
NA = Not analyzed or not applicable, compound not historically analyzed
µg/L = micrograms per liter.
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.

Table 5b
Surface Water Analytical Summary - SW-6
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type												
	Location ID	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6	SW-6
	Sample Date	8-Jul-14	4-Nov-14	28-May-15	4-Nov-15	3-May-16	1-Nov-16	2-May-17	31-Oct-17	2-May-18	10-Jan-19	16-May-19	30-Oct-19	13-May-20
Metals, Total														
Arsenic	µg/L	56.2	31.9	1.99 J	18.6	*< 1.70*	*NS*	3.61 J	6.22	4.10 J	*< 2.00*	2.77 J	5.45	2.09 J
Beryllium	µg/L	5.22	10.9	*< 0.200*	2.13	*< 0.20*	*NS*	*< 0.2*	0.480 J	0.232 J	*< 0.200*	0.310 J	*< 0.200*	*< 0.200*
Cadmium	µg/L	6.70	42.9	*< 0.110*	4.07	0.203 J	*NS*	0.365 J	4.89	0.360 J	*< 0.300*	*< 0.300*	0.629 J	< 0.300
Calcium	µg/L	NA	NA	NA	NA	NA	*NS*	NA	NA	NA	NA	28,300	28,700	39,200
Chromium	µg/L	25.7	48.1	*< 2.00*	49.4	*< 2.00*	*NS*	*< 3*	*< 3*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*
Copper	µg/L	36.9	80.5	1.35	62.1	1.05	*NS*	2.34 J	6.02	2.50	2.67	1.96 J	2.36	0.667 J
Lead	µg/L	35.7	101	0.97 J	95.2	*< 0.500*	*NS*	0.931 J	3.81	2.16	*< 0.500*	1.69 J	0.613 J	< 0.500
Magnesium	µg/L	NA	NA	NA	NA	NA	*NS*	NA	NA	NA	NA	2,830	3,740	3,880
Mercury	µg/L	0.199 J	0.333	*< 0.067*	0.425	*< 0.0670*	*NS*	*NA*	*< 0.067*	0.087 J	*< 0.067*	*< 0.067*	*< 0.067*	*< 0.0670*
Silver	µg/L	1.06	2.00	*< 0.200*	1.78	*< 0.200*	*NS*	*< 0.3*	*< 0.3*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*
Zinc	µg/L	1,060	9,260	28.9	467	25.7	*NS*	48.6 J	824	47.4	5.65 J	14.6 J	140	7.68 J
Metals, Dissolved														
Arsenic	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	*< 2.00*	*< 2.00*	4.29 J	< 2.00
Beryllium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*
Cadmium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	*< 0.300*	*< 0.300*	0.470 J	< 0.300
Calcium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	26,800	29,500	39,200
Chromium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*
Copper	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.48	0.897 J	1.54 J	0.470 J
Lead	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*
Magnesium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,800	3,720	3,880
Mercury	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	*< 0.067*	*< 0.067*	*< 0.067*	*< 0.0670*
Silver	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*
Zinc	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.13 J	*< 3.30*	136	4.14 J

Notes:
FD = Field duplicate sample.
NS = No sample.
NA = Not analyzed or not applicable, compound not historically analyzed
µg/L = micrograms per liter.
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.

Table 5b
Surface Water Analytical Summary - SW-6
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID	SW-6	SW-6	SW-6	SW-6	SW-6	Historical Statistics for SW-6					Historical Statistics for Site SW				
	Sample Date	6-May-21	6-May-21	14-Oct-21	28-Apr-22	13-Oct-22	No. of Analyses	No. of Detects	Min	Mean	Max	No. of Analyses	No. of Detects	Min	Mean	Max
	Sample Type		FD													
Metals, Total																
Arsenic	µg/L	48.1 J	11.2 J	3.78 J	2.01 J	21.2	2	2	2.5	2.9	3.3	16	16	0.500	5.16	31.4
Beryllium	µg/L	1.81	1.22	< 0.200	*< 0.200*	0.407 J	2	2	0.8	1.0	1.2	12	12	0.460	135	1,480
Cadmium	µg/L	3.91	4.38	< 0.300	*< 0.300*	0.623 J	2	2	1.5	4.2	6.9	18	18	0.470	21.6	121
Calcium	µg/L	50,600	33,700	36,700	27,300	34,900	0	0	NA	NA	NA	0	0	NA	NA	NA
Chromium	µg/L	10.2	4.06 J	< 3.00	*< 3.00*	3.55 J	2	2	7.2	10.8	14.4	23	23	0.570	661	13,300
Copper	µg/L	19.6	14.9	0.834 J	*< 0.300*	3.61	2	1	15.7	15.7	15.7	24	24	1.40	275	4,220
Lead	µg/L	21.9	14.1	< 0.500	*< 0.500*	2.15	2	2	13.7	20.8	27.8	28	28	0.300	60.5	868
Magnesium	µg/L	4,270	3,000	6,650	3,340	3,850	0	0	NA	NA	NA	0	0	NA	NA	NA
Mercury	µg/L	0.0880 J	0.121 J	< 0.0670	*< 0.0670*	*< 0.0670*	0	0	NA	NA	NA	9	9	0.160	5.14	41.1
Silver	µg/L	0.618 J	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	2	1	4.2	4.2	4.2	17	17	1.30	9.08	35.9
Zinc	µg/L	351	333	8.97 J	*< 3.30*	128	2	2	269	1,115	1,960	26	26	9.70	3,628	49,900
Metals, Dissolved																
Arsenic	µg/L	2.67 J	2.12 J	3.10 J	2.01 J	20.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	µg/L	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	0.408 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	µg/L	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	1.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	µg/L	37,600	36,100	34,800	27,300	33,700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	µg/L	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	3.42 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	µg/L	0.990 J	0.793 J	< 0.300	*< 0.300*	5.49	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	µg/L	0.517 J	< 0.500	< 0.500	*< 0.500*	3.48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	µg/L	3,850	3,720	6,430	3,340	3,630	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	µg/L	*< 0.0670*	*< 0.0670*	*< 0.0670*	*< 0.0670*	*< 0.300*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	µg/L	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.0670*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	µg/L	14.7 J	9.30 J	< 3.30	*< 3.30*	145	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
FD = Field duplicate sample.
NS = No sample.
NA = Not analyzed or not applicable, compound not historically analyzed
µg/L = micrograms per liter.
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.

Table 5c
Surface Water Analytical Summary - SW-12(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Unit	SW-12(R) 8-Jul-14	SW-12(R) 4-Nov-14	SW-12(R) 27-May-15	SW-12(R) 4-Nov-15	SW-12(R) 3-May-16	SW-12(R) 1-Nov-16	SW-12(R) 1-May-17	SW-12(R) 31-Oct-17	SW-12(R) 2-May-18	SW-12(R) 9-Jan-19	SW-12(R) 9-Jan-19 FD	SW-12(R) 16-May-19
Metals, Total														
Arsenic		µg/L	7.18	3.64 J	1.88 J	3.71 J	2.23 J	*NS*	12.5	6.57	16.9	13.4	12.8	12.0
Beryllium		µg/L	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*NS*	*< 0.2*	*< 0.2*	0.228 J	*< 0.200*	*< 0.200*	*< 0.200*
Cadmium		µg/L	0.236 J	*< 0.110*	*< 0.110*	*< 0.110*	*< 0.110*	*NS*	*< 0.3*	*< 0.3*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*
Calcium		µg/L	NA	NA	NA	NA	NA	*NS*	NA	NA	NA	NA	NA	126,000
Chromium		µg/L	3.51 J	*< 2.00*	*< 2.00*	*< 2.00*	*< 2.00*	*NS*	*< 3*	*< 3*	7.67 J	*< 3.00*	3.55 J	*< 3.00*
Copper		µg/L	9.41	4.91	1.09	3.92	1.48	*NS*	8.86 J	4.96	15.0	4.53	4.02	1.93 J
Lead		µg/L	23.4	0.577 J	1.14 J	*< 0.500*	*< 0.500*	*NS*	13.1	1.01 J	35.5	8.05	7.05	2.99
Magnesium		µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6,830
Mercury		µg/L	*< 0.067*	*< 0.067*	*< 0.067*	*< 0.067*	*< 0.067*	*NS*	*NA*	*< 0.067*	0.093 J	*< 0.067*	*< 0.067*	*< 0.067*
Silver		µg/L	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.100*	*< 0.200*	*NS*	0.479 J	*< 0.3*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*
Zinc		µg/L	39.5	44	14.6	8.92 J	4.09 J	*NS*	44.5 J	15.9	70.5	27.9	24.6	7.21 J
Metals, Dissolved														
Arsenic		µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	12.8	12.9	8.85
Beryllium		µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	*< 0.200*	*< 0.200*	*< 0.200*
Cadmium		µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	*< 0.300*	*< 0.300*	*< 0.300*
Calcium		µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	121,000
Chromium		µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	*< 3.00*	*< 3.00*	*< 3.00*
Copper		µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.69	0.853 J	1.39 J
Lead		µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	*< 0.500*	*< 0.500*	0.637 J
Magnesium		µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6,690
Mercury		µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	*< 0.067*	*< 0.067*	*< 0.067*
Silver		µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	*< 0.300*	*< 0.300*	*< 0.300*
Zinc		µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	10.0	9.15 J	*< 3.30*

Notes:
FD = Field duplicate sample.
NS = No sample.
NA = Not analyzed or not applicable, compound not historically analyzed
µg/L = micrograms per liter.
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.

Table 5c
Surface Water Analytical Summary - SW-12(R)
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	SW-12(R) 30-Oct-19	SW-12(R) 13-May-20	SW-12(R) 6-May-21	SW-12(R) 14-Oct-21	SW-12(R) 14-Oct-21 FD	SW-12(R) 28-Apr-22	SW-12(R) 13-Oct-22	SW-12(R) 13-Oct-22 FD	Historical Statistics for SW-12 No. of Analyses	No. of Detects	Min	Mean	Max	Historical Statistics for Site SW No. of Analyses	No. of Detects	Min	Mean	Max
Metals, Total																			
Arsenic	µg/L	4.06 J	7.71	10.7	4.71 J	4.45 J	5.42	4.05 J	2.08 J	0	0	NA	NA	NA	16	16	0.500	5.16	31.4
Beryllium	µg/L	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	1	1	9.5	9.5	9.5	12	12	0.460	135	1,480
Cadmium	µg/L	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	1	1	24.8	24.8	24.8	18	18	0.470	21.6	121
Calcium	µg/L	150,000	185,000	120,000	66,100	60,000	98,200	109,000	109,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	µg/L	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	1	1	76	76	76	23	23	0.570	661	13,300
Copper	µg/L	3.08	1.46 J	2.43	0.455 J	0.525 J	0.534 J	2.95 J	1.45 J	1	1	37.4	37.4	37.4	24	24	1.40	275	4,220
Lead	µg/L	1.00 J	0.888 J	3.52	0.569 J	0.536 J	*< 0.500*	2.47 J	*< 0.500 J*	1	1	2.8	2.8	2.8	28	28	0.300	60.5	868
Magnesium	µg/L	13,800	10,900	4,530	4,990	4,750	5,870	10,100	10,500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	µg/L	*< 0.067*	*< 0.0670*	*< 0.0670*	*< 0.0670 J*	0.413 J	*< 0.0670*	*< 0.0670*	*< 0.0670*	1	1	0.31	0.31	0.31	9	9	0.160	5.14	41.1
Silver	µg/L	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	1	1	1.8	1.8	1.8	17	17	1.30	9.08	35.9
Zinc	µg/L	19.8 J	4.24 J	21.3	4.60 J	4.94 J	*< 3.30*	40.8 J	9.50 J	1	1	5,660	5,660	5,660	26	26	9.70	3,628	49,900
Metals, Dissolved																			
Arsenic	µg/L	3.13 J	7.31	9.67	3.88 J	3.88 J	5.42	2.25 J	2.54 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	µg/L	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	µg/L	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	µg/L	154,000	182,000	114,000	63,800	61,900	98,200	111,000	113,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	µg/L	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	*< 3.00*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	µg/L	1.89 J	1.79 J	1.76 J	0.697 J	0.411 J	0.534 J	1.17 J	1.96 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	µg/L	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500*	*< 0.500 J*	1.29 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	µg/L	15,000	11,400	4,390	4,810	4,860	5,870	10,200	11,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	µg/L	*< 0.067*	*< 0.0670*	*< 0.0670*	0.0980 J	0.409 J	*< 0.0670*	*< 0.0670*	*< 0.0670*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	µg/L	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	*< 0.300*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	µg/L	10.4 J	*< 3.30*	15.2 J	*< 3.30*	3.48 J	*< 3.30*	7.84 J	20.8 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
FD = Field duplicate sample.
NS = No sample.
NA = Not analyzed or not applicable, compound not historically analyzed
µg/L = micrograms per liter.
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.

Table 5d
Surface Water Analytical Summary - SW-13
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID	SW-13	SW-13	SW-13	SW-13	SW-13	SW-13	SW-13	SW-13	SW-13	SW-13	SW-13	SW-13
	Sample Date	8-Jul-14	8-Jul-14	4-Nov-14	4-Nov-14	28-May-15	28-May-15	4-Nov-15	4-Nov-15	3-May-16	3-May-16	1-Nov-16	1-May-17
	Sample Type		FD		FD		FD		FD		FD		
Metals, Total													
Arsenic	µg/L	13.9	13.2	2.76 J	2.96 J	*< 1.7*	*< 1.7*	5.34	4.67 J	*< 1.70*	*< 1.70*	2.63 J	*< 2*
Beryllium	µg/L	0.619	0.325 J	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	0.421 J	*< 0.2*
Cadmium	µg/L	0.706 J	0.567 J	0.123 J	0.128 J	*< 0.110*	*< 0.110*	*< 0.110*	*< 0.110*	*< 0.110*	*< 0.110*	3.56	*< 0.3*
Calcium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	µg/L	14.2	6.54 J	*< 2.00*	*< 2.00*	*< 2.00*	*< 2.00*	2.04 J	2.26 J	*< 2.00*	*< 2.00*	3.09 J	*< 3*
Copper	µg/L	38.9	19.1	5.16	7.27	1.14	1.29	6.20	6.15	1.27	2.77	14.2	1.49 J
Lead	µg/L	90.1	47.6	2.44	7.84	1.21 J	1.77 J	9.35	10.3	3.10	2.52	35.3	1.8 J
Magnesium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	µg/L	0.165 J	0.113 J	*< 0.067*	*< 0.067*	*< 0.067*	*< 0.067*	*< 0.067*	*< 0.067*	*< 0.0670*	*< 0.067*	0.285	*NA*
Silver	µg/L	0.429 J	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.200*	*< 0.100*	*< 0.100*	*< 0.200*	*< 0.200*	*< 0.400*	0.413 J
Zinc	µg/L	218	130	47.6	52.5	12.9	14.8	33.7	34.6	9.90 J	19.5	1,450	35.2 J
Metals, Dissolved													
Arsenic	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
FD = Field duplicate sample.
NA = Not analyzed or not applicable, compound not historically analyzed
µg/L = micrograms per liter.
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.

Table 5d
Surface Water Analytical Summary - SW-13
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	SW-13 31-Oct-17	SW-13 2-May-18	SW-13 9-Jan-19	SW-13 16-May-19	SW-13 30-Oct-19	SW-13 13-May-20	SW-13 6-May-21	SW-13 14-Oct-21	SW-13 28-Apr-22	SW-13 13-Oct-22
Metals, Total											
Arsenic	µg/L	< 2	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	2.80 J	< 2.00	< 2.00	< 2.00
Beryllium	µg/L	< 0.2	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	0.239 J	< 0.200	< 0.200	< 0.200
Cadmium	µg/L	< 0.3	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300
Calcium	µg/L	NA	NA	NA	1,270	2,260	2,200	6,250	2,510	1,620	3,350
Chromium	µg/L	< 3	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00
Copper	µg/L	3.55	0.731 J	2.02	0.460 J	0.966 J	2.31	3.88	1.19 J	0.586 J	1.22 J
Lead	µg/L	5.63	0.883 J	< 0.500	< 0.500	0.824 J	2.87	19.8	1.32 J	< 0.500	2.84
Magnesium	µg/L	NA	NA	NA	424	957	1,240	1,440	1,070	611	1,230
Mercury	µg/L	< 0.067	0.076 J	< 0.067	< 0.067	< 0.067	< 0.0670	< 0.0670	0.101 J	< 0.0670	< 0.0670
Silver	µg/L	< 0.3	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300
Zinc	µg/L	49.4	14.9	4.51 J	4.40 J	13.8 J	19.6 J	22.0	12.1 J	6.30 J	16.3 J
Metals, Dissolved											
Arsenic	µg/L	NA	NA	2.18 J	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
Beryllium	µg/L	NA	NA	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200
Cadmium	µg/L	NA	NA	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300
Calcium	µg/L	NA	NA	NA	1,360	2,270	912	7,270	2,480	1,620	3,370
Chromium	µg/L	NA	NA	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00
Copper	µg/L	NA	NA	2.66	1.49 J	1.06 J	0.706 J	0.814 J	0.719 J	0.586 J	1.14 J
Lead	µg/L	NA	NA	< 0.500	< 0.500	0.787 J	0.563 J	1.15 J	0.830 J	< 0.500	2.84
Magnesium	µg/L	NA	NA	NA	436	945	371	1,030	1,090	611	1,250
Mercury	µg/L	NA	NA	< 0.067	< 0.067	< 0.067	< 0.0670	< 0.0670	0.119 J	< 0.0670	< 0.0670
Silver	µg/L	NA	NA	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300
Zinc	µg/L	NA	NA	5.10 J	6.14 J	13.3 J	6.36 J	9.66 J	12.4 J	6.30 J	16.4 J

Notes:
FD = Field duplicate sample.
NA = Not analyzed or not applicable, compound not historically analyzed
µg/L = micrograms per liter.
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.

Table 5d
Surface Water Analytical Summary - SW-13
Shpack Landfill Superfund Site
Attleboro and Norton, Massachusetts

Analyte	Location ID / Sample Date / Sample Type	Historical Statistics for SW-13 No. of Analyses	No. of Detects	Min	Mean	Max	Historical Statistics for Site SW No. of Analyses	No. of Detects	Min	Mean	Max
Metals, Total											
Arsenic	µg/L	1	1	1.30	1.30	1.30	16	16	0.500	5.16	31.4
Beryllium	µg/L	0	0	NA	NA	NA	12	12	0.460	135	1,480
Cadmium	µg/L	0	0	NA	NA	NA	18	18	0.470	21.6	121
Calcium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	µg/L	1	1	3.00	3.00	3.00	23	23	0.570	661	13,300
Copper	µg/L	1	1	8.70	8.70	8.70	24	24	1.40	275	4,220
Lead	µg/L	1	1	3.30	3.30	3.30	28	28	0.300	60.5	868
Magnesium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	µg/L	0	0	NA	NA	NA	9	9	0.160	5.14	41.1
Silver	µg/L	1	1	1.50	1.50	1.50	17	17	1.30	9.08	35.9
Zinc	µg/L	1	1	34.7	34.7	34.7	26	26	9.70	3,628	49,900
Metals, Dissolved											
Arsenic	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
FD = Field duplicate sample.
NA = Not analyzed or not applicable, compound not historically analyzed
µg/L = micrograms per liter.
< = Compound not detected. Reportable detection limit shown.
J = Estimated value, see data validation report.

