LMS/CLN/40813

FINAL
Long-Term Periodic Review Report
Colonie, New York, Site
Albany County,
Colonie, New York

NYSDEC Site Code 401006

June 2024

U.S. DEPARTMENT OF ENERGY | Legacy Management

This document has been designed for online viewing.

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Abbreviations

AEC	U.S. Atomic Energy Commission
ALM	Adult Lead Methodology
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
cDCE	*cis*-1,2-dichloroethene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
COC	contaminant of concern
DOE	U.S. Department of Energy
EE/CA	engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
ft	feet
FUSRAP	Formerly Utilized Sites Remedial Action Program
FYR	Five-Year Review
HHRA	Human Health Risk Assessment
HI	Hazard Index
IC	institutional control
IEUBK	Integrated Exposure Uptake Biokinetic
IRIS	Integrated Risk Information System
J&E	Johnson and Ettinger
LM	Office of Legacy Management
LTM	long-term monitoring
LTPR	long-term periodic review
µg/dL	micrograms per deciliter
µg/L	micrograms per liter
µg Pb/dL	micrograms of inorganic lead per deciliter
MNA	monitored natural attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NYCRR	*New York Codes, Rules and Regulations*
NYECL	*New York Environmental Conservation Law*
NYSDEC	New York State Department of Environmental Conservation

NYSDOH	New York State Department of Health
ORNL	Oak Ridge National Laboratory
OU	operable unit
PCE	tetrachloroethene
pCi/g	picocuries per gram
RAO	Remedial Action Objective
RBA	relative bioavailability
RfC	chronic reference concentration
RI	Remedial Investigation
ROD	Record of Decision
SMP	Site Management Plan
TCE	trichloroethene
TCG	target cleanup goal
UR_i	inhalation unit risk
USACE	U.S. Army Corps of Engineers
UU/UE	unlimited use and unrestricted exposure
VC	vinyl chloride
VOC	volatile organic compound

Executive Summary

This report documents the first long-term periodic review (LTPR) of the combined soil and groundwater remedies for the Colonie, New York, Site prepared by the U.S. Department of Energy (DOE) Office of Legacy Management (LM). The site is located at 1130 Central Avenue, in the town Colonie, county of Albany, New York. A long-term periodic review is required as long as residual contamination remains above unlimited use and unrestricted exposure conditions. A long-term periodic review will be required every 5 years for as long as any institutional controls are in place.

This long-term periodic review report meets the following regulatory requirements:

- The first Five-Year Review (FYR) for the Main Site Soils Operable Unit in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121(c), consistent with the National Contingency Plan (NCP) 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii) and the *Final Site Closeout Report for the Colonie FUSRAP Site* (USACE 2018b).
- The second FYR for the Groundwater Operable Unit in accordance with CERCLA Section 121(c), consistent with NCP 40 CFR Section 300.430(f)(4)(ii) and the next review requirements of the *First Five-Year Review Report for Colonie FUSRAP Site Groundwater Operable Unit* (USACE 2018a).
- The periodic review of soil easement areas in accordance with the *Long-Term Surveillance and Maintenance Plan for the Colonie, New York, Site* (DOE 2022) and the New York State Department of Environmental Conservation's (NYSDEC's) *Technical Guidance for Site Investigation and Remediation* (DER-10).

The purpose of the First FYR for the Main Site Soils Operable Unit and the Second FYR for the Groundwater Operable Unit is to evaluate the implementation and performance of each remedy in order to determine if the remedy is or will be protective of human health and the environment. This report is based on the template of the *First Five-Year Review Report for Colonie FUSRAP Site Groundwater Operable Unit* (USACE 2018a), which meets U.S. Environmental Protection Agency's recommended template requirements for the FYR.

The purpose of the periodic review of soil easement areas is to review the environmental easement institutional controls and prepare a report in accordance with NYSDEC's DER-10 guidance. The periodic review report is provided as the Appendix A.

The site consists of three operable units (OUs): the Main Site Soils OU, the Groundwater OU, and the Vicinity Properties OU. The USACE's *Colonie FUSRAP Site Vicinity Property Operable Unit Record of Decision* (USACE 2017b) found that no further action is required for the vicinity properties.

USACE's *Final Colonie FUSRAP Site Colonie Main Site Soils Record of Decision* (USACE 2015b) remedy included provisions for institutional controls through an environmental easement for management of three discrete inaccessible locations of residual soil contamination within three of the 27 final status survey units of the main site: Survey Unit 104 Easement Area, Survey Unit 124 Easement Area, and the North Lawn Easement Area. The environmental easement provides a means of protection based on both current and future land use by placing

restrictions on excavation within and uses of easement areas. The environmental easement and accompanying *Site Management Plan, Colonie FUSRAP Site* (DOE and USACE 2020) were completed by LM and USACE in 2020. The soil remedy is protective of human health and the environment. The institutional controls required under the easement have been complied with and there has been no disturbance of subsurface soil in the easement areas.

The soil remedy remains protective of human health and the environment. Institutional controls (ICs) in the form of an environmental easement were placed on three discrete areas of inaccessible soil contamination. The procedural requirements of the easement have been complied with. Annual inspections have shown that contaminated soils have remained undisturbed.

The groundwater remedy remains protective of human health and the environment. Potential future residents are protected from exposure to VOC vapors because ICs require vapor intrusion testing before building construction. The concentrations of VOCs in groundwater are decreasing as anticipated in the Record of Decision (ROD).

The assessment within this second review period for groundwater found that monitored natural attenuation of site groundwater is progressing according to plan. The remedial timeframe is generally within the initially estimated time frame of 15 years for compliance and continues to be protective of human health and the environment.

The next long-term periodic review of the Colonie site is to be held within 5 years of the signature date of this long-term periodic review.

FYR Summary Form

SITE IDENTIFICATION		
Site Name: DOE Colonie, New York, Site		
EPA ID: NYD002084721		
Region: 2	**State:** NY	**City/County:** Town of Colonie / Albany County

SITE STATUS	
NPL Status: Non-NPL	
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: Other Federal Agency **If "Other Federal Agency" was selected above, enter Agency name:** U.S. Department of Energy, Office of Legacy Management
Author name (Federal or State Project Manager): Shawn Eichelberger, Site Manager
Author affiliation: U.S. Department of Energy, Office of Legacy Management
Review period: September 20, 2017–September 20, 2022
Date of site inspection: July 26, 2022
Type of review: Statutory
Review number: 2
Triggering action date: January 15, 2018
Due date *(five years after triggering action date)*: January 15, 2023

ISSUES/RECOMMENDATIONS
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
Soil OU and Groundwater OU

FYR Summary Form (continued)

PROTECTIVENESS STATEMENT(S)		
Operable Unit: Groundwater OU	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Not applicable
Protectiveness Statement: The groundwater remedy for the Groundwater OU at the Colonie site remains protective of human health and the environment. Potential future residents are protected from exposure to volatile organic compound (VOC) vapors because institutional controls (ICs) require vapor intrusion testing before building construction. The concentrations of VOCs in groundwater are decreasing as anticipated in the Record of Decision.		
Operable Unit: Main Site Soil	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Not applicable
Protectiveness Statement: The soil remedy for the Main Site Soils OU remains protective of human health and the environment. ICs in the form of an environmental easement were placed on three discrete areas of inaccessible soil contamination. The procedural requirements of the easement have been complied with. Annual inspections have shown that contaminated soils have remained undisturbed.		

SITEWIDE PROTECTIVENESS STATEMENT (IF APPLICABLE)	
For sites that have achieved construction completion, enter a sitewide protectiveness determination and statement.	
Protectiveness Determination: Protective	*Addendum Due Date (if applicable):* *Not applicable*
Protectiveness Statement: The remedies for Main Site Soils and Groundwater OUs are protective of human health and the environment because ICs are in place and functioning as intended. The monitored natural attenuation remedy for groundwater is functioning because groundwater contaminant concentrations are declining as anticipated.	

1.0 Introduction

This report documents the first long-term periodic review (LTPR) of the combined soil and groundwater remedies for the Colonie, New York, Site, prepared by the U.S. Department of Energy (DOE), Office of Legacy Management (LM). The site is at 1130 Central Avenue, in the Town of Colonie, Albany County, New York (Figure 1). The Colonie site (Figure 2) was remediated under the Formerly Utilized Sites Remedial Action Program (FUSRAP) using the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, and it is subject to CERCLA requirements. The Colonie site is not on the National Priorities List, so requirements relevant to Superfund sites, including U.S. Environmental Protection Agency (EPA) oversight, do not apply. In accordance with CERCLA, reviews are required every 5 years when hazardous substances remain above levels that allow for unlimited use and unrestricted exposure (UU/UE). To ensure protection of human health and the environment, reviews will be conducted every 5 years for as long as future uses remain restricted.

The purpose of this LTPR is to evaluate the implementation and performance of site remedies to determine whether the remedies are and will continue to be protective of human health and the environment. This LTPR documents methods, findings, and conclusions, and it identifies any issues found during the review, if any, and provides recommendations to address them.

This LTPR meets the requirements of CERCLA Section 121(c), which states:

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

This review also meets the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan, also called the National Contingency Plan (NCP) in Title *40 Code of Federal Regulations* Section 300.430(f)(4)(ii) (40 CFR 300.430[f][4][ii]), which states:

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

The Colonie site consists of three operable units (OUs): the Main Site Soils OU, the Groundwater OU, and the Vicinity Properties OU. This is the first LTPR conducted by LM for the Colonie site. This LTPR contains a First Five-Year Review (FYR) for the Main Site Soils OU, a Second FYR for the Groundwater OU (U.S. Army Corps of Engineers [USACE] completed a First FYR in 2018 [USACE 2018a]), and a review of Soil Easement Areas required by the State of New York. The Vicinity Properties OU Record of Decision (USACE 2017b) hereafter called the Vicinity Property ROD, found that no further action is required for previously impacted soil and dust at the vicinity properties.

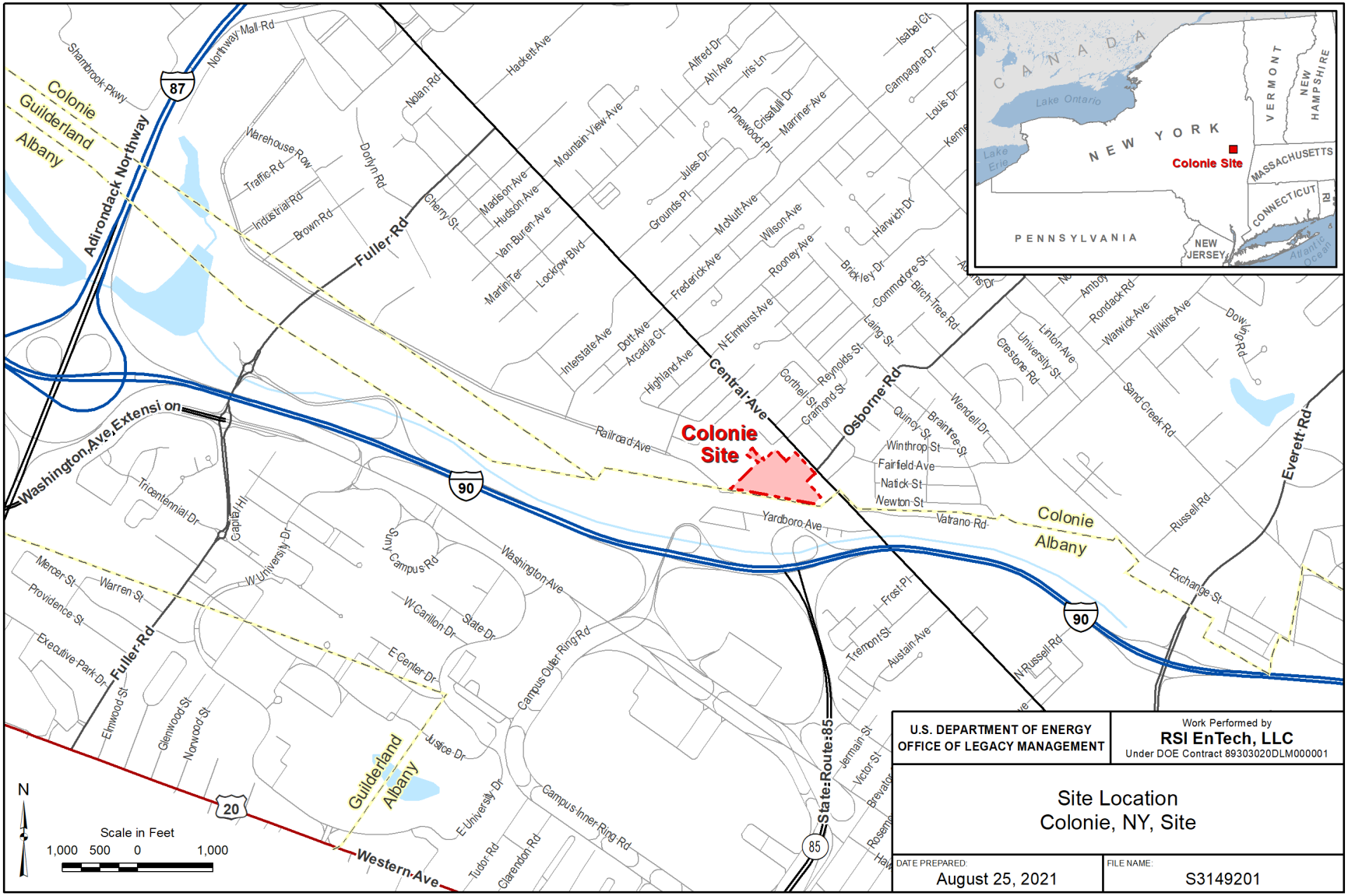


Figure 1. Colonie Site Location

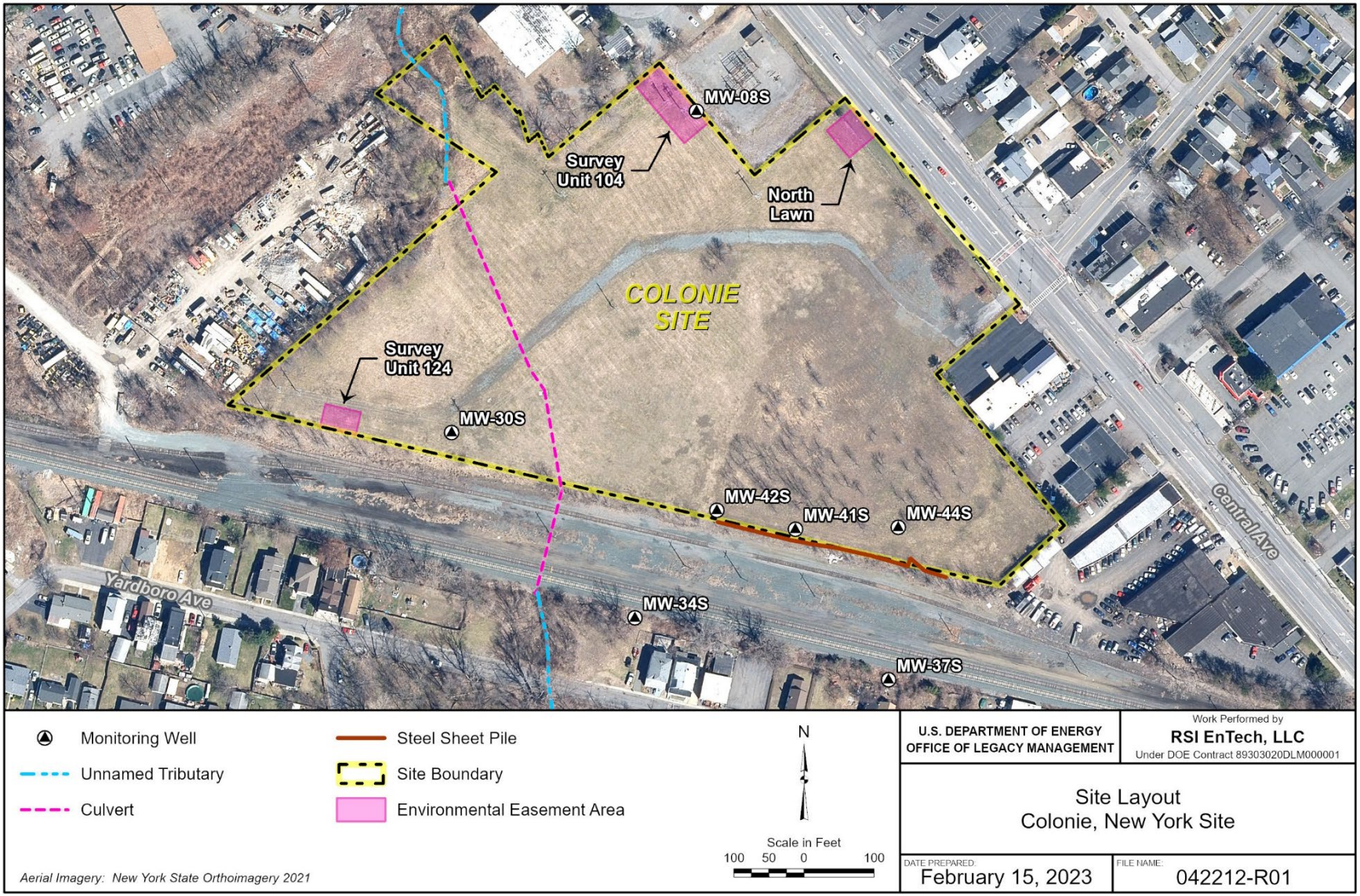


Figure 2. Colonie Site Layout

The review was conducted from April to September 2022. In addition to CERCLA and NCP requirements, this LTPR meets additional requirements specified in the following documents:

- *Final Site Closeout Report for the Colonie FUSRAP Site* (USACE 2018b); this report identified that a First FYR would be conducted in 2022 for the Main Site Soils OU
- *First Five-Year Review Report for Colonie FUSRAP Site Groundwater Operable Unit* (USACE 2018a); this report identified actions to be taken during the Second FYR for the Groundwater OU
- *Long-Term Surveillance and Maintenance Plan for the Colonie, New York, Site* (LMS/CLN/S13262), hereafter called the LTS&M Plan; this plan requires that a review be completed in 2022
- New York State Department of Environmental Conservation (NYSDEC) *Technical Guidance for Site Investigation and Remediation* (DER-10); this guidance specifies periodic review of soil easement areas

This report is based on EPA's *Comprehensive Five-Year Review Guidance* (EPA 2001a) and *Five-Year Review Recommended Template* (OLEM 9200.0-89). The Colonie site, however, is not on the National Priorities List, and EPA review is not required. Periodically, the Colonie site's soil easement areas, including institutional controls (ICs), are reviewed in accordance with NYSDEC's DER-10. Section 6.3 of DER-10 requires preparation of a periodic review report to document the inspection and efficacy of ICs at the site, which is provided as Appendix A and includes the following: (1) identification, assessment, and certification of all ICs required by the remedy; (2) results of the annual site inspections required by the LTS&M Plan; (3) all applicable site management forms and other records generated for the site during the reporting period in NYSDEC-approved electronic format, if not previously submitted; and (4) a site evaluation that includes the following: the compliance of the remedy with the requirements of the site-specific ROD, any new conclusions or observations regarding site contamination based on inspections, recommendations on any necessary changes, and an assessment of the overall performance and effectiveness of the remedy.

1.1 Site Chronology

The history of the site is presented on a timeline in Figure 3. Industrial operations at the site began in 1923, when the Embossing Company built a factory to make wooden toys. In 1927, Magnus Metal Company Inc. purchased the site and operated a brass foundry for manufacturing railroad components, including parts cast in sand molds and brass-bearing housings with surfaces of babbitt metal (an alloy of lead, copper, and antimony). In 1937, the National Lead Company purchased the site and continued to operate the brass foundry and conduct electroplating operations. Chemicals used in the plating operations included various acids, bases, metals, and degreasing solvents.

Before 1941, National Lead began filling in Patroon Lake, located on the western side of the site, with waste casting sand. The lake was used for additional waste disposal through 1961. The used casting sands contained high concentrations of heavy metals, primarily lead, copper, and arsenic. The filled-in lake was identified as a source of metal contamination. Sources for organic contamination were a burial site in the Patroon Lake area and chemical contamination of surfaces within a processing building.

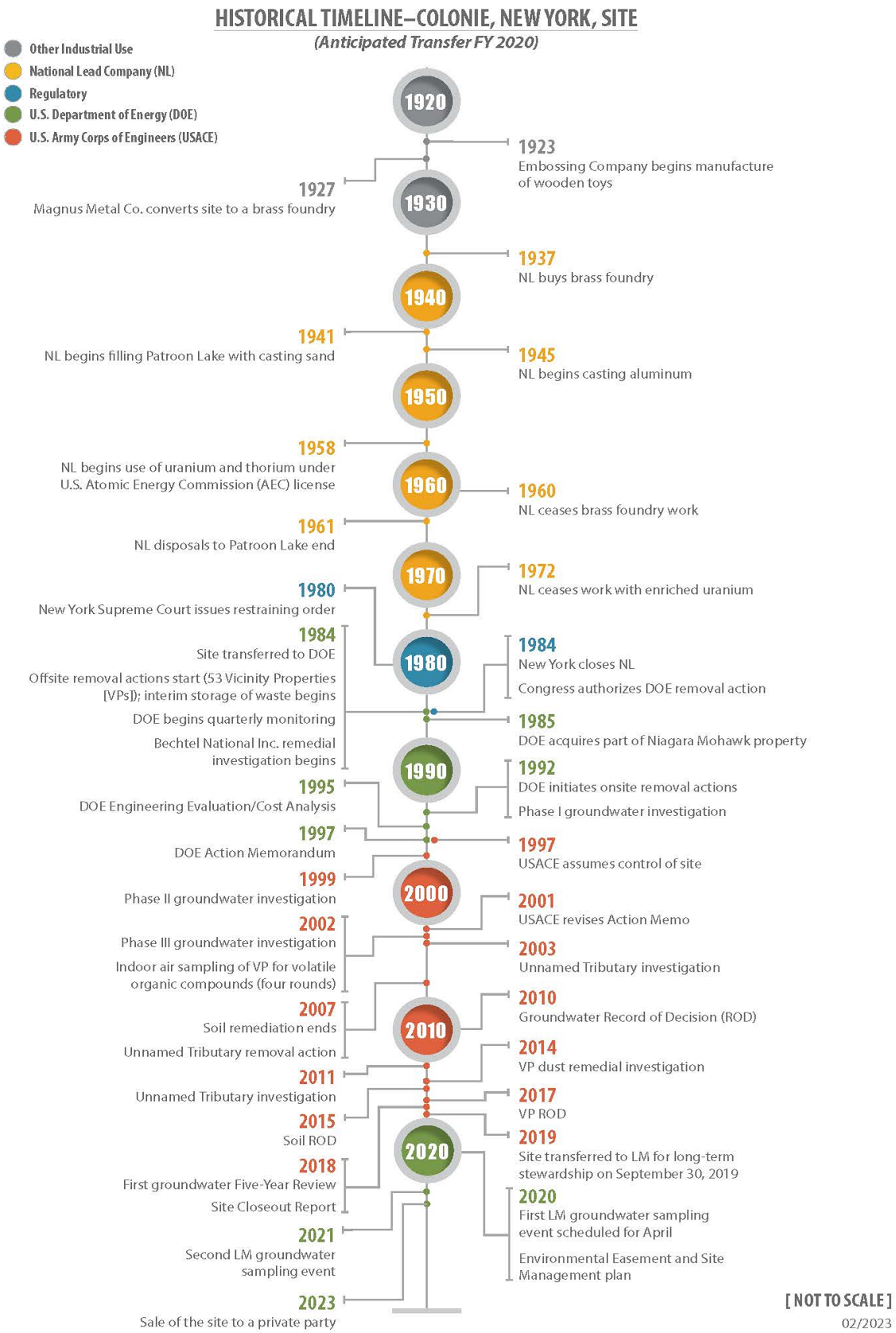


Figure 3. Colonie Historical Timeline

In 1958, the nuclear division of National Lead began producing items manufactured from uranium and thorium under a license issued by the U.S. Atomic Energy Commission (AEC). The plant handled enriched uranium from 1960 to 1972. During that time, National Lead also held several contracts to manufacture fuel from enriched uranium for use in experimental nuclear reactors. Depleted uranium, along with metals from other processes, contaminated soils. National Lead also converted depleted uranium tetrafluoride to depleted uranium metal, which was then fabricated into both commercial and military components (USACE 2018b). Some of the processes produced depleted uranium powder as a waste, which is pyrophoric. National Lead oxidized these powders in an onsite incinerator to eliminate the fire hazard, which resulted in aerial emission of depleted uranium particulates onto the site and vicinity properties (Lloyd et al. 2009). The AEC contract was terminated in 1968, and after that, work at the plant was devoted to fabricating shielding components, aircraft counterweights, and artillery projectiles from depleted uranium. The National Lead Company changed its name to NL Industries Inc. (NL) in 1971.

The New York State Supreme Court shut down the NL plant in 1984 due to the violation of air emissions regulations, and the site was sold to DOE. As part of the Energy and Water Appropriations Act of 1984 (PL 98-50), DOE was directed to remediate the site. DOE purchased the Niagara Mohawk property bordering the NL site to the west in 1985 to assist the cleanup (USACE 2000). A chronology of remedial actions by DOE and USACE is provided in the Response Action Summary (Section 2.4).

From 1984 through 1997, DOE investigated the site and 56 VPs and initiated the remediation process. During that time, DOE remediated 53 of the VPs and demolished the buildings onsite under the authority of the Colonie Site Action Memorandum for Removal Action (DOE 1997).

In 1997, Congress transferred responsibility for FUSRAP investigation and remediation to the U.S. Army Corps of Engineers (USACE). In 2003, USACE completed the Remedial Investigation (RI) of groundwater (USACE 2003). In 2007, USACE completed the large-scale soil removal action at the main site and the three remaining VPs by excavating and disposing of 135,000 cubic yards of soil contaminated with radionuclides, metals, and VOCs offsite and then backfilling with clean soil (USACE 2010c). USACE completed the Final Colonie FUSRAP Site Colonie Main Site Soils Record of Decision in 2015 (USACE 2015b).

On April 9, 2010, the Groundwater ROD was signed by USACE. The selected remedy for management of site groundwater was MNA with temporary land use controls as an option if needed to limit potential exposure to groundwater contaminants until target concentration goals (TCGs) are achieved. The Groundwater ROD specified a 2- to 5-year enhanced data collection period to measure the progress and compliance status of the natural attenuation remedy. USACE initiated the groundwater monitoring program in November 2010, to measure the progress of MNA (USACE 2010b; USACE 2014a).

In August 2010, USACE performed a review of the 53 vicinity properties remediated by DOE in the 1980s to ensure that the residual concentrations met proposed applicable or relevant and appropriate requirements (ARARs). The conclusion of the review was that additional work was necessary at two vicinity properties (USACE 2010b) at 50 Yardboro Avenue and 1118 Central Avenue. Those properties were then addressed with additional sampling and limited soil removal (USACE 2012).

From 2011 to 2014, USACE investigated depleted uranium dust contamination within VP structures (USACE 2018b). All radioactive materials that were above the risk-based cleanup goals have been removed from federal property, VPs, and groundwater. No further action is required to address radiological soil contamination. However, metals contamination remains in subsurface soils in three specific inaccessible areas near utility infrastructure (Figure 2). These areas are managed by an environmental easement and Site Management Plan (DOE and USACE 2020).

The Vicinity Property ROD was signed on September 20, 2017 (USACE 2017b), subsequent to a public meeting held on February 1, 2017, for the Proposed Plan for this OU. This ROD declared No Action for dust and No Further Action for soil and other media for the vicinity properties.

The Site Closeout Report for the Colonie FUSRAP site (USACE 2018b) was finalized in June 2018. Issuance of the site closeout report initiated the transition process between USACE and LM, which culminated in transfer of long-term surveillance activities to LM in September 2019.

LM has continued the long-term monitoring (LTM) program. The LTS&M Plan was developed, and has been updated annually, to document the processes and requirements for the management of the site. The history of the site is presented on a timeline in Figure 3.

2.0 Background

2.1 Physical Characteristics

The site is an 11.2-acre vacant area located at 1130 Central Avenue (New York State Route 5) in the Town of Colonie, Albany County, New York (Figure 1). The site property is relatively flat and is fenced with gated access. The site is bounded by a wooded area and scrap yard to the west, Central Avenue to the north, and CSX Transportation Inc. (CSX) and National Railroad Passenger Corporation (Amtrak) railroad tracks to the south (Figure 2). A National Grid electrical substation occupies an area of approximately 0.15 acres at the northwest corner of the site. The site is currently zoned for industrial use by the Town of Colonie. The most probable future land use at the site was considered urban residential by USACE for the risk assessment (URS 2004a).

Clean fill material was placed at the Colonie main site during the soil removal action (USACE 2010c). Native soil layers underlie the clean fill and consist of the following units in descending order: dune sands, silts and sands, varved clays and silts, silt with some clay, and clay with limited interbedded silt and sand. (Figure 4). The uppermost silt and sand unit located below the dune sands represents the Upper Aquifer or water table at the site and is referred to as the Upper Silt. A distinct sequence of varved clay and silt unit identified as the Upper Clay lies directly beneath the Upper Silt, separating it from the underlying silt unit that contains some clay, referred to as the Lower Silt. The Lower Silt represents the Lower Aquifer at the site, which is semiconfined and overlies another distinct clay unit known as the Lower Clay. Groundwater at the site is typically encountered at a depth of less than 10 feet (ft) below ground surface (bgs) in monitoring wells completed in either water bearing zone. Groundwater flow direction in both silt units has consistently been to the south-southwest, as shown in Figure 5.

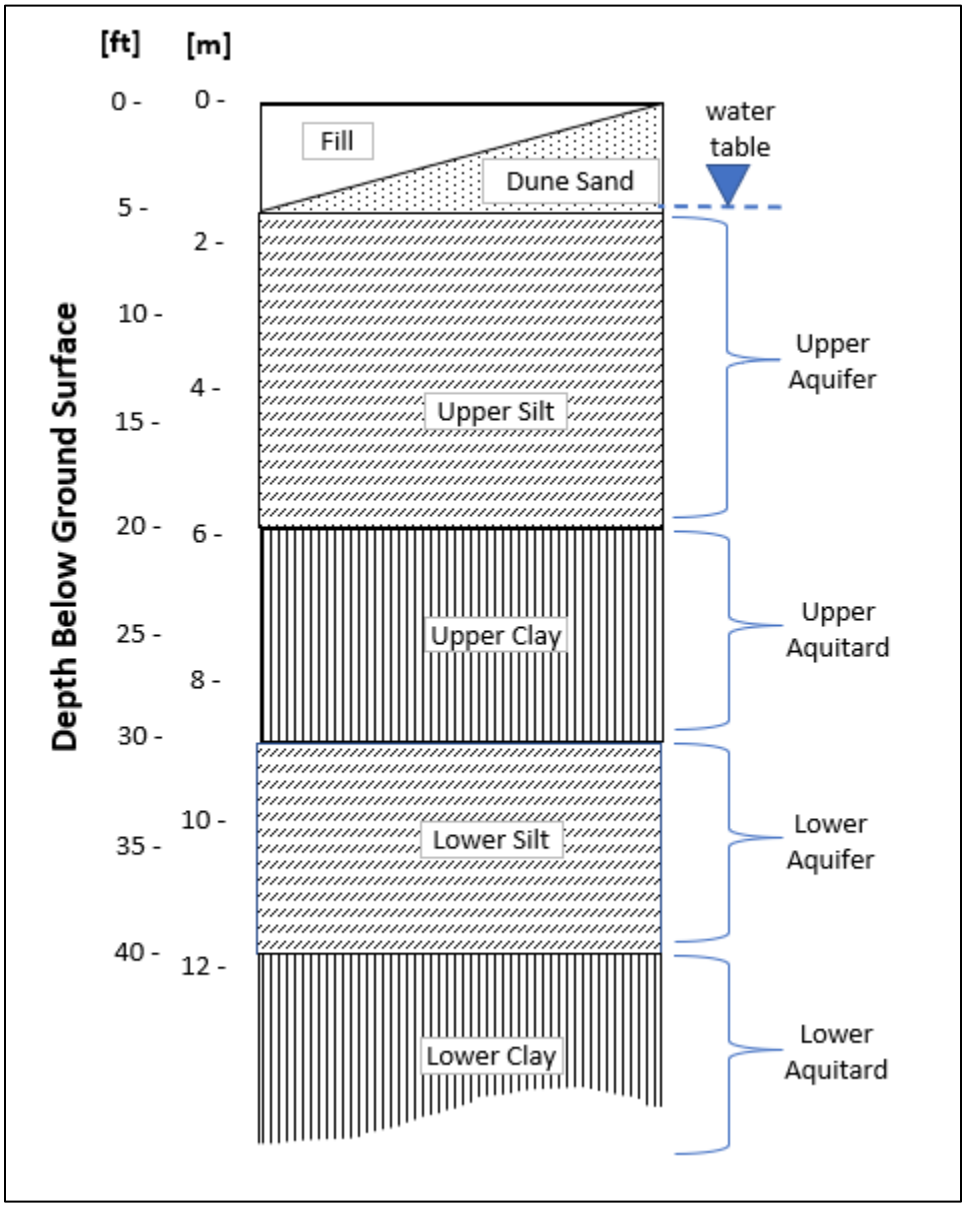


Figure 4. Geologic Cross Section

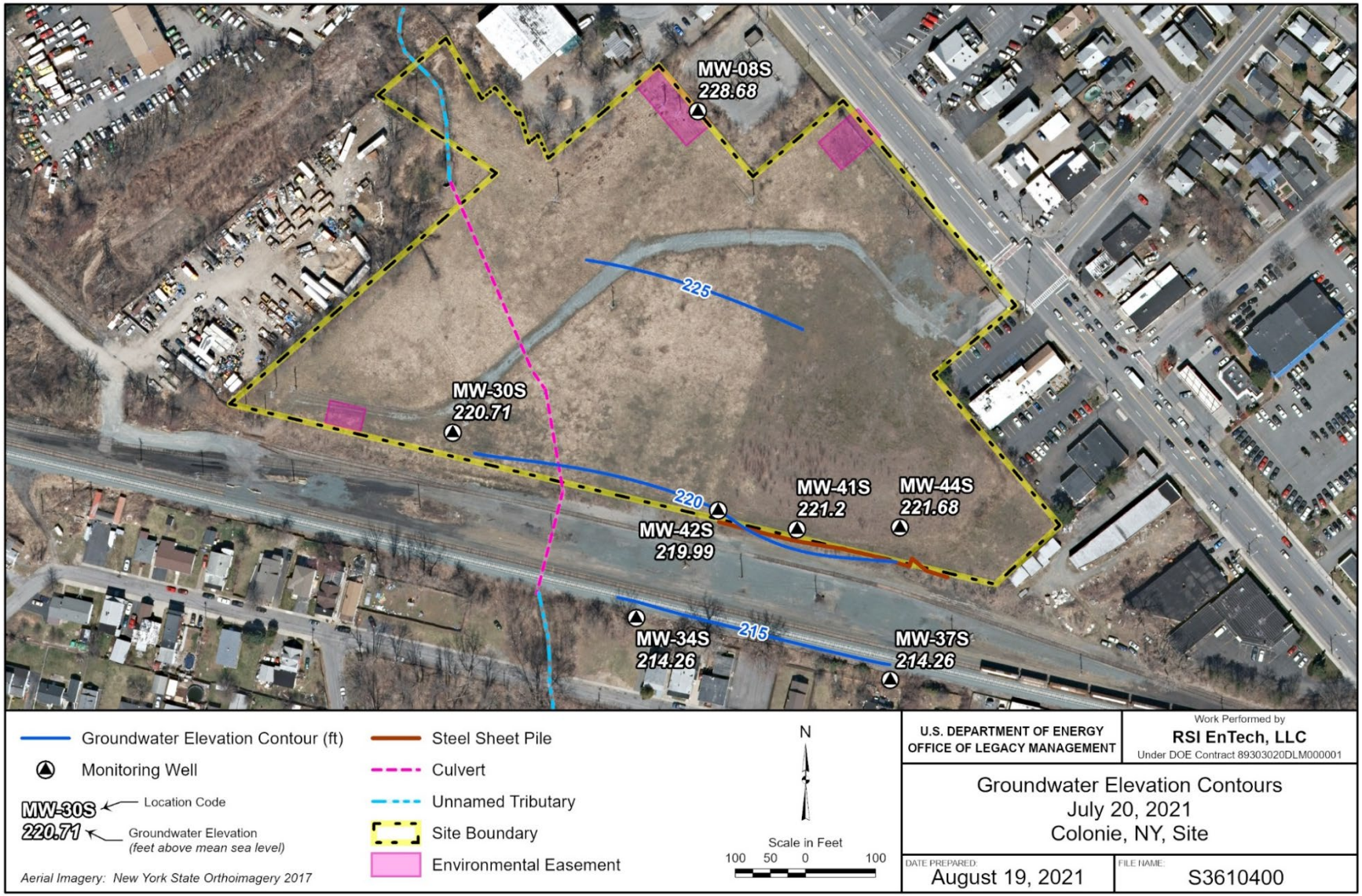


Figure 5. Colonie Site Groundwater Elevation Contours, July 2021

2.2 Land and Resource Use

The site was owned by the United States from February 1984 until January 2023. In January 2023, the site was sold to a private party. It was historically used for industrial operations and is currently vacant land. Land use surrounding the site is a mix of residential and commercial properties. CSX and Amtrak both operate railway lines adjacent to the site's southern border. A National Grid electrical substation occupies an area of approximately 0.15 acres at the northwest corner of the site. Groundwater in the vicinity of the site is not used as a potable source. Public water to surrounding residences and businesses is provided by the Latham Water District using a combination surface water from and wells near the Mohawk River (Colonie 2022).

2.3 History of Contamination

The site was used for manufacturing wood products and toys, and then converted to a brass foundry for manufacturing railroad components. National Lead purchased the facility in 1937 to conduct electroplating operations. Chemicals used in the plating operations included various acids, bases, metals, and degreasing solvents. National Lead also filled Patroon Lake with waste casting sand, and the lake was subsequently used for additional waste disposal through 1961. Sources for organic contamination were a burial site in the Patroon Lake area and chemical contamination of surfaces within a processing building. In addition, the nuclear division of National Lead began producing items manufactured from uranium and thorium under a license issued by the AEC beginning in 1958. The plant handled enriched uranium from 1960 to 1972. During that time, National Lead held several contracts to manufacture fuel from enriched uranium for use in experimental nuclear reactors.

Subsurface investigations of the native soil units and the groundwater zones present at the site revealed that historic activities resulted in contamination of soil and groundwater on the Colonie main site that included radiological, heavy metals, and VOCs contamination; VOCs were released into the Upper Aquifer through subsurface soils via infiltration, percolation, and spillage.

2.4 Previous Investigations and Response Actions

The Colonie site has undergone extensive investigations and response actions. The following list presents the key reports that document investigations and remedial actions performed at the site, including decision documents.

DOE Reports:

- *Certification Docket for the Remedial Action Performed at Colonie Site Vicinity Properties, 1984 and 1985* (DOE 1989a)
- Post-Remedial Action Report for the Colonie Site Vicinity Properties, 1988 (DOE 1989b)
- Certification Docket for the Remedial Action Performed at Site Vicinity Properties in Colonie and Albany, New York, 1988 (DOE 1990)
- *Characterization Report for the Colonie Site* (BNI 1992)

- *Engineering Evaluation/Cost Analysis (EE/CA) for the Colonie Interim Storage Site (CISS) Buildings* (DOE 1993)
- *Engineering Evaluation/Cost Analysis (EE/CA) for the Colonie Site* (DOE 1995)
- *Colonie Site—Action Memorandum for Removal Action* (DOE 1997)

USACE Reports:

- Phase I Geoprobe Groundwater Sampling Report (IT 1999)
- *Focused Site Investigation Report, Niagara Mohawk Power Station (NMPS)* (USACE 2000)
- Phase II Geoprobe Groundwater Sampling Report (IT 2001)
- Final Action Memorandum—Revising the February 14, 1997, DOE Action Memorandum: Soil Removal at the Colonie Site (USACE 2001)
- Final Groundwater Remedial Investigation Report (Shaw 2003)
- *Site Investigation Report for the Unnamed Tributary of Patroon Creek, Patroon Creek, and Three Mile Reservoir* (Shaw 2004)
- Final Human Health and Ecological Risk Assessments (URS 2004a; URS 2004b)
- Final Indoor Air Assessment Report (Shaw 2005)
- Engineering Evaluation/Cost Analysis (EE/CA) for the CSX Vicinity Property (USACE 2005)
- Final Indoor Air Data Assessment Addendum Report, 52 Yardboro (Shaw 2006)
- *CSX Vicinity Property Action Memorandum* (USACE 2006)
- Final Groundwater Feasibility Study (URS 2008)
- Final CSX Vicinity Property Report (USACE 2008a)
- Final Town of Colonie Vicinity Property Report (USACE 2008b)
- Distribution of Depleted Uranium Contamination in Colonie, New York, USA (Lloyd et.al. 2009)
- Final Post-Remedial Action Report (Shaw 2010)
- *Colonie FUSRAP Site Record of Decision, Colonie Site Groundwater* (USACE 2010a)
- Technical Memorandum Vicinity Property Assessment (USACE 2010b)
- *Investigation of Two Colonie FUSRAP Site Vicinity Properties* (USACE 2012)
- *Colonie FUSRAP Main Site Soils Remedial Investigation Summary Report* (USACE 2013a)
- *Confirmation Dust Sampling Report for the Colonie Vicinity Properties* (USACE 2013b)
- *Draft Final Report, CSX and 50 Yardboro Avenue Vicinity Property Closure, Colonie FUSRAP Site* (USACE 2013c)
- *2011–2012 Annual Long-Term Monitoring Report, Colonie FUSRAP Site* (USACE 2014)
- *Decommissioning Completion Report, Monitoring Wells and Piezometers, Colonie FUSRAP Site* (USACE 2015a)

- *Final Colonie FUSRAP Site Colonie Main Site Soils Record of Decision* (USACE 2015b)
- *2015–2016 Annual Report Long-Term Groundwater Monitoring, Natural Attenuation Remedy* (USACE 2016a)
- *Draft Final Colonie FUSRAP Site, Vicinity Property Operable Unit Remedial Investigation Summary Report* (USACE 2016b)
- *Vicinity Property Operable Unit Proposed Plan* (USACE 2017a)
- *Vicinity Property Operable Unit Record of Decision* (USACE 2017b)
- *Final Site Closeout Report for the Colonie FUSRAP Site* (USACE 2018a)
- *First Five-Year Review Report for Colonie FUSRAP Site Groundwater Operable Unit* (USACE 2018b)

DOE LM Reports:

- *Summary of the Condition Assessment Survey Report for the 2017 Inspection of the Colonie*, *New York, Site* (DOE 2018)
- LTS&M Plan, LMS/CLN/S13262 (updated 2019, 2020, 2021, and 2022)
- SMP (DOE and USACE 2020)
- 2020 Annual Inspection (DOE 2020a)
- Long-Term Groundwater Monitoring Report, 2020 (DOE 2020b)
- 2021 Annual Inspection (DOE 2021a)
- Long-Term Groundwater Monitoring Report, 2021 (DOE 2021b)

2.4.1 DOE Investigations and Response Actions

Before the transfer of the National Lead property to DOE in 1984, several radiological surveys were performed by National Lead including a survey of external radiation for the building and equipment as well as surface contamination at the National Lead facility.

In 1980, Teledyne Isotopes (Teledyne) conducted radiological surveys to ascertain radiological levels in vicinity property soils. Survey results indicated that uranium released into the air had settled on residential and industrial properties and structures and that most of the contamination was deposited in the direction of prevailing winds in the area (Teledyne 1980).

In October 1983, Oak Ridge National Laboratory (ORNL) began performing more detailed radiological surveys of the individual properties surrounding the NL plant to start identifying all locations where uranium contamination exceeded DOE remedial action guidelines.

The ORNL surveys identified 54 vicinity properties containing elevated levels of radioactive contamination that were designated for remedial action. Remedial action was conducted at 11 of these vicinity properties in 1984 and at 24 more in 1985. In 1988, remedial action was conducted at 16 of the 19 remaining properties; during this action, two additional properties (4 Maplewood Avenue and 16 Yardboro Avenue) were identified as contaminated and were subsequently designated and remediated, bringing the total number of designated vicinity properties to 56 and the total number of properties remediated in 1998 to 18 (ORNL 1988).

From 1984 to fall 1997, the site was managed by DOE. DOE investigated the main site and 56 vicinity properties and initiated the FUSRAP remediation process. Specifically, DOE performed the following response actions at the site: (1) investigated the vicinity properties, onsite structures, groundwater, and surface and subsurface soils; (2) developed a plan for removal of radiologically impacted soils; (3) performed remediation of 53 of 56 identified vicinity properties (DOE 1989a; DOE 1989b; DOE 1990); (4) removed onsite buildings; and (5) disposed of generated waste materials associated with these actions.

In February 1984, the Secretary of Energy accepted an offer from NL to donate the land, buildings, and equipment to DOE to help expedite the cleanup. In 1985, DOE acquired a portion of the Niagara Mohawk property bordering the Site on the north and northwest, and subsequently designated it as part of the Site. From 1984 to 1995, the Site was used for interim storage of radioactive materials removed from the vicinity properties (DOE 1989).

In 1992, DOE initiated actions to prepare the Main Site Building for cleanup, including preparation of the Engineering Evaluation and Cost Analysis (EE/CA) Report for the Colonie Interim Storage Site Building, (DOE 1993). In September 1995, an EE/CA (DOE 1995) to address cleanup of the Site was finalized. DOE then prepared the 1997 Action Memorandum (DOE 1997) that authorized partial excavation of soils with an engineered cap for Main Site soils.

From 1984 through 1988, groundwater samples were collected on a quarterly basis. Results of this sampling were published in annual environmental summary reports, which are available in the Administrative Record.

In 1984, 1985, and 1988, 53 of the 56 vicinity properties were remediated. The remaining three vicinity properties border the main site and were investigated and remediated during a subsequent removal action at the main site. Certification dockets were prepared by DOE attesting to the radiological status of the vicinity properties, and all contaminated materials from remediation activities were staged on the main site pending disposal. In 1985, DOE acquired a portion of the Niagara Mohawk property bordering the main site and subsequently designated it as part of the main site. In November 1992, DOE had prepared a *Characterization Report for the Colonie Site* (BNI 1992) documenting the results of field activities and outlining the nature and extent of contamination. From 1992 to 1996, the remaining NL buildings were demolished by DOE.

2.4.2 USACE Investigations and Response Actions

Response actions conducted by USACE under FUSRAP were subject to and conducted in accordance with CERCLA of 1980 (42 USC 9601 et seq.), as amended, and the NCP (40 CFR Part 300). USACE began assessing the status of the site in 1997. Plans for conducting remedial actions for each OU (i.e., Main Site Soils OU, the Groundwater OU, and Vicinity Property OU) at the site were prepared. Before the initiation of soil removal work, USACE reevaluated the remedial alternative (i.e., moderate excavation and cap and cover) selected by DOE. Due to uncertainties regarding implementability, physical constraints of the main site, and local community acceptance, USACE changed the preferred remedial alternative to large-scale excavation and disposal.

From 1999 to 2007, USACE completed a large-scale removal of soil at the Main Site, which included soil removal from the adjacent Town of Colonie Vicinity Property (USACE 2008b). In accordance with the removal action goals presented in the Final Action Memorandum (USACE 2001), USACE removed all radioactively contaminated soils exceeding cleanup criteria regardless of depth and excavated all accessible metals-contaminated soils exceeding criteria to a maximum depth of nine feet below original grade. USACE also removed soil containing VOC sources where they were encountered. Further details for the soil excavation are presented in Section 3.2.2.

Beginning in 1997, USACE conducted periodic groundwater monitoring to determine the nature and extent of radioactive and chemical constituents beneath the site. This included a phased groundwater investigation to determine the presence of VOC contamination and to delineate its vertical and areal extent in the groundwater.

The Groundwater RI conducted between 1999 and 2002 involved collection and analysis of groundwater samples from direct-push technology (Geoprobe) temporary sample points and from permanent monitoring wells. Surface water and sediment samples were also collected and analyzed as part of the RI.

USACE used a three-phased approach during the Groundwater RI to determine the nature and extent of VOC contamination in the groundwater, which was initiated by collecting groundwater samples from Geoprobe temporary sample points positioned in a grid configuration. The monitoring wells were installed based groundwater analysis results from the temporary sample points.

Analytical results from the Phase I through Phase III Geoprobe groundwater sampling indicated the presence of elevated levels of VOCs along the southern boundary of the site near the former location of the rear of the building. Sample results from monitoring wells installed in the Upper Aquifer identified the presence of elevated concentrations of VOCs. Total VOC concentrations in Upper Aquifer monitoring wells ranged from 27 to 2583 micrograms per liter (µg/L), based on the 2002 data. The RI data also indicated that groundwater in the Lower Aquifer was not impacted at concentrations above evaluation criteria. Results of the 1999 Phase I Geoprobe sampling were presented in the Phase I Geoprobe Groundwater Sampling Report (IT 1999). Results of the Phase II Geoprobe sampling were presented in the Phase II Geoprobe Groundwater Sampling Report (IT 2001). The results of the Phase III sampling are discussed in the Final Groundwater Remedial Investigation Report (Shaw 2003).

The Groundwater RI also identified the presence of tetrachloroethene (PCE) and the PCE breakdown products trichloroethene (TCE), *cis*-1,2-dichloroethene (cDCE), and vinyl chloride (VC) in the groundwater, which indicated that biodegradation processes were active. There is no record of historic use of either cDCE or VC at the site, thus their presence was attributed to biodegradation.

Information presented in the Groundwater RI indicated that VOC contamination expanded laterally from the source areas toward the railroad tracks and the unnamed tributary of Patroon Creek, consistent with the natural direction of groundwater flow (i.e., generally from northwest to southeast). The Upper Aquifer was also impacted by historic releases of radiological constituents.

2.5 Basis for Taking Action

2.5.1 Main Site Soil Operable Unit

Removal action activities for the Colonie FUSRAP Site were completed in accordance with Alternative 2B of the USACE Final Action Memorandum (USACE 2001). The initial Action Memorandum issued by DOE (DOE 1997) selected Alternative 3B (Moderate Excavation, offsite disposal, and onsite consolidation and cap). During the CERCLA review of Alternative 3B, USACE noted significant concern from both the community and NYSDEC. In coordination with NYSDEC, USACE reevaluated the alternatives and issued a revised technical memorandum selecting Alternative 2B (large scale excavation and offsite disposal). Based on characterization investigations, uranium, thorium, lead, and copper were the contaminants found to be present above the risk-based cleanup goals and were therefore the drivers of the response action (Shaw 2010).

2.5.2 Groundwater Operable Unit

The Human Health Risk Assessment (HHRA) (URS 2004a) evaluated onsite and offsite groundwater results and identified the following chlorinated VOCs as COCs: PCE, TCE, and their degradation products cDCE and VC.

The HHRA identified and quantified two potential residential exposure pathways: (1) groundwater consumption through domestic use, and (2) vapor intrusion of VOCs into buildings.

The first pathway, domestic groundwater consumption, was determined to be an incomplete pathway for VOCs and radiological constituents both onsite and offsite because groundwater in the vicinity of the site is not used as a potable source. Public water to surrounding residences and businesses is provided by the Latham Water District using a combination surface water from and wells near the Mohawk River (Colonie 2022). The other potentially complete exposure pathway was inhalation of VOC vapors that could volatilize from the groundwater and migrate via vapor intrusion into residential buildings for both onsite and offsite receptors. The onsite pathway was not complete at the time the HHRA was conducted but could be complete in the future if the site is ever declared suitable for residential use.

The potential for VOC vapor intrusion into offsite residences was evaluated by conducting multiple rounds of indoor air samples to fully assess the offsite pathway at potential receptor locations. All exposure pathway risks related to the intrusion of volatile chemicals and resultant indoor air concentrations were estimated using the EPA spreadsheet version of the Johnson and Ettinger (J&E) vapor intrusion model (EPA 2004).

Results of the HHRA and subsequent modeling in support of the Groundwater Feasibility Study (URS 2008) indicated that exposure to COCs (i.e., chlorinated VOCs) in the site groundwater under a hypothetical future onsite urban resident scenario via the vapor intrusion pathway may result in unacceptable risks (i.e., greater than the 10^{-4} and 10^{-6} risk range deemed protective in the NCP).

3.0 Remedial Actions

3.1 Remedy Selection

3.1.1 Main Site Soils OU

Extensive onsite soil removal was completed as a response action (discussed in Section 3.2.2) before signing of the Main Site Soils ROD. The onsite soil removal effectively removed radioactive, metals, and VOC contamination from the Main Site Soils. The soil removal action also addressed the directly adjacent Town of Colonie Vicinity Property.

The Main Site Soils ROD (USACE 2015b) was issued by USACE on March 26, 2015. USACE established Remedial Action Objectives (RAOs) for the Main Site Soils to eliminate or minimize potential human exposure to soil impacted by FUSRAP-related contaminants identified as exceeding the standards established in ARARs and site-specific remediation goals. Specifically, the RAOs were designed to prevent direct contact with site soils that remained in place following onsite soil removal due to their inaccessibility, which present a possible future risk to receptors.

The USACE identified three discrete soil locations that were inaccessible due to their proximity to active rail lines, utility power poles, or water lines, and thus were not excavated. The three areas shown in Figure 2 are subject to the following soil RAOs:

- Prevent direct contact with soil having arsenic concentrations in excess of an arithmetically determined mean background concentration of 7.4 milligrams per kilogram (mg/kg)
- Prevent direct contact with soil having lead concentrations exceeding 450 mg/kg, which would result in unacceptable risks due to lead blood levels above 10 micrograms per deciliter (µg/dL)

The selected remedy, presented in the ROD as "Alternative 2 (ICs)," was preferred over other alternatives because ICs are effective in both the short and long term in protecting the public and workers from onsite exposures, and are expected to manage risk in the most cost effective and easily implemented manner. ICs provide measures to prevent potential future onsite exposure to residual soil contaminant concentrations at depth through the placement of environmental easements. These easements will prohibit soil excavation at the three discrete locations found to present an unacceptable risk.

3.1.2 Groundwater OU

The Colonie Groundwater OU ROD was signed on April 9, 2010 (USACE 2010a). As a part of the remedy selection process in the Groundwater ROD, RAOs were developed to address the VOC-contaminated groundwater while considering the long-term goals of protecting human health and the environment and meeting ARARs of federal and state laws and regulations.

The Groundwater RAOs are:

- Limit exposure of potential future onsite urban residents to VOC constituents that may migrate into homes via the vapor intrusion pathway.
- Reduce the concentrations of VOCs in onsite groundwater to levels that are protective of future onsite urban residents who may be exposed to these compounds via the vapor intrusion pathway.

The ROD remedy is expected to reduce the excess cancer risk due to inhalation of vapors intruding into an onsite residence to less than 1 in 1 million (1×10^{-6}). This risk reduction will be achieved by lowering the concentrations of groundwater contaminants to the following TCGs:

- PCE: 5.5 µg/L
- TCE: 18 µg/L
- cDCE: 1800 µg/L
- VC: 1.4 µg/L

The selected remedy for groundwater in the ROD was MNA with ICs. The major components of the remedy are:

- A 2- to 5-year enhanced data collection period to assess the rate of natural attenuation processes and to document that geochemical conditions have returned to a state of equilibrium.
- At the end of the data collection period, MNA progress to be assessed to refine time frames. Subsequent LTM to be implemented as necessary until compliance with the TCGs has been achieved. The time frame for compliance has been estimated at 15 years.
- Temporary ICs to be utilized as appropriate to limit potential future onsite residential exposure to groundwater contaminants until the TCGs are achieved. In addition, restrictions on well drilling or groundwater pumping activities to ensure that groundwater is not used for potable or irrigation purposes.
- The remedial action will be considered complete and monitoring will be discontinued when compliance with the TCG concentrations have been achieved for all onsite monitoring wells included in the monitoring program. If during the monitoring period, measured concentrations in any well reach, and are maintained below the TCG concentrations for four consecutive quarters, the well will be removed from the monitoring program.

3.2 Remedy Implementation

3.2.1 Regulatory Framework Related to Remedy Monitoring and Maintenance

- **CERCLA and the NCP:**

  This LTPR is the functional equivalent of the FYRs required under CERCLA and the NCP. This LTPR meets the LTS&M Plan requirement for completion of a LTPR for both the Main Site Soils OU (First FYR) and the Groundwater OU (Second FYR). In accordance with the processes of CERCLA (42 USC 9601[c]) and the NCP (40 CFR 300.430[f][4][ii]), if a remedial action is selected that results in any hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for UU/UE, the lead agency must

review such action every 5 years after the initiation of the selected remedial action. USACE completed removal actions for the Main Site Soils OU in 2007 and completed the Main Site Soils ROD, which was signed in March 2015. The *Final Site Closeout Report for the Colonie FUSRAP Site* (USACE 2018b) identified that the First FYR report for the Main Site Soils OU would be submitted in 2023. USACE completed its First FYR report of the Groundwater OU in October 2017 (USACE 2018a) with the next review identified for 2022.

- **National Environmental Policy Act:**

  The National Environmental Policy Act (NEPA) Public Law 91-190 (PL 91-190) requires federal agencies to assess the impacts that federal actions may have on the quality of human health and the environment.

- ***New York Environmental Conservation Law* (NYECL):**

  An environmental easement is used as an IC to protect humans from the risk of exposure to residual subsurface contamination. The environmental easement was recorded by the Albany County Clerk on June 12, 2020. NYECL 71-36 provides the requirements for environmental easements. The easement is granted to the State of New York through NYSDEC, and by the United States through LM, and will convey with the deed upon transfer of site ownership. An SMP is required by the NYECL for the monitoring and maintenance of the environmental easement.

- **New York Environmental Remediation Regulations:**

  The Soil and Groundwater RODs state that NYSDEC provides oversight of long-term groundwater monitoring and soil easement. The groundwater LTM program (described in Section 3.2.3) is designed to conform with the NYSDEC program policy *Technical Guidance for Site Investigation and Remediation* (DER-10).

- **New York Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations:**

  New York ambient water quality standards are codified in Title 6 *New York Codes, Rules and Regulations* Part 703 (6 NYCRR 703). These standards do not apply to the Colonie groundwater remedy because USACE developed risk-based TCGs in compliance with CERCLA. New York standards are relevant to produced groundwater, such as excess water generated from groundwater sampling and purged well redevelopment water. NYSDEC allows release of produced groundwater to the ground surface if it meets the ambient groundwater quality standards and if it is not allowed to run into surface water or storm drains. The *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351) includes a program directive for the site that specifies how purge water is to be filtered through granular activate carbon to achieve the discharge standards before releasing it to the ground surface.

3.2.2 Main Site Soils Remedial Actions

Soil removal activities at the Main Site (including the adjacent Town of Colonie Vicinity Property) were completed by USACE in accordance with the Revised Action Memorandum (USACE 2001). Removal activities were first initiated by USACE in 1999 and were based upon the results of a 1995 DOE EE/CA report and the original DOE Action Memorandum (DOE 1995; DOE 1997). The DOE EE/CA and Action Memorandum document the selected "Alternative 3B, Moderate Excavation and Cap and Cover." Due to subsequent uncertainties

regarding implementability, physical constraints of the main site and local community resistance, USACE reevaluated the alternative when it assumed FUSRAP responsibility from DOE. Subsequently, USACE revised the DOE Action Memorandum to document the selection of "Alternative 2B, Large-Scale Excavation and Disposal" (rather than Alternative 3B). The USACE Revised Action Memorandum (USACE 2001) also provided revised cleanup criteria for metals and radiological constituents, which are listed in Table 1.

Table 1. Selected Soil TCGs

Contaminant	TCG
Uranium-238	35 pCi/g[a]
Thorium-232	2.8 pCi/g[a]
Arsenic	7.4 mg/kg
Copper	1912 mg/kg
Lead	450 mg/kg

Note:
[a] Net concentrations above background.

Abbreviations:
mg/kg = milligrams per kilogram
pCi/g = picocuries per gram

In accordance with the removal action goals specified in the USACE Revised Action Memorandum (Table 1), USACE removed all radioactively contaminated soils exceeding cleanup criteria regardless of depth and excavated all accessible metals-contaminated soils exceeding criteria to a maximum depth of 9 ft bgs. USACE also removed soil containing VOC sources where they were encountered. These excavations generally extended to a maximum of 5 ft below the surface of the water table, which accelerated the cleanup of groundwater.

Once USACE determined that a soil excavation unit was clean, and after obtaining NYSDEC concurrence for each final status survey unit, the area was backfilled with certified clean fill material and restored (e.g., graded and seeded). Due to the unanticipated depth of radiologically contaminated soils adjacent to the active CSX rail line, vertical sheet piling was installed to depths of as much as 50 ft bgs to facilitate remediation and to ensure the structural integrity of the active CSX rail line.

Once soil removal was completed, the requirements specified in the Multi-Agency Radiation Survey and Site Investigation Manual (NRC 2021) were applied to conduct final status survey for the main site. The final status survey is a detailed systematic sampling approach designed to obtain sufficient sample information to demonstrate that potential doses from remaining levels of radioactivity are below the cleanup criteria for each survey unit. USACE designated the entire site a Class 1 survey unit area. Class 1 survey unit areas are considered contaminated and require the highest degree of survey effort. USACE then performed a final status survey at each of the 27 individual Class 1 survey units as a means of demonstrating compliance with the soil cleanup criteria.

The individual results for metals were also compared to the appropriate cleanup criteria. In those cases where elevated individual sample results were above the criteria, the sample result was

averaged with the adjacent two samples to determine if the average was above or below the cleanup criteria. If the average of the three samples was less than the cleanup criteria, the NYSDEC would require no further action in that portion of the unit (Shaw 2010).

Residual soil concentrations for uranium-238 and thorium-232 satisfied the ARAR-based cleanup criteria of 35 picocuries per gram (pCi/g) and 2.8 pCi/g, respectively, for current and future use of the property that would allow UU/UE. All average residual concentrations for individual metal constituents also satisfied the risk-based cleanup criteria from 0 to 9 ft bgs.

Four individual soil samples from inaccessible locations up to 9 ft bgs exceeded the metals cleanup criteria, as shown in Table 2.

Table 2. Soil Samples Exceeding TCGs

Survey Unit	Sample No.	Depth (ft bgs)	Analyte [TCG]	Arsenic [7.4]	Copper [1912]	Lead [450]
SU104	CFS-104-002	1.82		**85.4**	234	232
SU109	CFS-109-009	2.4		**10.5**	895	**630**
SU124	CFS-124-011R	5.3		3.1	**2450**	**734**
North Lawn	CFS-NLF-012R	3.9		7.3	**4340**	**3370**

Reference: Final Post Remedial Action Report (Shaw 2010).
Notes:
Boldface values indicate exceedances. All concentrations are mg/kg.

The risk assessment of survey unit SU109 determined that there is no unacceptable risk associated with the residual contamination. In accordance with the Main Site Soils ROD, an environmental easement was instituted for the Survey Unit 104 Easement Area, Survey Unit 124 Easement Area, and the North Lawn Easement Area to prevent excavation of these areas.

Detailed information regarding site soil excavation activities can be located in the post-remedial action report (Shaw 2010). USACE completed the excavation and offsite disposal of soils from the main site in 2007 (URS 2008). A total of 135,244 cubic yards of soil was excavated from the main site (including the Town of Colonie vicinity property).

3.2.3 Groundwater Remedial Actions

As described in the Groundwater ROD, the requirement for an LTM program was identified to assess the groundwater remedy. USACE conducted the monitoring program from November 2010 until April 2017. Sampling frequencies were determined by statistical analysis of the groundwater data and has gradually changed from quarterly to annually to biennially. Well logs and construction details of the existing wells are included in Appendix B. Appendix C provides a historical groundwater data summary table that incorporates all VOC, radiological, MNA, and field data obtained over the previous LTM events from 2010 to 2020.

Monitoring wells and piezometers that were no longer used in groundwater LTM were decommissioned from July to August 2015, as reported to NYSDEC in the *Decommissioning Completion Report, Monitoring Wells and Piezometers, Colonie FUSRAP Site* (USACE 2015a).

The effort included the decommissioning of all Lower Aquifer monitoring wells. In addition, Upper Aquifer well MW-32S was decommissioned in September 2022. This well has been in compliance since the August 2015 event. This well was removed from the groundwater LTM program following the August 2016 sampling event because constituent concentrations were believed to be unrepresentative of local groundwater conditions due to a stagnating effect caused by the nearby (and just upgradient) sheet pile wall.

Each monitoring event was documented by data summary reports that were transmitted by USACE to NYSDEC. Annual reports were also prepared to evaluate remedy progress and status. The LTM program evolved through optimization via stepwise reductions in the number of monitoring wells, constituents analyzed, groundwater zones monitored, and frequency of sampling based on remedy progress. A summary of LTM program optimization is provided below.

2010–2015 LTM program: The 2-year demonstration period was completed in 2012, after which, the LTM program was revised by reducing the number of wells being sampled, the number of constituents being analyzed, and the frequency of sampling (Shaw 2012).