Table E-2: Surface Water Mann-Kendall Analysis from the April 2022 Inspection and Monitoring Report

Table 1
Descriptive Statistics
SHPACK-ATTLEBORO

Surface Water Location ID	Constituent Name	Units	Number of Data Points	Number of Detect Data Points	Number of Non-Detect Data Points	Percent Detects	Minimum Reporting Limit	Maximum Reporting Limit	Minimum Detection Limit	Median	Mean	Maximum Detection Limit	Standard Deviation	Coefficient of Variation	Distribution
SW-12R	Arsenic, Dissolved	ug/L	7	7	0	100.00%			3.13	7.31	7.294	12.8	3.437	47.12%	Normal
SW-12R	Arsenic, Total	ug/L	7	7	0	100.00%			4.06	9.06	8.806	13.4	3.546	40.27%	Normal
SW-12R	Beryllium, Dissolved	ug/L	7	0	7	0.00%	0.2	0.2		0.1	0.1		0	0.00%	NDD
SW-12R	Beryllium, Total	ug/L	7	0	7	0.00%	0.2	0.2		0.1	0.1		0	0.00%	NDD
SW-12R	Cadmium, Dissolved	ug/L	7	0	7	0.00%	0.3	0.3		0.15	0.15		0	0.00%	NDD
SW-12R	Cadmium, Total	ug/L	7	0	7	0.00%	0.3	0.3		0.15	0.15		0	0.00%	NDD
SW-12R	Calcium, Dissolved	ug/L	6	6	0	100.00%			63800	117500	122200	182000	41580	34.03%	Normal
SW-12R	Calcium, Total	ug/L	6	6	0	100.00%			66100	123000	123900	185000	41320	33.35%	Normal
SW-12R	Chromium, Dissolved	ug/L	7	0	7	0.00%	3	3		1.5	1.5		0	0.00%	NDD
SW-12R	Chromium, Total	ug/L	7	1	6	14.29%	3	3	5.09	1.5	2.013	5.09	1.357	67.41%	NDD
SW-12R	Copper, Dissolved	ug/L	7	7	0	100.00%			0.534	1.76	1.536	2.69	0.7417	48.29%	Normal
SW-12R	Copper, Total	ug/L	7	7	0	100.00%			0.455	1.93	2.256	4.53	1.29	57.17%	Normal
SW-12R	Lead, Dissolved	ug/L	7	1	6	14.29%	0.5	0.5	0.637	0.25	0.3053	0.637	0.1463	47.91%	NDD
SW-12R	Lead, Total	ug/L	7	7	0	100.00%			0.569	2.99	2.915	8.05	2.59	88.84%	Normal
SW-12R	Magnesium, Dissolved	ug/L	6	6	0	100.00%			4390	6280	8027	15000	4243	52.86%	Normal
SW-12R	Magnesium, Total	ug/L	6	6	0	100.00%			4530	6265	7792	13800	3730	47.87%	Normal
SW-12R	Mercury, Dissolved	ug/L	7	1	6	14.29%	0.067	0.067	0.098	0.0335	0.04271	0.098	0.02438	57.07%	NDD
SW-12R	Mercury, Total	ug/L	7	0	7	0.00%	0.067	0.067		0.0335	0.0335		0	0.00%	NDD
SW-12R	Silver, Dissolved	ug/L	7	0	7	0.00%	0.3	0.3		0.15	0.15		0	0.00%	NDD
SW-12R	Silver, Total	ug/L	7	0	7	0.00%	0.3	0.3		0.15	0.15		0	0.00%	NDD
SW-12R	Zinc, Dissolved	ug/L	7	3	4	42.86%	3.3	3.3	10	1.65	6.029	15.2	5.711	94.73%	NDD
SW-12R	Zinc, Total	ug/L	7	7	0	100.00%			4.24	10.7	13.68	27.9	9.31	68.06%	Normal
SW-13	Calcium, Total	ug/L	6	6	0	100.00%			1270	2230	2683	6250	1806	67.32%	Lognormal
SW-13	Chromium, Dissolved	ug/L	7	0	7	0.00%	3	3		1.5	1.5		0	0.00%	NDD
SW-13	Chromium, Total	ug/L	7	0	7	0.00%	3	3		1.5	1.5		0	0.00%	NDD
SW-13	Copper, Dissolved	ug/L	7	7	0	100.00%			0.586	0.814	1.148	2.66	0.7323	63.80%	Lognormal
SW-13	Copper, Total	ug/L	7	7	0	100.00%			0.46	1.19	1.682	3.88	1.164	69.20%	Normal
SW-13	Lead, Dissolved	ug/L	7	4	3	57.14%	0.5	0.5	0.563	0.563	0.5829	1.15	0.3552	60.95%	Normal
SW-13	Lead, Total	ug/L	7	4	3	57.14%	0.5	0.5	0.824	0.824	3.652	19.8	7.182	196.67%	Lognormal
SW-13	Magnesium, Dissolved	ug/L	6	6	0	100.00%			371	778	747.2	1090	314.2	42.05%	Normal
SW-13	Magnesium, Total	ug/L	6	6	0	100.00%			424	1013.5	951.3	1440	388.4	40.83%	Normal
SW-13	Mercury, Dissolved	ug/L	7	1	6	14.29%	0.067	0.067	0.119	0.0335	0.04571	0.119	0.03232	70.69%	NDD
SW-13	Mercury, Total	ug/L	7	1	6	14.29%	0.067	0.067	0.101	0.0335	0.04314	0.101	0.02551	59.14%	NDD
SW-13	Silver, Dissolved	ug/L	7	0	7	0.00%	0.3	0.3		0.15	0.15		0	0.00%	NDD
SW-13	Silver, Total	ug/L	7	0	7	0.00%	0.3	0.3		0.15	0.15		0	0.00%	NDD
SW-13	Zinc, Dissolved	ug/L	7	7	0	100.00%			5.1	6.36	8.466	13.3	3.32	39.22%	Normal
SW-13	Zinc, Total	ug/L	7	7	0	100.00%			4.4	12.1	11.67	22	7.298	62.55%	Normal

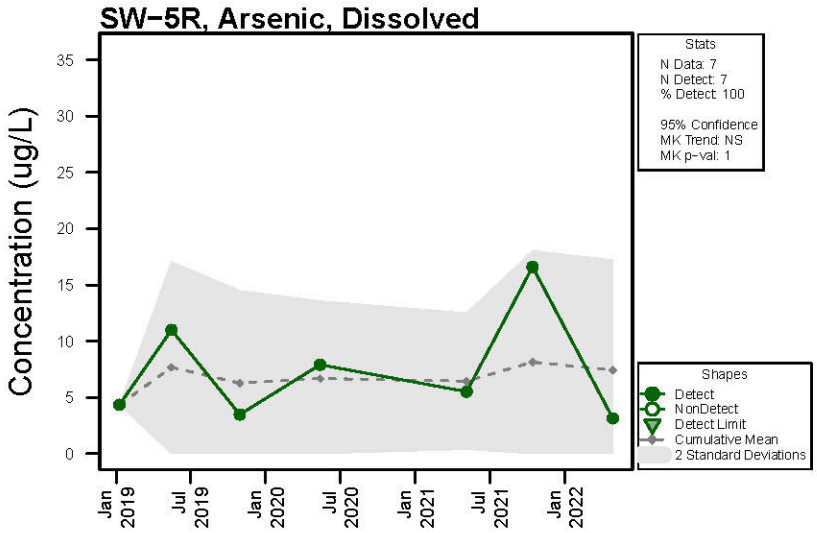
Notes
Data date range: 2019-01-09 to 2022-04-28
Non-detects were substituted with a value of half the reporting limit for calculations
Normal: the data fit a normal distribution
Lognormal: the data fit a lognormal distribution
NDD: No discernible distribution

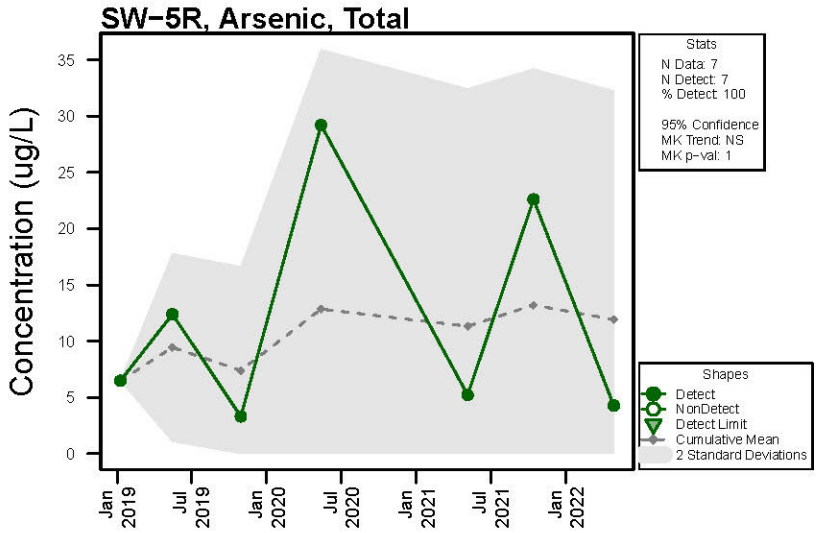
Source: Tables 1 and 2 and graphs from the April 2022 Inspection and Monitoring Report.

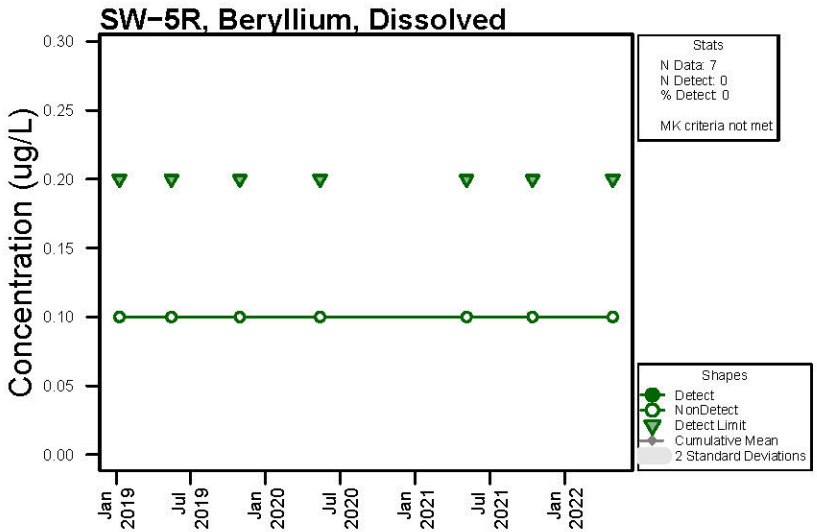
Table 2
Mann Kendall Test for Trends
SHPACK-ATTLEBORO

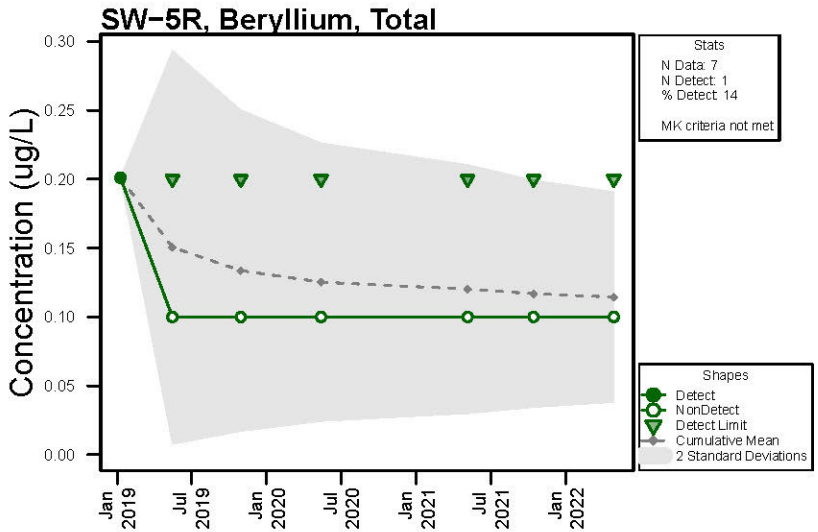
Surface Water Location ID	Constituent Name	Number of Data Points	Number of Detect Data Points	Percent Detects	Meet Data Requirements	p-value	tau2	tau	Trend
SW-5R	Arsenic, Dissolved	7	7	100.00%	Yes	1	0.00227	-0.0476	Stable
SW-5R	Arsenic, Total	7	7	100.00%	Yes	1	0.00227	-0.0476	Stable
SW-5R	Beryllium, Dissolved	7	0	0.00%	No				
SW-5R	Beryllium, Total	7	1	14.29%	No				
SW-5R	Cadmium, Dissolved	7	0	0.00%	No				
SW-5R	Cadmium, Total	7	1	14.29%	No				
SW-5R	Calcium, Dissolved	6	6	100.00%	Yes	1	0.00444	0.0667	Stable
SW-5R	Calcium, Total	6	6	100.00%	Yes	1	0.00444	0.0667	Stable
SW-5R	Chromium, Dissolved	7	0	0.00%	No				
SW-5R	Chromium, Total	7	2	28.57%	No				
SW-5R	Copper, Dissolved	7	7	100.00%	Yes	0.136	0.274	-0.524	Stable
SW-5R	Copper, Total	7	7	100.00%	Yes	0.773	0.0204	-0.143	Stable
SW-5R	Lead, Dissolved	7	1	14.29%	No				
SW-5R	Lead, Total	7	6	85.71%	Yes	0.773	0.0204	-0.143	Stable
SW-5R	Magnesium, Dissolved	6	6	100.00%	Yes	0.719	0.04	-0.2	Stable
SW-5R	Magnesium, Total	6	6	100.00%	Yes	0.719	0.04	-0.2	Stable
SW-5R	Mercury, Dissolved	7	0	0.00%	No				
SW-5R	Mercury, Total	7	0	0.00%	No				
SW-5R	Silver, Dissolved	7	0	0.00%	No				
SW-5R	Silver, Total	7	0	0.00%	No				
SW-5R	Zinc, Dissolved	7	6	85.71%	Yes	0.239	0.184	-0.429	Stable
SW-5R	Zinc, Total	7	7	100.00%	Yes	1	0.00227	-0.0476	Stable
SW-06	Arsenic, Dissolved	7	4	57.14%	No				
SW-06	Arsenic, Total	7	6	85.71%	Yes	0.136	0.274	0.524	Stable
SW-06	Beryllium, Dissolved	7	0	0.00%	No				
SW-06	Beryllium, Total	7	3	42.86%	No				
SW-06	Cadmium, Dissolved	7	1	14.29%	No				
SW-06	Cadmium, Total	7	3	42.86%	No				
SW-06	Calcium, Dissolved	6	6	100.00%	Yes	1	0.00444	0.0667	Stable
SW-06	Calcium, Total	6	6	100.00%	Yes	0.469	0.111	0.333	Stable
SW-06	Chromium, Dissolved	7	0	0.00%	No				
SW-06	Chromium, Total	7	1	14.29%	No				
SW-06	Copper, Dissolved	7	5	71.43%	Yes	0.0334	0.467	-0.683	Decreasing
SW-06	Copper, Total	7	7	100.00%	Yes	1	0.00227	0.0476	Stable
SW-06	Lead, Dissolved	7	1	14.29%	No				
SW-06	Lead, Total	7	4	57.14%	No				
SW-06	Magnesium, Dissolved	6	6	100.00%	Yes	0.469	0.111	0.333	Stable
SW-06	Magnesium, Total	6	6	100.00%	Yes	0.272	0.218	0.467	Stable
SW-06	Mercury, Dissolved	7	0	0.00%	No				
SW-06	Mercury, Total	7	1	14.29%	No				
SW-06	Silver, Dissolved	7	0	0.00%	No				
SW-06	Silver, Total	7	1	14.29%	No				
SW-06	Zinc, Dissolved	7	4	57.14%	No				
SW-06	Zinc, Total	7	7	100.00%	Yes	0.381	0.111	0.333	Stable
SW-12R	Arsenic, Dissolved	7	7	100.00%	Yes	0.381	0.111	-0.333	Stable
SW-12R	Arsenic, Total	7	7	100.00%	Yes	0.381	0.111	-0.333	Stable
SW-12R	Beryllium, Dissolved	7	0	0.00%	No				
SW-12R	Beryllium, Total	7	0	0.00%	No				
SW-12R	Cadmium, Dissolved	7	0	0.00%	No				
SW-12R	Cadmium, Total	7	0	0.00%	No				
SW-12R	Calcium, Dissolved	6	6	100.00%	Yes	0.272	0.218	-0.467	Stable
SW-12R	Calcium, Total	6	6	100.00%	Yes	0.272	0.218	-0.467	Stable
SW-12R	Chromium, Dissolved	7	0	0.00%	No				
SW-12R	Chromium, Total	7	1	14.29%	No				
SW-12R	Copper, Dissolved	7	7	100.00%	Yes	0.0302	0.51	-0.714	Decreasing
SW-12R	Copper, Total	7	7	100.00%	Yes	0.136	0.274	-0.524	Stable
SW-12R	Lead, Dissolved	7	1	14.29%	No				
SW-12R	Lead, Total	7	7	100.00%	Yes	0.381	0.111	-0.333	Stable
SW-12R	Magnesium, Dissolved	6	6	100.00%	Yes	0.469	0.111	-0.333	Stable
SW-12R	Magnesium, Total	6	6	100.00%	Yes	0.469	0.111	-0.333	Stable
SW-12R	Mercury, Dissolved	7	1	14.29%	No				
SW-12R	Mercury, Total	7	0	0.00%	No				
SW-12R	Silver, Dissolved	7	0	0.00%	No				
SW-12R	Silver, Total	7	0	0.00%	No				
SW-12R	Zinc, Dissolved	7	3	42.86%	No				
SW-12R	Zinc, Total	7	7	100.00%	Yes	0.562	0.0567	-0.238	Stable
SW-13	Arsenic, Dissolved	7	1	14.29%	No				
SW-13	Arsenic, Total	7	1	14.29%	No				
SW-13	Beryllium, Dissolved	7	0	0.00%	No				
SW-13	Beryllium, Total	7	1	14.29%	No				
SW-13	Cadmium, Dissolved	7	0	0.00%	No				
SW-13	Cadmium, Total	7	0	0.00%	No				
SW-13	Calcium, Dissolved	6	6	100.00%	Yes	0.719	0.04	0.2	Stable
SW-13	Calcium, Total	6	6	100.00%	Yes	0.719	0.04	0.2	Stable
SW-13	Chromium, Dissolved	7	0	0.00%	No				
SW-13	Chromium, Total	7	0	0.00%	No				
SW-13	Copper, Dissolved	7	7	100.00%	Yes	0.0107	0.655	-0.81	Decreasing
SW-13	Copper, Total	7	7	100.00%	Yes	1	0.00227	0.0476	Stable
SW-13	Lead, Dissolved	7	4	57.14%	No				
SW-13	Lead, Total	7	4	57.14%	No				
SW-13	Magnesium, Dissolved	6	6	100.00%	Yes	0.469	0.111	0.333	Stable
SW-13	Magnesium, Total	6	6	100.00%	Yes	0.719	0.04	0.2	Stable
SW-13	Mercury, Dissolved	7	1	14.29%	No				
SW-13	Mercury, Total	7	1	14.29%	No				
SW-13	Silver, Dissolved	7	0	0.00%	No				
SW-13	Silver, Total	7	0	0.00%	No				
SW-13	Zinc, Dissolved	7	7	100.00%	Yes	0.381	0.111	0.333	Stable
SW-13	Zinc, Total	7	7	100.00%	Yes	0.562	0.0567	0.238	Stable

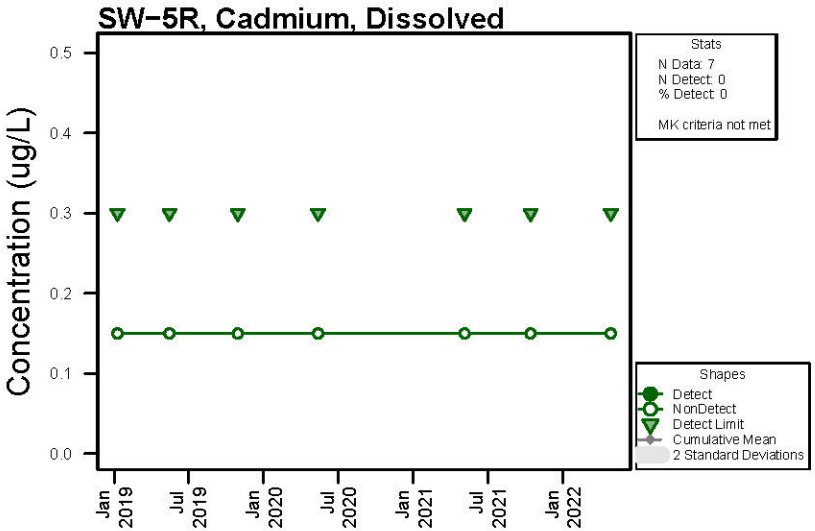
Notes
Data date range: 2019-01-09 to 2022-04-28
Non-detects were substituted with the lowest value of half the reporting limit value for trend analysis
Meet Data Requirements: trend tests were performed only if the dataset had >=5 detected values and >=50 percent detects.
p-value: A two-sided p-value describing the probability of the H0 being true (a=0.05)
tau2: tau^2, measure of linear model fit

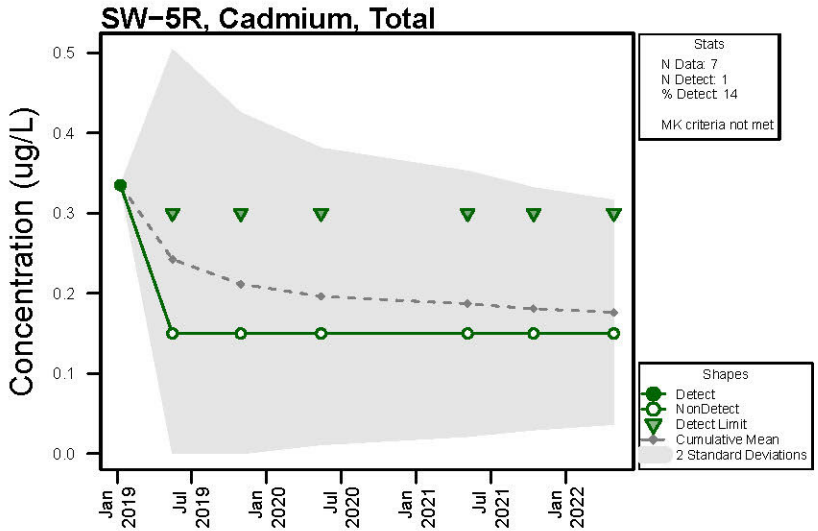

SW-5R, Arsenic, Dissolved
Concentration (ug/L)
0
5
10
15
20
25
30
35
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 1
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

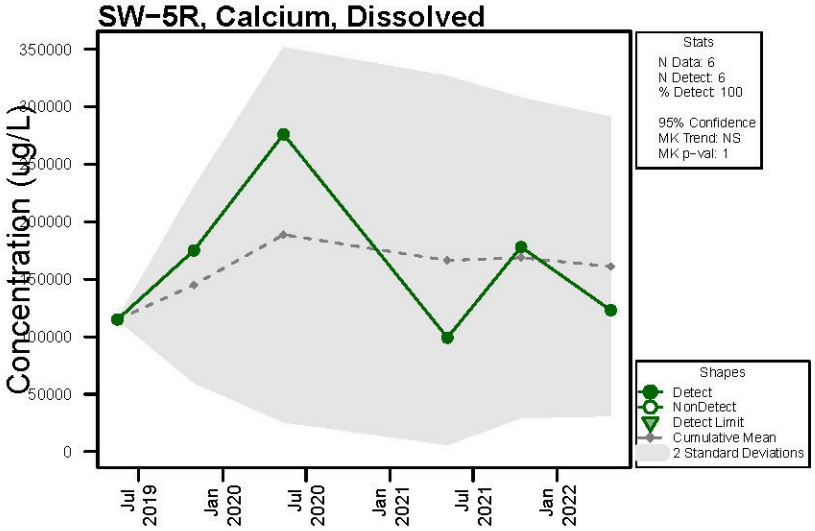

SW-5R, Arsenic, Total
Concentration (ug/L)
0
5
10
15
20
25
30
35
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 1
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

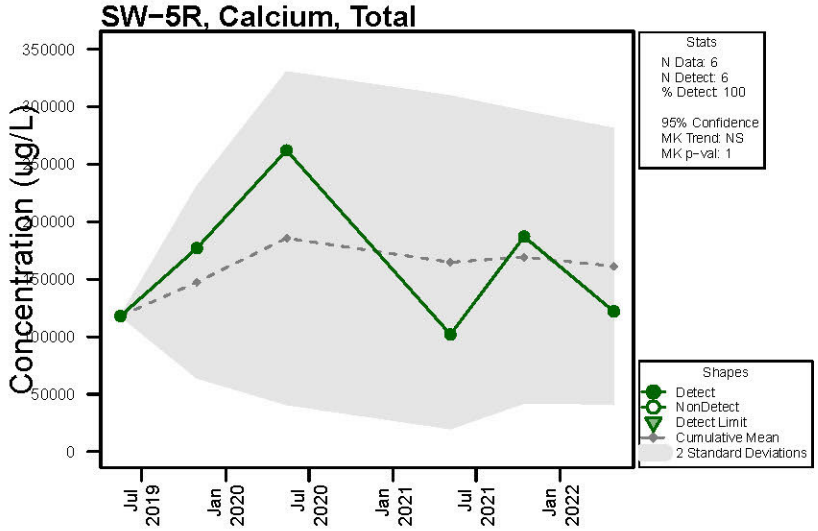

SW-5R, Beryllium, Dissolved
Concentration (ug/L)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

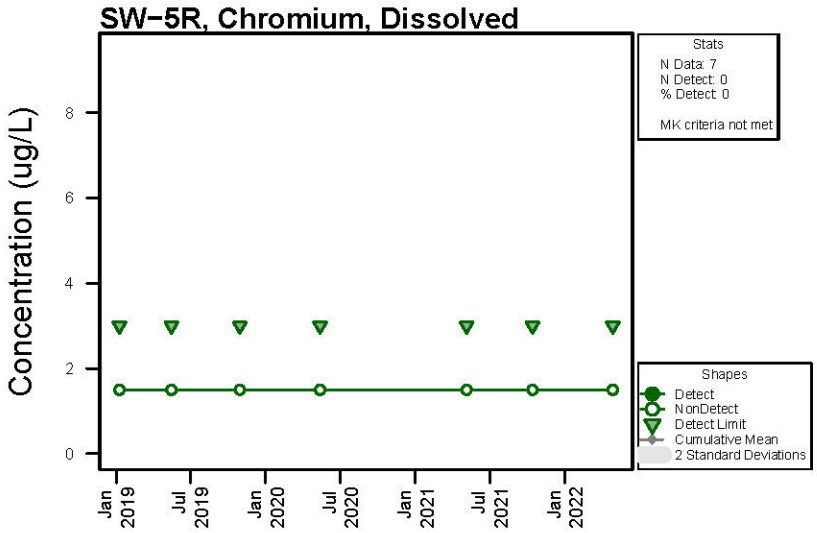

SW-5R, Beryllium, Total
Concentration (ug/L)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

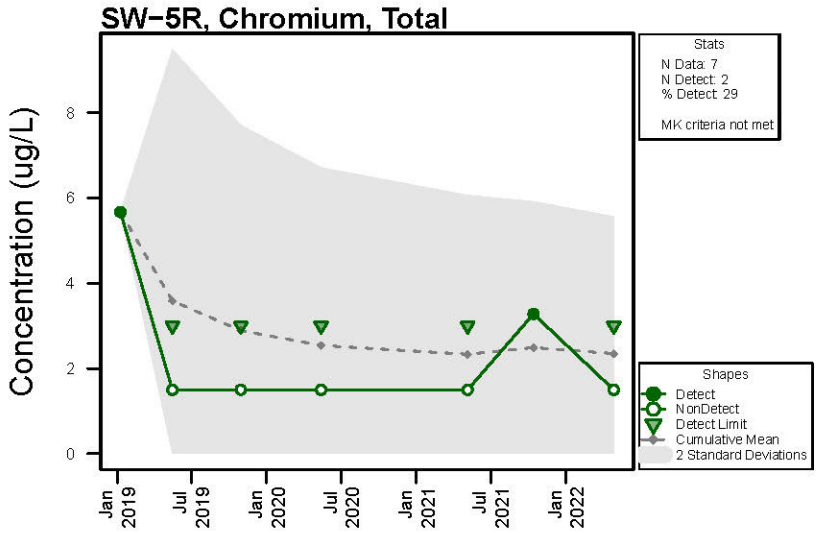

SW-5R, Cadmium, Dissolved
Concentration (ug/L)
0.0
0.1
0.2
0.3
0.4
0.5
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

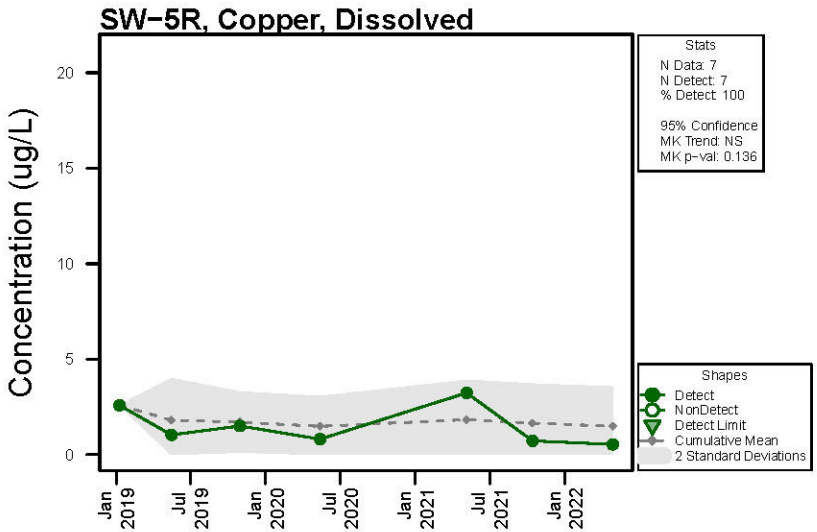

SW-5R, Cadmium, Total
Concentration (ug/L)
0.0
0.1
0.2
0.3
0.4
0.5
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

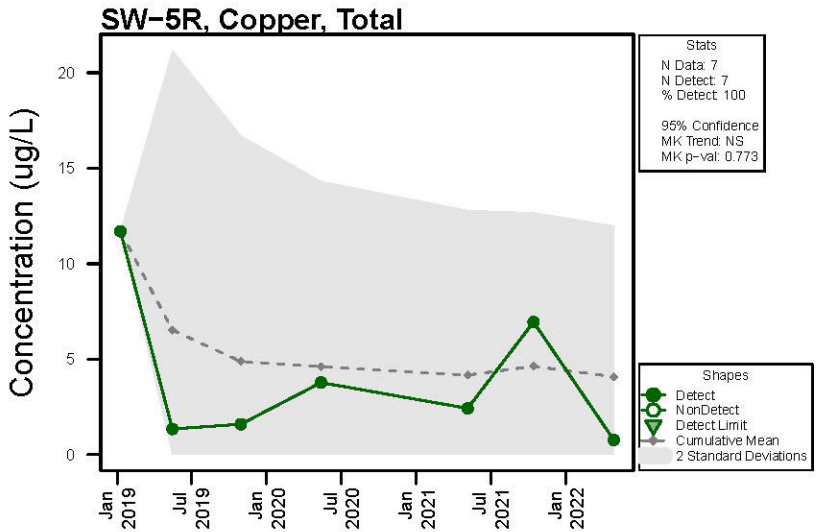

SW-5R, Calcium, Dissolved
Concentration (ug/L)
0
50000
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 1
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

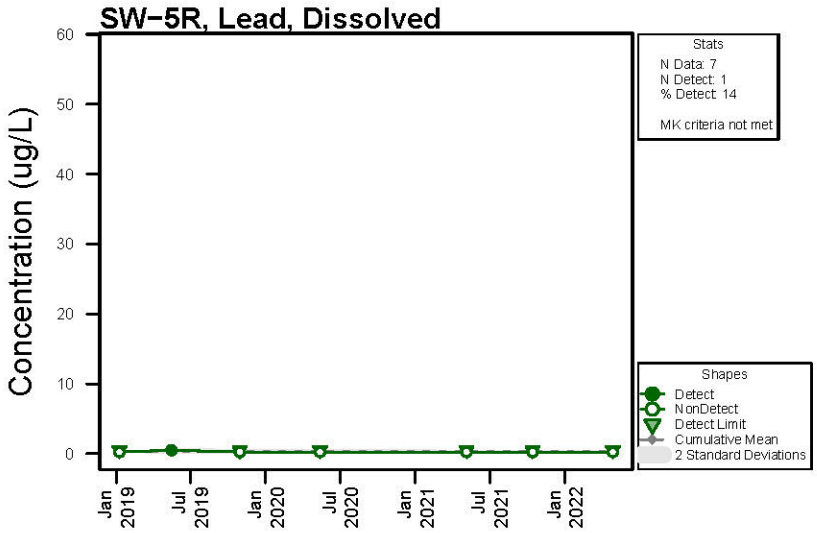

SW-5R, Calcium, Total
Concentration (ug/L)
0
50000
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 1
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

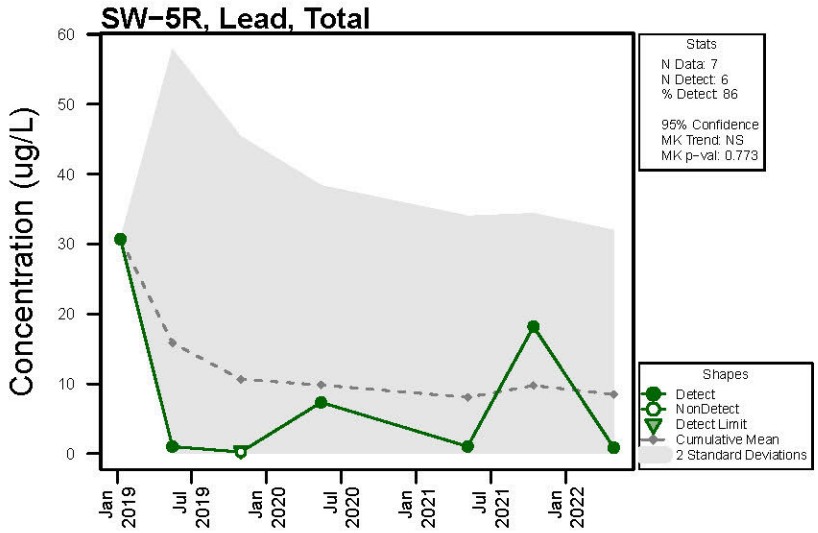

SW-5R, Chromium, Dissolved
Concentration (ug/L)
0
2
4
6
8
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

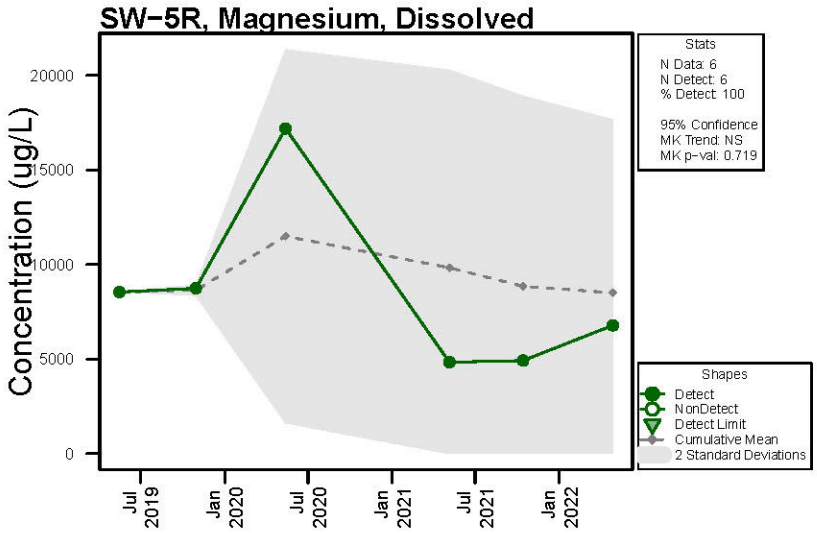

SW-5R, Chromium, Total
Concentration (ug/L)
0
2
4
6
8
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 2
% Detect: 29
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

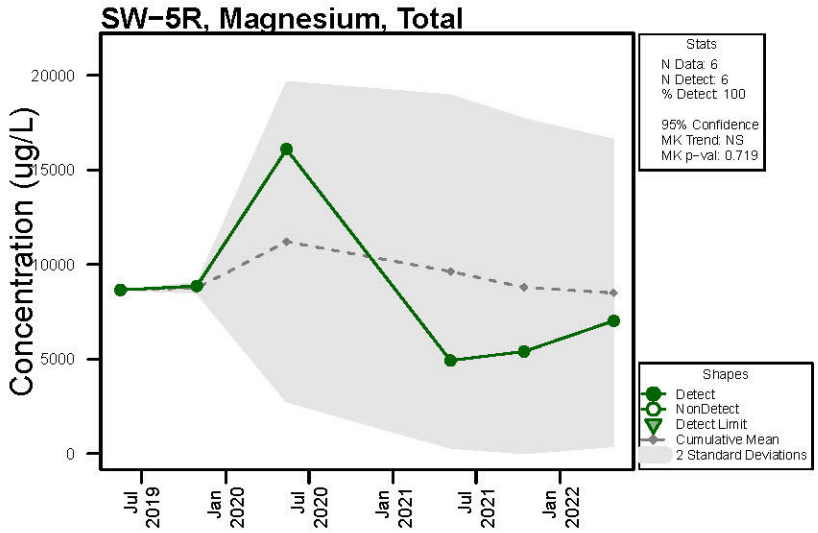

SW-5R, Copper, Dissolved
Concentration (ug/L)
0
5
10
15
20
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.136
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

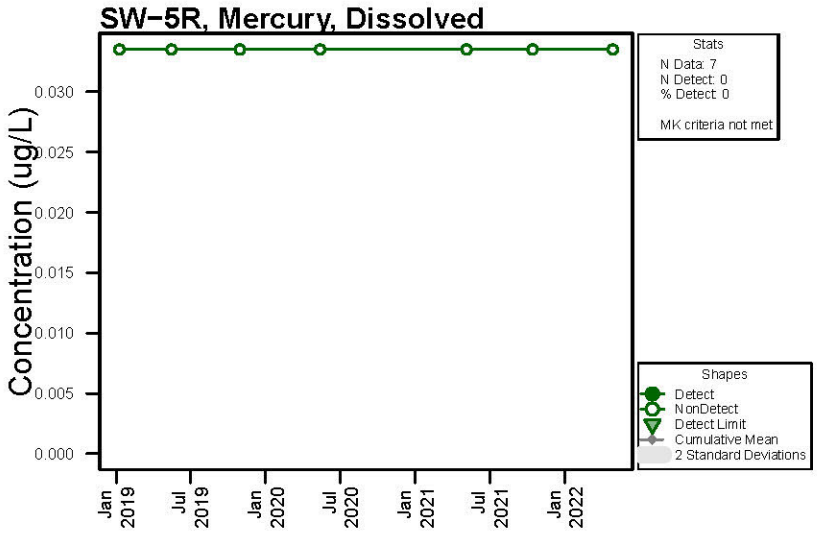

SW-5R, Copper, Total
Concentration (ug/L)
0
5
10
15
20
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.773
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

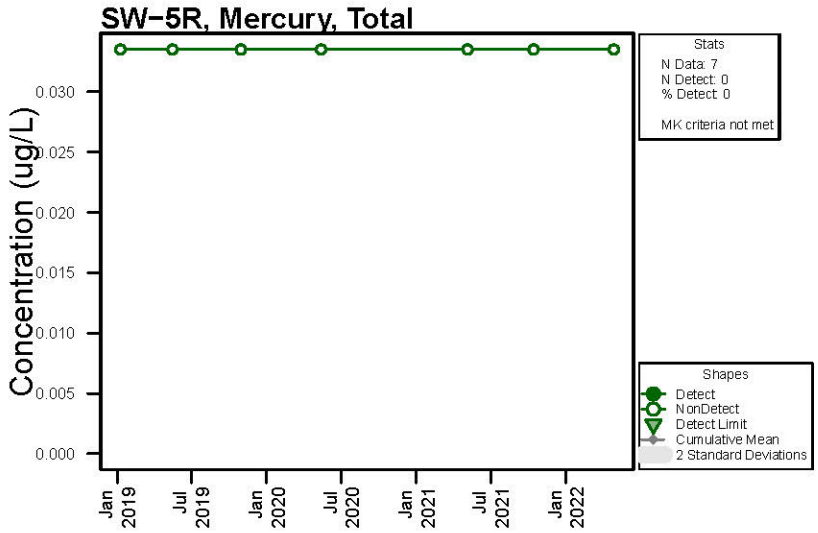

SW-5R, Lead, Dissolved
Concentration (ug/L)
0
10
20
30
40
50
60
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

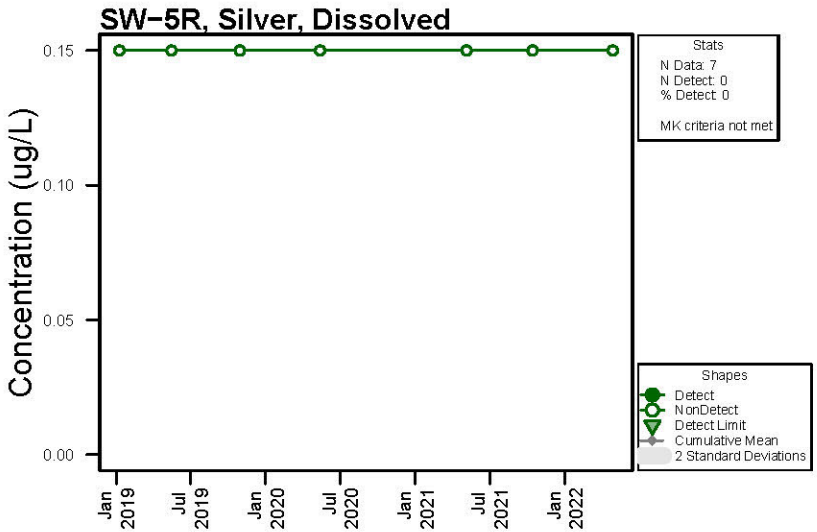

SW-5R, Lead, Total
Concentration (ug/L)
0
10
20
30
40
50
60
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 6
% Detect: 86
95% Confidence
MK Trend: NS
MK p-val: 0.773
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

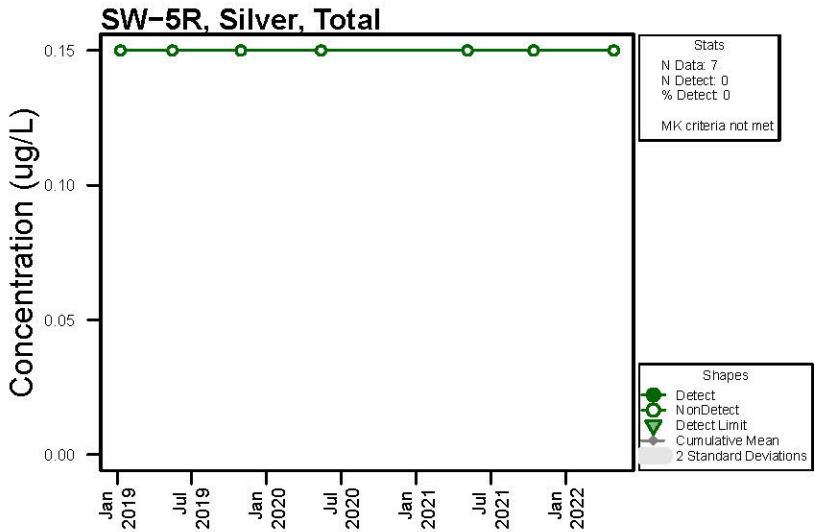

SW-5R, Magnesium, Dissolved
Concentration (ug/L)
0
5000
10000
15000
20000
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.719
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

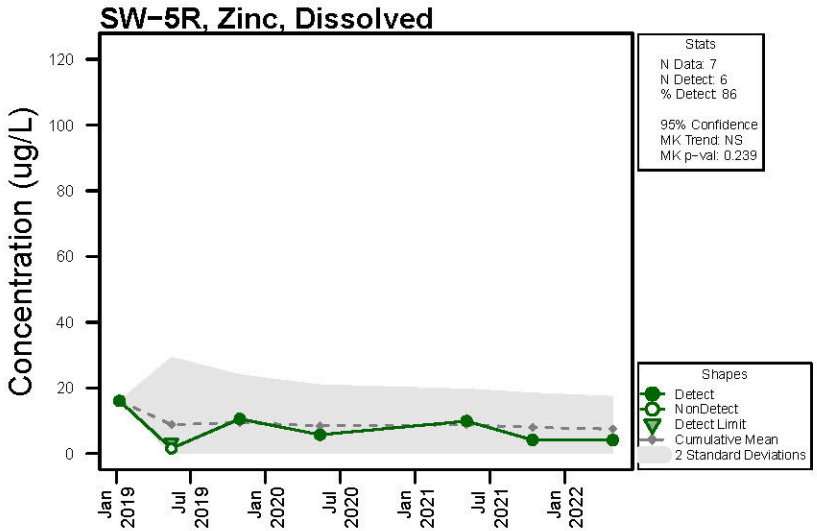

SW-5R, Magnesium, Total
Concentration (ug/L)
0
5000
10000
15000
20000
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.719
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

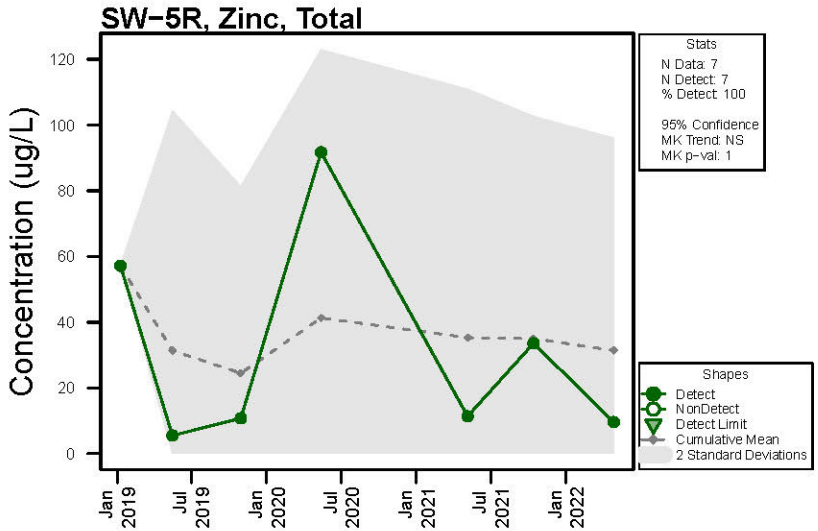

SW-5R, Mercury, Dissolved
Concentration (ug/L)
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