2015–2016 LTM program modifications: The 2015–2016 annual sampling report recommendations were to:

- Continue monitoring semiannually for 2 years.
- Sample monitoring well MW-08S annually for VOCs to continue monitoring upgradient groundwater conditions.
- Sample monitoring wells MW-30S, MW-34S, MW-37S, MW-41S, MW-42S, and MW-44S semiannually for VOCS and annually for MNA parameters.
- Discontinue sampling at monitoring well MW-32S and decommission the well.
- Discontinue sampling for uranium.

The monitoring events of August 2016 and April 2017 were performed under the optimized LTM program based on the recommendations from 2015–2016 annual sampling report (USACE 2017b). NYSDEC preferred that monitoring well MW-32S be removed from the program but not be decommissioned because it could be relied on as a contingency for groundwater data. The well was decommissioned in 2022 when LM demonstrated that permitting costs and risk of aquifer cross-contamination outweighed the potential value of the well as a contingent data source.

2016–2017 LTM program modifications: The USACE 2016–2017 annual LTM report stated that a direct comparison of VOC results to TCGs and the graphic representation of these results over time clearly demonstrate that the MNA remedy is making progress toward TCG compliance. The report showed:

- Three monitoring wells (MW-08S, MW-37S, and MW-42S) showed no detections of any of the COCs above respective TCGs during the monitoring period.
- One monitoring well (MW-30S) had no exceedances of TCGs for the last four monitoring events.
- One monitoring well (MW-34S) showed no exceedance during the last monitoring event.

- Two monitoring wells (MW-41S and MW-44S) had one VOC (i.e., PCE) that exceeded its TCG.

The report recommended that LTM be conducted every 2 years with the following monitoring specifics:

- Continue sampling the seven active wells for PCE, TCE, cDCE, and VC concentrations
- Retain monitoring well MW-08S as an upgradient control well
- Sample onsite monitoring wells MW-30S, MW-41S, MW-42S, and MW-44S to bound the plume
- Sample monitoring wells MW-34S and MW-37S to continue monitoring downgradient groundwater conditions

2020 LTM Program Modifications: USACE transferred the site to LM in September 2019, and LM conducted a sampling event in July 2020. NYSDEC requested a 2021 sampling event take place in order for future events to match the previously established schedule. LM sampled each well for a suite of MNA parameters and well stability parameters and determined that geochemical conditions were similar to previous measurements. The report recommended the following specifics:

- Redevelop wells before each sampling event
- Continue sampling for well stabilization parameters and VOCs
- Remove the lodged pump from well MW-44S
- Decommission offsite well MW-32S; NYSDEC did not concur with decommissioning well MW-32S

2021 LTM Program Modifications: LM conducted a sampling event in July 2021. The results indicated that contaminant concentrations continued to decline. Steadily decreasing groundwater turbidities indicated that well redevelopment was no longer warranted. The following program modifications were recommended:

- Cease well redevelopment activities
- Sample groundwater every 2 years
- Continue sampling for well stabilization parameters and VOCs; sampling for MNA parameters is no longer warranted
- Offsite well MW-32S (on CSX property) should be decommissioned because right-of-entry costs are high and potential damage to the well exposes the government to environmental risks; NYSDEC concurred with decommissioning well MW-32S

3.3 Institutional Controls

The Main Site Soils ROD mandates the placement of ICs in the form of an environmental easement on the three easement areas shown in Figure 2 and described in Section 3.1.1. A risk assessment performed in 2004 (URS 2004a) determined that these areas contained soil that posed excess risk to human health. The North Lawn Easement Area and Survey Unit 124 Easement Area subsurface soil posed excess risk to children due to lead exposure and Survey Unit 104

Easement Area subsurface soil posed excess risk to residents due to arsenic exposure. The residual contamination did not pose unacceptable risk to a future worker.

The Groundwater ROD mandates that ICs are to be used to ensure that the property is safe for future residential land use by limiting potential exposure of hypothetical future onsite residents to groundwater contamination via the vapor intrusion pathway.

ICs are incorporated into an environmental easement to ensure that the property is safe for its intended future use. The ICs are also detailed in the SMP (DOE and USACE 2020).

The environmental easement contains nine ICs:

1. The soil easement areas, as further identified in Appendix D, Schedule A (of the SMP), may be used for "Restricted Residential" as described in 6 NYCRR 375-1.8(g)(2)(ii), "Commercial" as described in 6 NYCRR 375-1.8(g)(2)(iii), and "Industrial" as described in 6 NYCRR 375-1.8(g)(2)(iv).
2. No digging or excavation shall be permitted in the soil easement areas without prior written approval of DOE and NYSDEC.
3. Vegetable gardens and farming are prohibited in the soil easement areas.
4. The use of groundwater underlying the site, as described in Appendix D, Schedule B (of the SMP), is prohibited without necessary water quality treatment as determined by the New York State Department of Health (NYSDOH) or the Albany County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from NYSDEC.
5. The potential for vapor intrusion must be evaluated for any buildings designed for occupancy on the site, as described in Appendix D, Schedule B (of the SMP), and appropriate actions to address exposures must be implemented.
6. Data and information pertinent to site management must be reported at the frequency and in a manner as defined in the SMP.
7. All future activities that will disturb remaining contaminated material must be conducted in accordance with the SMP.
8. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP.
9. Maintenance, monitoring, inspection, and reporting of any physical component of the remedy shall be performed as defined in the SMP.

4.0 Progress Since Last Review

This section addresses progress in addressing issues or recommendations made during previous LTPRs.

4.1 Main Site Soils OU Remedy

This is the first LTPR of the Main Site Soils OU. Therefore, there are no previous issues or recommendations concerning the remedy to address.

4.2 Groundwater OU Remedy

USACE issued the First FYR for the Colonie Groundwater OU in January 2018. The protectiveness statement from the First FYR was:

> The groundwater remedy at the Site is protective of human health and the environment.
>
> The remedy remains protective since both RAOs are currently being met for Site groundwater. That is, the first RAO is met since exposure to future onsite urban residents to VOC constituents that could migrate into homes via the vapor intrusion pathway is currently a nonexistent pathway because land-use is not residential and there are no homes on the Site property. The second RAO is being met by MNA which demonstrates that VOC concentrations have steadily declined and will likely continue until TCGs are attained likely over the next ten years.
>
> Note that no new pathways have been identified since MNA has been initiated. Domestic groundwater consumption is a pathway that was considered but dismissed for two main reasons. Direct groundwater consumption is not a viable pathway because the Upper Groundwater Zone does not yield sufficient quantities of water for daily use, nor is the groundwater from this zone considered potable because of the high percentage of solids carried by the groundwater.

No issues related to current site conditions or activities were identified during the First FYR that prevented the remedy from being protective then or in the future.

4.3 Vicinity Property OU Remedy

USACE issued the Vicinity Property OU ROD in January 2017 (USACE 2017b), which presented the final determinations for the management of soil and dust contamination located on the vicinity properties. The Groundwater ROD addresses groundwater both onsite and offsite. Previous removal actions (with the exception of dust) conducted by the DOE and the USACE for all of the vicinity properties have proved to be protective of human health and the environment and have eliminated the need for additional remedial action. The USACE has determined that removal actions conducted to date at the vicinity properties for soil allow for the properties' unrestricted release (i.e., cleanup action complete and property suitable for reuse with no requirements for land use restrictions or controls as documented in the *Technical Memorandum Vicinity Property Assessment, Colonie FUSRAP Site, Colonie, New York Site* (USACE 2010b). Dust sampling results for residential and commercial vicinity properties showed that uranium was detected above background concentrations; however, in accordance with CERCLA and the NCP, the concentrations do not pose an unacceptable risk to current and future residents and workers.

The soils recommendation for the Colonie FUSRAP vicinity properties is No Further Action.

The dust recommendation for the Colonie FUSRAP vicinity properties is No Further Action.

RAOs have been met for all media (i.e., soil and dust) addressed within the Vicinity Property OU. As such, a LTPR is not required for the Vicinity Property OU under CERCLA. No evaluation of the Vicinity Property OU remedy was performed for this LTPR.

5.0 LTPR Process

5.1 Administrative Components

The process for conducting the LTPR includes administrative planning (e.g., identifying the review team, developing a schedule), community notification, document and data review, a site inspection, and interviews. Administrative planning activities were completed by August 2020. The following subsections contain findings from the remaining activities.

5.2 Community Notification and Involvement

A public notice of this LTPR was published in the Albany *Times Union* newspaper on Monday, July 11, 2022. The notice stated that this LTPR was underway. Another public notice will be published when the LTPR is complete and available for public review on the Colonie Site webpage. A copy of the public notice and certification of publication is included as Appendix D.

5.3 Document Review

Project documents and data were reviewed to form the basis of the technical assessment of remedy protectiveness, which compares actual site conditions to the protectiveness requirements set forth in the decision, design, and implementation phases of the project.

In addition to documents cited in Section 5.3, documents and data reviewed in this LTPR include:

- The 2020, 2021, and 2022 annual site inspection reports (DOE 2020a, DOE 2021a, DOE 2022a)
- The 2020 and 2021 long-term groundwater monitoring reports (DOE 2020b, DOE 2021b)

5.4 Data Review

5.4.1 Main Soils OU

The Main Site Soils ROD remedy mandates the placement of ICs in the form of an environmental easement on the three easement areas shown in Figure 2 and described in Section 3.1.1. Extensive onsite soil removal was completed as a response action before signing of the Main Site Soils ROD. This action effectively removed radioactive, metals, and VOC contamination from the Main Site Soils OU. The soil removal action also addressed the directly adjacent Town of Colonie vicinity property. The USACE identified three discrete soil locations (i.e., the subsequent three easement areas) that were inaccessible due to their proximity to active rail lines, utility power poles, or water lines, and thus were not excavated.

No further soil sampling of these areas was required by the Main Site Soils ROD. Therefore, there are no new soils data during this review period.

5.4.2 Groundwater OU

The Groundwater OU remedy requires a LTM program for site groundwater, as described in Section 3.1.2. LM assumed the LTM program for site groundwater that was initiated by USACE upon finalization of the Groundwater ROD. The procedures and specifications of the LTM program are specified in the LTS&M Plan. Groundwater was sampled by LM in 2020 (DOE 2020b) and 2021 (DOE 2021b). The next sampling event is planned for 2023.

Project documents and data were reviewed to form the basis of the technical assessment of remedy protectiveness. This assessment compares actual site conditions to the protectiveness requirements established in the decision, design, and implementation phases of the project. This section presents a review of data relevant to the groundwater COCs (i.e., the chlorinated VOCs PCE, TCE, cDCE, and VC) as required by the Groundwater ROD (USACE 2010a). These four COCs must meet TCGs to conclude the LTM program. Specifically, a comparison of these COCs to TCGs is presented for each monitoring well to evaluate remedy performance and protectiveness. The analytical chemistry results as presented in the periodic groundwater LTM reports were deemed to be of adequate quality and therefore usable for reliable decision making to meet the project-specific data quality objectives.

The following sections present (1) a summary of groundwater analytical results for the COCs, (2) a summary of changes in concentrations of the COCs in groundwater over time and distance, (3) a comparison of VOC concentrations in groundwater to TCGs, (4) a summary of groundwater geochemical indicators, and (5) an evaluation of the groundwater monitoring well network.

5.4.3 Evaluation of the Groundwater Monitoring Well Network

The following discussion reviews the utility of each monitoring well:

- **MW-08S:** This upgradient well serves to assess upgradient influences and defines the gradient across the site
- **MW-30S:** This onsite well shows groundwater conditions near the former landfill location
- **MW-34S:** This offsite downgradient well serves as a sentinel well to demonstrate that contaminant migration is not occurring
- **MW-37S:** This is another sentinel well downgradient from the former building location; there has not been a TCG exceedance at this well
- **MW-41S:** This well assesses contaminant concentrations from the former building's source zone; it exhibits decreasing PCE concentrations above the TCG
- **MW-42S:** This well assesses contaminant concentrations from the former building's source zone; the four COCs are below their TCGs in this well, and concentrations continue to decrease. This well serves a redundant purpose to well MW-41S
- **MW-44S:** This well assesses contaminant concentrations from the former building's source zone; contaminant concentrations were not detected during the last two sampling events

5.4.4 Groundwater VOC Analysis Results

The presence of PCE breakdown products—TCE, cDCE, VC and finally the mineralization of VC in site groundwater—shows that PCE and its breakdown products are being degraded by the reductive dechlorination processes. As shown in Table 3, of the 28 VOC analysis results from the last sampling event (July 2021), 17 (60%) were not detected.

Wells with exceedances of the TCGs have decreased from three wells in 2010 to only a single well in 2021. On average, PCE concentrations have decreased by approximately 50% since the ROD was issued in 2010. PCE concentrations are 33% of 2010 concentrations, whereas VC concentrations are 62% of 2010 concentrations. Average cDCE concentrations have increased by a factor of nearly 2 since 2010 but remain less than 1% of the cDCE TCG.

- **Well MW-08S:** To date, this upgradient well has had no detections of VOCs during the LTM Program.
- **Well MW-30S:** This onsite well from near the filled-in former Patroon Lake had a PCE concentration of 2.88 micrograms per liter (µg/L) in July 2021 compared to 6.67 µg/L in July 2020. TCE, cDCE, and VC were not detected in July 2021.
- **Well MW-34S:** This offsite downgradient well had detections of PCE, cDCE, and VC near their detection limits in July 2021 and TCE was not detected This well had previous exceedances for VC until 2017. VOC concentrations in July 2021 are on average 50% lower than in November 2010.
- **Well MW-37S:** This offsite downgradient well had PCE, TCE, and VC concentrations either at or near their detection limits. The 2021 cDCE concentration is higher than the 2010 concentration by a factor of approximately 2, but the 2021 concentration is only 2% of the TCG.
- **Well MW-41S:** This onsite well near the former building location had PCE and TCE concentrations in 2021 that were approximately 50% of 2010 concentrations, while cDCE and VC concentrations are stable or elevated when compared to the 2010 concentrations. Well MW-41S has the only remaining analyte in exceedance of the TCGs; the PCE concentration was 12.7 µg/L in July 2021 compared to the TCG of 5.5 µg/L. The PCE concentration was 26.0 µg/L in November 2010.
- **Well MW-42S:** No COCs exceeded the TCGs in this onsite well near the former building in July 2021. cDCE was detected at a at a low concentration, while PCE, TCE, and VC were not detected. The cDCE concentration was 5.31 µg/L in July 2021 compared to 4.3 µg/L in November 2010. The cDCE concentration exceeded the New York groundwater quality standard of 5 µg/L but was well below the 1800 µg/L TCG.
- **Well MW-44S:** In July 2021, concentrations of PCE, TCE, cDCE, and VC were not detected in both the primary and duplicate sample collected from this onsite well near the former building location. The well was installed in 2015 and had PCE concentrations above the TCG in 2016 and 2017. However, PCE was not detected in 2020 and 2021.

The distribution of COCs in site groundwater during the July 2021 sampling event, is shown in Figure 6. Historical aqueous VOC data are included as Appendix C.

Table 3. VOC Analysis Summary

Well	Analyte	TCG [µg/L]	Sample Dates																							
			11/2010		3/2011		5/2011		8/2011		2/2012		5/2012		8/2012		8/2015		3/2016		8/2016		4/2017		7/2020		7/2021	
			Result [µg/L]	Q	Result [µg/L]	Q	Result [µg/L]	Q	Result [µg/L]	Q	Result [µg/L]	Q	Result [µg/L]	Q	Result [µg/L]	Q	Result [µg/L]	Q	Result [µg/L]	Q	Result [µg/L]	Q	Result [µg/L]	Q	Result [µg/L]	Q	Result [µg/L]	Q
MW-08S	PCE	5.5	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NS		1.0	U	1.0	U	0.333	U	0.333	U
	TCE	18.0	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NS		1.0	U	1.0	U	0.333	U	0.333	U
	cDCE	1800	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NS		1.0	U	1.0	U	0.333	U	0.333	U
	VC	1.4	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NS		1.0	U	1.0	U	0.333	U	0.333	U
MW-30S	PCE	5.5	**5.6**		4.7		3.6		4.4		4.5		4.6		**6.0**		2.8		1.5		3.9		3.1	J	**6.67**		2.88	
	TCE	18.0	1.4		1.1		0.5	J	1.6		1.7		1.6		2.4		1.6		0.52	J	1.2		1.0	U	1.54		0.333	U
	cDCE	1800	0.56	J	0.67	J	1.0	U	1.3		1.4		1.3		2.3		2.0		0.76	J	0.96	J	1.0	U	0.54	J	0.333	U
	VC	1.4	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	0.333	U	0.333	U
MW-34S	PCE	5.5	0.96		0.75	J	0.66	J	0.71	J	0.70	J	0.72	J	0.73	J	0.45	J	0.49	J	0.61	J	0.75	J	0.47	J	0.51	J
	TCE	18.0	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	0.29	J	0.333	U	0.333	U
	cDCE	1800	1.6		0.96	J	0.93	J	1.2		1.1	J	0.86	J	1.5		0.91	J	0.79	J	1.3		1.2		1.34		1.09	
	VC	1.4	**2.5**		**1.8**		**2.4**		**2.2**		**2.3**		**2.0**		**3.4**		1.7	J	1.1		**1.6**		1.1		0.97	J	0.86	J
MW-37S	PCE	5.5	0.25	J	1.0	U	0.25	J	0.39	J	0.58	J	0.21	J	0.37	J	0.49	J	0.38	J	1.0	U	0.50	J	0.333	U	0.333	U
	TCE	18.0	0.36	J	0.33	J	0.41	J	0.63	J	0.68	J	0.31	J	0.53	J	0.58	J	0.62	J	0.28	J	0.42	J	0.333	U	0.333	U
	cDCE	1800	17.0		27		27.0		34.0		28		39		48.0		52.0		39		51		49		45.6		41.6	
	VC	1.4	0.50	J	0.66	J	0.91	J	0.53	J	0.40	J	0.63	J	0.69	J	0.59	J	0.35	J	0.48	J	0.65	J	0.333	U	0.62	J
MW-41S	PCE	5.5	**26.0**		**15**		**39.0**		**24**		**30.0**		**28**		**30.0**		**14.0**		**25**		**18**		**24**		**15.0**		**12.7**	
	TCE	18.0	8.3		5.3		11.0		7.1		6.8		7.4		8.6		4.5		6.1		5.3		5.1		4.93		4.86	
	cDCE	1800	1.0		3.5		6.8		5.2		4.4		5.2		5.1		4.2		4.7		4.7		4.8		5.77		6.35	
	VC	1.4	0.66	J	0.58	J	0.92	J	0.69	J	1.0		1.2		1.0		0.90	J	0.53	J	0.62	J	0.58	J	0.33	U	0.76	J
MW-42S	PCE	5.5	0.43		0.20	J	0.37	J	0.23	J	0.22	J	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	0.34	J	0.33	U	0.33	U
	TCE	18.0	1.3		1.0		0.75	J	0.73	J	0.54	J	0.73	J	0.59	J	0.65	J	0.44	J	0.45	J	0.75	J	0.52	J	0.33	U
	cDCE	1800	4.3		3.4		9.2		12		6.6		7.4		11.0		13.0		7.2		8.5		7.6		7.00		5.31	
	VC	1.4	1.0	U	1.0	U	0.22	J	1.0	U	0.22	J	1.0	U	0.21	J	1.0	U	1.0	U	1.0	U			0.33	U	0.33	U
MW-44S	PCE	5.5															3.1		**13**		**15**		**18**		0.33	U	0.33	U
	TCE	18.0															4.0		7.7		9.9		9.9		0.33	U	0.33	U
	cDCE	1800															3.1		2.8		3.5		3.3		0.51	J	0.33	U
	VC	1.4															1.0	U	1.0	U	1.0	U	1.0	U	0.33	U	0.33	U

Note:
Boldface and shaded values indicate that the result exceeds the TCG.

Abbreviations:
J = estimated value below the method reporting limit
NS = not sampled
Q = qualifier assigned by laboratory
U = not detected at method reporting limit

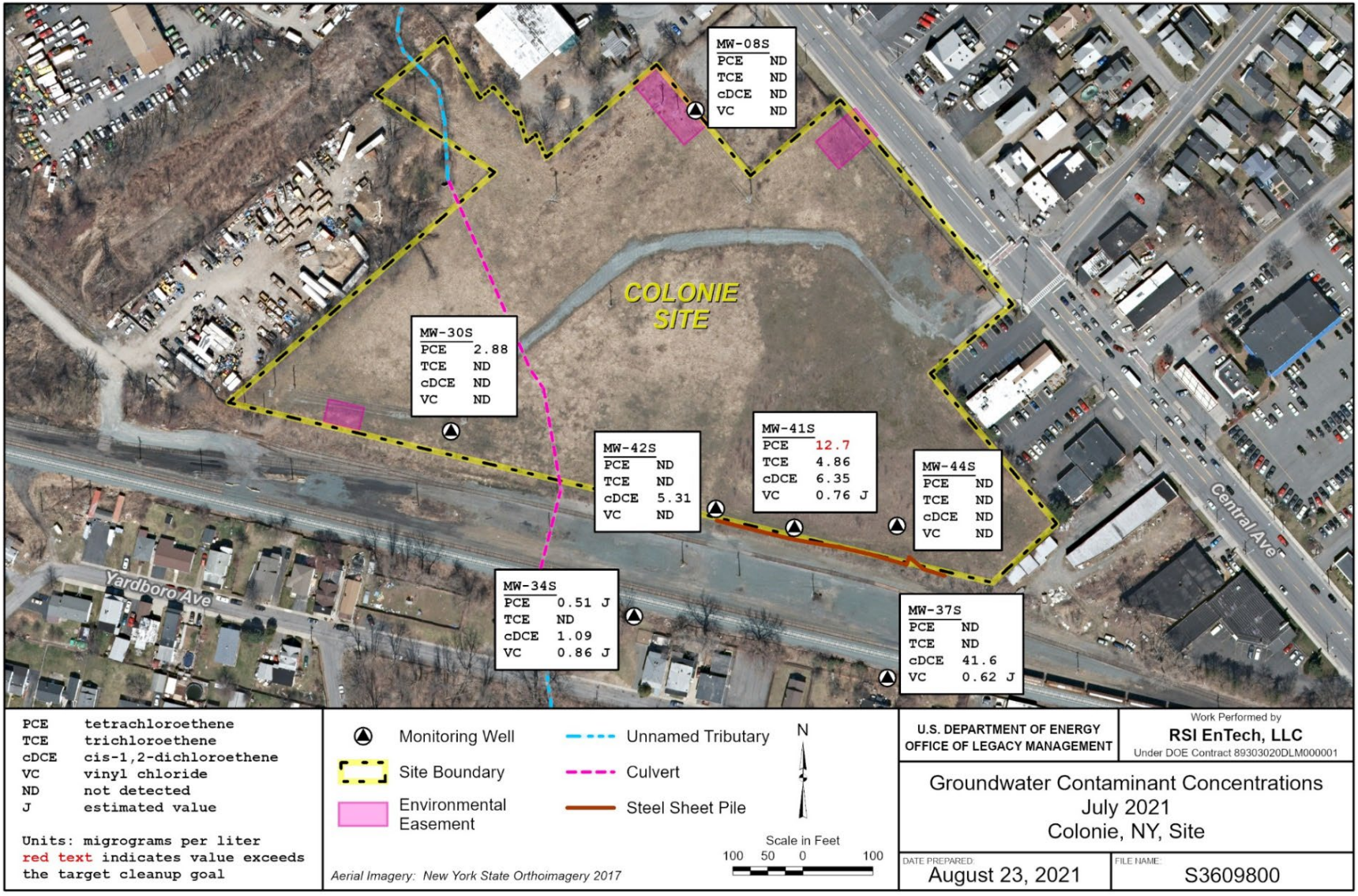


Figure 6. COC Concentrations in Colonie Site Monitoring Wells, July 2021

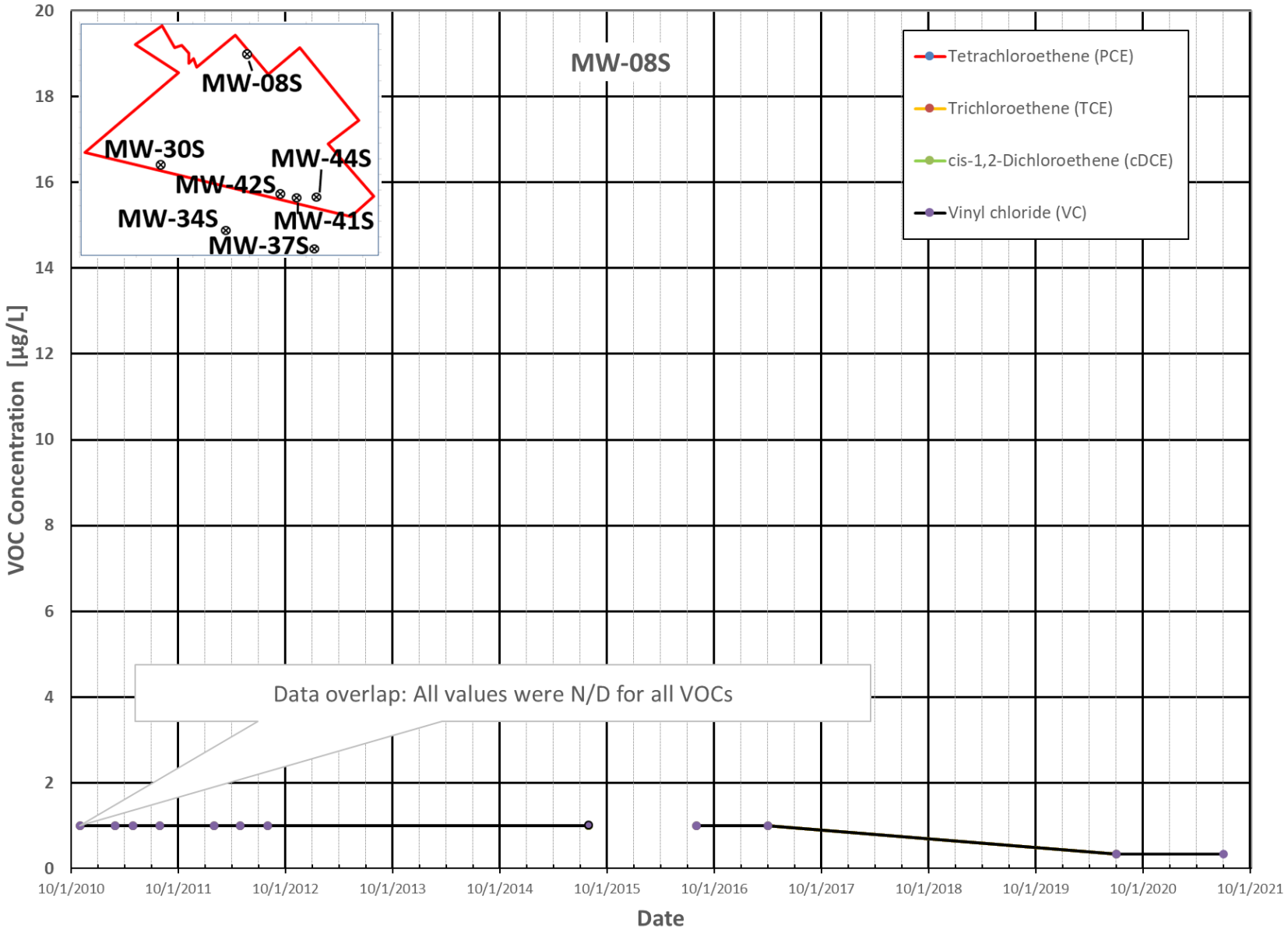
5.4.5 Temporal and Spatial Changes in Groundwater VOC Results

Nearly all detectable COCs had lower concentrations in July 2021 compared to November 2010. While there were two exceedances of TCGs in July 2020 (PCE in well MW-30S and MW-41S), there was only a single exceedance in July 2021 (PCE in well MW-41S).

As in previous events, PCE remains elevated near the former source zones: the former filled-in lake location near well MW-30S and the southeast corner of the building formerly near well MW-41S. PCE remains below the detection limit in downgradient wells MW-34S and MW-37S. The PCE breakdown products TCE, cDCE, and VC mostly show declining concentrations in these wells since at least 2015. cDCE has shown increasing trends in wells MW-37S MW-42S, however, these concentrations are 2 to 3 orders of magnitude below the TCG. The presence of VC in the LTM program wells indicates that cDCE is degrading albeit at a slower rate than PCE or TCE (see Section 5.4.4).

As shown in the time-series plots (Figure 7 through Figure 13), all wells show decreasing VOC concentrations over time, except the cDCE concentrations in wells MW-37S, MW-41S, and MW-42S.

Appendix E contains attenuation modeling results.