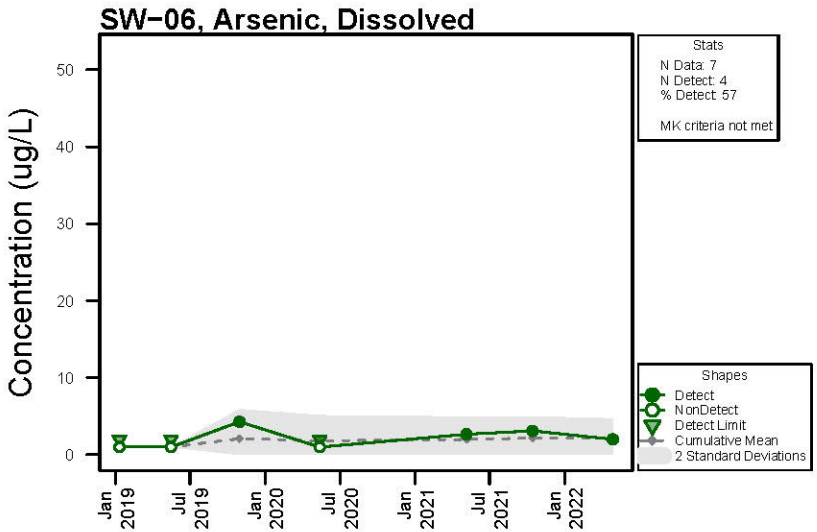

SW-5R, Mercury, Total
Concentration (ug/L)
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

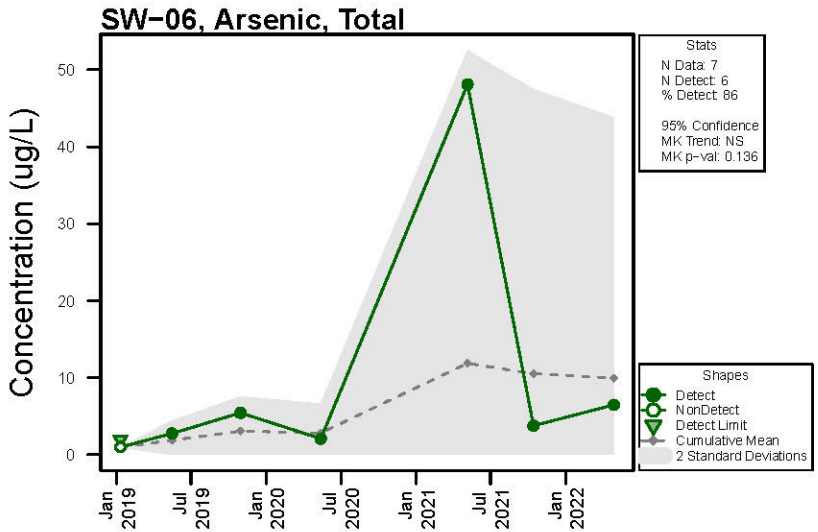

SW-5R, Silver, Dissolved
Concentration (ug/L)
0.15
0.10
0.05
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

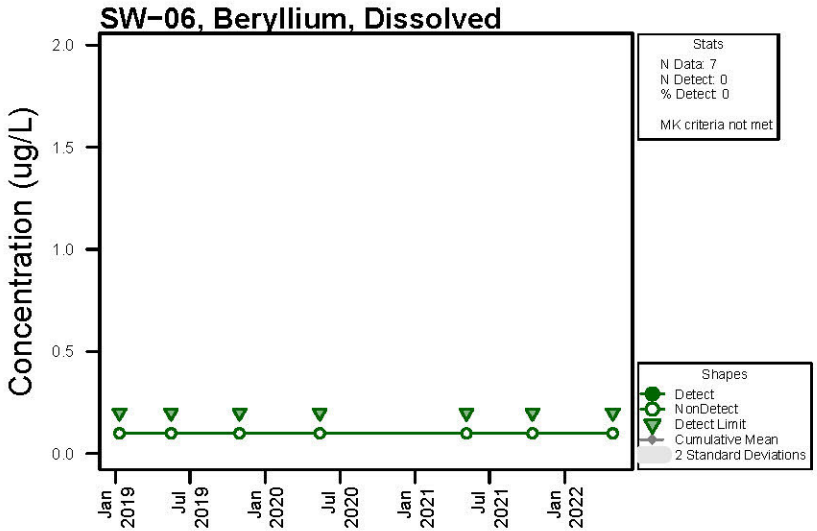

SW-5R, Silver, Total
Concentration (ug/L)
0.15
0.10
0.05
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

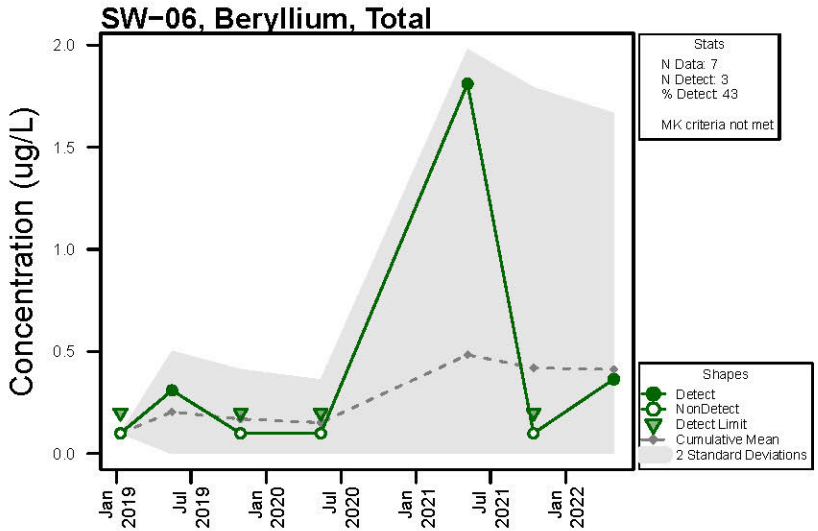

SW-5R, Zinc, Dissolved
Concentration (ug/L)
0
20
40
60
80
100
120
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 6
% Detect: 86
95% Confidence
MK Trend: NS
MK p-val: 0.239
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

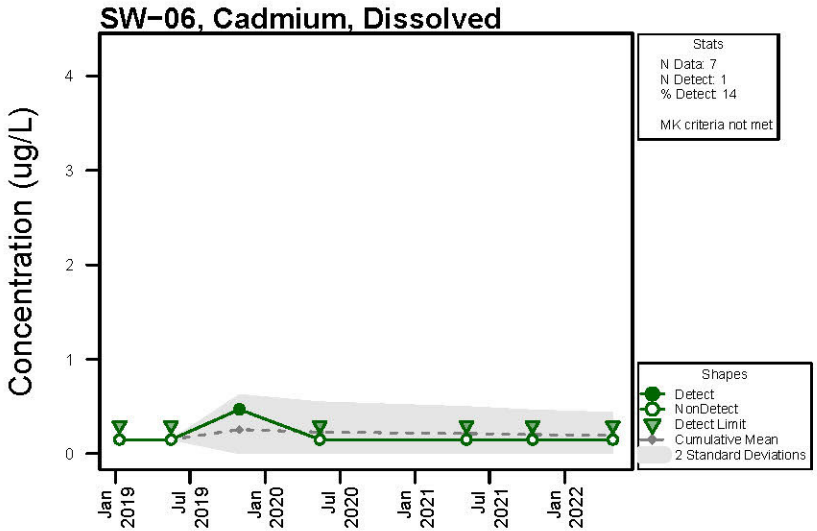

SW-5R, Zinc, Total
Concentration (ug/L)
0
20
40
60
80
100
120
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 1
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

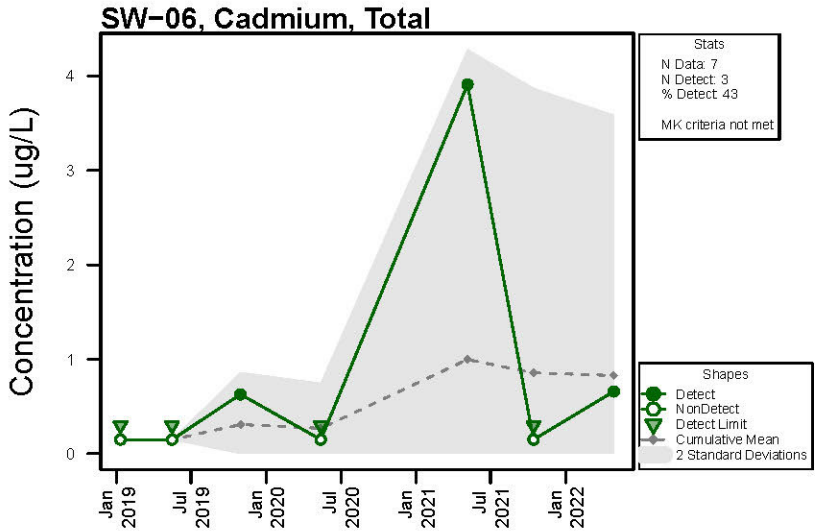

SW-06, Arsenic, Dissolved
Concentration (ug/L)
0
10
20
30
40
50
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 4
% Detect: 57
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

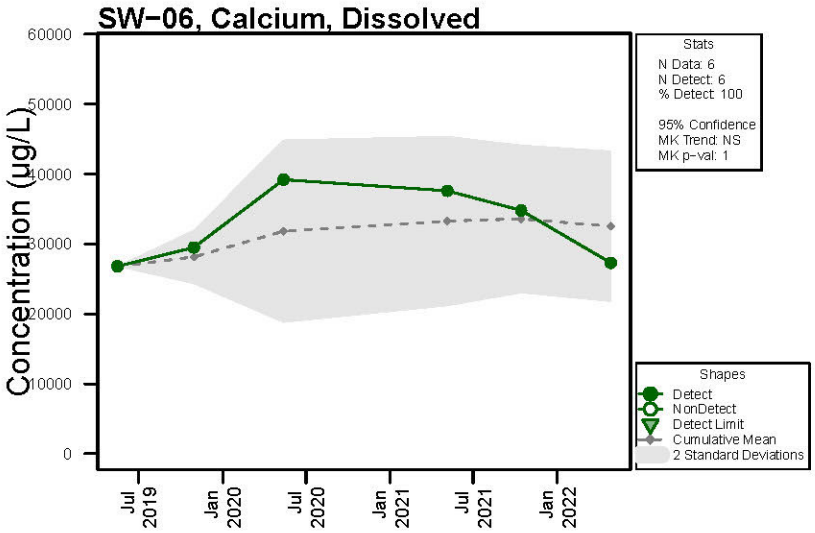

SW-06, Arsenic, Total
Concentration (ug/L)
0
10
20
30
40
50
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 6
% Detect: 86
95% Confidence
MK Trend: NS
MK p-val: 0.136
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

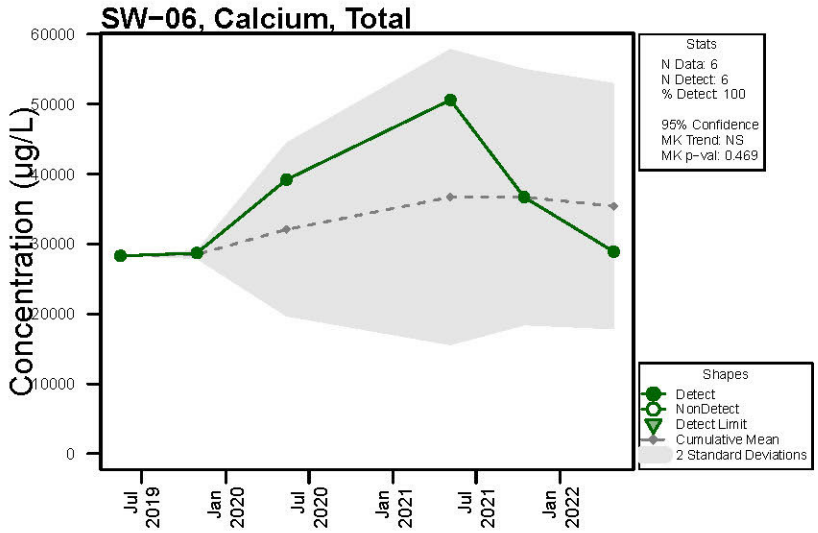

SW-06, Beryllium, Dissolved
Concentration (ug/L)
2.0
1.5
1.0
0.5
0.0
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

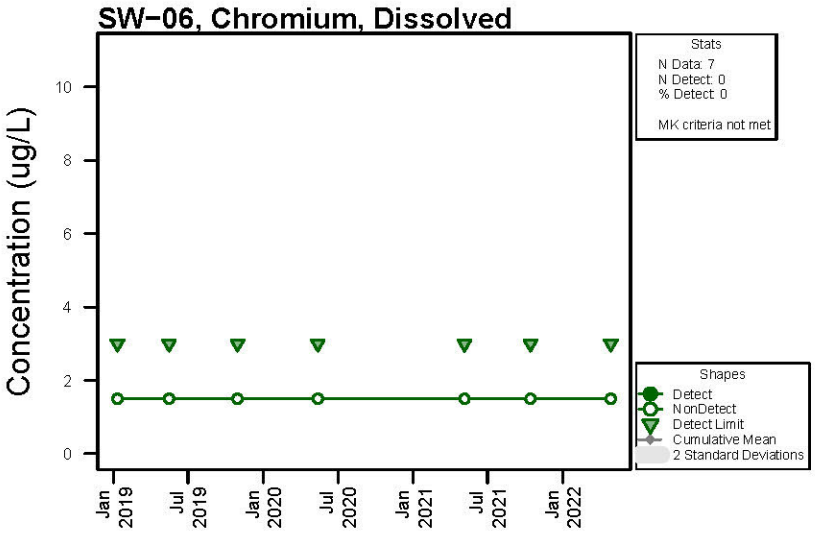

SW-06, Beryllium, Total
Concentration (ug/L)
2.0
1.5
1.0
0.5
0.0
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 3
% Detect: 43
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

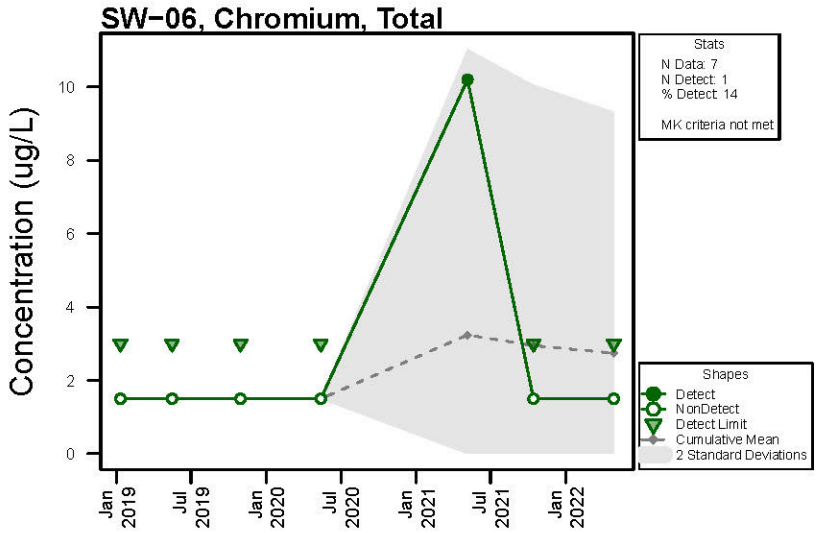

SW-06, Cadmium, Dissolved
Concentration (ug/L)
4
3
2
1
0
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

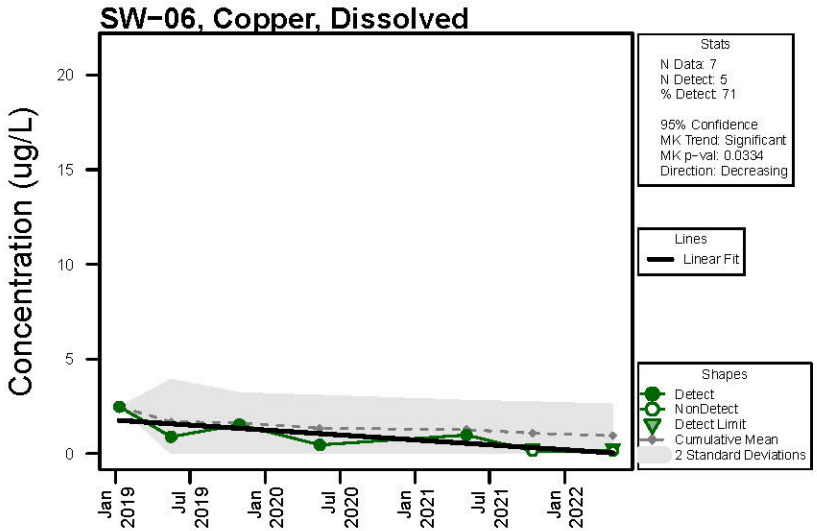

SW-06, Cadmium, Total
Concentration (ug/L)
4
3
2
1
0
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 3
% Detect: 43
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

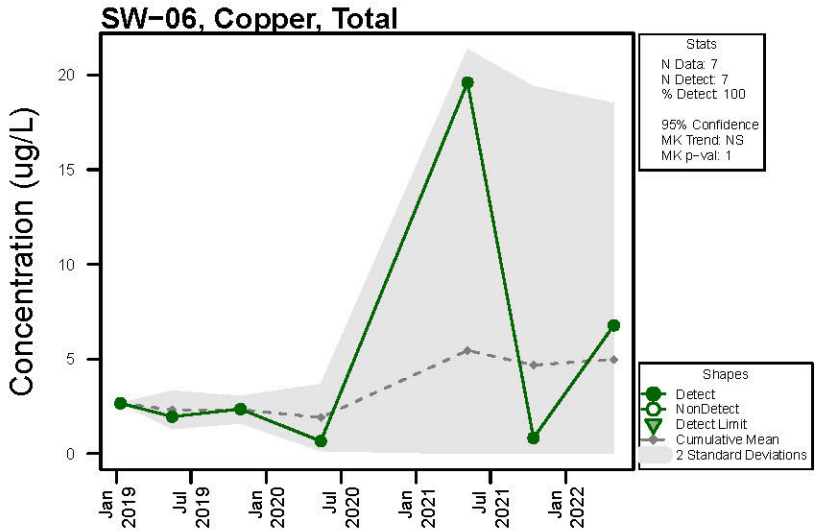

SW-06, Calcium, Dissolved
Concentration (ug/L)
60000
50000
40000
30000
20000
10000
0
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 1
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

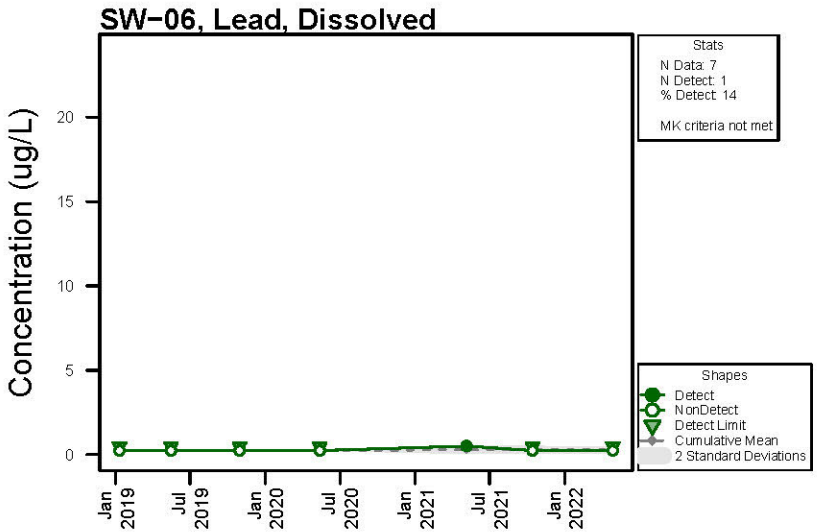

SW-06, Calcium, Total
Concentration (ug/L)
60000
50000
40000
30000
20000
10000
0
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.469
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

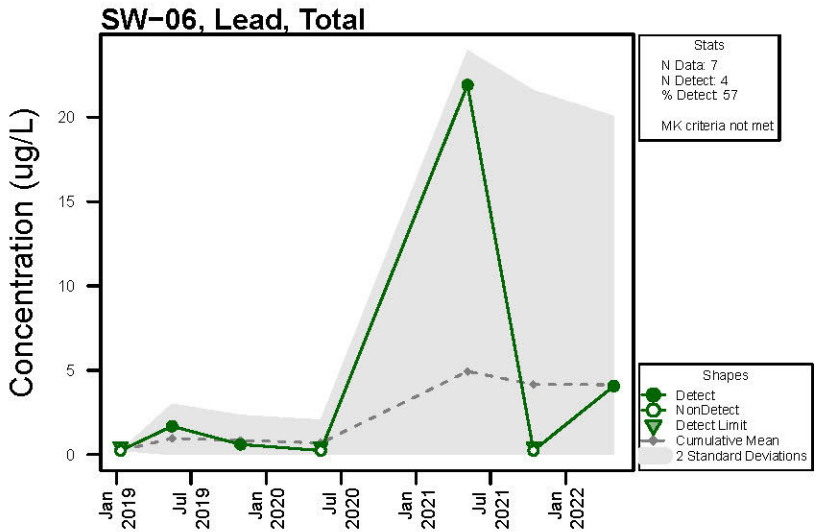

SW-06, Chromium, Dissolved
Concentration (ug/L)
10
8
6
4
2
0
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