Abbreviation: N/D = not detected

Figure 7. Well MW-08S: VOC Concentrations Over Time

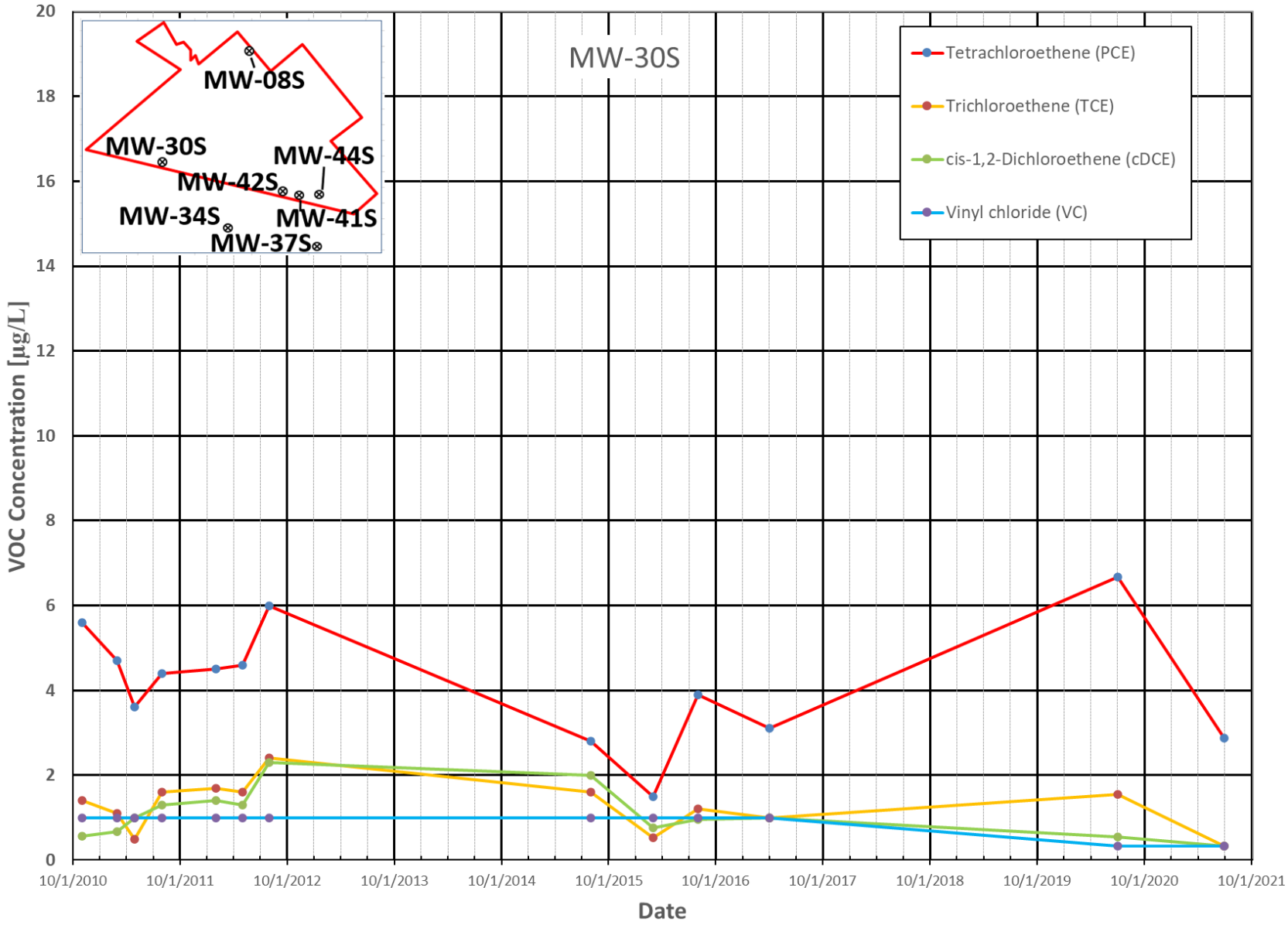


Figure 8. Well MW-30S: VOC Concentrations Over Time

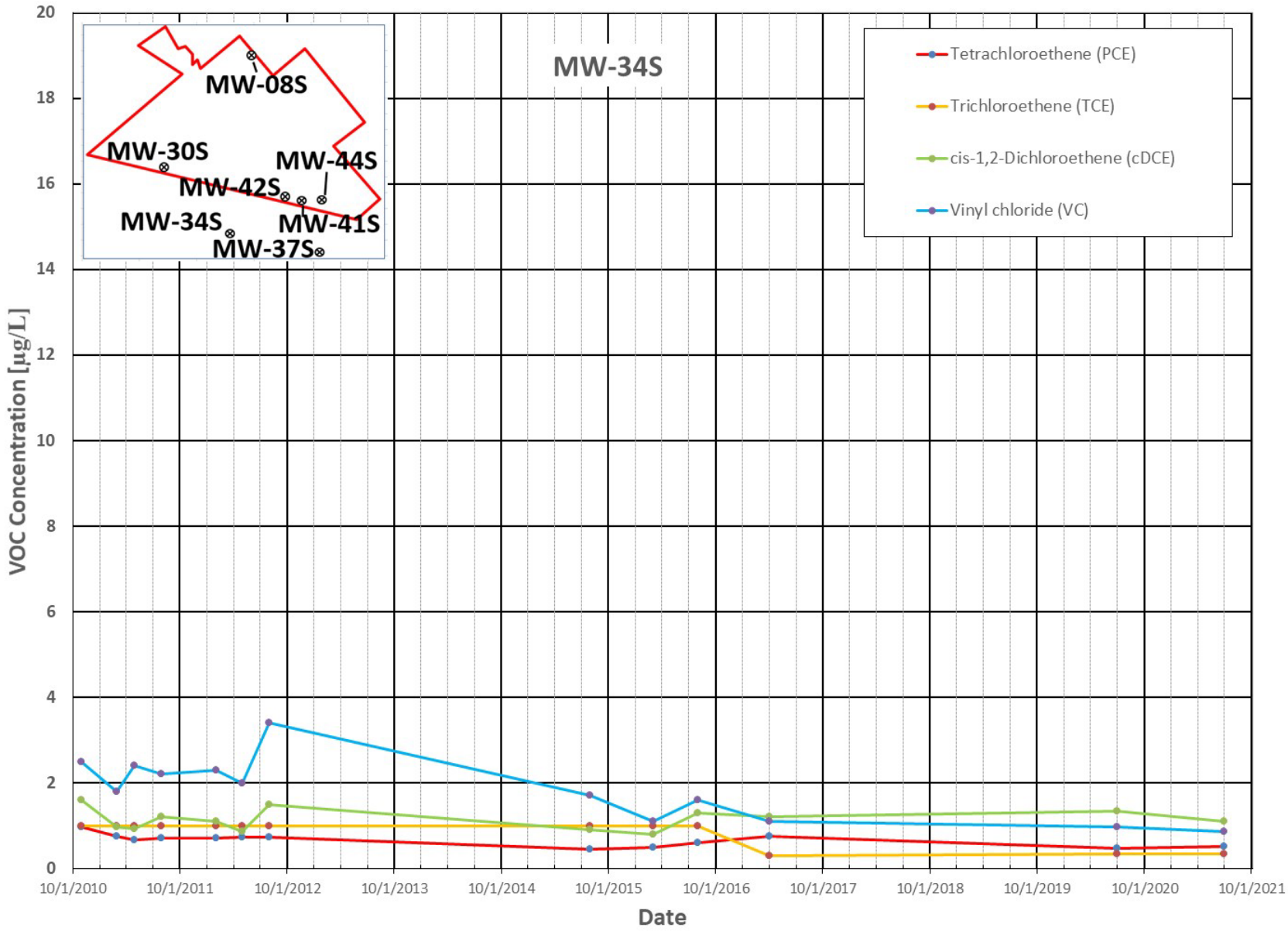


Figure 9. Well MW-34S: VOC Concentrations Over Time

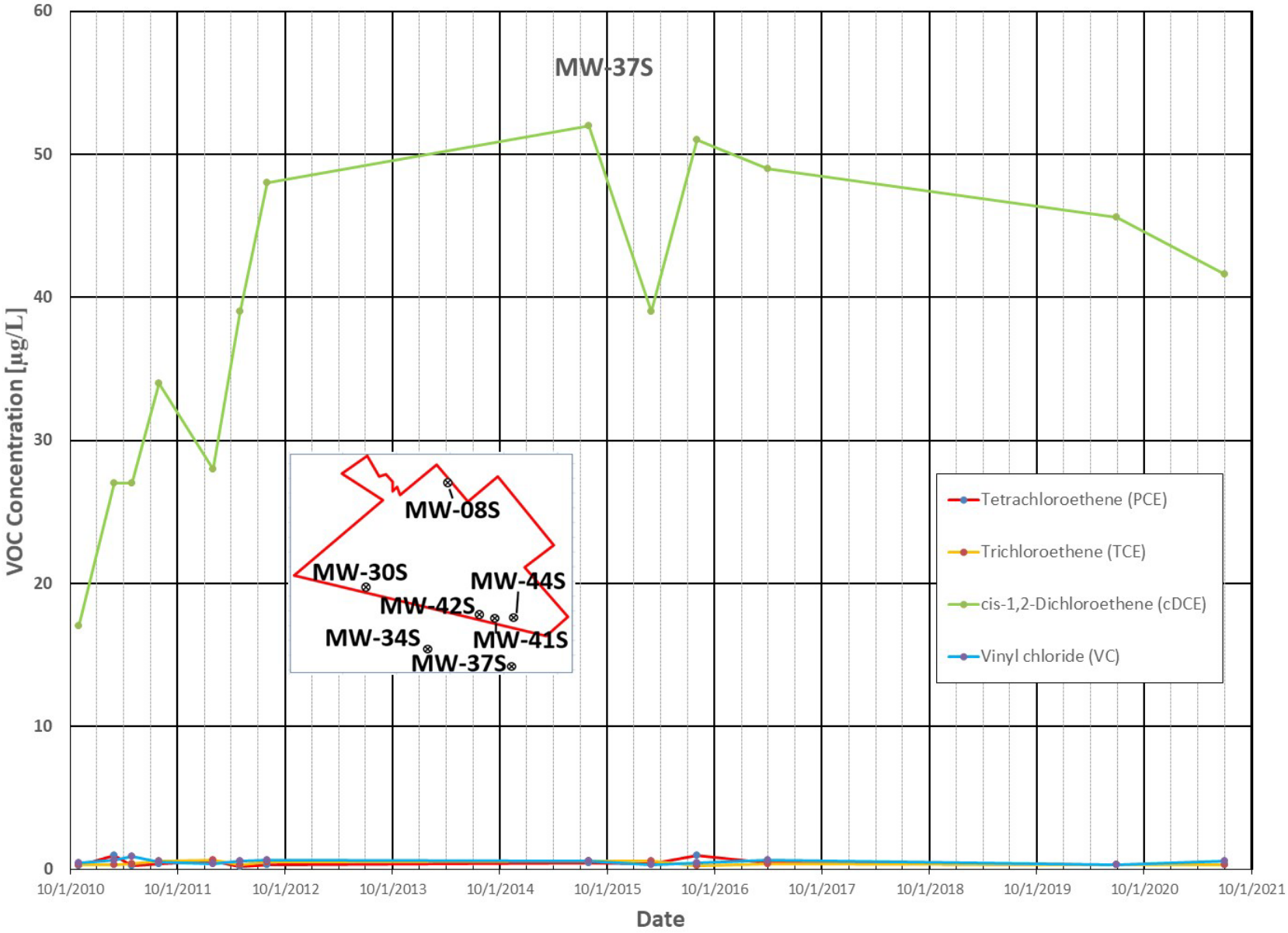


Figure 10. Well MW-37S: VOC Concentrations Over Time

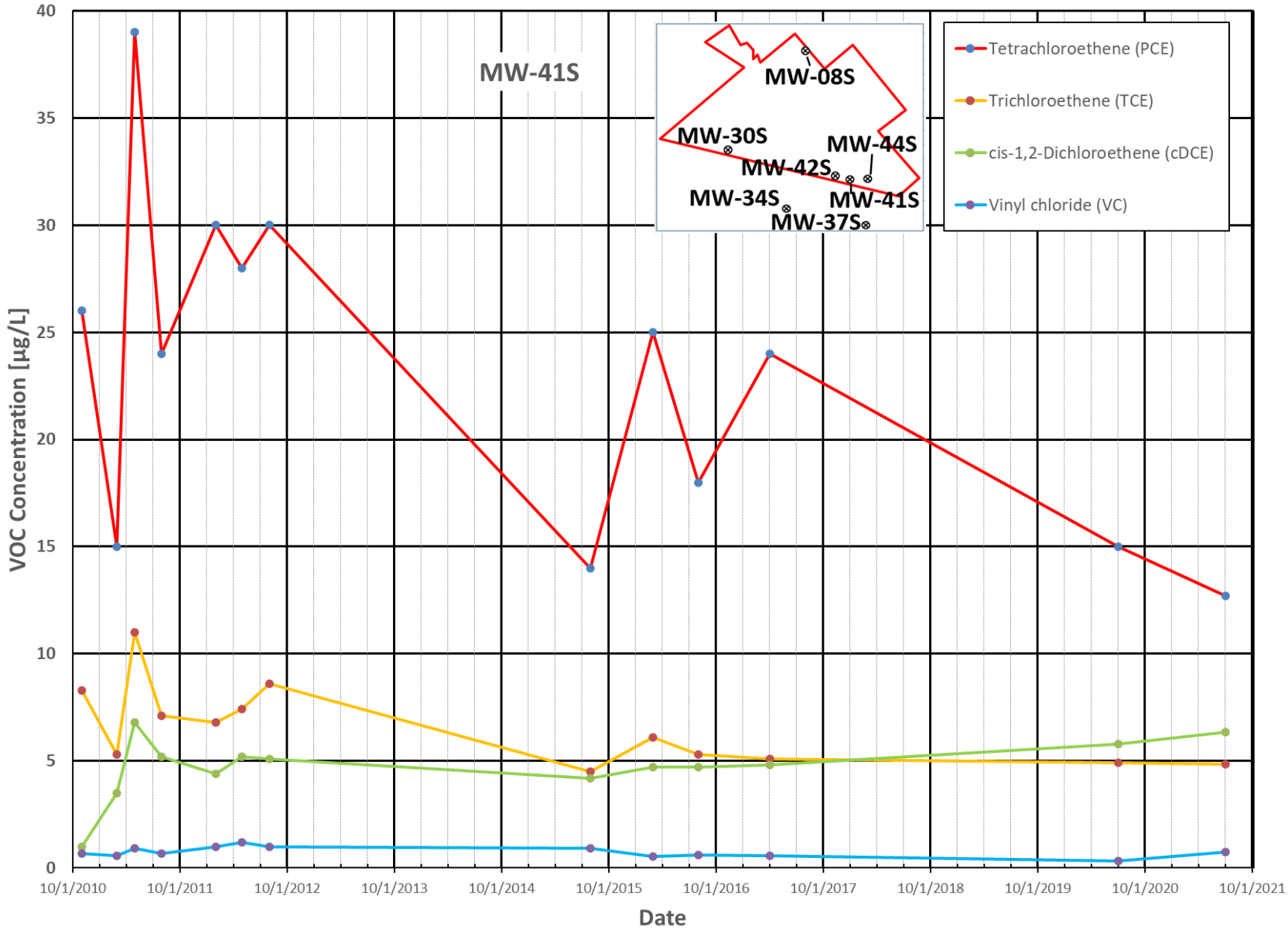


Figure 11. Well MW-41S: VOC Concentrations Over Time

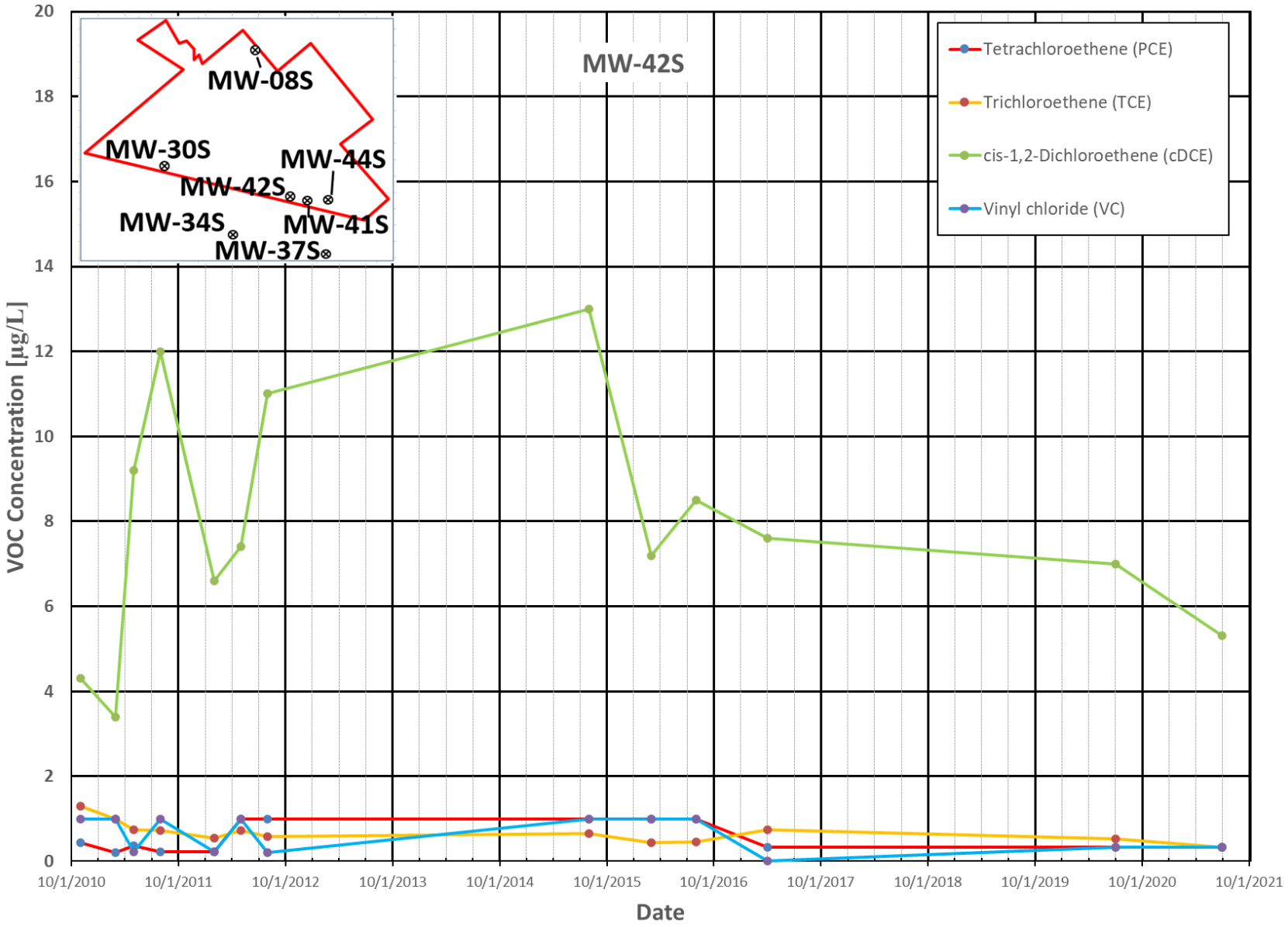


Figure 12. Well MW-42S: VOC Concentrations Over Time

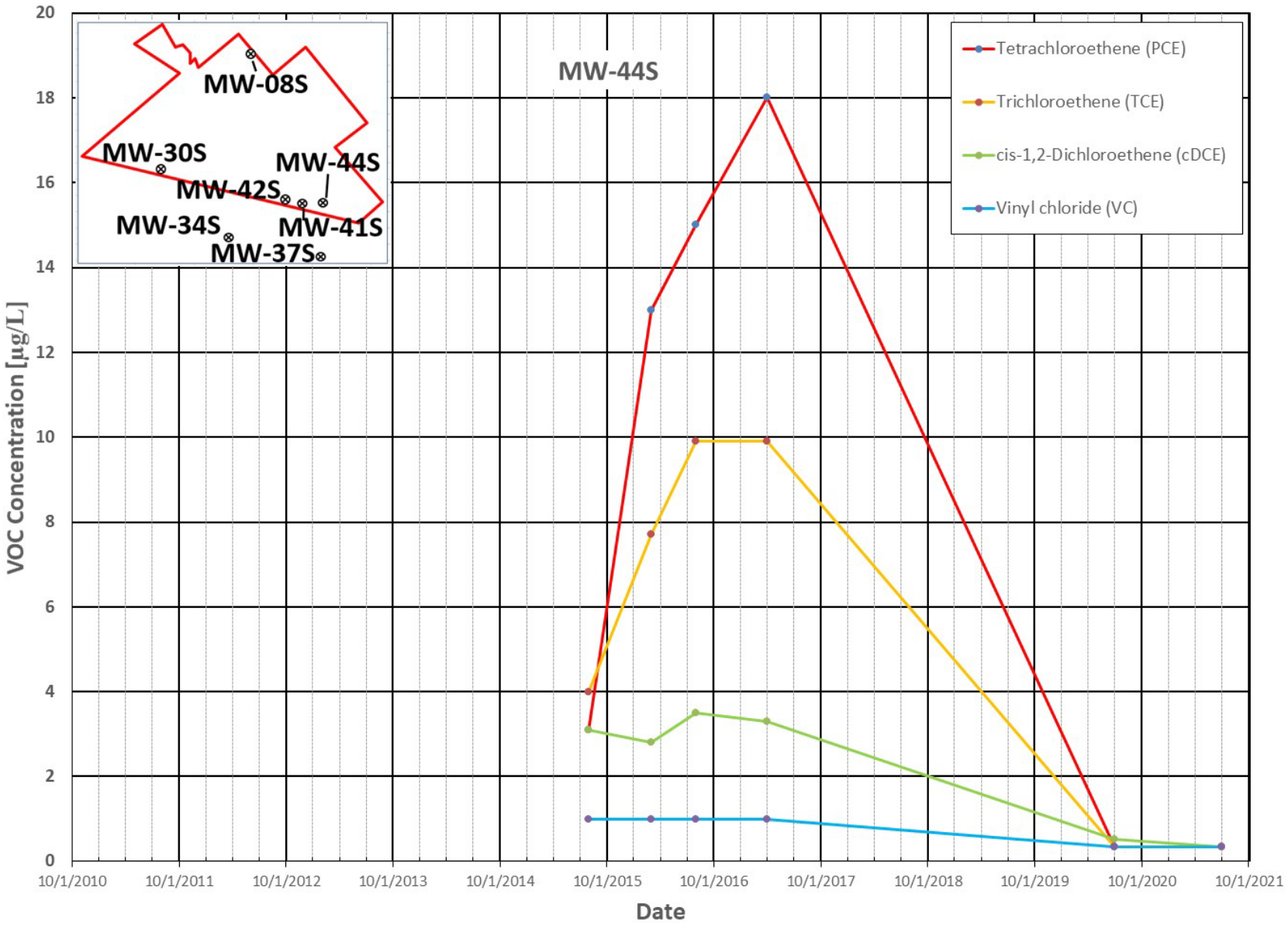


Figure 13. Well MW-44S: VOC Concentrations Over Time

5.4.6 Comparison of Groundwater VOC Results to TCGs

PCE was the only COC to exceed its TCG in the last monitoring event (July 2021), while at the initiation of the LTM program in 2010, there were three wells with PCE exceedances. The PCE exceedance in July 2021 occurred in well MW-41S, compared to exceedances in wells MW-30S, MW-34S, and MW-41S in November 2010.

5.5 Site Inspections

During the last 5 years, the site was transitioned to LM for long-term surveillance and maintenance. The date of transfer was September 2019. During the transition period, USACE and LM cooperated in the development of the environmental easement and SMP to limit potential exposure to inaccessible residual soil contamination. The LTS&M Plan was developed to manage these activities. The LTS&M Plan has been updated annually.

The site has been inspected annually to fulfill the requirements of the LTS&M Plan and the SMP. The LTS&M Plan requires inspections of all of the real property assets to document maintenance requirements. The SMP requires inspections of the easement areas to verify that soil has not been disturbed and that the ICs are being complied with.

LM takes the voluntary protective measure of notifying parties holding utility easements on the site of the existence of the environmental easement. The easement holders include National Grid, Verizon, and the Town of Colonie. These parties have been provided notifications annually since 2020. The inspection form from the most recent site inspection is included in Appendix F.

5.6 Stakeholder Interview

As part of the LTPR process, the LM site manager and LM Support site lead interviewed the NYSDEC project manager John Abunaw on Thursday, June 9, 2022. Mr. Abunaw stated that site conditions are acceptable, and that attenuation of groundwater contamination is progressing toward TCGs. The complete interview is included as Appendix G.

6.0 Technical Assessment

6.1 Question A: Are the remedies functioning as intended by the decision documents?

6.1.1 Status of the Soil Remedy

The ICs specified under the Main Site Soils ROD are functioning as intended. The environmental easement and accompanying SMP have been implemented and site inspections have been conducted as specified. The regulator has been notified of site conditions as required. There has been no disturbance of easement area soil.

6.1.2 Status of the Groundwater Remedy

The ICs specified in the Groundwater ROD are functioning as intended. The ICs prohibit use of site groundwater without approval by NYSDOH and require an investigation for vapor intrusion before building construction.

MNA of the groundwater is functioning as intended under the Groundwater ROD. The following evidence is offered in support:

- The only VOC with a concentration that exceeded its TCG is PCE (TCG: 5.5 µg/L)
  - The PCE exceedances occurred in wells MW-30S, MW-41S and MW-44S during the current review period
  - PCE concentrations in well MW-41S, detected at a 5-year maximum concentration of 24 µg/L in 2017, shows consistently declining concentrations
  - VOC concentrations at well MW-44S were not detected during the last two sampling events (2020 and 2021)
  - As described in Section 6.2.2, all detections of PCE are less than the current risk-based value (203 µg/L) derived for residential vapor intrusion protection
- Reductive dechlorination processes appear to be ongoing in the center of the plume since the breakdown products of PCE (i.e., TCE, cDCE, VC) are still being produced

A linear trend line was fit to the PCE concentration versus time graph, shown in Figure 14. A linear trend has a coefficient of determination that is slightly higher than a log-linear trend line (R^2 of 0.3925 versus 0.3913). The trend line meets the PCE TCG concentration of 5.5 µg/L in approximately 2028.

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

6.2.1 Main Site Soils ROD

The soil RAOs remain valid and are still protective. The soil cleanup values are listed in the Main Site Soils ROD as follows:

- Prevent direct contact with soil having arsenic concentrations in excess of an arithmetically determined mean background concentration of 7.4 mg/kg
- Prevent direct contact with soil having lead concentrations exceeding 450 mg/kg, which would result in unacceptable risk due to blood-lead levels above 10 µg/dL

The prevention of contact above these cleanup goals was facilitated by implementation of easements in areas where arsenic and lead concentrations in soil exceeded the cleanup goals and the soil had to be left in place because of infrastructure.

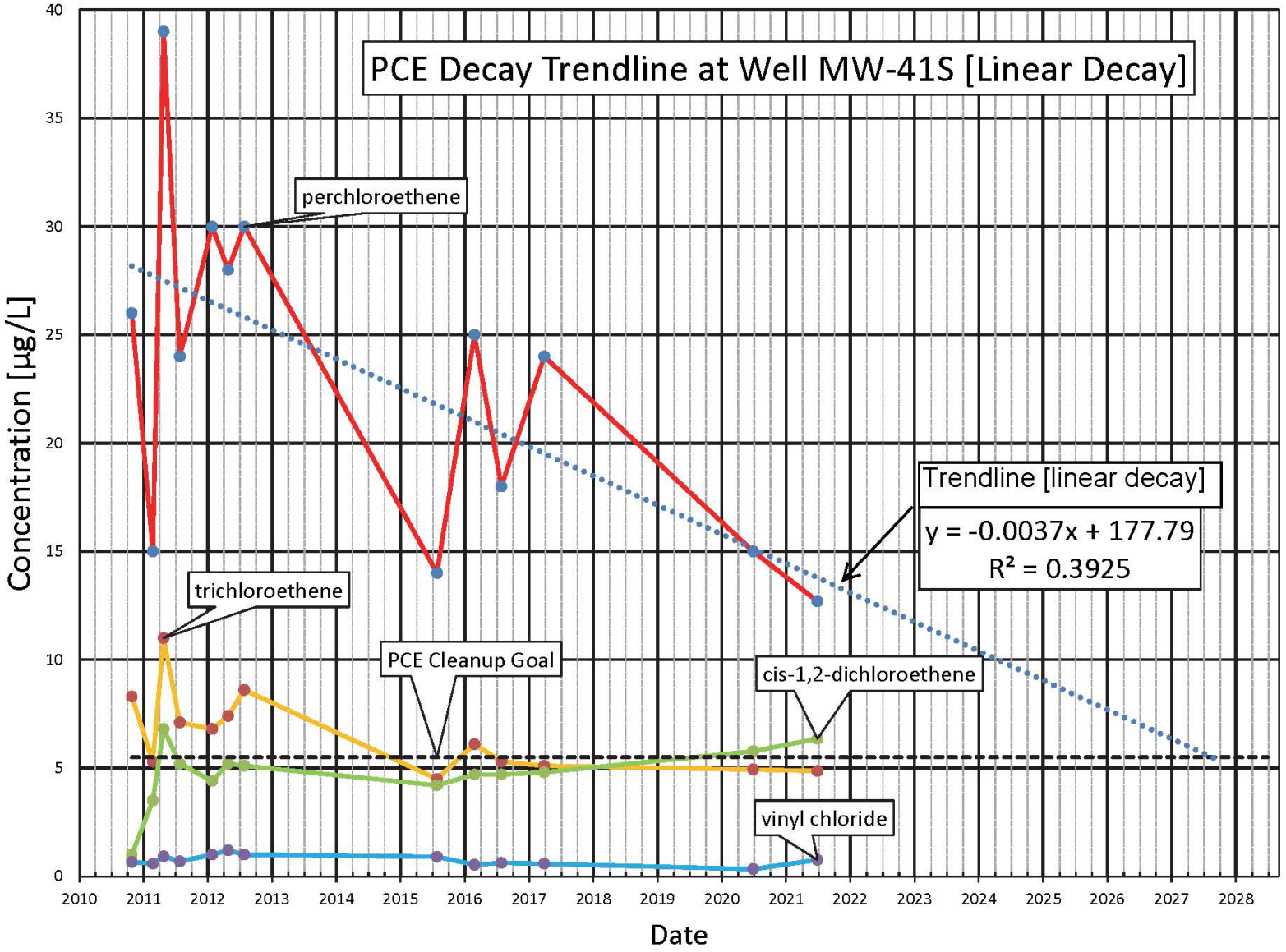


Figure 14. PCE Decay Trendline

As described in Section 6.2.1.1, the toxicity information has not changed for lead or arsenic. The exposure assumptions are likewise still protective. The models for evaluating lead exposure have been slightly revised and result in slightly lower exposure levels. Similarly, the bioavailability of arsenic has been adjusted (Section 6.2.1.1) since the HHRA, which was included as an appendix to the Main Site Soils RI Report (Appendix B of USACE 2013a).

The evaluation in Section 6.2.1.1 concluded that two of the exposure units (SU 104 and SU 124) do not represent an unacceptable human health risk at current soil concentrations.

6.2.1.1 Cancer Risk and Hazard Estimates

Inputs for noncancer hazards and cancer risks of future residents exposed to Main Site Soils are summarized in tables contained in the HHRA that was included as Appendix B of the Main Site Soils RI (USACE 2013a). Contaminants of potential concern identified in the Main Site Soils HHRA are lead, copper, and arsenic.

Lead

Risks from exposure to lead were reevaluated during this LTPR in this section using the Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children developed by EPA (EPA 2022a). A previous version of the IEUBK Model (EPA 2010) had been used to evaluate lead soil risks in the Main Site Soils HHRA (USACE 2013a). The EPA CERCLA goal for blood-lead concentration in a group of similarly exposed children is to limit overall lead exposure such that no more than 5% of children exceed 10 µg of inorganic lead per deciliter of blood (µg Pb/dL) (EPA 1994).

Table 4 compares IEUBK model blood lead results from the 2013 RI and the 2022 evaluation completed as part of this LTPR. The Main Site Soil RI found that modeled blood lead values exceeded the EPA CERCLA goal at the Survey Unit 124 Easement Area and the North Lawn Easement Area exposure units. However, the Survey Unit 124 Easement Area maximum detected soil lead concentration of 734 mg/kg was mistakenly used in the Main Site Soil RI IEUBK model as the exposure point concentration, instead of using the arithmetic mean concentration as described the IEUBK model user guide (EPA 2022a). When the Survey Unit 124 Easement Area arithmetic mean soil lead concentration of 371 mg/kg was used as the exposure point concentration in the current IEUBK model, this resulted in 1.37% of resident children exceeding 10 µg Pb/dL, which meets the threshold criterion of 5%. For all other survey units in the Main Site Soils HHRA, the arithmetic mean concentration was correctly used as the exposure point concentration and the blood lead criterion of no more than 5% of individuals exceeding 10 µg Pb/dL was met. The IEUBK lead model results from the 2022 evaluation completed as part of this LTPR are included as Appendix H.

Table 4. Comparison of IEUBK Results, 2013 Compared to 2022

	Model Version 1.1 Build 11 (2013)	Model Version 2.0 Build 1 (2022)
Inputs	Indoor Pb concentration: 30% of outdoor	Indoor Pb concentration: 30% of outdoor
	Outdoor air concentration: 0.1 µg/m^3	Outdoor air concentration: 0.1 µg/m^3
	Drinking water concentration: 4 µg/L	Drinking water concentration: 4 µg/L
	Mass fraction of outdoor soil to indoor dust conversion factor: 0.7	Mass fraction of outdoor soil to indoor dust conversion factor: 0.7
	Maternal blood concentration: 1 µg Pb/dL	Maternal blood concentration: 1 µg Pb/dL
	SU104 lead in soil concentration: 50 µg/g	SU104 lead in soil concentration: 50 µg/g
	SU109 lead in soil concentration: 215 µg/g	SU109 lead in soil concentration: 215 µg/g
	SU124 lead in soil concentration: 734 µg/g	SU124 lead in soil concentration: 371 µg/g
	North Lawn Easement Area lead in soil concentration: 1234 µg/g	North Lawn Easement Area lead in soil concentration: 1234 µg/g
Results	SU104 percent above 10 µg Pb/dL: 0.001% (=pass)	SU104 percent above 10 µg Pb/dL: 0.007% (=pass)
	SU109 percent above 10 µg Pb/dL: 0.39% (=pass)	SU109 percent above 10 µg Pb/dL: 0.30% (=pass)
	SU124 percent above 10 µg Pb/dL: 23.05% (=fail)	SU124 percent above 10 µg Pb/dL: 1.37% (=pass)
	North Lawn Easement Area percent above 10 µg Pb/dL: 53.71% (=fail)	North Lawn percent above 10 µg Pb/dL: 30.58% (=fail)

Abbreviations:
µg/g = micrograms per gram
µg/m^3 = micrograms per cubic meter

The EPA Adult Lead Methodology (ALM) was used in the Main Site Soils HHRA to evaluate risks associated with fetal blood-lead levels in exposed adult workers. All ALM results met the blood-lead criterion, as this model results in lower blood-lead levels than does the IEUBK model at the same soil concentration. Revised input parameter values recommended by EPA (EPA 2017b) for the ALM results in lower blood-lead values, and provides correspondingly higher cleanup goals, for exposed populations than those used in the ALM included in the Main Site Soils HHRA. Therefore, it was not necessary to reprocess the ALM to verify protectiveness for lead in soils.

Arsenic and Copper

The toxicity and related values used in the Main Site Soils RI Report HHRA for arsenic and copper, as well as current 2022 values, are provided in Table 5. The only change to these values since completion of the Main Site Soils HHRA is the use of a 60% oral relative bioavailability (RBA) for arsenic that was subsequently recommended by EPA (EPA 2022e).

Table 5. Soil Contaminant Toxicity Guidance from 2013 Compared to Current 2022 Values

Contaminant	2013 Guidance[a]	2022 Guidance[b]
Arsenic	Dermal absorption factor: 0.03	Dermal absorption factor: 0.03
	Oral RBA: 100%	Oral RBA: 60%[c]
	Oral reference dose: 3×10^{-4} mg/kg/d	Oral reference dose: 3×10^{-4} mg/kg/d
	Inhalation reference concentration: 1.5×10^{-5} mg/m^3	Inhalation reference concentration: 1.5×10^{-5} mg/m^3
	Oral cancer slope factor: 1.5 (mg/kg/d)$^{-1}$	Oral cancer slope factor[c]: 1.5 (mg/kg/d)$^{-1}$
	Inhalation unit risk: 4.3×10^{-3} (µg/m^3)$^{-1}$	Inhalation unit risk: 4.3×10^{-3} (µg/m^3)$^{-1}$
Copper	Oral reference dose: 4×10^{-2} mg/kg/d	Oral reference dose: 4×10^{-2} mg/kg/d
	Dermal absorption factor: 0.0	Dermal absorption factor: 0.0

Notes:
[a] *Colonie FUSRAP Main Site Soils Remedial Investigation Summary Report* (USACE 2013a).
[b] *Regional Screening Levels (RSLs)—Generic Tables* (EPA 2022c).
[c] Red value indicates a change from previous guidance.

Abbreviations:
mg/kg/d = milligrams per kilogram per day
µg/m^3 = micrograms per cubic meter

In the Main Site Soils HHRA, the arsenic hazard quotient (HQ) for the future child resident exceeded a value of 1 only for the Survey Unit 104 Easement Area (HQ of 1.3). A chemical-specific exposure level resulting in an HQ of 1 or less is regarded as being below a toxicological threshold such that even the most sensitive members of a population are unlikely to experience any associated adverse noncancer health effects (EPA 1989). An HQ exceedance of 1 indicates the potential for adverse health effects. The Regional Screening Level Calculator input/output is provided in Appendix I. The resulting Regional Screening Level Calculator arsenic HQ of 0.8 for the future child resident is less than 1 and is thus unlikely to present adverse noncancer health effects. The use of the 60% RBA value decreases the oral exposure and risk to arsenic in soil by 40%.

The 60% RBA was also used to recalculate the cancer risk for residential exposure at the Survey Unit 104 Easement Area. This resulted in the excess lifetime cancer risk decreasing from 1.3×10^{-4} in the Main Site Soils HHRA to a value of 8×10^{-5} in the 2022 recalculation from the EPA Regional Screening Level Calculator. Thus, cancer risks under future residential use at all exposure units (survey units) are within the EPA acceptable cancer risk range of 1 in 1 million to 1 in 10,000 (1×10^{-6} to 1×10^{-4}) excess lifetime cancer risk. The Main Site Soils HHRA, and the recalculated noncancer hazard and cancer risk for residential exposure to arsenic in soil at the Survey Unit 104 Easement Area are summarized in Table 6. The values in Table 6 are based on the maximum detected arsenic soil concentration of 85.4 mg/kg in the Survey Unit 104 Easement Area. Use of this maximum detected concentration introduces a high bias to the HQ and cancer risk values, especially observing that all other arsenic soil concentrations in the Survey Unit 104 Easement Area are less than the background-based value of 7.4 mg/kg.

The noncancer arsenic risk associated with residential exposure at the Survey Unit 104 Easement Area was recalculated using the EPA Regional Screening Level Calculator for chemicals (EPA 2022f) during this LTPR. The input parameter values are the same as those used in the Main Site Soils HHRA, except that a few exposure parameters identified in the HHRA as EPA

default values have since been revised based on EPA recommendations (EPA 2014). These revisions are minor and would have a negligible effect on risk assessment results.

Table 6. Comparison of Arsenic Risk in Soil at Exposure Survey Unit 104 Easement Area Based on 2013 RI Risk Evaluation and 2022 Recalculation

Arsenic Exposure Point Concentration (mg/kg)[a]	Noncancer HQ[b]		Excess Lifetime Cancer Risk[c]	
	From 2013 RI[d]	2022 Recalculated[e]	From 2013 RI[d]	2022 Recalculated[e]
85.4	1.3	0.8	1.3×10^{-4}	7.6×10^{-5}

Notes:
[a] The arsenic exposure point concentration is equal to the maximum detected concentration. All other samples had arsenic concentrations that are less than the background-based cleanup value of 7.4 mg/kg.
[b] Values of 1 or less are regarded as unlikely to result in adverse human health effects.
[c] Values in the range from 1×10^{-6} to 1×10^{-4} are regarded by EPA as acceptable; values less than this range are regarded as negligible.
[d] From the *Colonie FUSRAP Main Site Soils Remedial Investigation Summary Report* (USACE 2013a).
[e] Recalculated using the EPA PRG Calculator program. All input parameters are the same as the Main Site Soils RI (USACE 2013a), except those sources cited in the Main Site Soils RI as "USEPA default," where the value is no longer used by EPA. In these cases, the revised EPA default was used.

Risks associated with copper were not recalculated because (1) the Main Site Soils HHRA results show that none of the exposure units have unacceptable risks associated with copper, and (2) none of the toxicity and associated values have changed.

6.2.2 Groundwater ROD

The groundwater TCGs are risk-based values computed in the Groundwater FS using version 3.1 (February 2004) of the J&E model (EPA 2004). Each TCG was calculated to meet a 1×10^{-6} excess lifetime cancer risk and an HQ of 1. The 2004 inhalation toxicity values used in the FS are provided in Table 7, along with current 2022 inhalation toxicity values. With the exception of the VC chronic reference dose (RfC) which stayed the same (1.0×10^{-1} milligram per cubic meter [mg/m^3]), all cancer-based (inhalation unit risk [UR_i]) and noncancer-based chronic RfC values have been revised since 2004. Other than the 2022 cDCE RfC (4×10^{-1} mg/m^3) which is slightly higher than the corresponding 2004 RfC (3.5×10^{-1} mg/m^3), each of the 2022 UR_i and RfC values are lower than the 2004 values.

In the case of the UR_i values, lower values are less conservative and yield correspondingly lower risk and higher cleanup goal values. For RfCs, lower values indicate a greater hazard and correspondingly lower cleanup goal values. Note that a chronic RfC for VC of 8×10^{-2} mg/m^3 is listed in the November 2022 RSL tables (EPA 2022c), which is generally the source of J&E toxicity values. However, this VC RfC value which had been from an Agency for Toxic Substances and Disease Registry (ATSDR) document is no longer available on the ATSDR web site, and the source document has been replaced by a January 2023 review draft document that no longer lists a chronic inhalation toxicity value for VC (ATSDR 2023). Therefore, a chronic RfC of 1.0×10^{-1} mg/m^3, as listed in the Integrated Risk Information System (IRIS) (EPA 2023) and included in Table 7, was used in this evaluation for VC. IRIS values are typically the preferred toxicity values and are listed by EPA as the only Tier 1 source (EPA 2003; EPA 2022d).

Table 7. Inhalation Toxicity Values 2004 Compared to 2022

Contaminant	2004 Guidance[a]	2022 Guidance[b]
PCE	2004 Unit risk factor[c]: 5.9×10^{-6} $[\mu g/m^3]^{-1}$	2022 URi: 2.6×10^{-7} $[\mu g/m^3]^{-1}$
	2004 RfC: 6.0×10^{-1} mg/m^3	2022 RfC: 4.0×10^{-2} mg/m^3
TCE	2004 Unit risk factor[a]: 1.1×10^{-4} $[\mu g/m^3]^{-1}$	2022 URi: 4.1×10^{-6} $[\mu g/m^3]^{-1}$
	2004 RfC: 4.0×10^{-2} mg/m^3	2022 RfC: 2.0×10^{-3} mg/m^3
cDCE	2004 Unit risk factor[a]: No published value	2022 URi: No published value
	2004 RfC: 3.5×10^{-2} mg/m^3	2022 RfC[d]: 4×10^{-2} mg/m^3
VC	2004 Unit risk factor[a]: 8.8×10^{-6} $[\mu g/m^3]^{-1}$	2022 URi: 4.4×10^{-6} $[\mu g/m^3]^{-1}$
	2004 RfC: 1.0×10^{-1} mg/m^3	2022 RfC[e]: 1.0×10^{-1} mg/m^3

Notes:

[a] Reference: (USACE 2008b).

[b] *Regional Screening Levels (RSLs)—Generic Tables* (EPA 2022c), except as noted. Values were reviewed to determine whether they are still current and were revised if not current (see Note [e] below).

[c] *Unit risk factor* is the inhalation toxicity term that predates the current term *inhalation unit risk*.

[d] Value has considerable uncertainty because it is a screening chronic reference concentration (RfC) for trans-1,2-DCE (tDCE) (EPA 2020) based on a non–peer-reviewed study, and this tDCE value was selected by EPA as the cDCE screening chronic RfC by analog (EPA 2022b). An uncertainty factor of 3000 was applied in the derivation of the tDCE screening chronic RfC. The following is stated regarding the screening chronic RfC for cDCE: "Due to the lack of evidence described in the main Provisional Peer-Reviewed Toxicity Value (PPRTV) document, it is inappropriate to derive provisional inhalation toxicity values for *cis*-1,2-dichloroethylene (*cis*-1,2-DCE). However, some information is available for this chemical, which although insufficient to support deriving a provisional toxicity value under current guidelines, may be of use to risk assessors" (EPA 2022b). Note that no chronic or subchronic inhalation toxicity studies were identified for cDCE, and only a single cDCE acute study was identified (EPA 2022b).

[e] Value is from the Integrated Risk Information System (IRIS) (EPA 2023) because the RSL source has been updated to exclude a chronic RfC as described in the preceding paragraph.

Abbreviations:

mg/m^3 = milligram per cubic meter

$[\mu g/m^3]^{-1}$ = (risk) per microgram per cubic meter

To evaluate risk and determine protectiveness for TCGs, the cancer risks and noncancer hazards were recalculated at the respective TCG of each contaminant using the current version of the J&E model (version 6.0) (EPA 2017a) and current URi and chronic RfC values. The 2022 J&E model recalculation also provides the updated risk-based groundwater concentrations that are protective at a cancer risk of 1×10^{-6} and an HQ of 1. These concentrations are hereinafter referred to as "2022 J&E concentrations." The recalculated J&E output is provided as Appendix J, including the 2022 J&E concentrations. Table 8 provides a summary of the 2022 J&E model concentrations compared to the Groundwater TCGs.

Table 8. Comparison of ROD TCGs to 2022 J&E Model Output

COC[a]	TCG (µg/L)[a]	Basis of TCG[b]	2022 J&E Protective Values (µg/L)[c]	Basis of Recalculated 2022 J&E Concentration[c]
PCE	5.5	Cancer (1×10^{-6})	203	Cancer (1×10^{-6})
TCE	18	Cancer (1×10^{-6})	11	Cancer (1×10^{-6})
cDCE	1800	Noncancer (Hazard Quotient = 1)	1640[d]	Noncancer (HQ = 1)
VC	1.4	Cancer (1×10^{-6})	0.7	Cancer (1×10^{-6})

Notes:
[a] Groundwater ROD (USACE 2010a) and Groundwater FS (URS 2008).
[b] (USACE 2008c).
[c] From Appendix J, Vapor Intrusion Modeling Results.
[d] Value is based on a screening PPRTV chronic RfC (see Table 7, Note "d") and has considerable uncertainty.

All the recalculated 2022 J&E model protective values based on cancer risk at 1×10^{-6} are more stringent than those based on a noncancer hazard index (HI) of 1 (Appendix J). This is consistent with the TCG values, all of which are cancer risk based, except cDCE which was not identified as a carcinogen. The following observations are evident from Table 8:

- The recalculated 2022 J&E value for PCE is 37 times greater than the ROD TCG (i.e., 2022 J&E value is less stringent)
- The recalculated 2022 J&E value for TCE is 40% lower than the ROD TCG (i.e., 2022 J&E value is more stringent)
- The recalculated 2022 J&E value for cDCE is 9% lower than the ROD TCG (i.e., 2022 J&E value is slightly more stringent)
- The recalculated 2022 J&E value for VC is 50% lower than the ROD TCG (i.e., 2022 J&E value is more stringent).

Table 9 provides a comparison of the analytical results from the last 5 years to the ROD TCG and the recalculated 2022 J&E values. As described above, the recalculated PCE value is much less stringent than the ROD TCG. Thus, whereas 5 of the 21 samples collected over the last 5 years had PCE concentrations that exceeded the TCG, none of the samples had PCE concentrations that exceeded the 2022 J&E concentration. Conversely, the 2022 J&E concentration for VC is twice as stringent as the ROD TCG for VC. As a result, none of the 20 samples collected over the past 5 years had exceedances of the ROD TCG for VC, but 4 of the 20 samples had concentrations that exceed the 2022 J&E VC value. None of the TCE concentrations detected in the last 5 years exceed the ROD TCG for TCE or the 2022 J&E concentration at the 1×10^{-6} risk level. Also, none of the cDCE concentrations exceed the noncancer-based TCG or the 2022 J&E noncancer-based concentration at an HQ of 1.

Table 9. Comparison of Recent Analytical Results to Groundwater ROD TCGs and 2022 Risk-Based Values for Residential Vapor Intrusion Protection

COC[a]	ROD TCG[b] (µg/L)	2022 J&E Groundwater Concentration[c] (µg/L)	Maximum Detected Concentration (µg/L)[d]		Exceedances of ROD TCG, Last 5 Years[e]	Exceedances of 2022 J&E Value, Last 5 Years[e]
			Last 5 Years (2017–2021)	Last Sampling Event (2021)		
PCE	5.5	203	**24**	**12.7**	5/21	0/21
TCE	18	11	9.9	4.86	0/21	0/21
cDCE	1800	1640[f]	49	41.6	0/21	0/21
VC	1.4	0.7	*1.1*	*0.86*	0/20	4/20

Notes:
[a] Remaining contaminants of concern in groundwater.
[b] Target Cleanup Goals listed in the Groundwater ROD (USACE 2010a) and Groundwater FS (URS 2008).
[c] From Appendix J, Vapor Intrusion Modeling Results.
[d] Excerpted from Table 3. **Boldface** values indicate exceedance of a TCG; *italics* indicate exceedance of a 2022 J&E concentration.
[e] Indicates (number of exceedances)/(total number of analytical results) over last 5 years.
[f] Because a screening chronic reference concentration was used to derive this value, there is considerable uncertainty. Refer to Table 7, Note "d".

Based on the results summarized in Table 9, only PCE exceeds the ROD TCG. Because the recalculated 2022 J&E PCE concentration is much less stringent than the corresponding ROD TCG, exceedances of the ROD TCG for PCE does not necessarily indicate that the detected level is not protective at a 1×10^{-6} risk level. Similarly, the lack of exceedances of the ROD TCG for VC does not necessarily indicate that a detected VC concentration is protective at 1×10^{-6} because the recalculated 2022 J&E value for VC is more stringent than the ROD TCG. Therefore, overall risks associated with the ROD TCGs and maximum detected concentrations were calculated using the current J&E model.

Table 10 presents the overall cancer risk results based on the current J&E model with current toxicity values. The cancer risk of the three carcinogens, PCE, TCE, and VC (each at the 1×10^{-6} risk level) at the 2022 J&E concentrations is a combined total 3×10^{-6} cancer risk. This value of 3×10^{-6} was also the total cancer risk during development of the ROD TCGs. The current J&E model was run using the ROD TCGs, and the resulting combined cancer risk was 3.7×10^{-6}, which is only slightly greater than the combined cancer risk total of 3×10^{-6}. The combined PCE-TCE-VC excess lifetime cancer risk associated with the maximum detected PCE-TCE-VC concentrations that have been detected over the past 5 years is 2.6×10^{-6}, which is consistent with the combined risk associated with the recalculated 2022 J&E concentrations.

Table 10. Calculation of the Vapor Intrusion Pathway Overall Cancer Risks Using ROD Target Cleanup Levels and 2022 Risk-Based Values

COC[a]	Maximum Detected Concentration Over Last 5 Years[b] (µg/L)	TCG[a] (µg/L)	New TCG Calculations[c] (µg/L)	Cancer Risk of TCGs Recalculated 2022 Using J&E Model[c]	Cancer Risk of Maximum Detected Concentration Based on 2022 J&E Values[d]
PCE	24	5.5	203	2.7×10^{-8}	1.2×10^{-7}
TCE	9.9	18	11	1.6×10^{-6}	9.0×10^{-7}
cDCE	49	1800	1640	NA[e]	NA[e]
VC	1.1	1.4	0.7	2.1×10^{-6}	1.6×10^{-6}
Combined Risk[f]			**3.0×10^{-6}**	**3.7×10^{-6}**	**2.6×10^{-6}**

Notes:
[a] Groundwater ROD (USACE 2010a) and groundwater FS (URS 2008).
[b] Excerpted from Table 3.
[c] From Appendix J, Vapor Intrusion Modeling Results. Calculations that result in 1×10^{-6} risks except for cDCE.
[d] Value is the quotient of the maximum detected concentration divided by the corresponding 2022 J&E concentration.
[e] Value is based on noncancer risk.
[f] For the 2022 J&E concentration, the combined risk is simply the sum of the risks associated with each of the three carcinogenic COCs (i.e., 1×10^{-6} multiplied by 3). For the TCGs and the maximum detected concentrations, the combined risk is the sum of the risk values shown above for each column.

Abbreviations:
NA = not applicable

All sets of the combined cancer risk values shown in Table 10 are nearly equivalent. Also, each is near the low end of the 1×10^{-6} to 1×10^{-4} EPA acceptable risk range. Therefore, the current maximum VOC levels in groundwater do not represent an unacceptable vapor intrusion risk to a hypothetical future resident.

As shown in Table 8, cDCE is the only COC with a TCG based on noncancer effects. However, each of other three COCs also have noncancer toxicity values. Therefore, the J&E model was used to estimate a groundwater concentration of each COC at an HQ of 1 as presented in Appendix J. At a concentration associated with an HQ of 1, exposure to the COC is regarded as unlikely to result in any adverse noncancer health effects (EPA 1989). The vapor intrusion pathway HQ was calculated for each COC as shown in Table 11 using the maximum detected concentration divided by the J&E modeled groundwater concentration at an HQ of 1. The last row of Table 11 shows the HI associated with the vapor intrusion pathway. The total HI is the sum of the COC-specific HQ values. Exposure resulting in an HI of 1 or less is regarded as unlikely to result in any adverse health effects to any members of the population with respect to the COCs and exposure pathway in question (i.e., vapor intrusion).

Table 11. Calculation of the Vapor Intrusion Pathway Noncancer Hazard Index at the Maximum Detected Groundwater Concentrations

COC[a]	Maximum Detected Concentration Over Last 5 Years[b] (µg/L)	Groundwater Concentration at Noncancer HQ = 1, Based on 2022 J&E Model Output (µg/L)[c]	Noncancer HQ of Maximum Detected Concentration Based on 2022 J&E Model[d]
PCE	24	785	0.03
TCE	9.9	48	0.21
cDCE	49	1640	0.03
VC	1.1	424	0.003
Hazard Index[e]			**0.3**

Notes:
[a] Groundwater ROD (USACE 2010a) and groundwater FS (URS 2008).
[b] Excerpted from Table 3.
[c] From Appendix J, Vapor Intrusion Modeling Results.
[d] Value is the quotient of the maximum detected concentration divided by the corresponding groundwater concentration associated with a hazard quotient (HQ) = 1. For example, the HQ for PCE is calculated as:

24 µg/L ÷ 785 µg/L = 0 .03.

[e] The hazard index is the sum of the HQ values. HI values of 1 or less are regarded as unlikely to represent a human health hazard for even the most sensitive members of an exposed population. Note that only risks associated with the same target organ are regarded as additive. Therefore, adding the HQ for all COCs is conservative.

The maximum detected concentration of each of the COCs is less than the respective COC-specific groundwater concentration that represents an HQ of 1 via the vapor intrusion pathway. The HI of 0.3 indicates that any individual in the exposed population is unlikely to experience adverse noncancer health effects. Note that only risks associated with the same target organ are regarded as additive (EPA 2001b). Therefore, adding the HQs for all COCs in the derivation of the HI is conservative.

In summary, based on the J&E modeling results using current toxicity values, groundwater at the maximum detected concentrations does not represent an unacceptable noncancer hazard via the vapor intrusion pathway.

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

No other information has come to light that could call into question the protectiveness of the Main Site Soils OU and Groundwater OU remedies.

EPA guidance suggests that the impacts of natural disasters on the remedy be discussed in this section. There were no natural disasters at the Colonie site during this review period. As a result, performance of the remedy was not impacted by weather extremes or natural disasters during this review period.

6.4 Technical Assessment Summary

The groundwater and soil remedies are functioning as intended.

The Main Site Soils OU mandates ICs in the form of an environmental easement. The environmental easement and accompanying SMP have been implemented and site inspections have been conducted as specified. The regulator has been notified of site conditions as required. There has been no disturbance of easement area soil. The environmental easement contains nine ICs. These ICs are in place and effective in preventing unacceptable exposures to known residual contaminants by prohibiting digging and excavation and controlling intrusive activities.

The Groundwater ROD mandates that ICs are to be used to ensure that the property is safe for future residential land use by limiting potential exposure of hypothetical future onsite residents to groundwater contamination via the vapor intrusion pathway. ICs are incorporated into an environmental easement to ensure that the property is safe for its intended future use. The ICs are also detailed in the SMP (DOE and USACE 2020). The ICs prohibit use of site groundwater without approval by NYSDOH and require an investigation for vapor intrusion before building construction.

MNA of the groundwater is functioning as intended by the Groundwater ROD. The groundwater OU remedy of MNA continues to support the RAOs for site groundwater:

- *Limit exposure of potential future onsite urban residents to VOC constituents that may migrate into homes via the vapor intrusion pathway*. The onsite pathway for vapor intrusion does not currently exist but could possibly become complete in the future. In the event that land use of the site becomes residential, then one or more of the ICs described in Section 3.3 will be utilized to protect human health. Therefore, this RAO is being met at the present time.
- *Reduce the concentrations of VOCs in onsite groundwater to levels that are protective of future onsite urban residents who may be exposed to these compounds via the vapor intrusion pathway*. VOC concentrations in onsite groundwater are decreasing over time under the MNA remedy which, in the event of a change in land use of the Site to residential use, will limit exposure of potential future onsite urban residents to VOC constituents that could have otherwise migrated into homes via the vapor intrusion pathway. Therefore, this will protect future onsite urban residents who may be exposed to these compounds via the vapor intrusion pathway.

Monitoring and maintenance plans are in place to ensure the long-term integrity of the remedies. Routine inspections of remedy components ensure that maintenance and repairs are identified and implemented.

7.0 Issues and Recommendations

It has been determined that all remedies are functioning as designed. Adequate oversight mechanisms are in place to identify possible deficiencies, and adequate resources are available to correct or mitigate any problems if they were to occur.

8.0 Protectiveness Statements

The following protective statements are identified for the Colonie site's Main Site Soils OU and Groundwater OU:

Main Site Soils OU Protectiveness Statement
Protectiveness Determination: Protective
The soil remedy remains protective of human health and the environment. ICs in the form of an environmental easement were placed on three discrete areas of inaccessible soil contamination. The procedural requirements of the easement have been complied with. Annual inspections have shown that contaminated soils have remained undisturbed.
Groundwater OU Protectiveness Statement
Protectiveness Determination: Protective
The groundwater remedy remains protective of human health and the environment. Potential future residents are protected from exposure to VOC vapors because ICs require vapor intrusion testing before building construction. The concentrations of VOCs in groundwater are decreasing as anticipated in the ROD.

9.0 Next LTPR

The next LTPR report is required within 5 years from the completion date of this review.

10.0 References

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Appendix A

Periodic Review Report

RSI ENTECH
In Partnership with Amentum and TFE
United for the Legacy Management Mission

LMS/CLN/42225

FINAL
Periodic Review Report
Colonie, New York, Site
Albany County, Colonie, New York

NYSDEC Site Code 401006
April 2023

Work performed under DOE contract number 89303020DLM000001
for the U.S. Department of Energy Office of Legacy Management.

This document has been designed for online viewing.

Contents

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Appendixes

Abbreviations

dL	deciliter
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
HHRA	Human Health Risk Assessment
HI	hazard index
IC	institutional control
IEUBK	Integrated Exposure Uptake Biokinetic
LM	Office of Legacy Management
LTPR	long-term periodic review
µg	micrograms
mg/kg	milligrams per kilogram
NL	National Lead Industries
NYCRR	*New York Codes, Rules and Regulations*
NYSDEC	New York State Department of Environmental Conservation
Pb	inorganic lead
PRR	periodic review report
RBA	relative bioavailability
RI	Remedial Investigation
ROD	Record of Decision
SMP	Site Management Plan
USACE	U.S. Army Corps of Engineers

1.0 Introduction

This Periodic Review Report (PRR) is required by Section 6 of the March 2020 *Colonie FUSRAP Site, Albany County, Colonie, New York, Site Management Plan* (DOE and USACE 2020), hereafter called the Site Management Plan (SMP), for the U.S. Department of Energy (DOE) Office of Legacy Management (LM) Colonie, New York, Site. The site is at 1130 Central Avenue (New York Route 5) in the Town of Colonie, Albany County, New York (Figure 1).

The SMP (DOE and USACE 2020) addresses the means for implementing institutional controls (ICs) that are required by the environmental easement for three discrete areas of the site, as shown in Figure 2. The easement areas are also indicated on the site survey map that is included as Appendix A.

This PRR has been developed in accordance with Section 6.3 of the *Technical Guidance for Site Investigation and Remediation* (DER-10) and with the SMP.

This PRR documents inspection and efficacy of the ICs implemented at the site during the initial reporting period from April 1, 2020, to August 31, 2022. The SMP stipulates that subsequent PRRs will be conducted at 5-year intervals.

2.0 Site Location

The site is identified as Section 53.11 Block 1 and Lots 13.2 and 14 on the Town of Colonie tax map. The site is an approximately 11.29-acre area. The site is bounded by a heavily wooded lot to the west (7 Railroad Avenue), CSX Transportation Inc. and National Railroad Passenger Corporation (Amtrak) railroad tracks on the southwest and south, active commercial properties on the east and northeast, New York State Route 5 (Central Avenue) on the north, and a defunct National Grid electrical substation on the northwest (Figure 2). LM is the owner of the site during the current reporting period.

3.0 Site History

Industrial operations began at the site in approximately 1923 when The Embossing Company purchased a portion of the present-day site to construct a facility to manufacture wood products and toys. In 1927, Magnus Metal Company Inc. purchased the property and converted the facility to a brass foundry for manufacturing railroad components. Magnus Metal Company Inc. cast the brass components in sand molds and manufactured brass bearing housings with surfaces of babbitt metal (an alloy of lead, copper, and antimony).

In 1937, the National Lead Company purchased the facility and continued the brass foundry operations initiated by Magnus Metal Company Inc. At some point before 1941, the National Lead Company purchased an adjacent lot that contained a portion of Patroon Lake and began filling Patroon Lake with used casting sand that contained high levels of lead and other metals. After World War II, the plant began casting aluminum parts and frames for aircraft. In 1958, the nuclear division of the National Lead Company began producing items manufactured from uranium and thorium under a license issued by the U.S. Atomic Energy Commission. The National Lead Company discontinued its brass foundry operations in 1960.

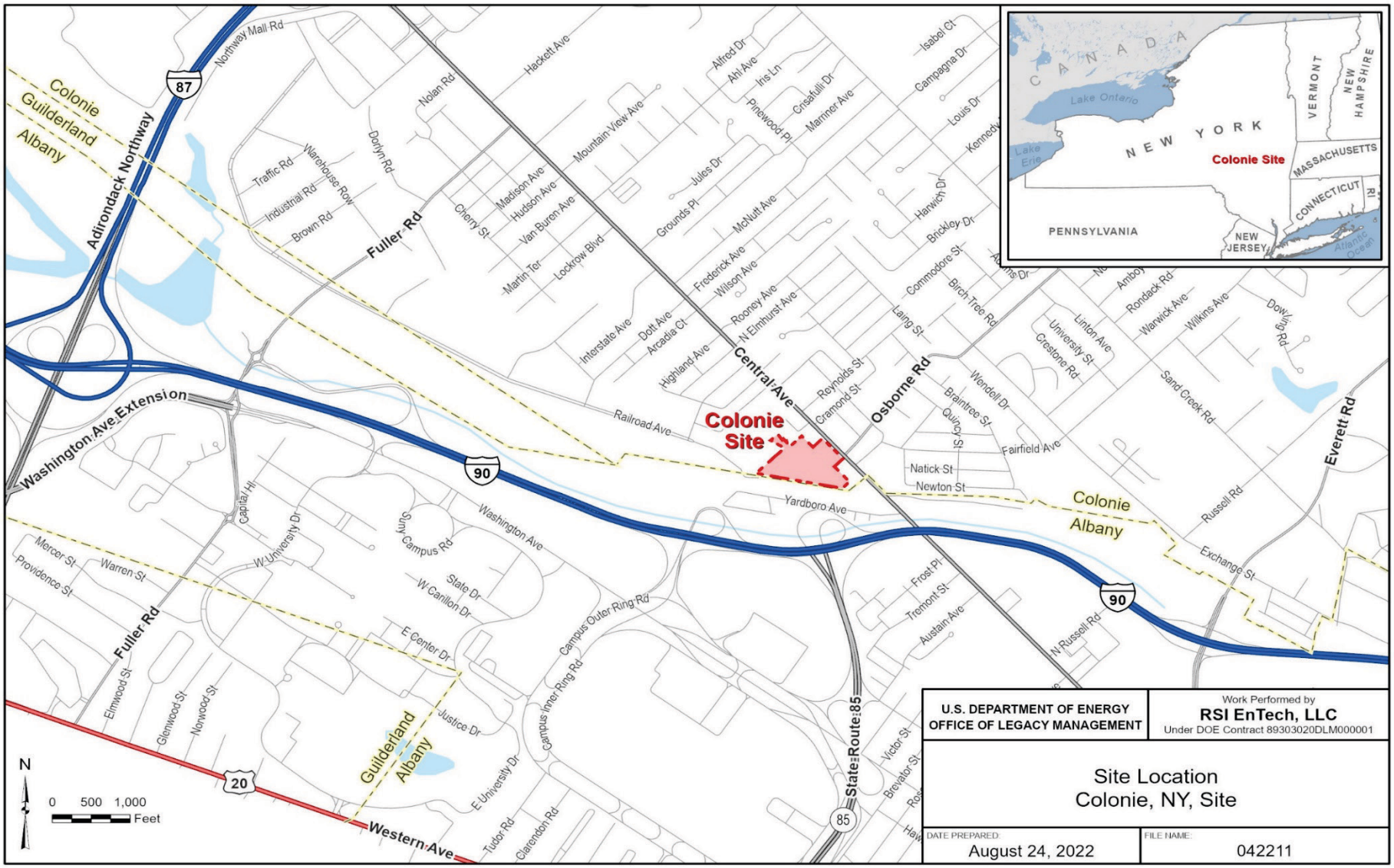

Figure 1. Colonie Site Location

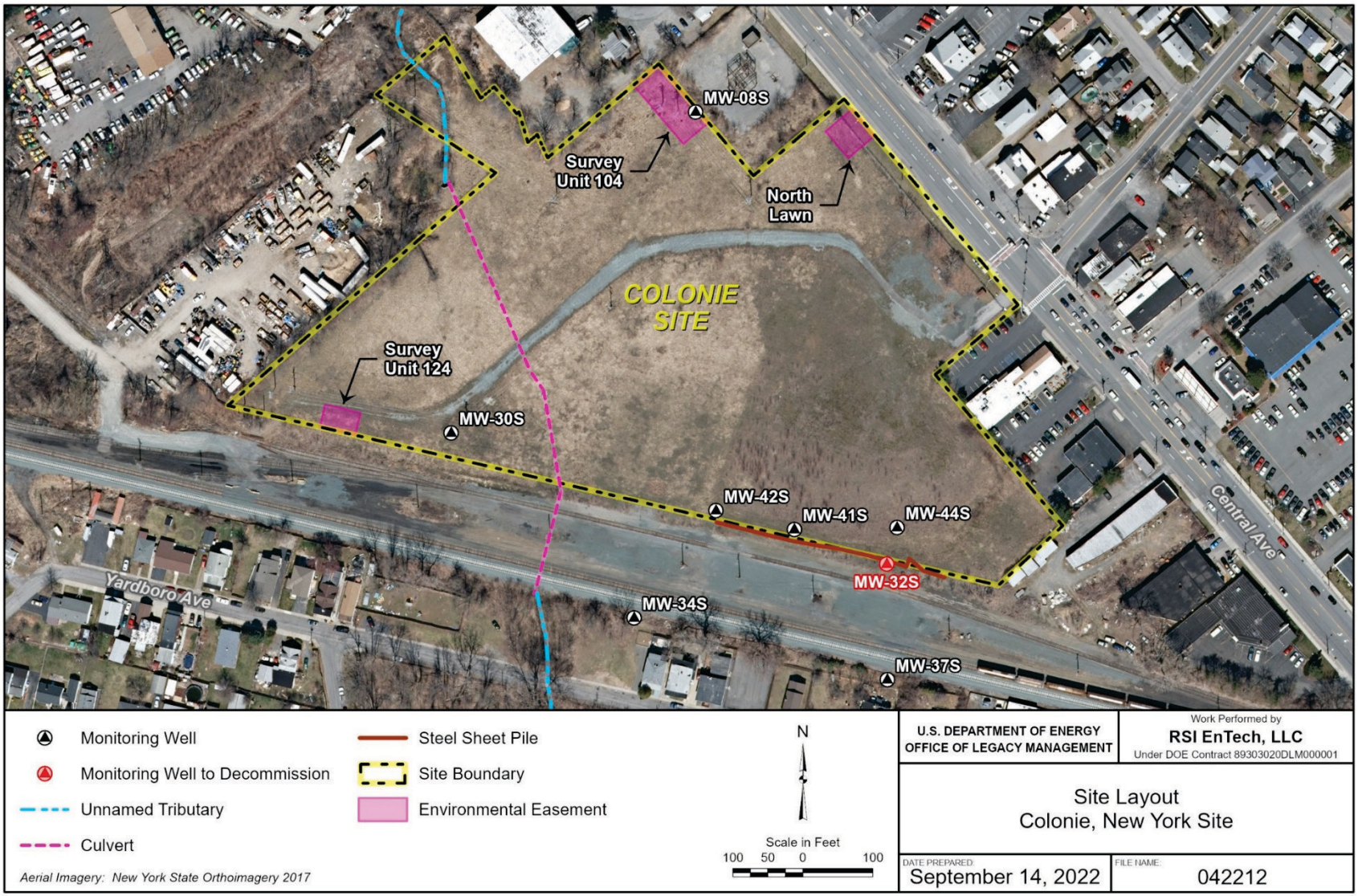

Figure 2. Colonie Site Layout

The National Lead Company changed its name to NL Industries Inc. (NL) in 1971. From 1958 to 1984, NL conducted a number of processes using radioactive materials, primarily depleted uranium, but also thorium and enriched uranium. The plant handled enriched uranium from approximately 1960 to 1972. From 1966 to 1972, NL held several contracts to manufacture fuel from enriched uranium for experimental nuclear reactors. Operations were conducted at the plant to reduce depleted uranium-tetrafluoride to depleted uranium metal, which was then fabricated into shielding components, ballast weights for airplanes, and armor-piercing projectiles.