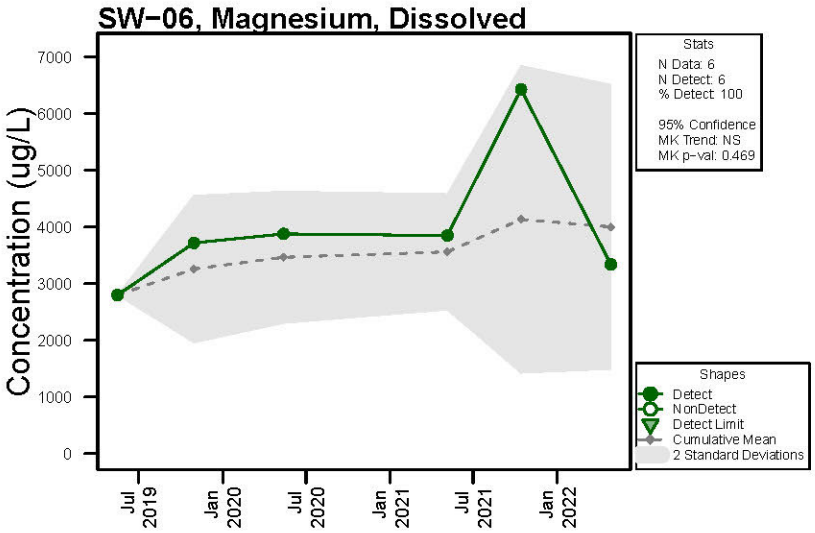

SW-06, Chromium, Total
Concentration (ug/L)
10
8
6
4
2
0
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

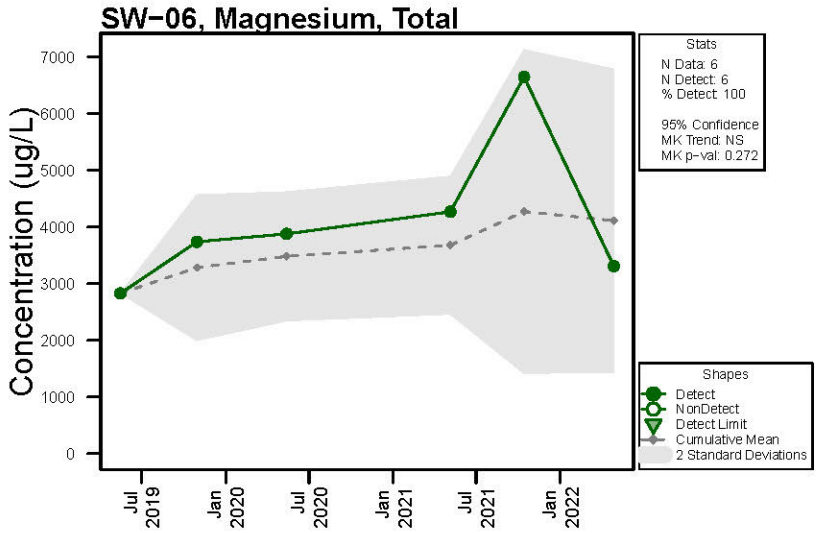

SW-06, Copper, Dissolved
Concentration (ug/L)
0
5
10
15
20
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 5
% Detect: 71
95% Confidence
MK Trend: Significant
MK p-val: 0.0334
Direction: Decreasing
Lines
Linear Fit
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

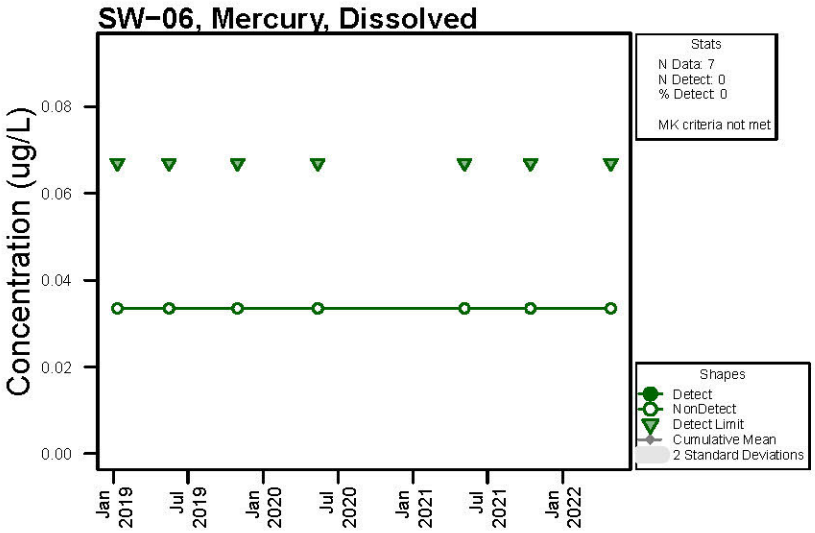

SW-06, Copper, Total
Concentration (ug/L)
0
5
10
15
20
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 1
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

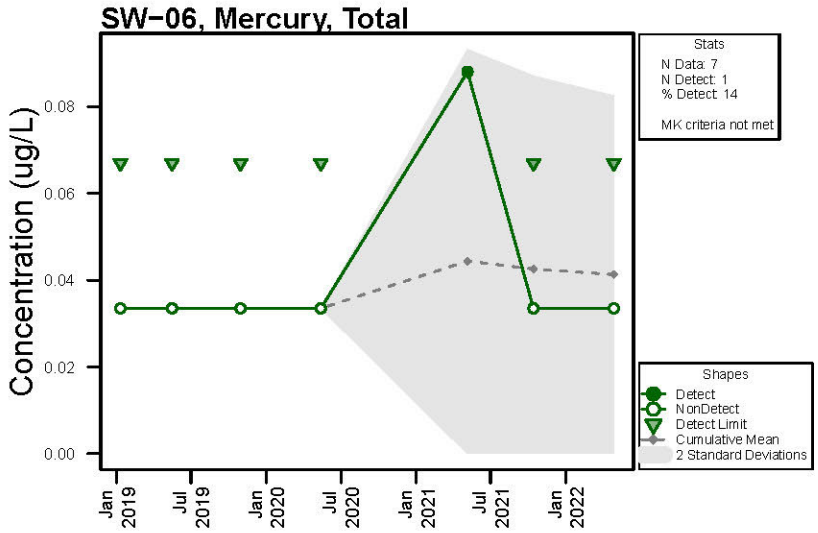

SW-06, Lead, Dissolved
Concentration (ug/L)
0
5
10
15
20
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

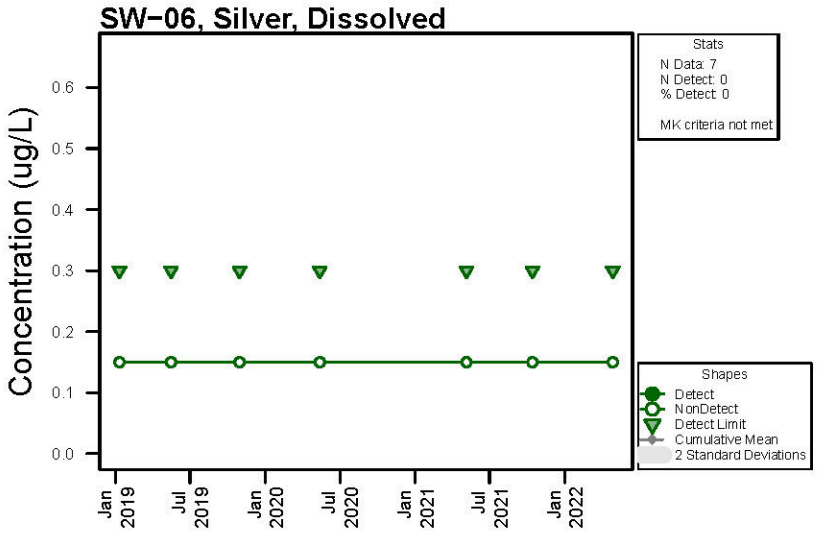

SW-06, Lead, Total
Concentration (ug/L)
0
5
10
15
20
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 4
% Detect: 57
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

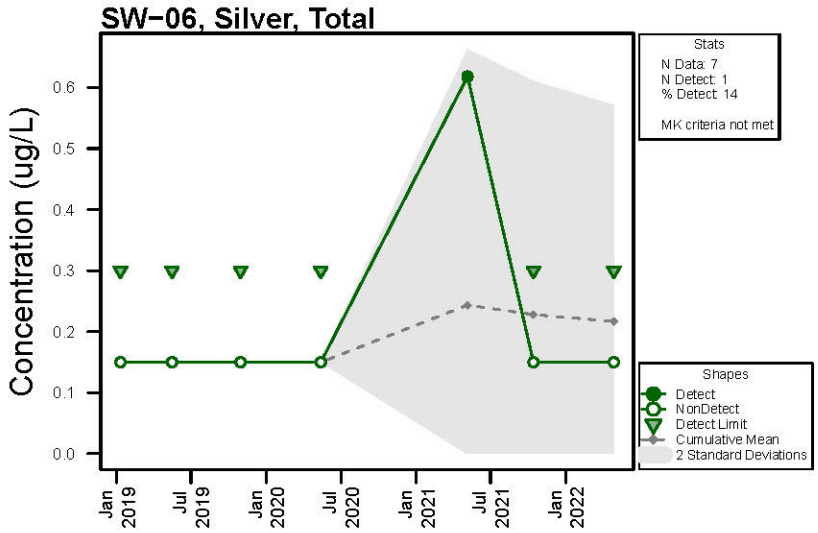

SW-06, Magnesium, Dissolved
Concentration (ug/L)
7000
6000
5000
4000
3000
2000
1000
0
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.469
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

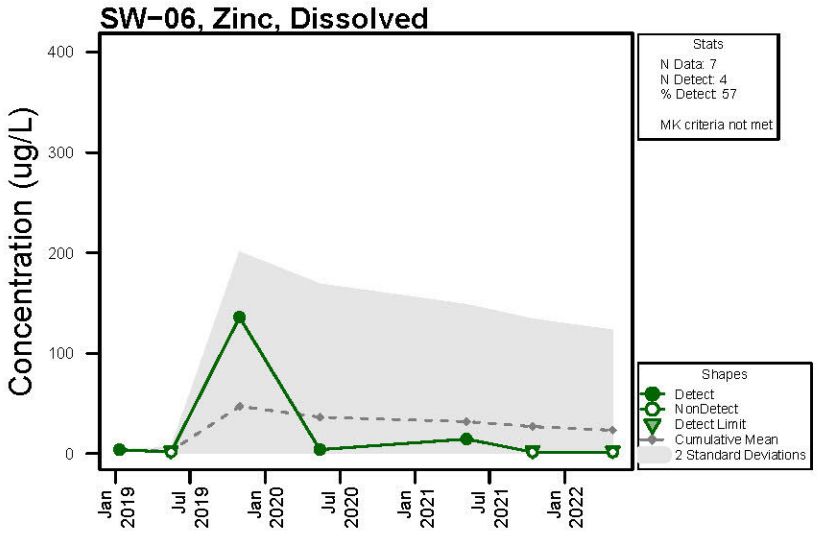

SW-06, Magnesium, Total
Concentration (ug/L)
7000
6000
5000
4000
3000
2000
1000
0
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.272
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

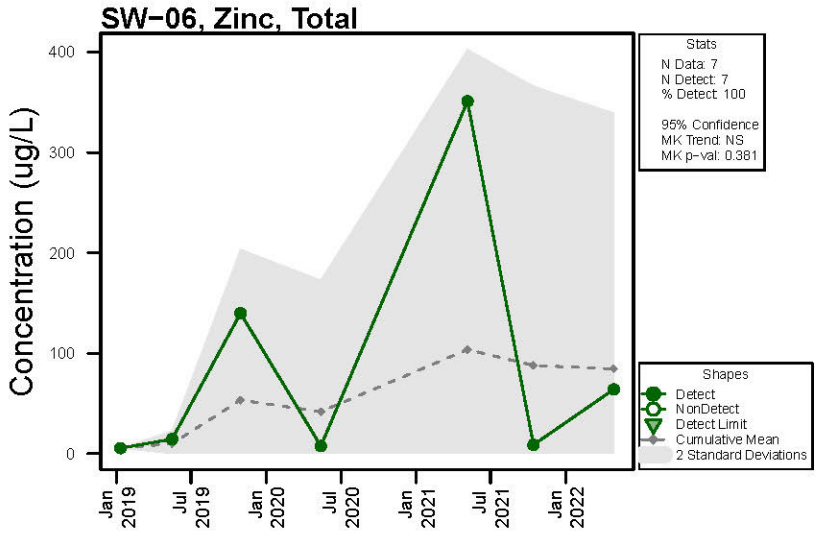

SW-06, Mercury, Dissolved
Concentration (ug/L)
0.08
0.06
0.04
0.02
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

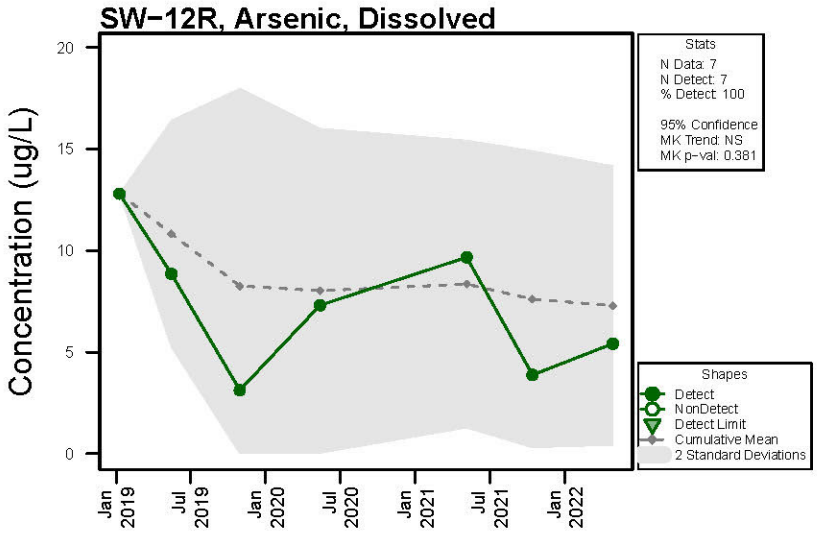

SW-06, Mercury, Total
Concentration (ug/L)
0.08
0.06
0.04
0.02
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

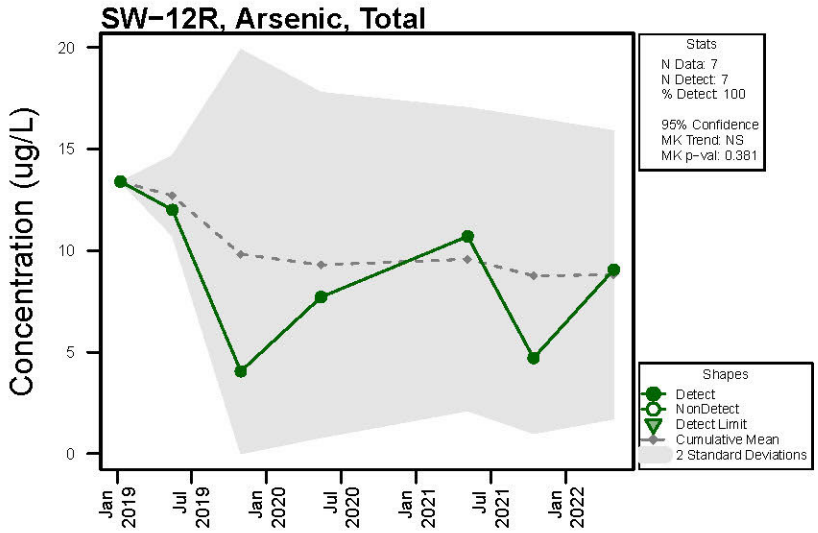

SW-06, Silver, Dissolved
Concentration (ug/L)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

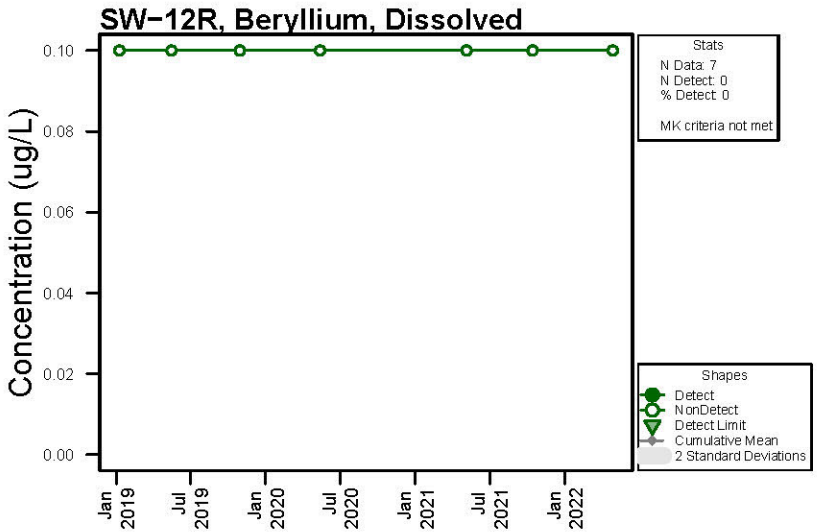

SW-06, Silver, Total
Concentration (ug/L)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

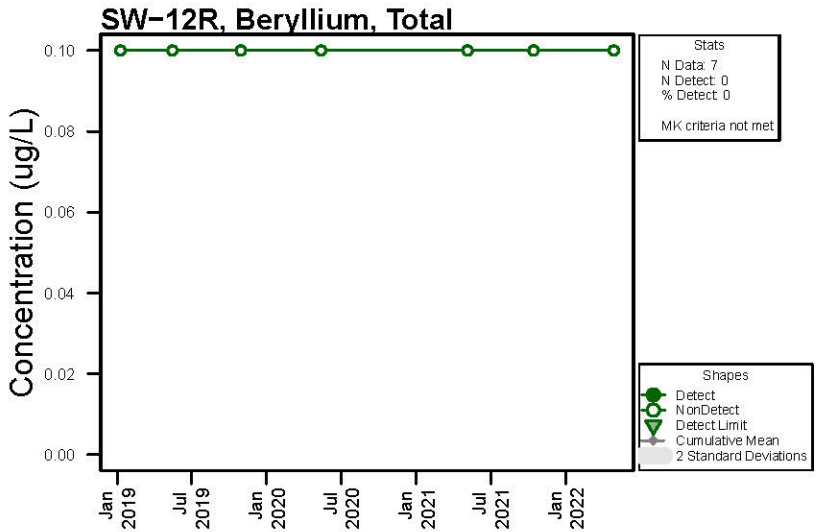

SW-06, Zinc, Dissolved
Concentration (ug/L)
0
100
200
300
400
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 4
% Detect: 57
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

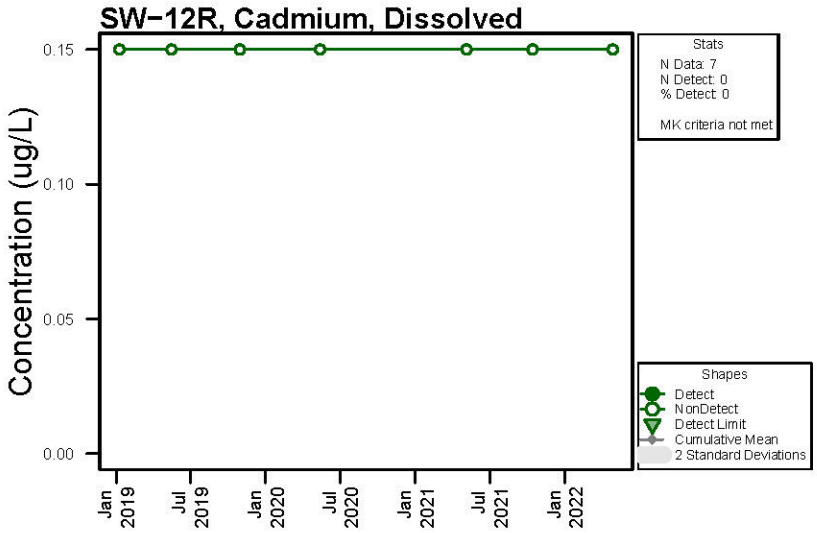

SW-06, Zinc, Total
Concentration (ug/L)
0
100
200
300
400
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.381
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

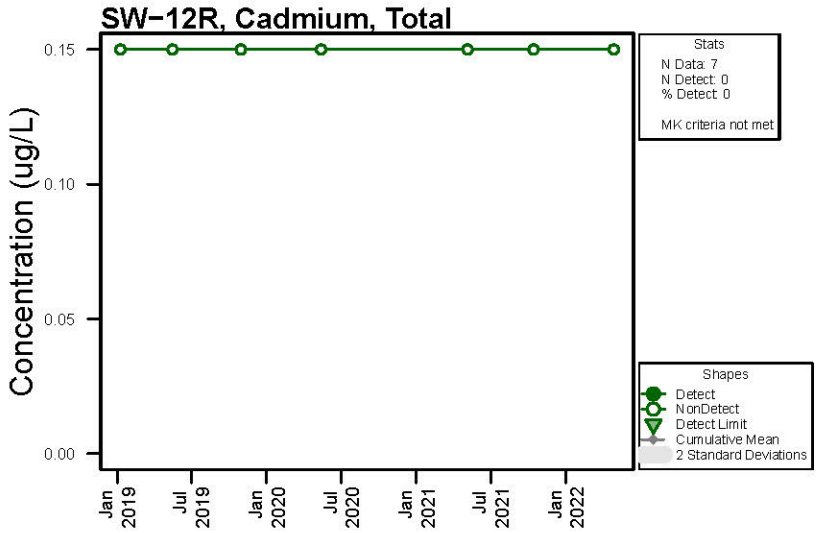

SW-12R, Arsenic, Dissolved
Concentration (ug/L)
20
15
10
5
0
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.381
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