In 1980, DOE surveyed the vicinity properties surrounding the NL plant and determined that uranium released into the air during former operations was deposited on nearby residential and commercial properties and structures. DOE found the preponderance of the deposition in the direction of the area's prevailing winds (from the northwest and the southeast). DOE identified 56 vicinity properties requiring Remedial Action.

4.0 Remedial Actions

New York State officials closed NL in 1984, after which Congress authorized DOE to remediate the property. In February 1984, the Secretary of Energy accepted an offer from NL to donate the land, buildings, and equipment to DOE to help expedite the cleanup.

In 1984, 1985, and 1988, 53 vicinity properties were remediated, certification dockets were prepared attesting to their radiological status, and all contaminated materials from remediation activities were staged on the Colonie main site pending disposal.

In 1985, DOE acquired a portion of the Niagara Mohawk property bordering the Colonie main site and subsequently designated it as part of the main site.

In November 1989, DOE had prepared a characterization report for the site documenting the results of field activities and outlining the nature and extent of contamination (DOE 1989). From 1992 to 1996, the remaining NL site buildings were demolished by DOE. Authority for remediating the site was assigned to DOE by Congress through the Energy and Water Development Appropriations Act of 1984 in Public Law 98-50 (PL 98-50).

In October 1997, authority for executing Formerly Utilized Sites Remedial Action Program (FUSRAP) remediation activities was transferred from DOE to U.S. Army Corps of Engineers (USACE) by further congressional action. In accordance with the removal action goals in the *Final Action Memorandum* (USACE 2001), USACE removed all radioactively contaminated soils exceeding cleanup criteria regardless of depth and all metals-contaminated soils exceeding criteria to a depth of 9 feet below original grade. USACE also removed soil containing volatile organic compound sources where encountered. Once USACE determined that a soil excavation unit met the cleanup criteria and the New York State Department of Environmental Conservation (NYSDEC) concurred, the area was backfilled with certified clean fill material and restored. The *Colonie FUSRAP Main Site Soils Remedial Investigation Summary Report* documents the remedial work performed (USACE 2013). On March 26, 2015, USACE signed the *Colonie FUSRAP Site, Colonie Main Site Soils Record of Decision* (USACE 2015).

5.0 Residual Contamination

Existing metals contamination remains in site soils, whereas the radionuclides of concern have been removed. The remaining metals contamination is limited to small areas in the shallow subsurface and some portions of the deeper subsurface (greater than 12 feet in depth). The shallow subsurface areas were not excavated during the removal action due to the presence of semipermanent physical obstructions, including high-voltage power line support poles, a rail line, and a fire hydrant and water main. Deep subsurface soils were not removed; removal was not authorized in the *Final Action Memorandum* (USACE 2001), because there is no complete exposure pathway to those soils.

The small areas in the shallow subsurface with remaining contamination are the Survey Unit 104 Easement Area, the Survey Unit 124 Easement Area, survey unit SU109, and the North Lawn Easement Area. Three of these four small areas are addressed by the SMP; however, survey unit SU109 does not pose an unacceptable risk and is not subject to an environmental easement. The results of the January 2013 post-removal action sampling indicate that the layer of contamination at each of these shallow subsurface locations is less than a few feet thick (USACE 2013). A summary of each location is provided below:

- **Survey Unit 104 Easement Area (1.82 feet depth):** Arsenic, 85.4 milligrams per kilogram (mg/kg) (cleanup goal 7.4 mg/kg). The sample was between active power poles. Additional vertical and horizontal excavation would impact power pole support soils.
- **Survey Unit 124 Easement Area (5.3 feet depth):** Copper, 2450 mg/kg (cleanup goal 1912 mg/kg) and lead, 734 mg/kg (cleanup goal 450 mg/kg). The sample was adjacent to an active power pole. Additional vertical and horizontal excavation would impact the power pole support soils.
- **North Lawn Easement Area (3.9 feet depth):** Copper, 4340 mg/kg (cleanup goal 1912 mg/kg) and lead, 3370 mg/kg (cleanup goal 450 mg/kg). The sample was adjacent to the main fire hydrant for commercial and residential properties along Central Avenue. The local fire chief stated that full-time access to the hydrant was required, and additional excavation would impact the stability of the hydrant.
- **Survey Unit SU109 (2.4 feet depth):** Arsenic, 10.5 mg/kg (cleanup goal 7.4 mg/kg) and lead 630 mg/kg (cleanup goal 450 mg/kg). The sample was on the property boundary adjacent to an active rail line. Additional excavation would impact the rail support soils. This unit is not subject to environmental easement because there is no unacceptable risk associated with the remaining contamination.

Soil sample results for six locations in deeper subsurface soils (shallowest is 12 feet below ground surface) were greater than the metals cleanup goals for soil less than 9 feet below ground surface. The six locations are confined to a single portion of the site where past NL landfill operations in the former Patroon Lake occurred. These deep subsurface soils were not removed because there is no complete exposure pathway to those soils. The results of the January 2013 post-removal action sampling indicate that the layer of contamination at each of these deep subsurface locations ranges from less than a few feet thick to thickness greater than 10 feet (USACE 2013).

6.0 Institutional Controls

The residual contamination at the site will not pose an unacceptable threat to human health and the environment provided the following ICs are employed:

(1) The Soil Easement Areas, as further identified in Appendix D, Schedule A, of the SMP, may be used for "Restricted Residential" as described in Title 6 *New York Codes, Rules and Regulations* Part 375-1.8(g)(2)(ii) (6 NYCRR 375-1.8(g)(2)(ii), "Commercial;" as described in 6 NYCRR 375-1.8(g)(2)(iii); and "Industrial" as described in 6 NYCRR 375-1.8(g)(2)(iv).

(2) No digging or excavation shall be permitted in the Soil Easement Areas without prior written approval of DOE and NYSDEC.

(3) Vegetable gardens and farming are prohibited in the Soil Easement Areas.

(4) The use of groundwater underlying the site, as described in Appendix D, Schedule B, of the SMP, is prohibited without necessary water quality treatment as determined by the New York State Department of Health or the Albany County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from NYSDEC.

(5) The potential for vapor intrusion must be evaluated for any buildings designed for occupancy on the site, as described in Appendix D, Schedule B of the SMP, and appropriate actions to address exposures must be implemented

(6) Data and information relevant to site management must be reported at the frequency and in a manner as defined in the SMP.

(7) All future activities that will disturb remaining contaminated material must be conducted in accordance with the SMP.

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP.

(9) Maintenance, monitoring, inspection, and reporting of any physical component of the remedy shall be performed as defined in the SMP.

7.0 Annual Inspections

As described in Section 4.0 of the SMP, sitewide inspections have been performed annually by the owner. During these inspections, inspection forms were completed and are provided in Appendix B. The forms compile sufficient information to assess the following:

- Compliance with all ICs, including site usage
- General site conditions at the time of the inspection
- Confirmation that site records are up to date

The site was inspected during the following events within the reporting period:

- July 13–16, 2020
- July 19–21, 2021
- July 25, 2022

7.1 Results of the Annual Inspections

The following are results from the sitewide annual inspections:

- July 13–16, 2020
  - At the North Lawn Easement Area, a grass-free patch is evident where the former fire hydrant has been cut away at ground surface
  - The Survey Unit 104 Easement Area showed no signs of excavation or erosion
  - The Survey Unit 124 Easement Area showed no signs of erosion or excavation
- July 19–21, 2021
  - At the North Lawn Easement Area, the grass cover was unstressed and uniform
  - The Survey Unit 104 Easement Area showed no signs of stressed vegetation, excavation, or erosion
  - The Survey Unit 124 Easement Area showed no signs of stressed vegetation, erosion, or excavation
- July 25, 2022
  - At the North Lawn Easement Area, the U.S. General Services Administration had installed a “For Sale” sign 50 feet south of the fence line, which is just outside of the easement area
  - The Survey Unit 104 Easement Area showed no signs of stressed vegetation, excavation, or erosion
  - The Survey Unit 124 Easement Area showed no signs of stressed vegetation, erosion, or excavation; there was an animal burrow under the south fence line nearby, but it did not impact the easement area

8.0 Effectiveness of the ICs

8.1 Compliance of the Remedy with the Record of Decision (ROD)

The remedy is in compliance with the Main Site Soils Operable Unit (OU) ROD (USACE 2015).

The remedy for Main Site Soils OU is the implementation of ICs by filing an environmental easement that establishes the land use restrictions to be employed to ensure that the property is safe for its intended future use. The remedy requires that once USACE transferred full control of the property back to DOE, then LM (as the current owner of the Colonie site) would implement the ICs. Such ICs would be detailed in an approved SMP. These controls would be designed to

account for the potential future onsite residential land use by limiting potential exposure of future onsite residents to residual metals contamination at depth by restricting soil excavation at the Survey Unit 104 Easement Area, the Survey Unit 124 Easement Area, and the North Lawn Easement Area.

LM has implemented ICs in the form of an environmental easement granted to the NYSDEC and recorded it with the Albany County Clerk, which requires compliance with the approved SMP and all ICs placed on the site.

8.2 New Conclusions or Observations Regarding Site Contamination

LM has conducted a long-term periodic review (LTPR) of soil and groundwater remedies for the site as described in the *Long-Term Periodic Review Report DOE Colonie Site, Town of Colonie, Albany County, New York* (DOE 2022). LM reviewed the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives used at the time of the selection of the remedies.

The technical review of the risk assessment for lead exposure in the Survey Unit 124 Easement Area determined that there was no excess risk from exposure to soil in that survey unit. The Soil Remedial Investigation (RI) found that modeled blood lead values exceeded the U.S. Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) goal at the Survey Unit 124 Easement Area and the North Lawn Easement Area exposure units. However, the Survey Unit 124 Easement Area maximum detected soil lead concentration of 734 mg/kg was mistakenly used in the Soil RI Integrated Exposure Uptake Biokinetic (IEUBK) model as the exposure point concentration, instead of using the arithmetic mean concentration as described the IEUBK model user guide (EPA 2022a). When the Survey Unit 124 Easement Area arithmetic mean soil lead concentration of 371 mg/kg was used as the exposure point concentration in the current IEUBK model, this resulted in 1.37% of resident children exceeding 10 micrograms (µg) of inorganic lead (Pb) per deciliter (dL) of blood, which meets the threshold criterion of 5%. For all other soil units in the Main Site Soils OU Human Health Risk Assessment (HHRA), the arithmetic mean concentration was correctly used as the exposure point concentration and the blood lead criterion of no more than 5% of individuals exceeding 10 µg Pb/dL was met. The Survey Unit 124 Easement Area is safe for unlimited use and unrestricted exposure. It is recommended that the Survey Unit 124 Easement Area be removed from the environmental easement.

The technical review of the risk assessment for lead exposure in Survey Unit 104 Easement Area determined that there was in fact no excess risk from exposure to soil in that survey unit. In the Main Site Soils OU HHRA, the arsenic hazard index (HI) for the future child resident exceeded a value of 1 only for the Survey Unit 104 Easement Area (HI = 1.3). An HI exceedance of 1 indicates the potential for adverse health effects. The noncancer arsenic risk associated with residential exposure at the Survey Unit 124 Easement Area was recalculated using the EPA Regional Screening Level Calculator for chemicals (EPA 2022b). The resulting Regional Screening Level Calculator for arsenic's HI of 0.8 is less than 1 and is thus unlikely to present adverse noncancer health effects. The use of the 60% relative bioavailability (RBA) value decreases the oral exposure and risk to arsenic in soil by 40%. Similarly, the 60% RBA was used to recalculate the cancer risk for residential exposure at the Survey Unit 124 Easement Area. This resulted in the excess lifetime cancer risk decreasing from 1.3×10^{-4} in the Main Site Soils OU HHRA to a value of 8×10^{-5} in the 2022 recalculation from the EPA Regional Screening

Level Calculator. Thus, cancer risks under future residential use at all exposure units were within the EPA acceptable cancer risk range from 1 in 1 million to 1 in 10,000 (1×10^{-6} to 1×10^{-4}) excess lifetime cancer risk.

8.3 Recommendations Regarding Any Necessary Changes

For the Survey Unit 124 Easement Area, a math error was made during the Main Site Soils OU HHRA in lead exposure calculations. Upon recalculation it was determined that this easement area passes the site-specific risk assessment. Therefore, the LTPR recommends that the Survey Unit 124 Easement Area should be removed from the environmental easement.

For the Survey Unit 104 Easement Area, there has been a change to the arsenic bioavailability assumptions since completion of the Main Site Soils OU HHRA that reduces the arsenic exposure estimate by 40%. Upon recalculation it was determined that this easement area passes site-specific risk assessment. Therefore, the LTPR recommends that the Survey Unit 104 Easement Area should be removed from the environmental easement.

8.4 Overall Performance and Effectiveness of the Remedy

The certification of ICs has been assigned by the site owner's representative and is included as Appendix C.

9.0 References

6 NYCRR 375. "Environmental Remediation Programs," *New York Codes, Rules and Regulations.*

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Appendix A

Site Survey Map

XREFS: NONE

PROJECT NUMBER: 15.5628

CAD SYNC: FILE NAME: K:\Projects\155628\Survey\BS FUSRAP.dwg

LEGEND

BOL BOLLARD
CIRS CAPPED IRON ROD SET
CIRF CAPPED IRON ROD FOUND
CB CATCH BASIN
CBA CATCH BASIN FOUND
MON CONCRETE MONUMENT FOUND
DMH DRAINAGE MANHOLE
ES END SECTION
GLV GATE VALVE
HYD HYDRANT
IRF IRON PIPE FOUND
IRS IRON ROD FOUND
MW MONITOR WELL
SMH SANITARY MANHOLE
TMH TELEPHONE MANHOLE
TSB TRAFFIC SIGNAL BOX
TSP TRAFFIC SIGNAL POLE
UP UTILITY POLE
WM WATER METER
WSO WATER SHUTOFF
YL YARD LIGHT

Land-Use Control Areas

FOR INFORMATIONAL PURPOSES. Restrict metals detections below 0 depth of 12 feet to/next to ground surface in this location. The area does not pose a human health risk (i.e., no complete exposure pathway exists), under current and reasonably future land use.
Soils deeper than 12 feet below ground surface in this area exceed state regulatory standards, but pose no CERCLA risk, and therefore are not included in the Land-Use Controls.

BOUNDARY DESCRIPTION

All that certain tract, piece or parcel of land situate, lying and being in the Town of Colonie, County of Albany, State of New York, lying Southwest of Central Avenue, and being more particularly bounded and described as follows:

BEGINNING at the point of intersection of the Southwesterly boundary of Central Avenue 99 foot-wide right-of-way with the division line between the lands of The United States of America as described in Book 2256 of Deeds at Page 590 on the Northwest and the lands now or formerly of Edge of Woods Holding Group, Ltd. as described in Book 2648 of Deeds at Page 826 on the Southeast and runs thence from said point of beginning South 49 deg. 50 min. 56 sec. West along the above mentioned division line 154.71 feet to the point of intersection of the common division line between the lands of The United States of America on the Southwest and the lands now or formerly of Edge of Woods Holding Group, Ltd. as described in Book 2648 of Deeds at Page 826 and lands now or formerly of MBF Management Corporation as described in Book 2865 of Deeds at Page 977 on the Northeast; thence South 40 deg. 09 min. 04 sec. East along the above last mentioned common division line 282.62 feet to the point of intersection of the division line between the lands of The United States of America on the Northwest and the lands now or formerly of Donald Grimm as described in Book 2673 of Deeds at Page 237 on the Southeast; thence South 47 deg. 15 min. 51 sec. West along the above last mentioned division line 125.43 feet to the point of intersection of the division line between the lands of The United States of America on the North and the lands formerly of New York Central Railroad lands now or formerly of Consolidated Rail Corporation on the South said division line being the municipal division line between the Town of Colonie on the North and the City of Albany on the South; thence North 76 deg. 51 min. 24 sec. West along the above last mentioned division line 1,130.65 feet to the point of intersection of the common division line between the lands of The United States of America as described in Book 2268 of Deeds at Page 141 on the Southeast and the lands now or formerly of Hadi Ipek and Havzi Ipek as described in Book 2835 of Deeds at Page 760 and lands now or formerly of the Town of Colonie on the Northwest; thence North 49 deg. 00 min. 37 sec. East along the above last mentioned common division line 507.01 feet to its intersection with the common division line between the lands of The United States of America as described in Book 2268 of Deeds at Page 141 on the Northeast and the lands now or formerly of the Town of Colonie and lands now or formerly of Hadi Ipek and Havzi Ipek on the Southwest; thence North 56 deg. 44 min. 01 sec. West along the above last mentioned common division line 203.50 feet to its intersection with the division line between the lands of The United States of America on the Southeast and the lands now or formerly of Niagara Mohawk Power Corporation as described in Book 1494 of Deeds at Page 305 on the Northwest; thence North 49 deg. 46 min. 29 sec. East along the above last mentioned division line 127.37 feet to the point of intersection of the division line between the lands of The United States of America as described in Book 2268 of Deeds at Page 141 on the Southwest and the lands now or formerly of TJM Enterprises of Albany, LLC on the Northeast; thence along the above last mentioned division line the following seven (7) courses: 1) South 30 deg. 34 min. 41 sec. East 101.44 feet to a point; 2) thence North 49 deg. 46 min. 29 sec. East 25.00 feet to a point; 3) thence South 40 deg. 13 min. 31 sec. East 50.00 feet to a point; 4) thence North 49 deg. 46 min. 29 sec. East 4.00 feet to a point; 5) thence South 16 deg. 32 min. 41 sec. East 45.58 feet to a point; 6) thence North 49 deg. 48 min. 29 sec. East 17.33 feet to a point; and 7) thence South 24 deg. 18 min. 21 sec. East 36.35 feet to its intersection with the division line between the lands of The United States of America on the Southeast and the lands now or formerly of TJM Enterprises of Albany, LLC on the Northwest; thence North 49 deg. 42 min. 29 sec. East along the above last mentioned division line 267.73 feet to a point at the intersection of the division line between the lands of The United States of America as described in Book 2268 of Deeds at Page 141 and Book 2256 of Deeds at Page 590 on the Southwest and the lands now or formerly of Niagara Mohawk Power Corporation as described in Book 915 of Deeds at Page 251 on the Northeast; thence South 40 deg. 18 min. 04 sec. East along the above last mentioned division line 169.59 feet to the intersection with the above mentioned Southwesterly boundary of Central Avenue; thence South 40 deg. 12 min. 14 sec. East along the Southwesterly boundary of Central Avenue 385.26 to the point or place of beginning and containing 11.29 acres of land, more or less.

MAP NOTES:

1. Boundary information shown hereon was compiled from an actual field survey as shown on map reference no. one and field updated on September 2, 2016.
2. North orientation and bearings are referenced to Grid North and are based on the New York State Plane Coordinate System, East Zone, NAD 83/2011 epoch 2010.00.
3. Vertical datum shown hereon is NAVD 88 (Geoid 12A) and was obtained from GPS observations which were post processed holding Cobleskill and Saratoga CORS.
4. This survey was prepared without the benefit of an up to date abstract of title or title report and is therefore subject to any easements, covenants, restrictions or any statement of fact that such documents may disclose.
5. Parcel is subject to a nonplottable 10 foot wide right of way and easement for communication lines along the southerly side of Central Avenue granted by NL Industries, Inc. to New York Telephone Company and recorded January 24, 1964 in Book 2254 of Deeds at Page 849.
6. Lands conveyed NL Industries, Inc. to The United States of America in Book 2256 of Deeds at Page 590 are recited as being subject to an unrecorded easement to the Town of Colonie for drainage facilities and corridor for the same, an unrecorded easement to New York Telephone Company for conduit and manholes and an unrecorded license to New York Telephone Company for the storage of soils.
7. Lands conveyed by Niagara Mohawk Power Corporation to The United States of America in Book 2268 of Deeds at Page 141 are recited as being subject to the reservation for the right and easement for the transmission and distribution of electricity, the reservation of all existing transmission towers, lines and associated equipment presently located on the described property and recited as being subject to a fencing and drainage easement dated June 6, 1973 between the grantor and the Town of Colonie.

MAP REFERENCES:

1. "Boundary Survey Lands of The United States of America 1130 Central Avenue", prepared by C.T. Male Associates, P.C., dated September 14, 2007, project no. 07.7520, DWG. No. 07-651.
2. "Deed Restriction Areas Colonie FUSRAP Site 1130 Central Avenue Albany, New York 12205", prepared by C.T. Male Associates, P.C., dated July 9, 2008, project no. 99.5377, DWG. No. 08-432.
3. "Survey Portion of Lands of N.L. Industries, Inc." prepared by C.T. Male Associates, P.C., dated September 3, 1982, MAP No. 82-166R.
4. "Environmental Easement Survey Lands of The United States of America 1130 Central Avenue", prepared by C.T. Male Associates, D.P.C., dated September 2, 2016, last revised August 21, 2017, project no. 15.5628, DWG. No. 16-545.
5. "U.S. Army Corps of Engineers Formerly Utilized Sites Remedial Action Program, Proposed Limits of Northlawn Remediation 10/2003 Colonie FUSRAP Site 1130 Central Avenue, Albany, NY 12205", prepared by Shaw Environmental, Inc., dated November 5, 2003, Drawing No. 837935D4.
6. "Proposed Easement Lands Now or Formerly of National Lead Company To Be Granted To The Town of Colonie", prepared by C.T. Male Associates, P.C., dated July 30, 1974, Map No. 72-386 3/6.

I certify to the following that this survey has been prepared in accordance with the Code of Practice for Land Surveys adopted by the N.Y.S. Association of Professional Land Surveyors as last revised.

The People of The State of New York, acting through their Commissioner of the Department of Environmental Conservation
The United States of America

Carl M. Rigdon, P.L.S. No. 50711 Date

"ONLY COPIES OF THIS MAP SIGNED IN RED INK AND EMBOSSED WITH THE SEAL OF AN OFFICER OF C.T. MALE ASSOCIATES OR A DESIGNATED REPRESENTATIVE SHALL BE CONSIDERED TO BE A VALID TRUE COPY".

BAR SCALE
50 0 25 50 100
1 inch = 50 ft.

CARL M. RIGDON
P.L.S. NO. 50711

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTER	CHECK	APPR.
8/21/17	1	REVISED TITLE	GLB	CMR	WJN
03/23/18	2	ADDED FORMER DEED LINES AND EASEMENT LABELS	GLB	DGD	WJN
	3				
	4				
	5				
	6				
	7				
	8				

UNAUTHORIZED ALTERATION OR ADDITION TO THIS ENDORSEMENT IS A VIOLATION OF SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

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APPROVED: WJN
DRAFTED : GLB
CHECKED : DGD
PROJ. NO : 15.5628
SCALE : 1" = 50'
DATE : SEPT. 2, 2016

BOUNDARY SURVEY
Lands of
THE UNITED STATES OF AMERICA
1130 CENTRAL AVENUE

TOWN OF COLONIE — ALBANY COUNTY, NEW YORK

C.T. MALE ASSOCIATES
Engineering, Surveying, Architecture & Landscape Architecture, D.P.C.
50 CENTURY HILL DRIVE, LATHAM, NY 12110
518.786.7400 * FAX 518.785.7299

SHEET 1 OF 1
DWG. NO: 17-519

Appendix B

Inspection Forms

Date of this Inspection: JULY 16, 2020 Date of the last inspection: INITIAL INSPECTION

Names of Inspector(s): CARL YOUNG, LMS SITE LEAD

Other persons present and roles: _____

1) Pre-Trip	
1.1 Was a readiness review conducted?	☒yes ☐no ☐n/a
1.2 Was this form reviewed by the LM site manager?	☐yes ☐no ☒n/a
1.3 Were deficiencies or issues identified on the previous inspection form?	☐yes ☒no ☒n/a
1.4 Will this inspection include an annual site-wide inspection for the soil easement areas?	☒yes ☐no ☐n/a
1.5 Has this form be revised since the previous inspection?	☐yes ☐no ☒n/a
1.6 Is right-of entry in effect for offsite locations? If not, do not access off-site locations	☒yes ☐no ☐n/a
Notes: INITIAL INSPECTION / INITIAL USE OF FORM	

07/09/20

2) General Observations	
2.1 Was a Plan of the Day / Week prepared?	☒yes ☐no ☐n/a
2.2 Was a Job Safety Analysis reviewed?	☒yes ☐no ☐n/a
Notes, including weather conditions:	
SUNNY, 83°F, SLIGHT WIND	

3) Fencing – Inspector will walk along the entire interior fence line. Photograph all deficiencies	
3.1 Missing or damaged fence components, including gates and locks?	☒yes ☐no ☐n/a
3.2 Excessive corrosion of fence components?	☐yes ☒no ☐n/a
3.3 Trees or vegetation either contacting or damaging any fence component?	☒yes ☐no ☐n/a
3.4 Erosion or other soil loss that would allow human access?	☐yes ☒no ☐n/a
3.5 Indications of vandalism or unauthorized entry?	☒yes ☐no ☐n/a
Notes (include photo numbers):	
3.1 FENCE DAMAGE - POSTS STRUCK (3), BARBED WIRE CUT (1), TREE DAMAGE	
3.3 TREE LIMB ON BARBED WIRE ON WEST SIDE	
3.5 TRESPASS FROM MEXICAN RESTAURANT - ALSO ON SOUTH SIDE WHERE BARBED WIRE WAS CUT.	

4) Signs – Reference the locations in the Signage plan shown in Figure 1. Photograph all deficiencies	
4.1 Missing or damaged signs?	☐yes ☒no ☐n/a
4.2 Excessive corrosion of signs?	☐yes ☒no ☐n/a
4.3 Indications of vandalism?	☐yes ☒no ☐n/a
Notes (include photo numbers):	

5) Locks – Reference the locations of defects or issues. Well locks are reviewed with wells in Section X. Photograph all deficiencies.	
5.1 Missing or damaged lock at front entrance?	☐yes ☒no ☐n/a
5.2 Missing or damaged lock at rear entrance?	☐yes ☒no ☐n/a
5.3 Missing or damaged lock at west pedestrian entrance?	☐yes ☒no ☐n/a
Notes (include photo numbers):	
5.1 KEYED LOCK + CONTRACTOR COMBO LOCK IN PLACE	

6) Vegetation		
6.1 Has the grass along Central Avenue been recently mown?	Grass height: (4) inches	☒yes ☐no ☐n/a
6.2 Is the grass along Central Avenue fence line trimmed?	Grass height: (4) inches	☒yes ☐no ☐n/a
6.3 Is there trash on the lawn on Central Avenue?		☐yes ☒no ☐n/a
6.4 Has the grass in the site interior been recently mown?	Grass height: (4) inches	☒yes ☐no ☐n/a
6.5 Is there trash on the site?		☒yes ☐no ☐n/a
6.6 Are there signs of stressed vegetation?		☒yes ☐no ☐n/a
6.7 Are there dead trees or downed branches?		☒yes ☐no ☐n/a
6.8 Are there any areas of erosion on the grounds?		☒yes ☐no ☐n/a
Notes (include photo numbers):		
6.5 SOME BOTTLES & LITTER FROM REAR RESTAURANT		
6.6 DROUGHT CONDITIONS - GRASS IS YELLOWED		
6.7 BRANCHES FROM RESTAURANT HAVE BEEN THROWN ONTO SITE.		
6.8 MINOR WHEEL RUTS IN GRASS FROM MOWING W/ SKID STEER.		

7) Roads and Parking Area	
7.1 Are there any driving hazards in the road or parking area?	☐yes ☒no ☐n/a
7.2 Do any conditions make the road unsafe or unusable?	☐yes ☒no ☐n/a
Notes (include photo numbers):	

8) Storm Drain System	
8.1 Is the northern catch basin intact and undamaged?	☒yes ☐no ☐n/a
8.2 Is the eastern catch basin intact and undamaged?	☒yes ☐no ☐n/a
8.3 Is the central catch basin intact and undamaged?	☒yes ☐no ☐n/a
8.4 Are there any obstructions in the unnamed tributary?	☐yes ☒no ☐n/a
8.5 Are there any signs of erosion in the unnamed tributary?	☐yes ☒no ☐n/a
Notes (include photo numbers):	
EAST BASIN ISN'T ID'd ON MAP.	

9) Easement Areas	
9.1 Is this an annual inspection where the Site Management Plan Checklist will be used? If 'yes' then do not complete the remainder of this section.	☒yes ☐no ☐n/a
9.2 Are there signs that digging has occurred in any of the easement areas?	☒yes ☐no ☐n/a
9.3 Are there any signs of dumping, staining, or vegetative stress?	☐yes ☒no ☐n/a
Notes (include photo numbers): 10 NORTHERN THERE REMAINS 4 SALT PATCH WHERE THE HYDRANT WAS CUT AWAY.	

10) Monitoring Wells – Photograph all wells if possible and list photo numbers	
10.1 Are separate well inspection forms being used? If yes, do not complete this section.	☒yes ☐no ☐n/a
10.2 Are there signs of damage to the wells or bollards?	☐yes ☒no ☐n/a
10.3 Are the locks installed and undamaged?	☒yes ☐no ☐n/a
Notes (include photo numbers): WELL MW-44S WAS REPAIRED ON MONDAY. ALSO SEE SEPARATE WELL INSPECTION FORMS.	

11) Storage Shed	
11.1 Is the shed locked and secure?	☒yes ☐no ☐n/a
11.2 Are there signs of vandalism or damage?	☐yes ☒no ☐n/a
11.2 Are there signs of water damage inside the shed?	☐yes ☒no ☐n/a
Notes (include photo numbers): THE EQUIPMENT IN THE SITED MUST BE GOVERNMENT-OWNED. THERE IS A C-TAG ON AN AIR COMPRESSOR. NONE OF THE EQUIPMENT SHOWS SIGNS OF RECENT USE.	

12) Mail box	
12.1 Is the mail box present and intact?	☒yes ☐no ☐n/a
12.2 Are there signs of vandalism or damage?	☒yes ☐no ☐n/a
Notes (include photo numbers): 12.2 THERE ARE DENTS IN THE MAILBOX.	

12) Personal Property	
12.1 Refer to the Personal Property inventory. Is all equipment accounted for?	☒yes ☐no ☐n/a
12.2 Are there signs of vandalism or damage?	☐yes ☒no ☐n/a
Notes (include photo numbers): EQUIPMENT THOUGHT TO BE LANDSCAPERS MUST BE USG PROPERTY AIR COMPRESSOR, LAWN MOWER, 2 LINE TRIMMERS, GARDEN CART.	

13) Additional Notes – Summarize Notable Issues
Notes (include photo numbers):
5.1 FENCE BARBED WIRE MUST HAVE BEEN CUT.
7.5 SPOKE WITH LANDSCAPE CONTRACTORS ABOUT DUMPING ONSITE BY RESTAURANT WORKERS.

I. COLONIE SITE INFORMATION

Date of Inspection:	Type of Inspection (site walk, windshield):
JULY 16, 2020	SITE WALK
General Site Conditions: LANDSCAPING IS KEMPT SOME WASTE FROM RESTAURANT NO SIGN OF EXCAVATION OR DISTURBANCE OF EASEMENT AREAS. Weather/Temperature: SUNNY, 93°F	Inspection Team Names/Affiliation (print): CARL YOUNG / NAVARRO

Deed Holder: DOE

If the property is owned by the DOE, is it currently leased? Yes (No)

Site Records, Inspections, and Reports up to date? (Yes) No

Institutional Controls:

1. Excavation is restricted in the Soil Easement Areas.
2. Data and information pertinent to Site management must be reported at the frequency and in a manner as defined in this SMP.
3. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP.
4. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP.
5. Maintenance, monitoring, inspection, and reporting of any physical component of the remedy shall be performed as defined in this SMP.
6. Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the Property Owner to assure compliance with the restrictions identified by the Environmental Easement.
7. Gardening and farming are prohibited in the Soil Easement Areas.

Agency or company conducting the inspection: NAVARRO RESEARCH & ENGINEERING

Primary Inspector CARL YOUNG (Name) SITE LEAD (Title) 410-316-4029 (Phone No.)

Carl Young (Signature) 07/16/20 (Date)

Use the following to document current changed Site Conditions, include as Attachments:
Photographs Maps Other (sketches, etc.)

II. INSTITUTIONAL CONTROLS (ICs)

**If deficiencies are noted, the locations should be documented on a site map and photographed.*

1. Property Use:

Are all ICs being complied with?	(Yes)	No
Soil Easement Areas disturbed in any manner?	Yes	(No)
Changes in Site Conditions?	Yes	(No)
Is there any Gardening or Farming?	Yes	(No)
Is the property used for industrial purposes?	Yes	(No)
Is the property used for commercial purposes?	Yes	(No)
Is the property currently vacant?	(Yes)	No
Any evidence of new construction?	Yes	(No)

Remarks: _____

2. Soil Conditions:

Is there any evidence of digging or soil excavation? Yes (No)

Authorization/Permit #: _____

Any signs of dumping, staining, or vegetative stress? (Yes) No

Remarks: GRASS ACROSS SITE HAS YELLOWED DUE TO DROUGHT

3. **Real Property Assets:**

Do any property assets need maintenance? (Yes) No

Remarks: THERE IS DAMAGED BARBED WIRE, DAMAGED FENCE POSTS. THE DAMAGED WELL MW-46S WAS REPAIRED.

III. EVALUATION OF INSTITUTIONAL CONTROLS (ICs)

1. Implementation and Enforcement:

Site conditions imply ICs have been properly implemented. (Yes) No

Site conditions imply ICs are fully enforced. (Yes) No

Remarks: _____

2. Observations, Conclusions, Recommendations (including changes needed and overall performance and effectiveness of the remedy):

Remarks: MINOR FENCE REPAIRS SHOULD BE DONE. ONSITE WELLS SHOULD BE PROTECTED BY BOLLARDS.

Date of this Inspection: 07-19-21 Date of the last inspection: 07-16-20

Names of Inspector(s): CARL YOUNG

Other persons present and roles: DARINA CASTILLO (LM) OBSERVER

1) Pre-Trip – note whether this is an annual inspection	
1.1 Was a readiness review conducted?	☒yes ☐no ☐n/a
1.2 Were deficiencies or issues identified on the previous inspection form?	☒yes ☐no ☐n/a
1.3 Does this inspection include the annual inspection for the soil easement areas?	☒yes ☐no ☐n/a
1.4 Has this form been revised since the previous inspection?	☒yes ☐no ☐n/a
1.5 Is right-of entry in effect for offsite locations? If not, do not access off-site locations	☒yes ☐no ☐n/a
Notes: 1.2 PREVIOUS VISIT NOTED DAMAGE TO BARBED WIRE AT ONE LOCATION, PLUS DUMPING FROM RESTAURANT.	

2) General Observations - including weather conditions	
2.1 Was a Plan of the Day / Week prepared?	☒yes ☐no ☐n/a
2.2 Was a Job Safety Analysis reviewed onsite?	☒yes ☐no ☐n/a
Notes: GOOD WEATHER. SOME RAIN AT NIGHT BUT CLEAR IN DAYTIME. WARM. NO TICKS. SOME WASPS UNDER WELL CAP AT MW-035.	

3) Fencing – Inspector will walk along the entire interior fence line. Photograph all deficiencies	
3.1 Missing or damaged fence components, including gates and locks?	☒yes ☐no ☐n/a
3.2 Excessive corrosion of fence components?	☐yes ☒no ☐n/a
3.3 Trees or vegetation either contacting or damaging any fence component?	☒yes ☐no ☐n/a
3.4 Erosion or other soil loss that would allow human access?	☐yes ☒no ☐n/a
3.5 Indications of vandalism or unauthorized entry?	☒yes ☐no ☐n/a
Notes (include photo numbers): (3.1) 3 SECTIONS BARBED WIRED BROKEN. 8 BROKEN POSTS, 8 BENT POSTS	
3.2 - FROST CRACKS AT SEVERAL POSTS	
3.3 - VEG GROWING INTO FENCE AT SEVERAL LOCATIONS	
3.5 - A 2ND BREAK IN BARBED WIRE (3RD NOT FROM TRESPASS)	

4) Signs – Reference the locations in the signage plan shown in Figure 1. Photograph all deficiencies	
4.1 Missing or damaged signs?	☐yes ☒no ☐n/a
4.2 Excessive corrosion of signs?	☐yes ☒no ☐n/a
4.3 Indications of vandalism?	☐yes ☒no ☐n/a
Notes (include photo numbers):	
ALL SIGNS ARE INTACT.	

5) Locks – Reference the locations of defects or issues. Well locks are reviewed with wells in Section 10. Photograph all deficiencies.	
5.1 Missing or damaged lock at front entrance?	☐yes ☑no ☐n/a
5.2 Missing or damaged lock at rear entrance?	☐yes ☑no ☐n/a
5.3 Missing or damaged lock at west pedestrian entrance?	☐yes ☐no ☑n/a
Notes (include photo numbers):	
REPLACED LOCKS W/ LM LOCKS AT OFFSITE WELLS. ALL LOCKS EXCEPT PEDESTRIAN ENTRANCE ARE NOW LM LOCKS.	

6) Vegetation – Reference lawn care, tree growth, signs of stress		
6.1 Has the grass along Central Avenue been recently mown?	Grass height: 4-IN	☑yes ☐no ☐n/a
6.2 Is the vegetation along Central Avenue fence line trimmed?	Grass height: 4-IN	☑yes ☐no ☐n/a
6.3 Is there trash on the lawn on Central Avenue?		☐yes ☑no ☐n/a
6.4 Has the grass in the site interior been recently mown?	Grass height: 6IN	☑yes ☐no ☐n/a
6.5 Is there trash on the site?		☐yes ☑no ☐n/a
6.6 Are there signs of stressed vegetation?		☐yes ☑no ☐n/a
6.7 Are there dead trees or downed branches within the property?		☑yes ☐no ☐n/a
6.8 Are there any areas of erosion on the grounds?		☑yes ☐no ☐n/a
Notes (include photo numbers):		
6-5 SOME BOTTLES NEAR RESTAURANT		
6-6 SOME TREES MAY BE STRESSED (TOO MUCH RAIN?)		
6-8 SOME BARE SPOTS IN CENTER OF SITE		

7) Roads and Parking Area – Review drivability and vegetation ingress	
7.1 Are there any driving hazards in the road or parking area?	☑yes ☐no ☐n/a
7.2 Do any conditions make the road unsafe or unusable?	☐yes ☑no ☐n/a
Notes (include photo numbers):	
7.1 STANDING WATER AT SOUTHERN END OF ROAD	

8) Storm Drain System – Inspect for blockage	
8.1 Is the northern catch basin intact and undamaged?	☑yes ☐no ☐n/a
8.2 Is the eastern catch basin intact and undamaged?	☑yes ☐no ☐n/a
8.3 Is the central catch basin intact and undamaged?	☑yes ☐no ☐n/a
8.4 Are there any obstructions in the unnamed tributary?	☑yes ☐no ☐n/a
8.5 Are there any signs of erosion in the unnamed tributary?	☐yes ☑no ☐n/a
Notes (include photo numbers):	
8-4 SOME VEG STUCK ON FENCE WHERE TRIBUTARY LEAVES SITE	

9) Environmental Easement Areas – Inspect and photo-document	
9.1 Is this an annual inspection where the Site Management Plan Checklist will be used? If 'yes' then do not complete the remainder of this section.	☒yes ☐no ☐n/a
9.2 Are there signs that digging has occurred in any of the easement areas?	☐yes ☒no ☐n/a
9.3 Are there any signs of dumping, staining, or vegetative stress?	☐yes ☒no ☐n/a
Notes (include photo numbers):	
NORTH LAWN EASEMENT AREA: BARE PATCH AT FORMER HYDRANT LOCATION IS GRASSED OVER.	

10) Monitoring Wells – Photograph all wells if possible and list photo numbers	
10.1 Are separate well inspection forms being used? If yes, do not complete this section.	☐yes ☒no ☐n/a
10.2 Are there signs of damage to the wells or bollards?	☐yes ☒no ☐n/a
10.3 Are the locks installed and undamaged?	☒yes ☐no ☐n/a
Notes (include photo numbers):	
LM LOCKS ARE INSTALLED AT EVERY WELL	

11) Storage Shed – Inspect for wear and damage	
11.1 Is the shed locked and secure?	☒yes ☐no ☐n/a
11.2 Are there signs of vandalism or damage?	☐yes ☒no ☐n/a
11.2 Are there signs of water damage inside the shed?	☐yes ☒no ☐n/a
Notes (include photo numbers):	
THE SHED IS SECURE. THE ROOF IS APPROACHING END OF USEFUL LIFE.	

12) Mailbox – photo-document	
12.1 Is the mail box present and intact?	☒yes ☐no ☐n/a
12.2 Are there signs of vandalism or damage?	☐yes ☒no ☐n/a
Notes (include photo numbers):	
NO CHANGES SINCE 2020 INSPECTION	

12) Personal Property	
12.1 Refer to the Personal Property inventory. Is all equipment accounted for?	☒yes ☐no ☐n/a
12.2 Are there signs of vandalism or damage?	☐yes ☒no ☐n/a
Notes (include photo numbers):	
REPAIRED A SPARE PUMP. ADDED SOME HAND TOOLS FROM WELL REPAIR. THERE ARE SOME SPARE FITTINGS.	

13) Additional Notes – Summarize Notable issues
Notes (include photo numbers):
3.1 THERE IS NOW A SECOND SECTION OF BARBED WIRE THAT HAS BEEN CUT. A 3RD SECTION IS DAMAGED NEAR THE RESTAURANT. THERE ARE 8 FENCE POSTS BROKEN AND 8 MORE ARE DAMAGED.

Annual Site Inspection Form
Colonie FUSRAP Site
Town of Colonie, Albany County, New York

I. COLONIE SITE INFORMATION

Date of Inspection:	Type of Inspection (site walk, windshield):
MON 19 JULY & TUE 20 JULY 2021	SITE WALK
General Site Conditions: WET CONDITIONS, MOWN LAWN	**Inspection Team Names/Affiliation (print):** CARL YOUNG / LMS; DARNA CASTILLO / LM OBSERVER
Weather/Temperature: CLEAR, 90°F	

Deed Holder: DOE

If the property is owned by the DOE, is it currently leased? Yes (No)

Site Records, Inspections, and Reports up to date? (Yes) No

Institutional Controls:

1. Excavation is restricted in the Easement Areas.
2. Data and information pertinent to Site management must be reported at the frequency and in a manner as defined in this SMP.
3. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP.
4. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP.
5. Maintenance, monitoring, inspection, and reporting of any physical component of the remedy shall be performed as defined in this SMP.
6. Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the Property Owner to assure compliance with the restrictions identified by the Environmental Easement.
7. Gardening and farming are prohibited in the Easement Areas.

Agency or company conducting the inspection: RSI - ENTECH

Primary Inspector CARL YOUNG PG LMS SITE LEAD 410-836-4029
Name Title Phone No.

Carl Young
Signature

Date 07/20/21

Use the following to document current changed Site Conditions, include as Attachments:
Photographs Maps Other (sketches, etc.)

Annual Site Inspection Form
Colonie FUSRAP Site
Town of Colonie, Albany County, New York

II. INSTITUTIONAL CONTROLS (ICs)

**If deficiencies are noted, the locations should be documented on a site map and photographed.*

1. Property Use:

Are all ICs being complied with?	(Yes)	No
Easement Areas disturbed in any manner?	Yes	(No)
Changes in Site Conditions?	Yes	(No)
Is there any Gardening or Farming?	Yes	(No)
Is the property used for industrial purposes?	Yes	(No)
Is the property used for commercial purposes?	Yes	(No)
Is the property currently vacant?	(Yes)	No
Any evidence of new construction?	Yes	(No)

Remarks: THE USAGE HAS NOT CHANGED

2. Soil Conditions:

Is there any evidence of digging or soil excavation?	Yes	(No)
Authorization/Permit #: _____		
Any signs of dumping, staining, or vegetative stress?	Yes	(No)

Remarks: NO DIGGING

3. **Real Property Assets:**

Do any property assets need maintenance? (Yes) No

Remarks: FENCE DAMAGE: 3 BROKEN SECTIONS BARBED WIRE AND 8 BROKEN FENCE POSTS

Note: One of the broken sections of barbed wire and 4 of the broken posts were noted in 2020.

III. EVALUATION OF INSTITUTIONAL CONTROLS (ICs)

1. Implementation and Enforcement:

Site conditions imply ICs have been properly implemented.	(Yes)	No
Site conditions imply ICs are fully enforced.	(Yes)	No

Remarks: NO SIGNS OF EXCAVATION OR UNAPPROVED USE

2. Observations, Conclusions, Recommendations (including changes needed and overall performance and effectiveness of the remedy):

Remarks: THE ICs REMAIN PROTECTIVE, THERE ARE NO INDICATIONS THAT ICs HAVE BEEN VIOLATED.

DOE Office of Legacy Management Colonie NY SiteSite Inspection Checklist

Date of this Inspection: JULY 26, 2022 Date of the last inspection: JULY 19, 2021

Names of Inspector(s): CARL YOUNG

Other persons present and roles: DARINA CASTILLO - LM OVERSIGHT, PAUL ARMANI-NYSDEC
TRICA GOSS & TOMMY CHRISTOPHER - AMTRAK OVERSIGHT

1) Pre-Trip – note whether this is an annual inspection			
1.1 Was a readiness review conducted?	☑yes	☐no	☐n/a
1.2 Were deficiencies or issues identified on the previous inspection form?	☒yes	☐no	☐n/a
1.3 Does this inspection include the annual inspection for the soil easement areas?	☑yes	☐no	☐n/a
1.4 Has this form been revised since the previous inspection?	☐yes	☒no	☐n/a
1.5 Is right-of entry in effect for offsite locations? If not, do not access off-site locations	☒yes	☐no	☐n/a
Notes: 1.2 DAMAGE TO BARBED WIRE			

2) General Observations – including weather conditions			
2.1 Was a Plan of the Day / Week prepared?	☑yes	☐no	☐n/a
2.2 Was a Job Safety Analysis reviewed onsite?	☒yes	☐no	☐n/a
Notes: WARM AND DRY. WOODCHUCK BURROWS PRESENT. NO TICKS SEEN. NO POISON IVY NOTED.			

3) Fencing – Inspector will walk along the entire interior fence line. Photograph all deficiencies			
3.1 Missing or damaged fence components, including gates and locks?	☒yes	☐no	☐n/a
3.2 Excessive corrosion of fence components?	☐yes	☒no	☐n/a
3.3 Trees or vegetation either contacting or damaging any fence component?	☑yes	☐no	☐n/a
3.4 Erosion or other soil loss that would allow human access?	☒yes	☐no	☐n/a
3.5 Indications of vandalism or unauthorized entry?	☒yes	☐no	☐n/a
Notes (include photo numbers): 3.1 CONTRACTOR LOCK SHOWED ATTEMPTED CUT			
3.3 SOME TREE BRANCHES REST ON BARBED WIRE ON WEST FENCE LINE IN SW CORNER.			
3.4 ANIMAL BURROW NEAR SOUTH GATE COULD ALLOW HUMAN ENTRY.			
3.5 CUT IN CHAIN LINK FENCE BEHIND RESTAURANT'S EAST PARKING AREA.			

4) Signs – Reference the locations in the signage plan shown in Figure 1. Photograph all deficiencies			
4.1 Missing or damaged signs?	☒yes	☐no	☐n/a
4.2 Excessive corrosion of signs?	☐yes	☑no	☐n/a
4.3 Indications of vandalism?	☑yes	☐no	☐n/a
Notes (include photo numbers): 4.1 & 4.2 SPRAY PAINT OF "FEDERAL PROPERTY" SIGNS P2 & P3			

5) Locks – Reference the locations of deficits or issues. Well locks are reviewed with wells in Section 10. Photograph all deficiencies.			
5.1 Missing or damaged lock at front entrance?	☒yes	☐no	☐n/a

5.2 Missing or damaged lock at rear entrance?	yes ☒no ☐n/a
5.3 Missing or damaged lock at west pedestrian entrance?	☐yes ☐no ☒n/a
Notes (include photo numbers): CONTRACTOR LOCK WAS DAMAGED BY INCOMPLETE CUTTING.	

6) Vegetation – Reference lawn care, tree growth, signs of stress		
6.1 Has the grass along Central Avenue been recently mown?	Grass height: 2"	☒yes ☐no ☐n/a
6.2 Is the vegetation along Central Avenue fence line trimmed?	Grass height: 2"	☒yes ☐no ☐n/a
6.3 Is there trash on the lawn on Central Avenue?		☐yes ☒no ☐n/a
6.4 Has the grass in the site interior been recently mown?	Grass height: 4"	☒yes ☐no ☐n/a
6.5 Is there trash on the site?		☐yes ☒no ☐n/a
6.6 Are there signs of stressed vegetation?		☒yes ☐no ☐n/a
6.7 Are there dead trees or downed branches within the property?		☐yes ☒no ☐n/a
6.8 Are there any areas of erosion on the grounds?		☒yes ☐no ☐n/a
Notes (include photo numbers): 6-6 DROUGHT HAS MADE GRASS YELLOW 6-8 ANIMAL BURROWS UNDER FENCE IN 2 LOCATIONS		

7) Roads and Parking Area – Review drainability and vegetation progress	
7.1 Are there any driving hazards in the road or parking area?	☐yes ☒no ☐n/a
7.2 Do any conditions make the road unsafe or unusable?	☐yes ☒no ☐n/a
Notes (include photo numbers):	

8) Storm Drain System – Inspect for blockage	
8.1 Is the northern catch basin intact and undamaged?	☒yes ☐no ☐n/a
8.2 Is the eastern catch basin intact and undamaged?	☒yes ☐no ☐n/a
8.3 Is the central catch basin intact and undamaged?	☒yes ☐no ☐n/a
8.4 Are there any obstructions in the unnamed tributary?	☐yes ☒no ☐n/a
8.5 Are there any signs of erosion in the unnamed tributary?	☐yes ☒no ☐n/a
Notes (include photo numbers): 8-4 A FEW SMALL BRANCHES WHERE TRIBUTARY EXITS SITE IN KEYHOLE AREA.	

9) Environmental Easement Areas – Inspect and photo-document	
9.1 Is this an annual inspection where the Site Management Plan Checklist will be used? If 'yes' then do not complete the remainder of this section.	☒yes ☐no ☐n/a
9.2 Are there signs that digging has occurred in any of the easement areas?	☐yes ☐no ☐n/a
9.3 Are there any signs of dumping, staining, or vegetative stress?	☐yes ☐no ☐n/a

Notes (include photo numbers): GSA SIGNS IS ON EDGE OF EASEMENT AREA.

10) Monitoring Wells – Photograph all wells if possible and list photo numbers			
10.1 Are separate well inspection forms being used? If yes, do not complete this section.	☐yes	☒no	☐n/a
10.2 Are there signs of damage to the wells or bollards?	☐yes	☑no	☐n/a
10.3 Are the locks installed and undamaged?	☑yes	☐no	☐n/a
Notes (include photo numbers): ALL WELLS ARE IN GOOD CONDITION. THE EDGE OF THE PAD AT MW-44S IS CRACKED.			

11) Storage Shed – Inspect for pests and damage			
11.1 Is the shed locked and secure?	☐yes	☑no	☐n/a
11.2 Are there signs of vandalism or damage?	☐yes	☑no	☐n/a
11.2 Are there signs of water damage inside the shed?	☐yes	☑no	☐n/a
Notes (include photo numbers): FEDERAL PROPERTY NOT CONVEYING IS REMOVED LOCK TO SHED IS MISSING.			

12) Mailbox – photo-document			
12.1 Is the mail box present and intact?	☑yes	☐no	☐n/a
12.2 Are there signs of vandalism or damage?	☒yes	☐no	☐n/a
Notes (include photo numbers): 12.2 SAME WRINKLE AS PREVIOUS YEAR.			

13) Personal Property			
12.1 Refer to the Personal Property inventory. Is all equipment accounted for?	☑yes	☐no	☐n/a
12.2 Are there signs of vandalism or damage?	☐yes	☑no	☐n/a
Notes (include photo numbers):			

14) Additional Notes – Summarize Notable Issues
Notes (include photo numbers):

Annual Site Inspection Form
Colonie FUSRAP Site
Town of Colonie, Albany County, New York

I. COLONIE SITE INFORMATION

Date of Inspection:	Type of Inspection (site walk, windshield):
JULY 26, 2022	SITE WALK
General Site Conditions:	Inspection Team Names/Affiliation (print): CARL YOUNG - LEGACY MGMT SUPPORT (RSI); DARINA CASTILLO - LEGACY MGMT; PAJU ARMANI - NYSDEC
Weather/Temperature: CLOUDY, 90°F	

Deed Holder: DOE

If the property is owned by the DOE, is it currently leased? Yes (No)

Site Records, Inspections, and Reports up to date? (Yes) No

Institutional Controls:

1. Excavation is restricted in the Easement Areas.
2. Data and information pertinent to Site management must be reported at the frequency and in a manner as defined in this SMP.
3. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP.
4. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP.
5. Maintenance, monitoring, inspection, and reporting of any physical component of the remedy shall be performed as defined in this SMP.
6. Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the Property Owner to assure compliance with the restrictions identified by the Environmental Easement.
7. Gardening and farming are prohibited in the Easement Areas.

Agency or company conducting the inspection: RSI - ENTECH

Primary Inspector CARL YOUNG (Name) SITE LEAD (Title) 410-816-4029 (Phone No.)

Signature [signature] Date 07-26-22

Use the following to document current changed Site Conditions, include as Attachments:
(Photographs) Maps Other (sketches, etc.)

Annual Site Inspection Form
Colonie FUSRAP Site
Town of Colonie, Albany County, New York

II. INSTITUTIONAL CONTROLS (ICs)

**If deficiencies are noted, the locations should be documented on a site map and photographed.*

1. Property Use:

Are all ICs being complied with?	(Yes)	No
Easement Areas disturbed in any manner?	Yes	(No)
Changes in Site Conditions?	(Yes)	No
Is there any Gardening or Farming?	Yes	(No)
Is the property used for industrial purposes?	Yes	(No)
Is the property used for commercial purposes?	Yes	(No)
Is the property currently vacant?	(Yes)	No
Any evidence of new construction?		Yes
(No)		

Remarks: FENCE WAS CUT FOR ENTRY BEHIND RESTAURANT PARKING LOT. POSTS FOR A GSA SIGN WERE INSTALLED AT EDGE OF NORTH LAWN EASEMENT AREA

2. Soil Conditions:

Is there any evidence of digging or soil excavation? Yes (No)
Authorization/Permit #: _____
Any signs of dumping, staining, or vegetative stress? (Yes) No

Remarks: VEGETATIVE STRESS TO LAWN DUE TO DROUGHT

3. **Real Property Assets:**

Do any property assets need maintenance? (Yes) No

Remarks: CUT IN CHAIN-LINK FENCE AS NOTED IN ITEM 1.

III. EVALUATION OF INSTITUTIONAL CONTROLS (ICs)

1. Implementation and Enforcement:

Site conditions imply ICs have been properly implemented. (Yes) No
Site conditions imply ICs are fully enforced. (Yes) No

Remarks: _____

2. Observations, Conclusions, Recommendations (including changes needed and overall performance and effectiveness of the remedy):

Remarks: THE FENCE DAMAGE DOES NOT AFFECT EASEMENT.

Appendix C

Certification of Institutional Controls

Certification of ICs

For each IC identified for the site, I certify that all of the following statements are true:

- The inspection of the site to confirm the effectiveness of the IC required by the remedial program was performed under my direction.
- The IC employed at this site is unchanged from the date the control was put in place, or last approved by the Department.
- Nothing has occurred that would impair the ability of the control to protect the public health and environment.
- Nothing has occurred that would constitute a violation or failure to comply with any Site Management Plan for this control.
- Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control.
- Use of the site is compliant with the Environmental Easement.
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices.
- The information presented in this report is accurate and complete.

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Shawn Eichelberger, having the business address of U.S. Department of Energy, 11035 Dover Street, Suite 600, Westminster, Colorado 80021, am certifying as Owner's Designated Representative of the Office of Legacy Management to sign this certification for the site.

_____ _____

Signature of Owner's Designated Representative Date

Appendix B

Well Logs and Well Construction Details

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
Colonie Interim Storage Site	14501-139	1 OF 1	B39W08S

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
CISS	N 1776 E 1122	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-7-84	11-7-84	Empire Soils	Acker AD-2	7-1/2"			14.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
/			231.45	229	/ /	/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
		E. W. Lundeen

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN. CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
							228.8				0.0 - 0.3 Ft. TOPSOIL.	
								5			0.3 - 10.8 Ft. SAND (SP). Light brown, medium- to coarse-grained, well sorted, rounded to subangular, frosted particles. 10% silt. Noncohesive. Dry to saturated at 3.5 Ft. (DUNE SAND)	
							218.1	10			10.8 - 14.0 Ft. Clayey SILT (ML). Gray to dark gray noncohesive to slightly cohesive, slightly plastic material. Rapid to moderate dilatancy. (UPPER SAND)	
							214.9				Bottom of borehole at 14.0 Ft. Monitor well installed and screened at 6.0 to 11.0 Ft., 11/7/84.	

S = SPLIT SPOON; ST = SHELBY TUBE; = DENNISON; P = PITCHER; O = OTHER

SITE: CISS

HOLE NO.: B39W08S

Drilling Log

IT CORPORATION
A Member of the IT Group

Monitoring Well: 30-S

Project: Colonie FUSRAP Site — Owner: USACE
Location: Colonie, NY — Proj. No.: 866724
Surface Elev.: — Total Hole Depth: 14.5 ft. — Diameter: —
Top of Casing: 226.74 ft. — Water Level Initial: 6 ft — Static: —
Screen: Dia: 2 in — Length: 10 ft. — Type/Size: Sch 40PVC in
Casing: Dia: 2 in. — Length: 6 ft. — Type: Sch 40PVC
Fill Material: — Rig/Core: —
Drill Co.: Maxim Technology — Method: HSA
Driller: C. DiNova — Log By: T. Maynard — Date: 08/01/00 — Permit #: —
Checked By: — License No.: —

See Site Map For Boring Location

COMMENTS:

Atmosphere & samples monitored by EDI

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count / % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2 to 24							
0–6							0-10': Dark brown-brown, medium grained sand, increased silt content w/depth, increased moisture-wetness w/depth, trace boulder, cobble, gravel, fine gravel, content decreases w/depth.
6						SM	▽
10–12				2/2/2/2 80%		SM	10-12': Brown, saturated, sandy silt; 60-80% silt, very fine-fine grained sand, trace clay, medium dense.
12–14.5						SM	

Page: 1 of 1

Colonie FUSRAP Site	DISTRICT: Baltimore	BORING NUMBER: MW – 34S
COMPANY NAME: IT Corporation	DRILL SUBCONTRACTOR: Parratt Wolff	SHEET: 1 of 2

PROJECT NAME: TERC CONTRACT NO. DACA31-95-D-0083	SITE LOCATION: 1130 Central Ave. Albany, NY
NAME OF DRILLER: Mickey Marshall	HOLE LOCATION: See site map
NAME OF GEOLOGIST: Marc Flanagan	SIGNATURE OF GEOLOGIST:
TYPE AND SIZE OF DRILLING AND SAMPLING EQUIPMENT: Hollow Stem Auger / Split spoon sampler	DATE STARTED: 12/20/2001 — DATE COMPLETED: 12/20/2001
	SURFACE ELEVATION: 218.33
	DEPTH TO FIRST ENCOUNTERED WATER: NA
DEPTH TO REFUSAL: NA	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA
DEPTH DRILLED INTO BEDROCK: NA	OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA
TOTAL DEPTH OF HOLE: 18.5'	TOTAL FLUID LOSSES: NA

GEOTECHNICAL SAMPLES	SAMPLE DEPTH	UNDISTURBED/DISTURBED	TOTAL NUMBER OF CORE BOXES

ENVIRONMENTAL SAMPLES	SAMPLE DEPTH	ANALYTES	TOTAL CORE RECOVERY %

DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	CASING TYPE	WELL DEPTH	SCREENED INTERVAL
Monitoring well installed	#0 Morie	MW – 34S	2" PVC	18.5'	8.5'-18.5'

DATE	START TIME	FINISH TIME	DRILLING DEPTH	DESCRIPTION

SKETCH OF DRILLING LOCATION/ADDITIONAL COMMENTS SCALE:

PROJECT TO 33, DC SCHOOLS	BORING.
NOTE: ATTACH WELL CONSTRUCTION DIAGRAM	MW – 34S

IT DRILLING LOG (CONTINUATION SHEET) | BORING NUMBER MW – 34S

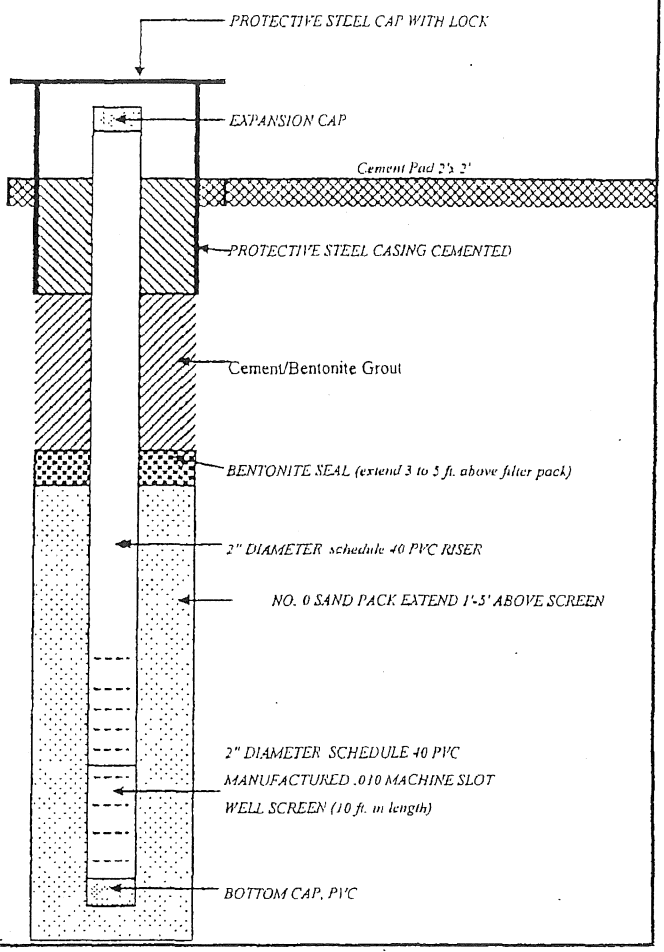
OJECT NAME: COLONIE FUSRAP SITE | GEOLOGIST: M.Flanagan | SHEET: 2

DEPTH	BLOW COUNT	USCS SYMBOL	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	SAMPLE ID/DEPTH	REMARKS
						Augered down to 8'. No split spoons collected.
8---	5	ML	Brown to brown-gray silt, trace clay content, slight density, Wet	7.0		
-	3					
-	4					
-	2					
10---	3	ML	Gray-brown silt, trace clay content, slight density, Wet.	6.0		
-	3					
-	2					
-	3					
12---	2	ML	Gray-brown silt, trace clay content, slight density, Last ~4" gray silt, some clay, medium density, Wet.	10.0		
-	3					
-	2					
-	2					
14---	2					
-	2	CL	Gray-brown clay, medium density, some silt interbedded, Wet.	15.0		
-	3					
-	3					
16---	3					
-	3	CL	Gray-brown clay, medium density, trace silt in 2 horizons, Wet.	15.0		
-	3					
-	5					
18---						