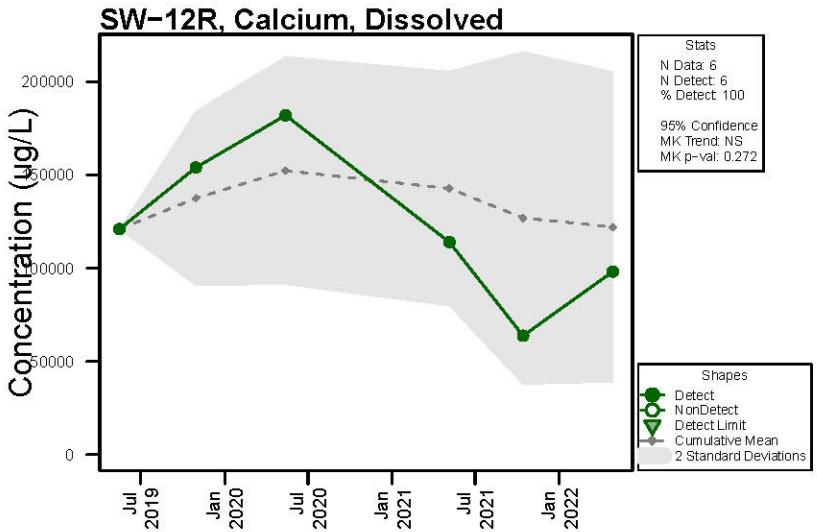

SW-12R, Arsenic, Total
Concentration (ug/L)
20
15
10
5
0
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.381
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

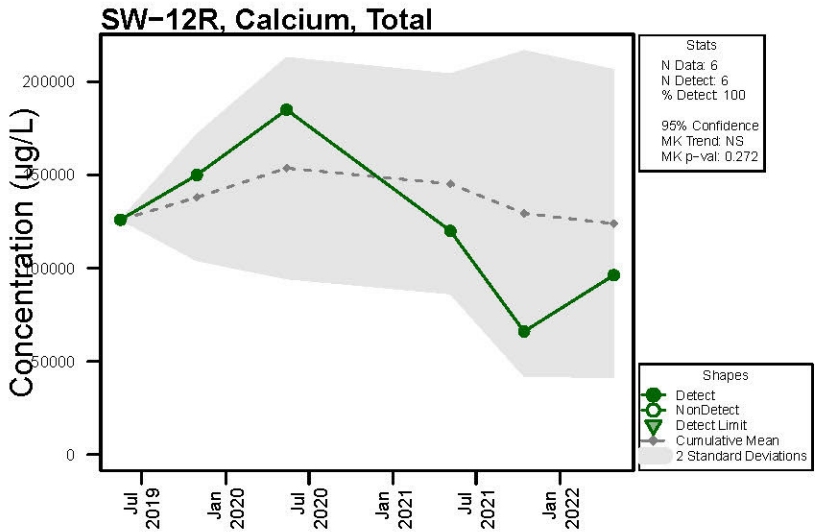

SW-12R, Beryllium, Dissolved
Concentration (ug/L)
0.10
0.08
0.06
0.04
0.02
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

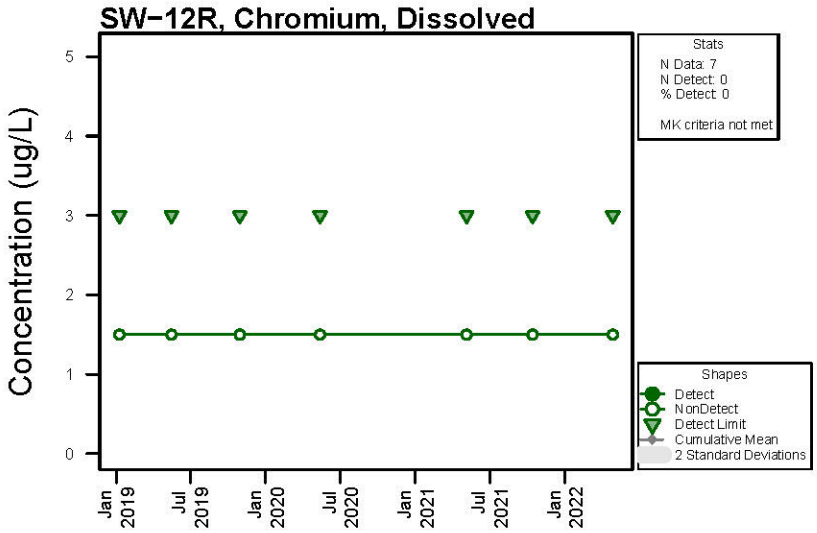

SW-12R, Beryllium, Total
Concentration (ug/L)
0.10
0.08
0.06
0.04
0.02
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

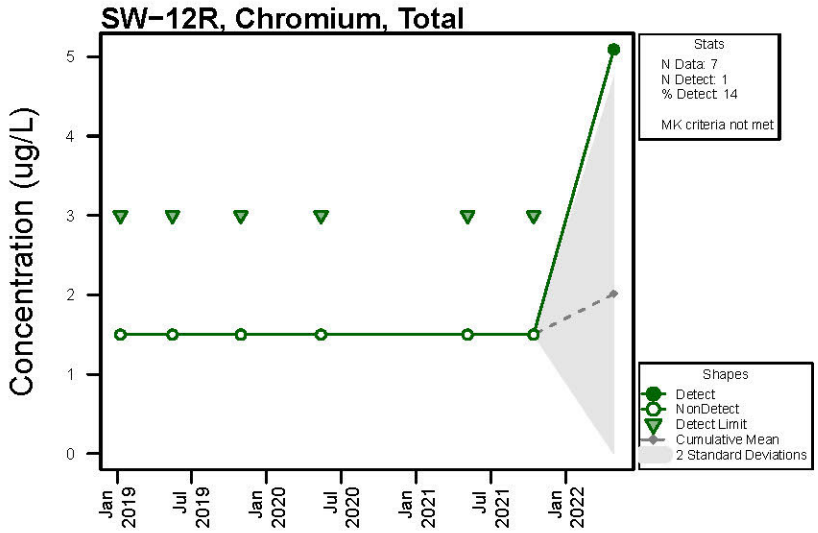

SW-12R, Cadmium, Dissolved
Concentration (ug/L)
0.15
0.10
0.05
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

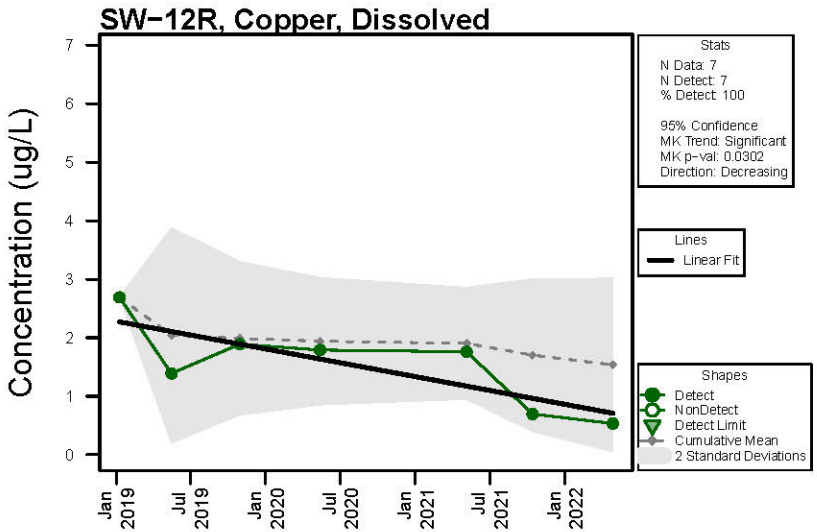

SW-12R, Cadmium, Total
Concentration (ug/L)
0.15
0.10
0.05
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

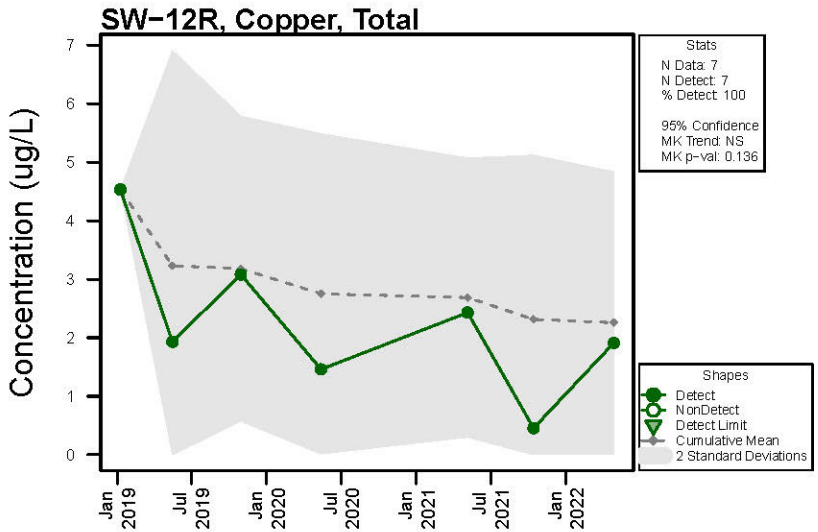

SW-12R, Calcium, Dissolved
Concentration (ug/L)
200000
0
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.272
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

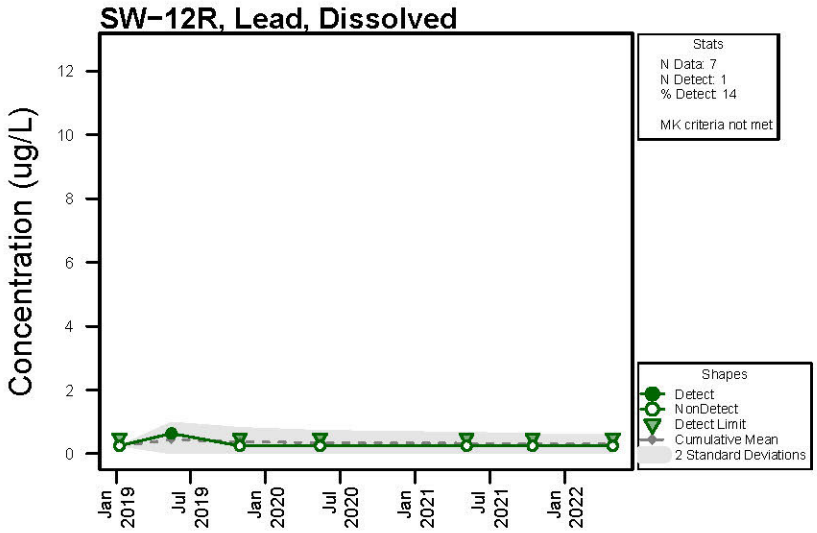

SW-12R, Calcium, Total
Concentration (ug/L)
200000
0
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.272
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

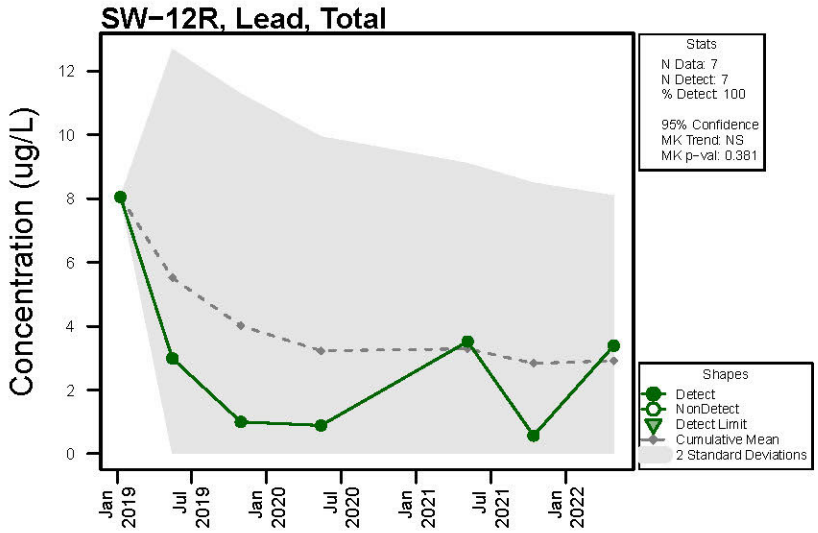

SW-12R, Chromium, Dissolved
Concentration (ug/L)
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022

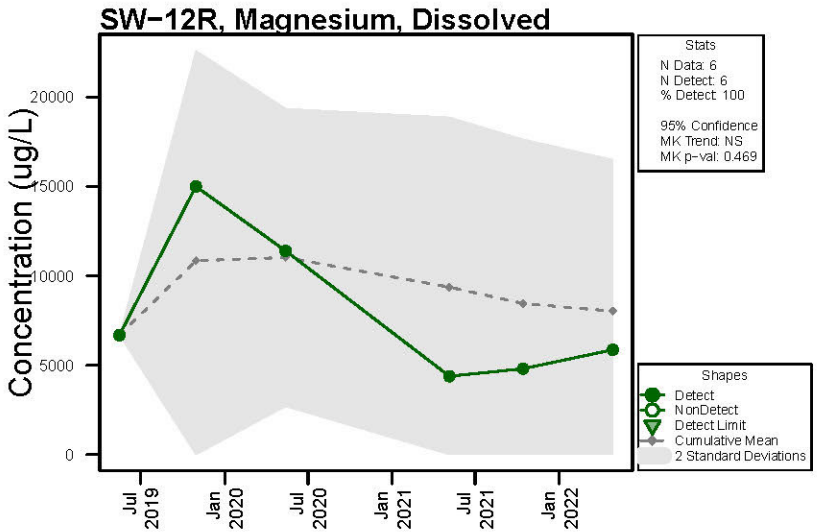

SW-12R, Chromium, Total
Concentration (ug/L)
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022

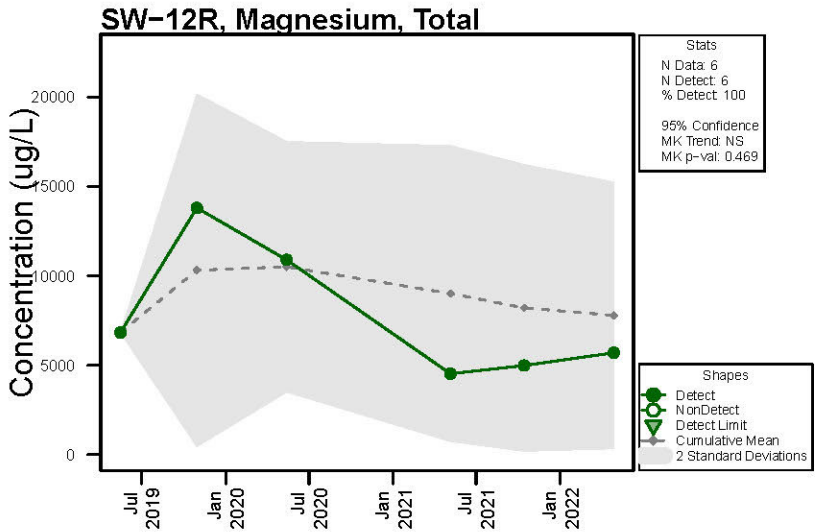

SW-12R, Copper, Dissolved
Concentration (ug/L)
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: Significant
MK p-val: 0.0302
Direction: Decreasing
Lines
Linear Fit
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022

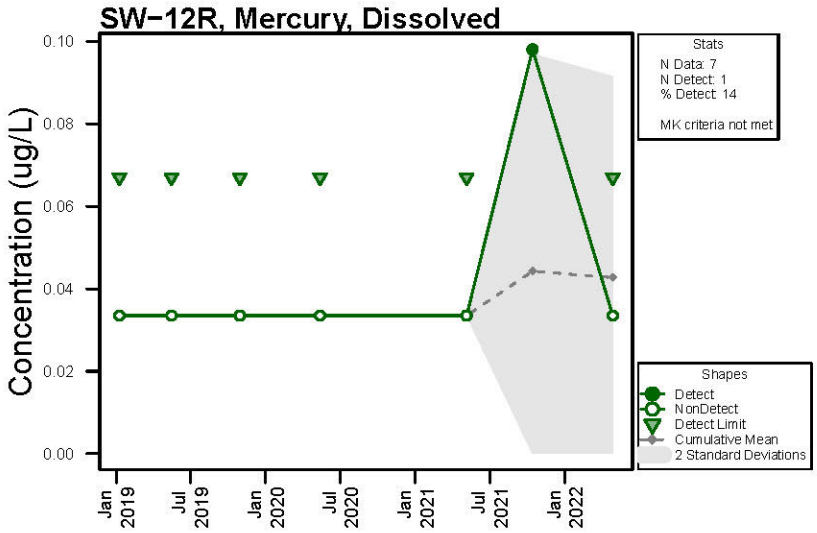

SW-12R, Copper, Total
Concentration (ug/L)
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.136
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022

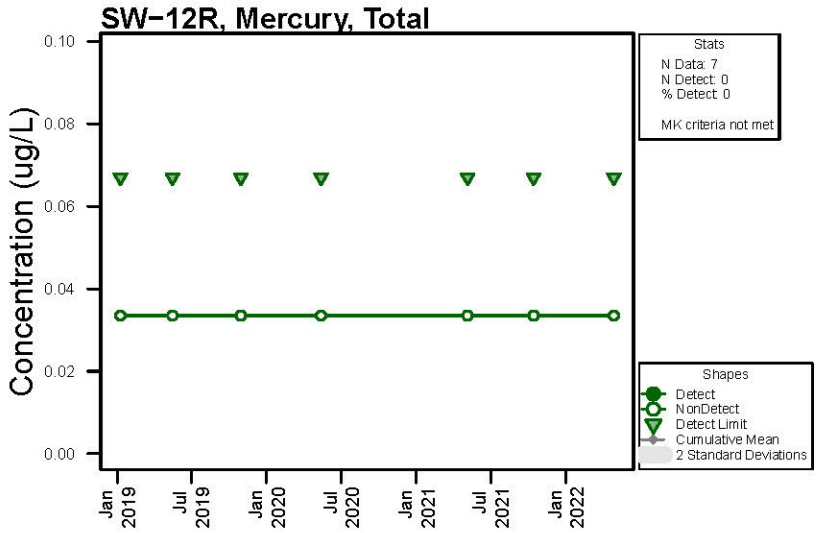

SW-12R, Lead, Dissolved
Concentration (ug/L)
0
2
4
6
8
10
12
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

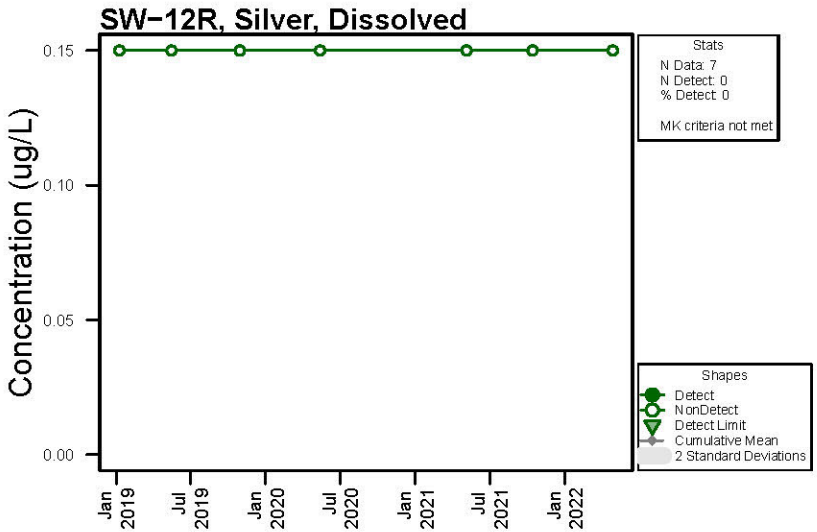

SW-12R, Lead, Total
Concentration (ug/L)
0
2
4
6
8
10
12
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.381
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

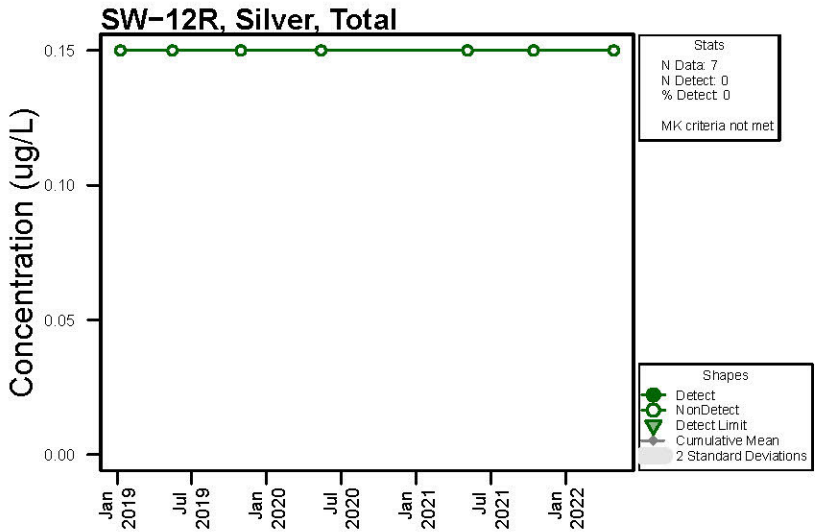

SW-12R, Magnesium, Dissolved
Concentration (ug/L)
0
5000
10000
15000
20000
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.469
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

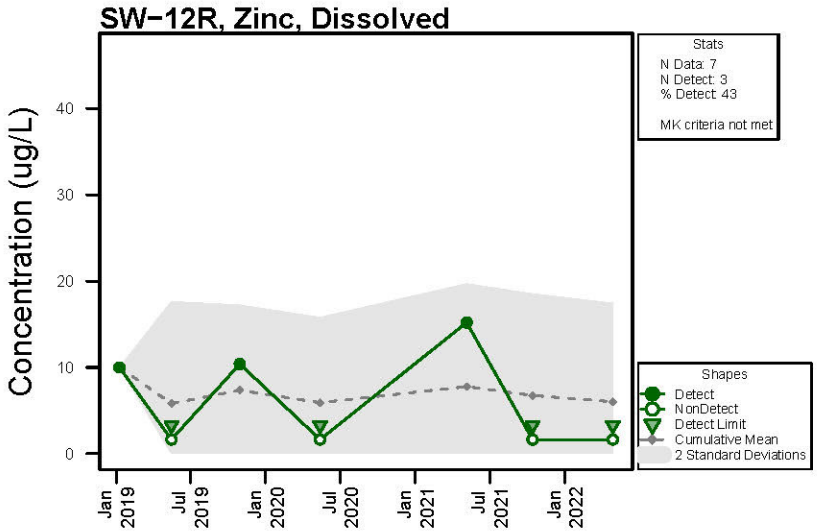

SW-12R, Magnesium, Total
Concentration (ug/L)
0
5000
10000
15000
20000
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.469
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

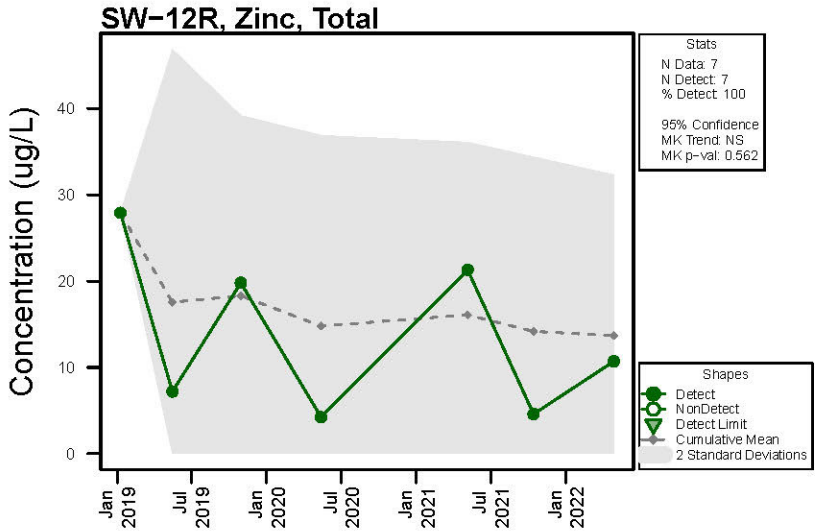

SW-12R, Mercury, Dissolved
Concentration (ug/L)
0.10
0.08
0.06
0.04
0.02
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

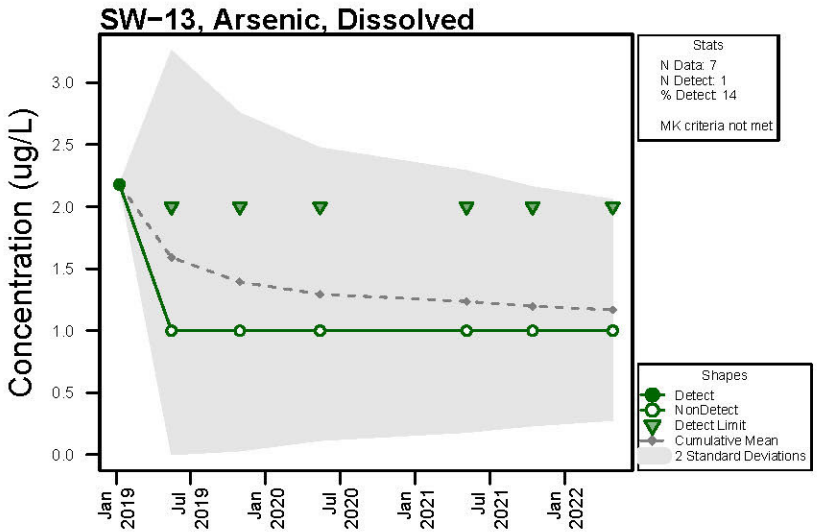

SW-12R, Mercury, Total
Concentration (ug/L)
0.10
0.08
0.06
0.04
0.02
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

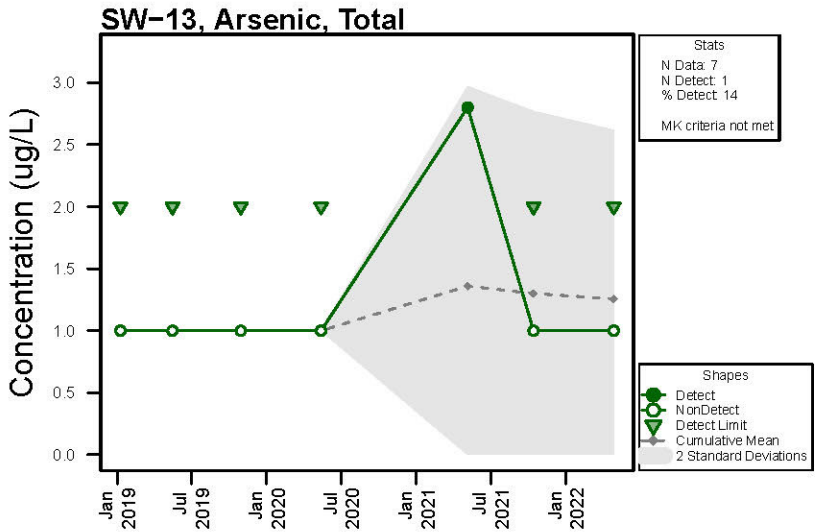

SW-12R, Silver, Dissolved
Concentration (ug/L)
0.15
0.10
0.05
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

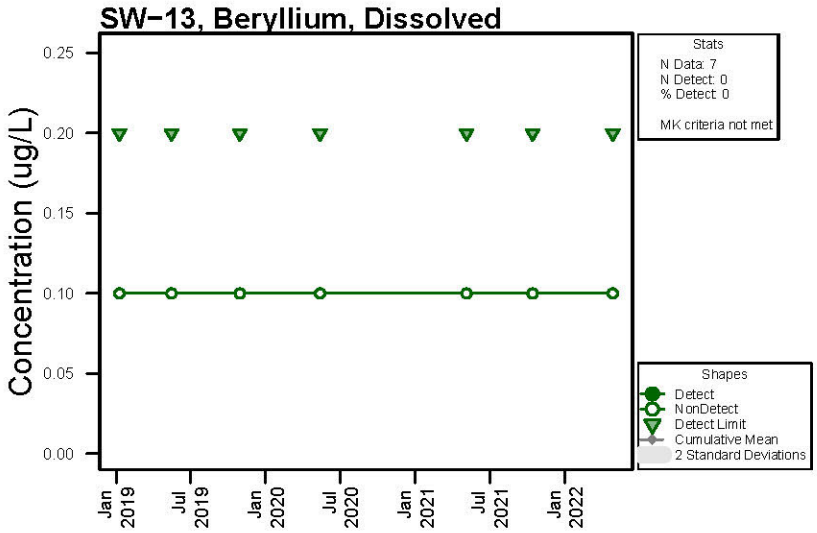

SW-12R, Silver, Total
Concentration (ug/L)
0.15
0.10
0.05
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

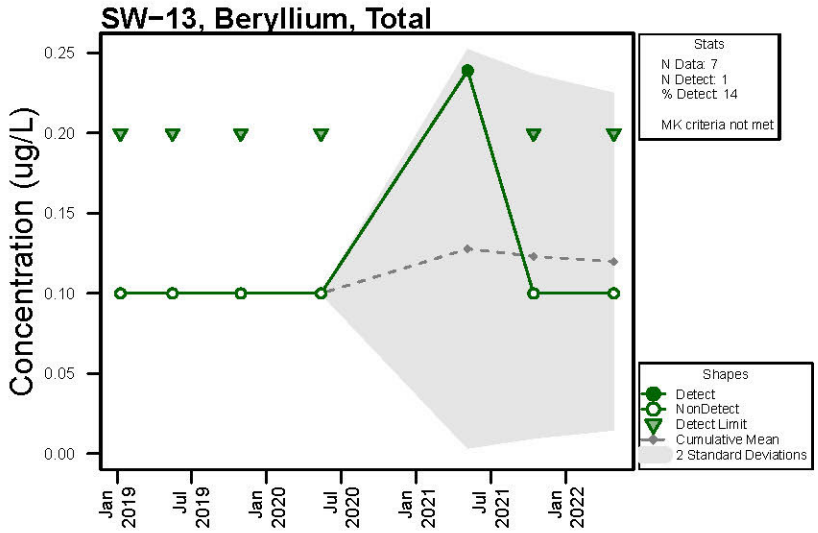

SW−12R, Zinc, Dissolved
Concentration (ug/L)
0
10
20
30
40
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 3
% Detect: 43
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

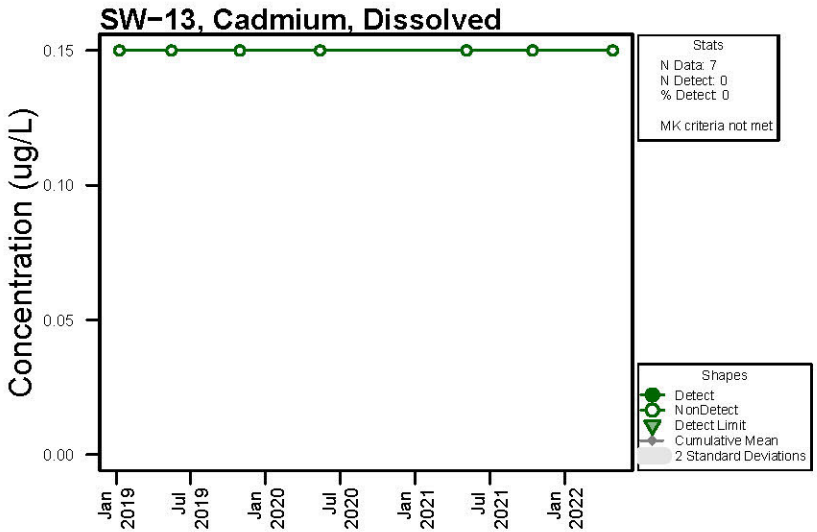

SW−12R, Zinc, Total
Concentration (ug/L)
0
10
20
30
40
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.562
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

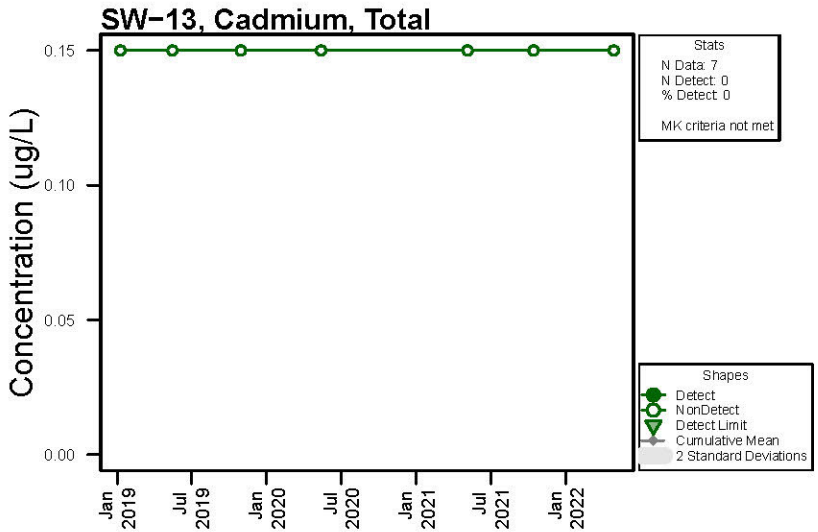

SW−13, Arsenic, Dissolved
Concentration (ug/L)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

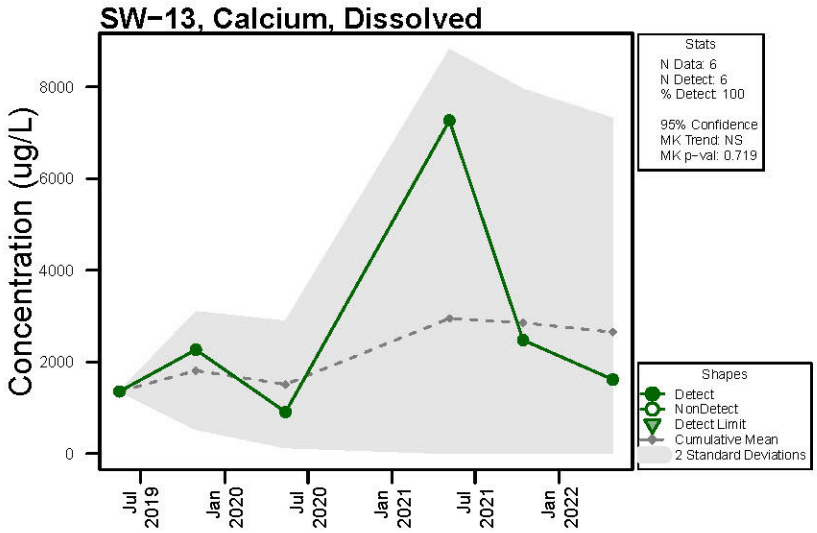

SW−13, Arsenic, Total
Concentration (ug/L)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

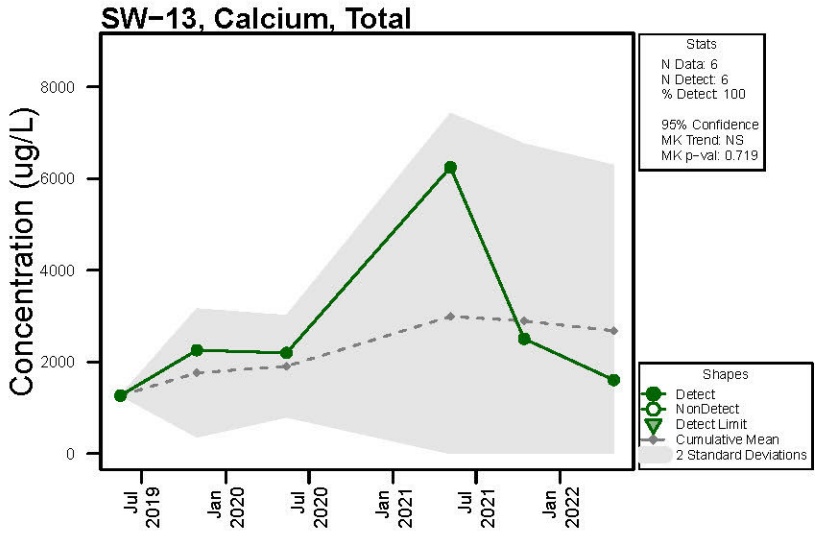

SW-13, Beryllium, Dissolved
Concentration (ug/L)
0.25
0.20
0.15
0.10
0.05
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

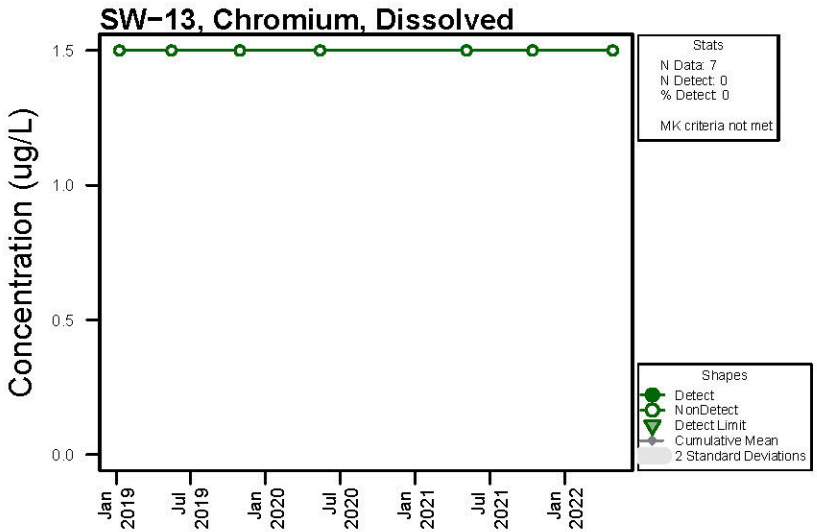

SW-13, Beryllium, Total
Concentration (ug/L)
0.25
0.20
0.15
0.10
0.05
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

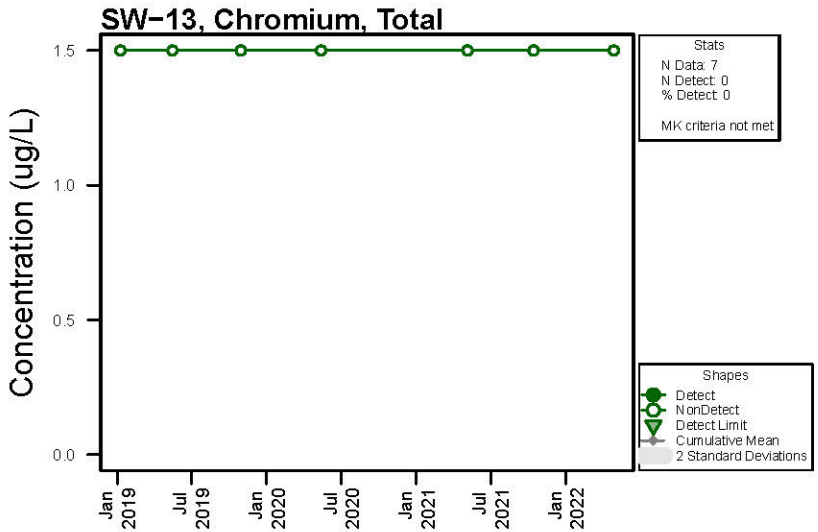

SW-13, Cadmium, Dissolved
Concentration (ug/L)
0.15
0.10
0.05
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

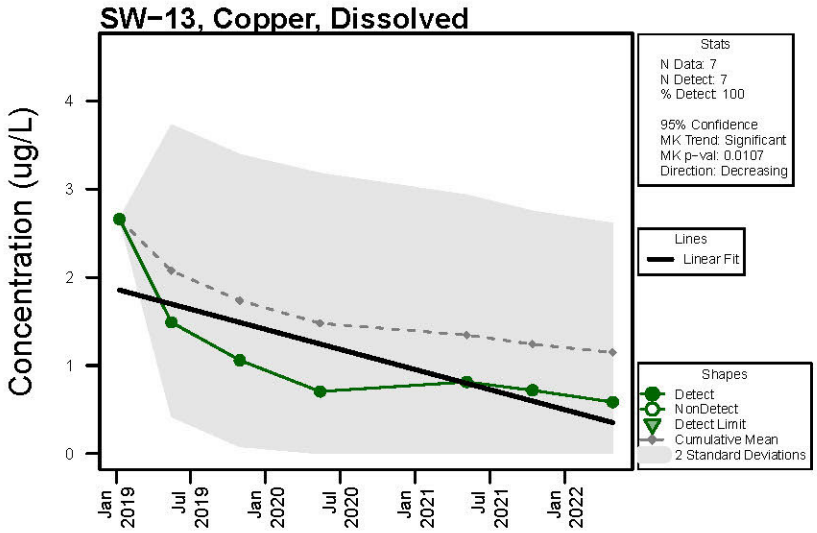

SW-13, Cadmium, Total
Concentration (ug/L)
0.15
0.10
0.05
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

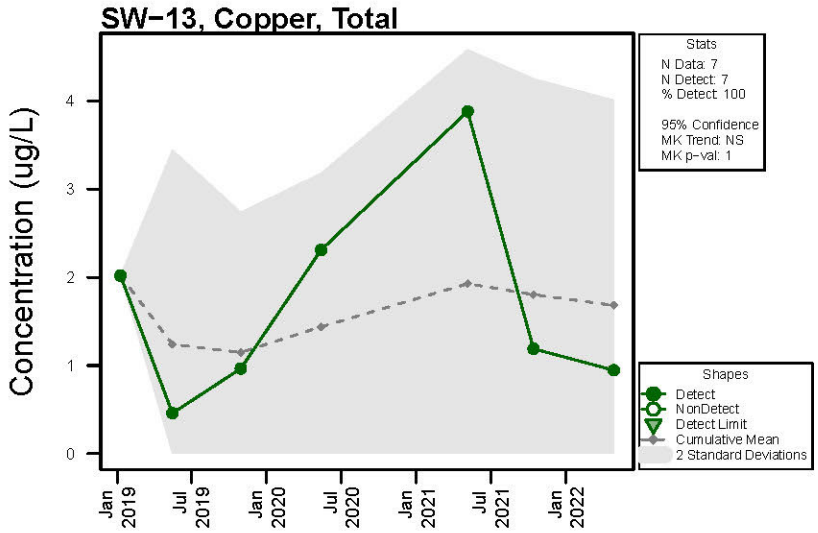

SW-13, Calcium, Dissolved
Concentration (ug/L)
8000
6000
4000
2000
0
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.719
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

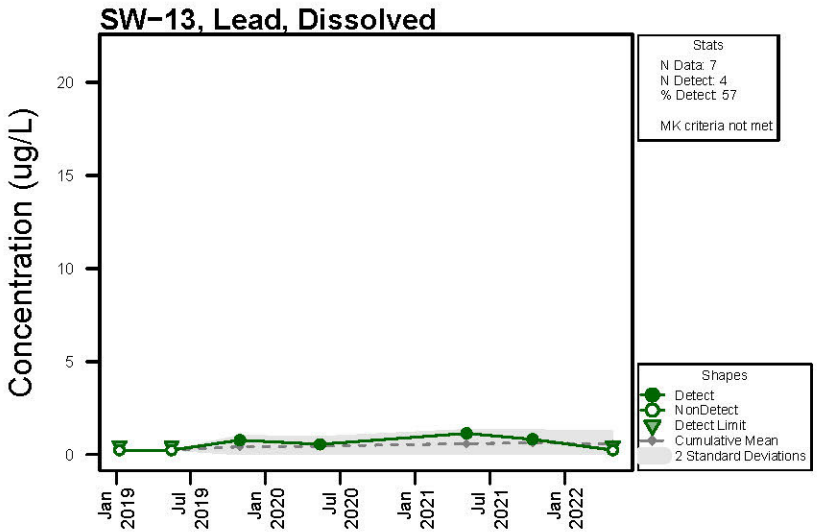

SW-13, Calcium, Total
Concentration (ug/L)
8000
6000
4000
2000
0
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.719
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

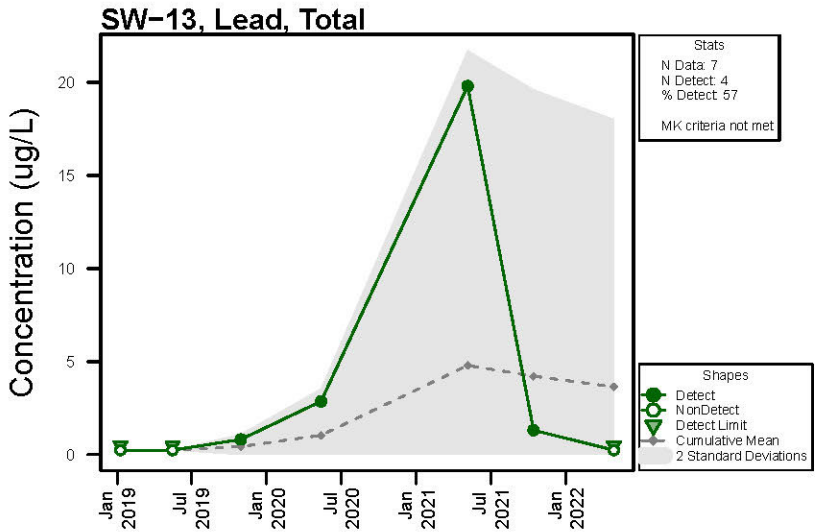

SW-13, Chromium, Dissolved
Concentration (ug/L)
1.5
1.0
0.5
0.0
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

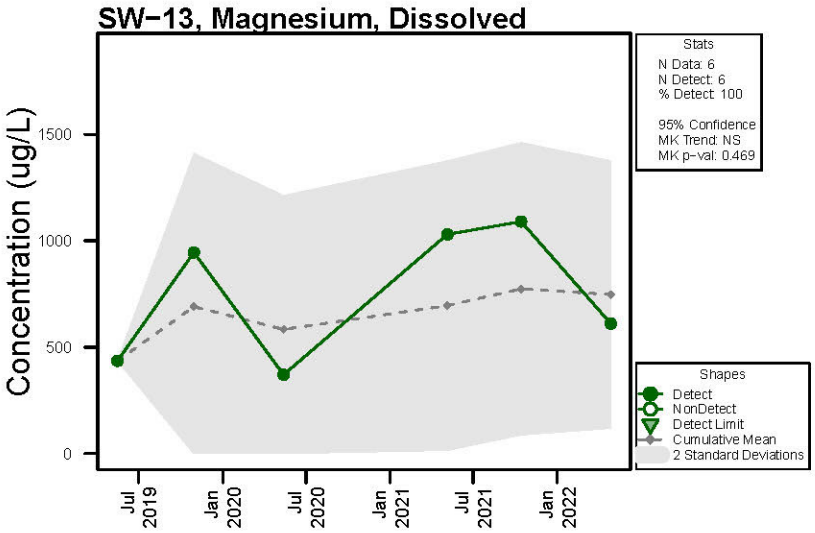

SW-13, Chromium, Total
Concentration (ug/L)
1.5
1.0
0.5
0.0
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

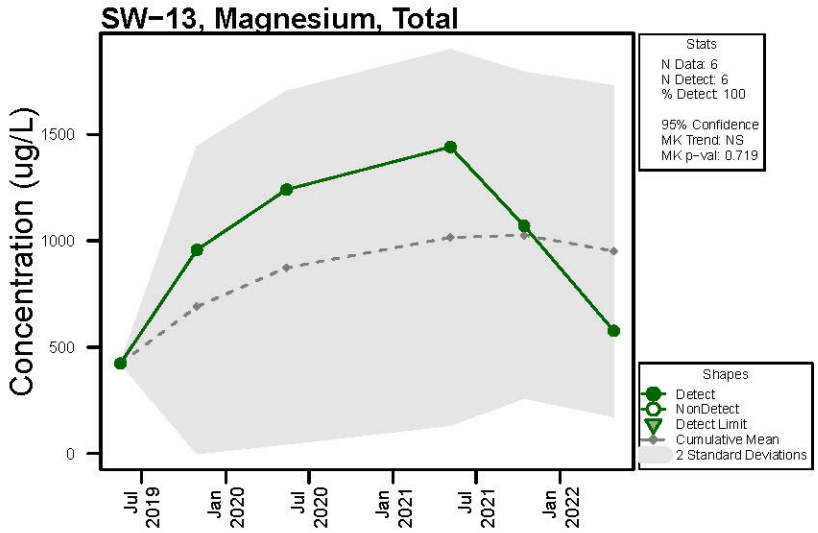

SW-13, Copper, Dissolved
Concentration (ug/L)
0
1
2
3
4
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: Significant
MK p-val: 0.0107
Direction: Decreasing
Lines
Linear Fit
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

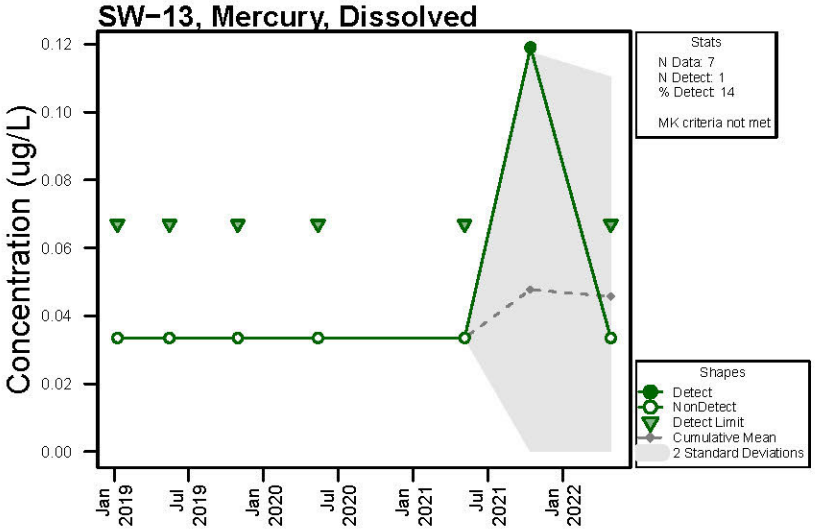

SW-13, Copper, Total
Concentration (ug/L)
0
1
2
3
4
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 1
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

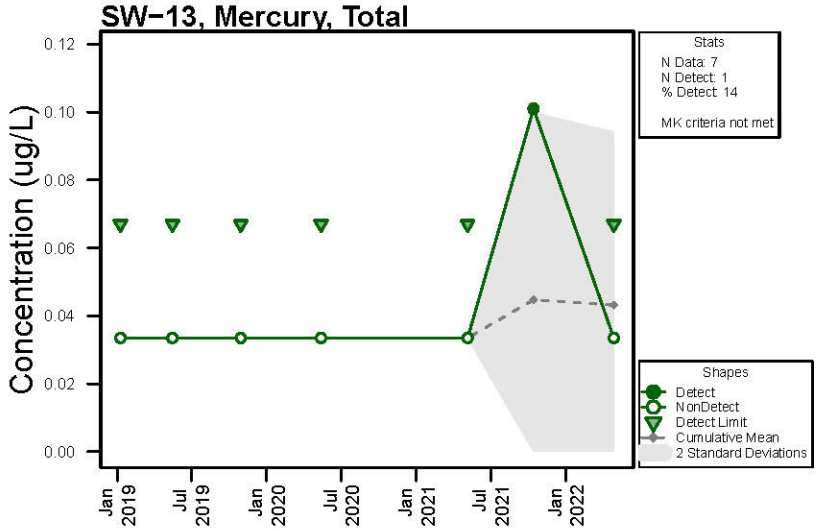

SW-13, Lead, Dissolved
Concentration (ug/L)
0
5
10
15
20
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 4
% Detect: 57
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

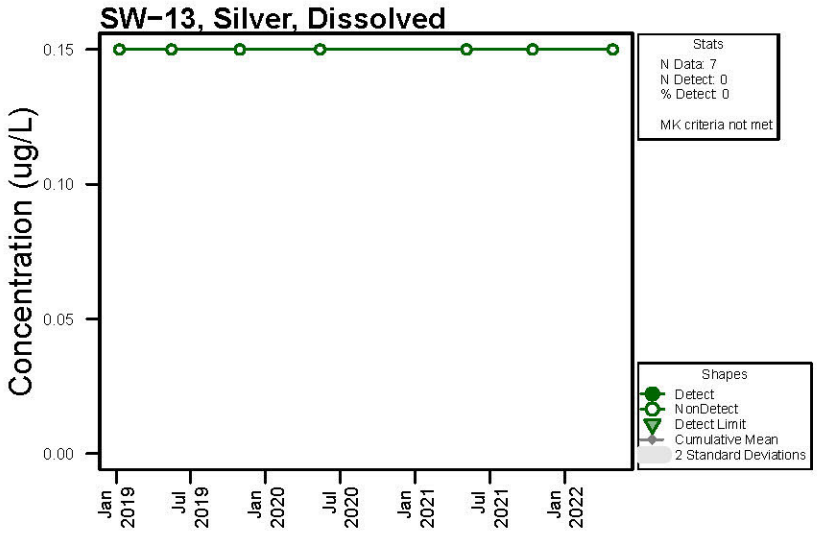

SW-13, Lead, Total
Concentration (ug/L)
0
5
10
15
20
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 4
% Detect: 57
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

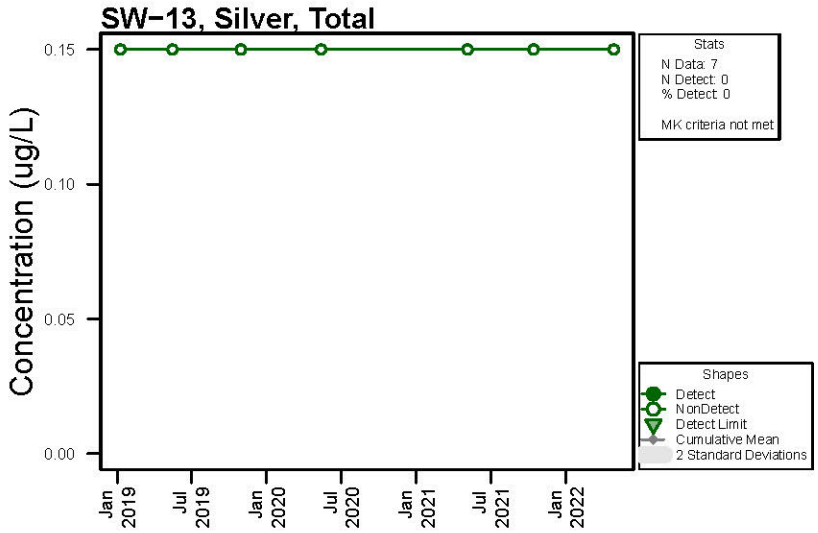

SW-13, Magnesium, Dissolved
Concentration (ug/L)
0
500
1000
1500
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.469
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

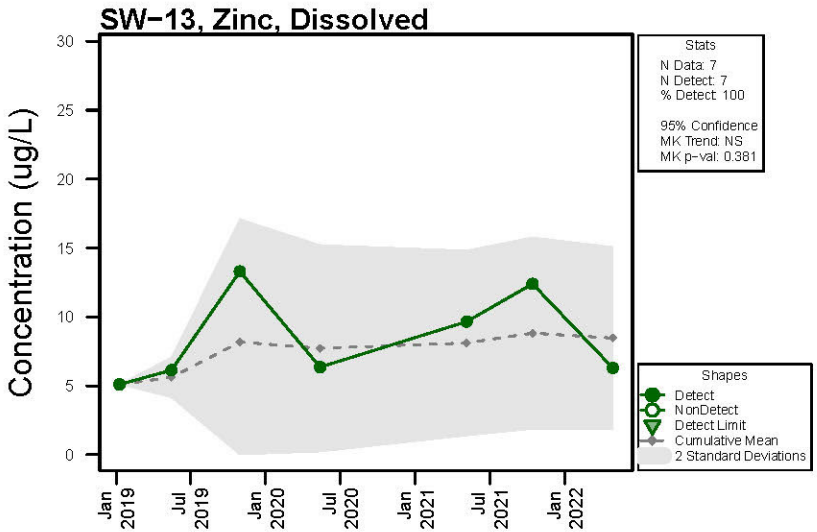

SW-13, Magnesium, Total
Concentration (ug/L)
0
500
1000
1500
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 6
N Detect: 6
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.719
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

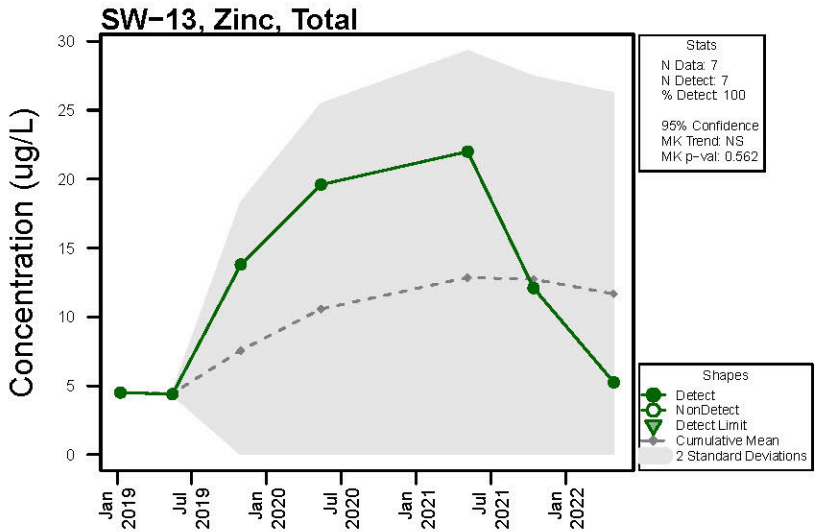

SW-13, Mercury, Dissolved
Concentration (ug/L)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations


SW-13, Mercury, Total
Concentration (ug/L)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 1
% Detect: 14
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations


SW-13, Silver, Dissolved
Concentration (ug/L)
0.15
0.10
0.05
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations


SW-13, Silver, Total
Concentration (ug/L)
0.15
0.10
0.05
0.00
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 0
% Detect: 0
MK criteria not met
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations


SW-13, Zinc, Dissolved
Concentration (ug/L)
30
25
20
15
10
5
0
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.381
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations


SW-13, Zinc, Total
Concentration (ug/L)
30
25
20
15
10
5
0
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Stats
N Data: 7
N Detect: 7
% Detect: 100
95% Confidence
MK Trend: NS
MK p-val: 0.562
Shapes
Detect
NonDetect
Detect Limit
Cumulative Mean
2 Standard Deviations

APPENDIX F – SITE INSPECTION PHOTOS

Locked site entrance gate

Signage at the entrance to the Site

Fence along Union Road

Access road for National Grid utility easement

View at the end of the utility access road in the former Tongue Area

Surface water sampling location in the former Tongue Area

View into the former Inner Rung area

ATV tracks between the Site and the Attleboro Landfill, Inc.

View from the Attleboro Landfill, Inc. landfill looking down on the Site

Groundwater monitoring well ERM-107S (in the middle) with unused wells on either side

Groundwater monitoring well ERM-101S

Unused garage/shed located across Union Road from the Site

APPENDIX G – SITE INSPECTION CHECKLIST

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Shpack Landfill	**Date of Inspection:** April 27, 2023
Location and Region: Attleboro/Norton, MA; Region 1	**EPA ID:** MAD980503973
Agency, Office or Company Leading the Five-Year Review: EPA Region 1	**Weather/Temperature:** Cloudy/50s

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Other: soil/sediment excavation and off-site disposal; wetlands restoration; monitoring

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

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

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

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

   Agency MassDEP
   Contact Garry Waldek (Name) Project Manager (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached: See Appendix D.

   Agency City of Attleboro
   Contact James DiLisio (Name) Mayor (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached: See Appendix D.

   Agency Town of Norton
   Contact Michael Unitis (Name) Acting Mayor (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached: See Appendix D.

   Agency Town of Norton
   Contact John Thomas (Name) Director, Conservation Department (Title) _____ (Date) _____ (Phone No.)

Problems/suggestions ☐ Report attached: See Appendix D.

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

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

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

1. **O&M Documents**

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

Remarks: Site records are maintained off site by the City of Attleboro and their contractor.

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

Remarks: _____

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

Remarks: _____

4. **Permits and Service Agreements**

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

Remarks: _____

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

Remarks: _____

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

Remarks: _____

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

Remarks: _____

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

Remarks: _____

9. **Discharge Compliance Records**

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

Remarks: _____

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

Remarks: _____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for state

☐ PRP in-house ☒ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☐ _____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date

☒ Funding mechanism/agreement in place ☐ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

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

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

Describe costs and reasons: _____

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

A. Fencing

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

Remarks: Fence intact, but not required by ROD.

B. Other Access Restrictions

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

Remarks: MassDEP sign at gated entrance; the City of Attleboro plans to add a new sign to identify the Site as a Superfund site.

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

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

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

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

Frequency: annual

Responsible party/agency: City of Attleboro

Contact _____ _____ _____ _____

Name Title Date Phone no.

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

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

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

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

Other problems or suggestions: ☐ Report attached

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

Remarks: _____

D. General

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

Remarks: ATV tracks were observed extending from the Site to the adjacent ALI, Inc. landfill.

2. **Land Use Changes On Site** ☐ N/A

Remarks: None

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

Remarks: The ALI, Inc. landfill abuts the Site; solar panels are planned for the landfill.

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☐ N/A

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

Remarks: Utility easement access road also provides access to surface water sampling locations.

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

D. Cover Penetrations ☐ Applicable ☐ N/A

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

F. Cover Drainage Layer ☐ Applicable ☐ N/A

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

1. **Siltation** Area extent: _____ Depth: _____ ☐ N/A
   ☐ Siltation not evident
   Remarks: _____

2. **Erosion** Area extent: _____ Depth: _____
   ☐ Erosion not evident
   Remarks: _____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks: _____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks: _____

H. Retaining Walls ☐ Applicable ☐ N/A

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

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Area extent: _____ Depth: _____
   Remarks: _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Area extent: _____ Type: _____
   Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Area extent: _____ Depth: _____
   Remarks: _____

4. **Discharge Structure** ☐ Functioning ☐ N/A
   Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

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

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

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

C. Treatment System ☐ Applicable ☐ N/A

D. Monitoring Data

1. **Monitoring Data**
   ☐ Is routinely submitted on time ☐ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

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

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

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

Remarks: _____

X. OTHER REMEDIES – WETLANDS RESTORATION

Restored areas appeared to be well vegetated during the site inspection. The 2020 Wetlands Reports demonstrates the wetlands have met the performance metrics.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

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

The remedy was designed to protect human health and the environment by eliminating, reducing and controlling exposures to human and environmental receptors through engineering controls and institutional controls. More specifically, the excavation and off-site disposal of all materials exceeding cleanup levels eliminated exposure to contaminants. A public water line was extended to within 500 feet of the Site and nearby affected potable wells were decommissioned. Institutional controls have been implemented to restrict future use of the Site and use of groundwater. The remedy is effective and functioning as designed.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O&M procedures are adequate.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

None.

D. Opportunities for Optimization

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

None.

APPENDIX H – CLEANUP LEVEL REVIEW

Table H-1: Soil Cleanup Levels

COC	Soil Cleanup Level (mg/kg, except where noted)[a]	Composite Worker Soil RSL/PRG[b] (mg/kg, except where noted)		Cancer Risk[c]	Noncancer HQ[d]
		1 x 10^{-6} Risk	HQ = 1		
Dioxin TEQ	0.001	0.000022	0.00072	5 x 10^{-5}	1
Radium 226	3.1 pCi/g	0.0208 pCi/g	--	1 x 10^{-4}	--
Uranium 234	220 pCi/g	0.0342 pCi/g	--	**6 x 10^{-3}**	--
Uranium 235	52 pCi/g	0.0731 pCi/g	--	**7 x 10^{-4}**	--
Uranium 238	110 pCi/g	0.02 pCi/g	--	**5 x 10^{-3}**	--
Arsenic	12	3	480	4 x 10^{-6}	0.03
Benzo(a)anthracene	28	21	--	1 x 10^{-6}	--
Benzo(a)pyrene	2.8	2.1	220	1 x 10^{-6}	0.01
Benzo(b)fluoranthene	28	21	--	1 x 10^{-6}	--
Dibenz(a,h)anthracene	2.8	2.1	--	1 x 10^{-6}	--
Lead	**1,400**	1,000[e]		--	
Nickel	7,000	64,000	22,000	1 x 10^{-7}	
Total Uranium	1,100	--	230	--	**5**

Notes:

a) Cleanup levels from Table L-1 of the Site's 2004 ROD.

b) Current EPA RSLs for non-radionuclides, available at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables (accessed 4/12/2023). Current EPA preliminary remediation goals (PRGs) for radionuclides, available at https://epa-prgs.ornl.gov/radionuclides/download.html (accessed 4/12/2023).

c) The 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 = (cleanup level ÷ cancer-based RSL) × 10^{-6}.

d) The noncancer HQ was calculated using the following equation: HQ = cleanup goal ÷ noncancer-based RSL.

e) Using updated default Integrated Exposure Uptake Biokinetic Model and ALM parameters at a target BLL of 5 µg/dL, a SL of 1,000 ppm is developed for commercial/industrial exposures. Lead is further discussed in Section V. Technical Assessment, Question B.

-- = RSL/PRG not established; risk or HQ not calculated.

Bold = value exceeds EPA's acceptable cancer risk range (10^{-4} to 10^{-6}) or acceptable HQ (1).

Table H-2: Soil Cancer Slope Factor Comparison for Uranium 234, Uranium 235 and Uranium 238

COC	Exposure Route	2004 Cancer Slope Factor[a]	Current Cancer Slope Factor[b]
Uranium 234	External Exposure	2.52 E-10	2.52 E-10
Uranium 235	External Exposure	5.43 E-7	5.18 E-7
Uranium 238	External Exposure	1.14 E-7	1.14 E-7[c]
Uranium 234	Soil Ingestion	1.6 E-10	1.58 E-10
Uranium 235	Soil Ingestion	1.6 E-10	1.57 E-10
Uranium 238	Soil Ingestion	2.1 E-10	2.10 E-10[c]
Uranium 234	Water Ingestion	7.1 E-11	7.07 E-11
Uranium 235	Water Ingestion	7.2 E-11	6.96 E-11
Uranium 238	Water Ingestion	8.7 E-11	8.71 E-11[c]

Notes:

a) Compiled from the 2004 ROD, Table G-6.

b) Current radionuclide carcinogenicity slope factors located at: https://www.epa.gov/radiation/radionuclide-table-radionuclide-carcinogenicity-slope-factors (accessed 5/22/2023).

c) Value presented for U-238+D.