FIELD FORM
STICK-UP WELL CONSTRUCTION DIAGRAM
COLONIE FUSRAP (to be completed in the field)
WELL ID (MW - 34S)

	DEPTH (RECORD ON THIS FORM)
SURFACE	
DEPTH BOTTOM STEEL CSG-	1.80
DEPTH TOP BENTONITE-	3.5
DEPTH BOTTM BENTONITE-	6.5
DEPTH TOP SAND-	6.5
DEPTH TOP OF SCREEN-	8.5
DEPTH BOTTOM SCREEN-	18.5
TOTAL DEPTH-	18.5

CONSTRUCTION DETAILS



GEOLOGIST: M.Flanagan
DATE INSTALLED: 12-20-01
DATE COMPLETED:12-20-01
BOREHOLE DIAMETER: 8 in.
TYPE OF DRILLING:Hollow Stem Auger
DRILLER/RIG: M.Marshall/Parrat Wolff

LOCATION DESCRIPTION: "C"

Colonie FUSRAP Site	DISTRICT: Baltimore	BORING NUMBER: MW – 37S
COMPANY NAME: IT Corporation	DRILL SUBCONTRACTOR: Parratt Wolff	SHEET: 1 of 2

PROJECT NAME: TERC CONTRACT NO. DACA31-95-D-0083	SITE LOCATION: 1130 Central Ave. Albany, NY
NAME OF DRILLER: Mickey Marshall	HOLE LOCATION: See site map
NAME OF GEOLOGIST: Marc Flanagan	SIGNATURE OF GEOLOGIST:
TYPE AND SIZE OF DRILLING AND SAMPLING EQUIPMENT: Hollow Stem Auger / Split spoon sampler	DATE STARTED: 1/27/2002 — DATE COMPLETED: 1/27/2002
	SURFACE ELEVATION: 220 (est.)
	DEPTH TO FIRST ENCOUNTERED WATER: NA
DEPTH TO REFUSAL: NA	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA
DEPTH DRILLED INTO BEDROCK: NA	OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA
TOTAL DEPTH OF HOLE: 22'	TOTAL FLUID LOSSES: NA

GEOTECHNICAL SAMPLES	SAMPLE DEPTH	UNDISTURBED/DISTURBED	TOTAL NUMBER OF CORE BOXES

ENVIRONMENTAL SAMPLES	SAMPLE DEPTH	ANALYTES	TOTAL CORE RECOVERY %

DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	CASING TYPE	WELL DEPTH	SCREENED INTERVAL
Monitoring well installed	#0 Morie	MW – 37S	2" PVC	22'	10'-20'

DATE	START TIME	FINISH TIME	DRILLING DEPTH	DESCRIPTION

SKETCH OF DRILLING LOCATION/ADDITIONAL COMMENTS SCALE:

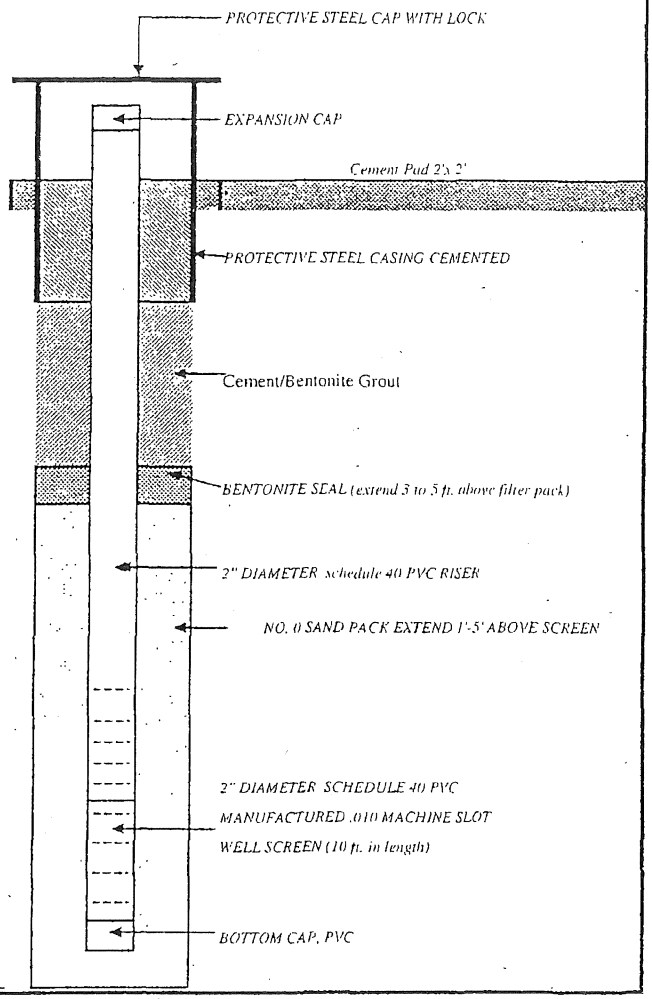
PROJECT TO 33, DC SCHOOLS	BORING:
NOTE: ATTACH WELL CONSTRUCTION DIAGRAM	MW – 37S

IT DRILLING LOG (CONTINUATION SHEET)				BORING NUMBER MW – 37S		
PROJECT NAME: COLONIE FUSRAP SITE				GEOLOGIST: M. Flanagan		SHEET: 2
DEPTH	BLOW COUNT	USCS SYMBOL	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	SAMPLE ID/DEPTH	REMARKS
						Augered down to 10'. No split spoons collected.
10--- - - - 12--- - - - 14--- - - - 16--- - - - 18--- - - - 20--- - - - 22---	4 4 6 4 4 4 4 5 1 3 3 2 3 3 2 3 2 3 2 3 3 5 4 5	ML	Brown-gray silt, trace fine grain sand, slight density, Wet.	<1.0		
		ML	Brown-gray silt, slight density, Wet.	<1.0		
		ML	Brown-gray silt, slight density, Wet.	<1.0		
		ML	Brown-gray silt, slight density, trace brown-gray clay in 2" lens at bottom of spoon, Wet.	<1.0		
		CL	Brown-gray silt, some clay, interbedded throughout spoon, medium density, Wet.	<1.0		
		ML	Brown-gray silt, slight density, ~1" brown-gray clay lens, interbedded at bottom of spoon, Wet.	<1.0		

FIELD FORM
STICK-UP WELL CONSTRUCTION DIAGRAM
COLONIE FUSRAP (to be completed in the field)
WELL ID (MW - 37S)

	DEPTH (RECORD ON THIS FORM)
SURFACE	
DEPTH BOTTOM STEEL CSG-	~2.0
DEPTH TOP BENTONITE-	3.0
DEPTH BOTTM BENTONITE-	8.0
DEPTH TOP SAND-	8.0
DEPTH TOP OF SCREEN-	11.0
DEPTH BOTTOM SCREEN-	21.0
TOTAL DEPTH-	22.0

CONSTRUCTION DETAILS



GEOLOGIST: M. Flanagan
DATE INSTALLED: 1-27-02
DATE COMPLETED:1-27-02
BOREHOLE DIAMETER: 8 in.
TYPE OF DRILLING:Hollow Stem Auger
DRILLER/RIG: M.Marshall/Parrat Wolff

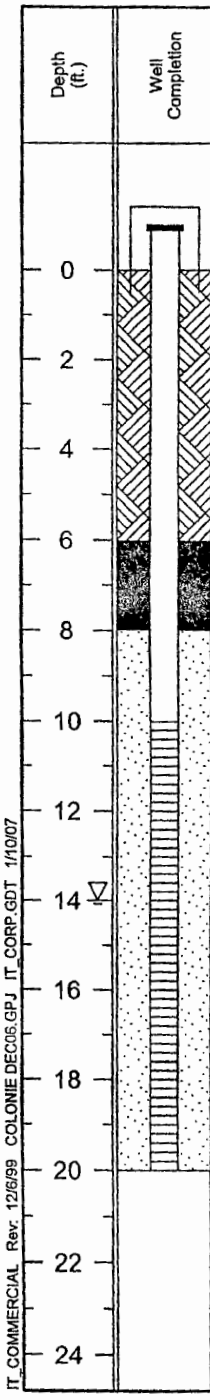
LOCATION DESCRIPTION: "F"

Drilling Log

Monitoring Well **MW-41S**

Project: Colonie FUSRAP Site | Owner: Shaw Environmental, Inc.
Location: Central Ave., Colonie, NY | Proj. No.: 837935
Surface Elev.: 223.0 ft. | Total Hole Depth: 23.0 ft. | North: | East:
Top of Casing: NA | Water Level Initial: ▽ 14.0 ft. | Static: NA | Diameter: 6.25 in.
Screen: Dia 2 in. | Length: 10 ft. | Type/Size: PVC Sch 40/0.010 in.
Casing: Dia 2 in. | Length: 11 ft. | Type: PVC Sch 40
Fill Material: Morie Sand #1 | Rig/Core:
Drill Co.: ADT | Method: HSA
Driller: R.Comfort | Log By: R.Adams | Date: 12/11/06 | Permit #: NA
Checked By: | License No.:

COMMENTS



Description

(Color, Texture, Structure)

Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.

Grass, brown coarse grain SAND and GRAVEL, dry (fill).

Brown, medium grain SAND, some subangular gravel, dry.

Brown, medium grain SAND, little subangular gravel, moist.

Brown, fine to medium grain SAND, some silt, moist.

Brown-gray, SILT, little clay, moist.

Brown, fine grain SAND and SILT, moist.

Gray, SILT, trace clay, moist.

Gray, SILT, trace clay, saturated.

IT_COMMERCIAL Rev. 12/6/99 COLONIE DEC05.GPJ IT_CORP.GDT 1/10/07

Drilling Log

Monitoring Well **MW-42S**

Page: 1 of 1

Project Colonie FUSRAP Site Owner Shaw Environmental, Inc.

Location Central Ave., Colonie, NY Proj. No. 837935

Surface Elev. 223.0 ft. Total Hole Depth 23.0 ft. North ____ East ____

Top of Casing NA Water Level Initial ▽ 10.0 ft. Static NA Diameter 6.25 in.

Screen: Dia 2 in. Length 10 ft. Type/Size PVC Sch 40/0.010 in.

Casing: Dia 2 in. Length 10 ft. Type PVC Sch 40

Fill Material Morie Sand #1 Rig/Core ____

Drill Co. ADT Method HSA

Driller R.Comfort Log By R.Adams Date 12/12/06 Permit # NA

Checked By ____ License No. ____

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery / Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0						
2		0.22			SW	Grass, brown, medium grain SAND, some gravel, dry.
4		0.14				
6		0.14			SM	Brown, fine grain SAND, some silt, some gravel, moist.
8		0.29				
10 ▽		0.98			SM	Brown-gray, SILT and fine grain SAND, trace gravel, wet.
12		1.12			ML	Brown-gray, SILT and fine grain SAND, trace gravel, wet, slight petro-like odor.
14		1.78				
16					ML	Brown-gray, SILT and fine grain SAND, trace gravel, wet.
18						
20		0.28			ML	Gray, SILT, little fine grain sand, wet.
22		0.27				
24						

IT_COMMERCIAL Rev: 12/6/99 COLONIE DEC06.GPJ IT_CORP.GDT 1/10/07

VISUAL CLASSIFICATION OF SOILS

BORING NUMBER	**MW44S**	PROJECT NAME	Colonie FUSRAP						
PROJECT NUMBER	500304	COORDINATES	Northing 1405456.27, Easting 679685.18					DATE	
ELEVATION	Ground: 223.20 ft msl	TOC: 224.65 ft msl						STARTED	7/27/2015
GEOLOGIST	B. Squire	GWL	Depth		Date/Time			COMPLETED	7/27/2015
DRILLING METHOD	HSA & Split Spoon							PAGE/PAGES	1/2

DEPTH (ft)	SAMPLE NUMBER	RECOVERY (ft)	PID (ppm)	DESCRIPTION	USCS SYMBOL	REMARKS
1 2 3 4 5				Brown f-c SAND, little silt, little rock, damp		Hand auger, log from cuttings
6 7	1	1	0.0	Brown silty SAND, some gravel, loose, damp	SM	
8 9	2	1.5	0.0	As above, grading to gray-brown		
10 11	3	1.0	0.0	As above, moist		
12 13	4	1.5	0.0	As above Brown f SAND, few to little silt, loose, wet	SP/SM	
14 15	5	0.0	0.0	As above (trace recovery)		
16 17	6	1.0	0.0	As above Gray vf-f SAND, some silt, loose, saturated	SM	
18 19	7	1.5	0.0	As above,		
20	8	NR	0.0	As above		

Continued on page 2

NOTES:

c = coarse
m = medium
f = fine
vf = very fine

ft = feet
NA= not applicable
NR= not recorded
ppm = parts per million

Drilling Contractor: Parratt-Wolffe
Drilling Equipment: HSA and split spoon
Driller: M. Eaves

VISUAL CLASSIFICATION OF SOILS

BORING NUMBER	MW44S	PROJECT NAME	Colonie FUSRAP						
PROJECT NUMBER	500304	COORDINATES	Northing 1405456.27, Easting 679685.18					DATE	
ELEVATION	Ground: 223.20 ft msl	TOC: 224.65 ft msl						STARTED	7/27/2015
GEOLOGIST	B. Squire	GWL	Depth		Date/Time			COMPLETED	7/27/2015
DRILLING METHOD	HSA & Split Spoon							PAGE/PAGES	2/2

DEPTH (ft)	SAMPLE TYPE & NUMBER	RECOVERY (ft)	PID / Oil Screen (ppm / pos-neg)	DESCRIPTION	USCS SYMBOL	REMARKS
21	8 (cont.)	NR	0.0	As above	SM	
22				Drilled interval		
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
39						
39						
40						

End of boring = 22 ft.

NOTES:

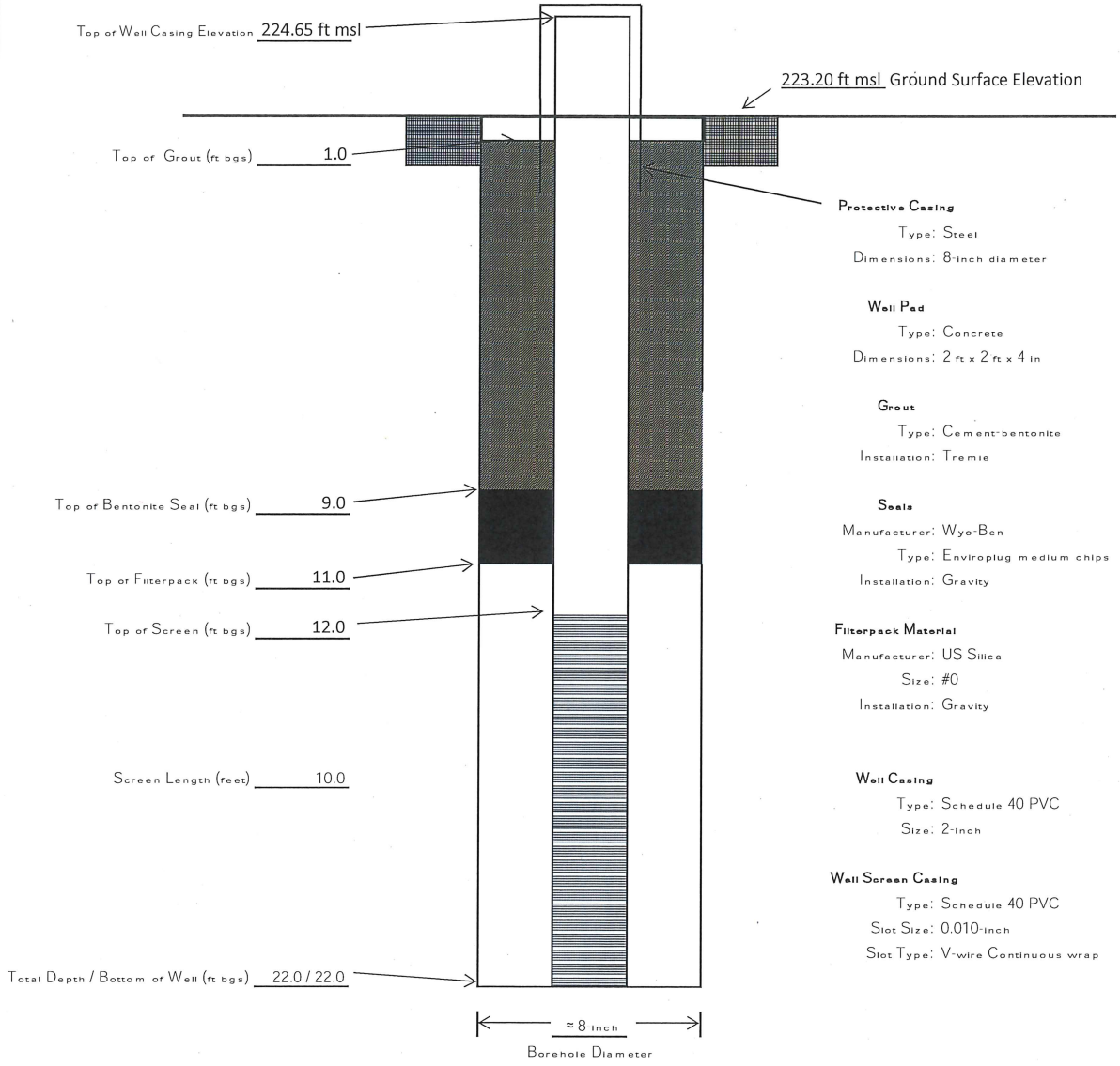
c = coarse
m = medium
f = fine
vf = very fine

ft = feet
NA= not applicable
NR= not recorded
ppm = parts per million

Drilling Contractor: Parratt-Wolffe
Drilling Equipment: HSA and split spoon
Driller: M. Eaves

MONITORING WELL CONSTRUCTION LOG

PROJECT	Colonie FUSRAP	WELL NUMBER	MW44S		
LOCATION	Colonie, NY	SITE LOCATION	Main Site		
CLIENT	USACE	DATE INSTALLED	7/27/2015		
SUBCONTRACTOR	Parratt Wolff	NORTHING	1405456.27		
DRILLER	M. Eaves	EASTING	679685.18		
SHAW FIELD REPRESENTATIVE	B. Squire	NAD		NGVD	



NOTES: Elevations are feet above mean sea level
ft bgs = feet below ground surface

Not to Scale

Appendix C

Historical Groundwater Data

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site

Sampling Date	Units	28-Jul-08		29-Oct-08		18-Feb-09		21-May-09		1-Dec-98		1-May-99		1-Oct-99		1-Jan-00	
Well ID		MW-02S		MW-02S		MW-02S		MW-02S		MW-08S		MW-08S		MW-08S		MW-08S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	-		-		-		-		10	U	5	U	10	U	-	
PCE	µg/L	-		-		-		-		10	U	5	U	10	U	-	
TCE	µg/L	-		-		-		-		10	U	5	U	10	U	-	
VC	µg/L	-		-		-		-		10	U	10	U	10	U	-	
cis-1,2-DCE	µg/L	-		-		-		-		10^	U	5^	U	10^	U	-	
trans-1,2-DCE	µg/L	-		-		-		-								-	
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	-		-		-		-		**1.7**	**B**	2.9	U	2.1	U	-	
Lead (Dissolved)	µg/L	-		-		-		-		-		-		-		2.3	U
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228	pCi/L	-		-		-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	**1.00**	J	**1.15**	**J**	**1.24**	**J**	**0.967**	**J**	-		-		-		-	
DOC	mg/L	**1.34**	J	**0.940**	**J**	**1.190**	**J**	**0.953**	**J**	-		-		-		-	
Ethane	µg/L	2.0	U	2.0	U	2.0	U	2.0	U	-		-		-		-	
Ethene	µg/L	2.0	U	2.0	U	2.0	U	2.0	U	-		-		-		-	
Methane	µg/L	**12.0**		**14**		**13**		**8.7**		-		-		-		-	
Nitrate-N	mg/L	0.10	U	**14**	**J**	0.10	U	0.10	U	-		-		-		-	
Sulfate	mg/L	**46.7**		**14**		**62.7**		**45.0**		-		-		-		-	
Chloride	mg/L	**84.7**		**14**		**162**		**92.8**		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L	**0.43**		**14**		0.50	U	0.40		-		-		-		-	
Ferrous Iron, Fe(II)	mg/L	**1.2**		**14**		**0.6**		1.4		-		-		-		-	
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	6.20		7.63		7.42		7.27		-		-		-		-	
Specific Conductance	mS/cm	0.510		0.494		0.702		0.461		-		-		-		-	
Turbidity	NTU	76.0		23.0		22.4		1.5		-		-		-		-	
Dissolved Oxygen	mg/L	3.36		NM		2.12		9.97		-		-		-		-	
Temperature	^{o}C	14.11		13.26		10.72		11.99		-		-		-		-	
ORP	mV	-72.8		-133.0		-156.8		-106.2		-		-		-		-	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	1-Mar-00		1-Aug-00		1-Dec-00		1-Feb-01		1-Aug-01		1-Dec-01		1-Feb-02		2-Jun-02	
Well ID		MW-08S		MW-08S		MW-08S		MW-08S		MW-08S		MW-08S		MW-08S		MW-08S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	10	U	10	U	-		1	U	0.83	U	-		0.5	U	0.5	U
PCE	µg/L	10	U	10	U	-		1	U	0.78	U	-		0.5	U	0.5	U
TCE	µg/L	10	U	10	U	-		1	U	0.49	U	-		0.5	U	0.5	U
VC	µg/L	10	U	10	U	-		2	U	1.0	U	-		0.5	U	0.5	U
cis-1,2-DCE	µg/L	10^	U	10^	U	-		1^	U	0.49	U	-		0.5	U	0.5	U
trans-1,2-DCE	µg/L					-				0.84	U	-		0.5	U	0.5	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	2.3	U	1.3	U	-		**4.3**		1.2	U	-		2.8	U	2.8	U
Lead (Dissolved)	µg/L	-		-		1.3	U	3.2		-		1.2	U	2.8	U	2.8	U
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228	pCi/L	-		-		-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-		-		-	
Methane	µg/L	-		-		-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L	-		-		-		-		-		-		-		-	
Ferrous Iron, Fe(II)	mg/L	-		-		-		-		-		-		-		-	
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	-		-		-		-		-		-		-		-	
Specific Conductance	mS/cm	-		-		-		-		-		-		-		-	
Turbidity	NTU	-		-		-		-		-		-		-		-	
Dissolved Oxygen	mg/L	-		-		-		-		-		-		-		-	
Temperature	^{o}C	-		-		-		-		-		-		-		-	
ORP	mV	-		-		-		-		-		-		-		-	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	1-Mar-03		3-Dec-03		4-Jul-04		4-Dec-04		5-Jun-05		5-Dec-05		1-Dec-06		26-Jun-07	
Well ID		MW-08S		MW-08S		MW-08S		MW-08S		MW-08S		MW-08S		MW-08S		MW-08S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
PCE	µg/L	**0.3**	**J**	0.5	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U
TCE	µg/L	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
VC	µg/L	0.5	U	0.5	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
cis-1,2-DCE	µg/L	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
trans-1,2-DCE	µg/L	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	~~**2.2**~~	**R**	2.2	U	3	U	2	UJ	2	U	2	U	2	U	2	U
Lead (Dissolved)	µg/L			2.2	U	25	U	25	U	2.2	UJ	2	U	-		-	
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228	pCi/L	-		-		-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-		-		-	
Methane	µg/L	-		-		-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L	-		-		-		-		-		-		-		-	
Ferrous Iron, Fe(II)	mg/L	-		-		-		-		-		-		-		-	
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	-		6.65		-		6.26		6.74		6.8		6.71		6.58	
Specific Conductance	mS/cm	-		0.452		-		0.353		0.432		0.633		0.336		0.314	
Turbidity	NTU	-		0.0		-		1.4		5.3		0.0		0.0		1.3	
Dissolved Oxygen	mg/L	-		4.58		-		0.71		2.28		0.86		1.05		0.64	
Temperature	^{o}C	-		6.22		-		16.72		8.63		13.17		10.02		11.28	
ORP	mV	-		222.2		-		282.3		192.4		221.1		230.6		84.3	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	28-Dec-08		28-Jul-08		29-Oct-08		18-Feb-09		21-May-09		1-Dec-98		1-May-99		1-Oct-99	
Well ID		MW-08S		MW-08S		MW-08S		MW-08S		MW-08S		MW-010S		MW-010S		MW-010S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	10	U	5	U	10	U
PCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	10	U	5	U	10	U
TCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	10	U	5	U	10	U
VC	µg/L	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U	10	U	10	U	10	U
cis-1,2-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	10^	U	5^	U	10^	U
trans-1,2-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U						
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	-		1.0	U	1.0	U	1.0	U	1.0	U	**2.4**	**B**	2.9	U	2.1	U
Lead (Dissolved)	µg/L	-		1.0	U	1.0	U	1.0	U	1.0	U	-		-		-	
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228	pCi/L	-		-		-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-		-		-	
Methane	µg/L	-		-		-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L	-		-		-		-									
Ferrous Iron, Fe(II)	mg/L	-		-		-		-									
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	6.36		5.52		6.68		7.00		6.20		-		-		-	
Specific Conductance	mS/cm	0.486		0.401		0.280		0.483		0.418		-		-		-	
Turbidity	NTU	10.4		1.3		1.0		0.0		0.0		-		-		-	
Dissolved Oxygen	mg/L	0.97		0.95		0.45		0.00		4.08		-		-		-	
Temperature	°C	13.90		16.61		12.95		5.80		13.19		-		-		-	
ORP	mV	161.4		520.3		150.0		115.0		198.1		-		-		-	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	1-Jan-00		1-Mar-00		1-Aug-00		1-Dec-00		1-Feb-01		1-Aug-01		1-Dec-01		1-Feb-02	
Well ID		MW-010S		MW-010S		MW-010S		MW-010S		MW-010S		MW-010S		MW-010S		MW-010S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	-		10	U	10	U	-		1	U	0.83	U	-		0.5	U
PCE	µg/L	-		10	U	10	U	-		1	U	0.78	U	-		0.5	U
TCE	µg/L	-		10	U	10	U	-		1	U	0.49	U	-		0.5	U
VC	µg/L	-		10	U	10	U	-		2	U	1.0	U	-		0.5	U
cis-1,2-DCE	µg/L	-		10^	U	10^	U	-		1^	U	0.49	U	-		0.5	U
trans-1,2-DCE	µg/L	-						-				0.84	U	-		0.5	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	-		2.3	U	1.3	UV	-		**10**		1.2	U	-		2.8	U
Lead (Dissolved)	µg/L	2.3	U	-		-		3.6	V	3.4		-		1.2	U	2.8	U
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228	pCi/L	-		-		-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-		-		-	
Methane	µg/L	-		-		-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L																
Ferrous Iron, Fe(II)	mg/L																
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	-		-		-		-		-		-		-		-	
Specific Conductance	mS/cm	-		-		-		-		-		-		-		-	
Turbidity	NTU	-		-		-		-		-		-		-		-	
Dissolved Oxygen	mg/L	-		-		-		-		-		-		-		-	
Temperature	^{o}C	-		-		-		-		-		-		-		-	
ORP	mV	-		-		-		-		-		-		-		-	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	1-Jun-02		1-Mar-03		3-Dec-03		4-Jul-04		4-Dec-04		5-Jun-05		5-Dec-05		1-Dec-06		26-Jun-07	
Well ID		MW-010S		MW-010S		MW-010S		MW-010S		MW-010S		MW-010S		MW-010S		MW-010S		MW-010S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
PCE	µg/L	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U
TCE	µg/L	0.5	U	0.5	U	0.5	U	**0.21**	**J**	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
VC	µg/L	0.5	U	0.5	U	0.5	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
cis-1,2-DCE	µg/L	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
trans-1,2-DCE	µg/L	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	2.8	U	2.2	U	2.2	U	3	U	3	U	2	U	2	U	2	U	2	U
Lead (Dissolved)	µg/L	10	U	2.2	U	2.2	U	25	U	25	U	25	U	2	U	-		-	
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-		-		-		-		-	
Gross Beta	pCi/L	-		-		-		-		-		-		-		-		-	
Total Uranium	µg/L	-		-		-		-		-		-		-		-		-	
Combined Radium 226/228	pCi/L	-		-		-		-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-		-		-		-	
Methane	µg/L	-		-		-		-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L																		
Ferrous Iron, Fe(II)	mg/L																		
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	-		7.95		-		7.98		8		7.91		7.74		8.00		6.90	
Specific Conductance	mS/cm	-		0.224		-		0.331		0.385		0.355		0.242		0.227		0.347	
Turbidity	NTU	-		3.8		-		0		0.5		0.2		3.2		0.0		5.2	
Dissolved Oxygen	mg/L	-		3.8		-		1.7		1.48		2.13		2.72		1.46		0.22	
Temperature	°C	-		10.06		-		12.26		10.43		11.25		9.78		10.76		16.58	
ORP	mV	-		-14.7		-		-79.9		-69.2		101.3		-42.5		-94.1		201.3	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	28-Jul-08		29-Oct-08		18-Feb-09		21-May-09		1-Dec-98		1-May-99		1-Oct-99		1-Jan-00	
Well ID		MW-010S		MW-010S		MW-010S		MW-010S		MW-21S		MW-21S		MW-21S		MW-21S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	10	U	5	U	10	U	-	
PCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	10	U	5	U	10	U	-	
TCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	10	U	5	U	10	U	-	
VC	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	10	U	10	U	10	U	-	
cis-1,2-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	10^	U	5^	U	10^	U	-	
trans-1,2-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U							-	
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	**0.588**	J	1.0	U	1.0	U	1.0	U	**2.3**	**B**	2.9	U	2.1	U	-	
Lead (Dissolved)	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	-		-		-		2.3	U
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228	pCi/L	-		-		-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-		-		-	
Methane	µg/L	-		-		-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L																
Ferrous Iron, Fe(II)	mg/L																
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	5.71		7.94		7.82		7.80		-		-		-		-	
Specific Conductance	mS/cm	0.297		0.255		0.355		0.266		-		-		-		-	
Turbidity	NTU	NM		0.0		1.2		0.0		-		-		-		-	
Dissolved Oxygen	mg/L	2.91		0.74		7.38		-		-		-		-		-	
Temperature	^{o}C	20.78		12.92		7.51		14.07		-		-		-		-	
ORP	mV	411.7		-117.8		-95.6		-9.0		-		-		-		-	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	1-Mar-00		1-Aug-00		1-Dec-00		1-Feb-01		1-Aug-01		1-Dec-01		1-Feb-02		2-Jun-02	
Well ID		MW-21S		MW-21S		MW-21S		MW-21S		MW-21S		MW-21S		MW-21S		MW-21S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	10	U	10	U	-		1	U	0.83	U	-		0.5	U	0.5	U
PCE	µg/L	10	U	10	U	-		1	U	0.78	U	-		**240**	**D**	**41**	**D**
TCE	µg/L	10	U	10	U	-		1	U	0.49	U	-		**23**	**V**	**3**	
VC	µg/L	10	U	10	U	-		2	U	1.0	U	-		0.5	U	0.5	U
cis-1,2-DCE	µg/L	10^	U	10^	U	-		1^	U	0.49	U	-		0.5	U	0.5	U
trans-1,2-DCE	µg/L					-				0.84	U	-		0.5	U	0.5	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	2.3	U	1.3	U	-		**2.1**	**B**	1.2	U	-		2.8	U	2.8	U
Lead (Dissolved)	µg/L	-		-		1.3	U	1.9	B	-		1.2	U	2.8	U	2.8	U
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228	pCi/L	-		-		-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-		-		-	
Methane	µg/L	-		-		-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L																
Ferrous Iron, Fe(II)	mg/L																
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	-		-		-		-		-		-		-		-	
Specific Conductance	mS/cm	-		-		-		-		-		-		-		-	
Turbidity	NTU	-		-		-		-		-		-		-		-	
Dissolved Oxygen	mg/L	-		-		-		-		-		-		-		-	
Temperature	^{o}C	-		-		-		-		-		-		-		-	
ORP	mV	-		-		-		-		-		-		-		-	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	1-Mar-03		4-Dec-03		4-Jul-04		4-Dec-04		5-Jun-05		30-Nov-05		1-Dec-05		1-Dec-06	
Well ID		MW-21S		MW-21S		MW-21S		MW-21S		MW-21S		MW-21S		MW-21S		MW-21S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	-		1.0	U	1.0	U
PCE	µg/L	**7**		**3**		**2.5**		**1.7**		**1.5**	J	-		1.0	U	**0.5**	J
TCE	µg/L	**0.5**		0.5	U	1.0	U	1.0	U	1.0	U	-		1.0	U	1.0	U
VC	µg/L	0.5	U	0.5	U	2.0	U	2.0	U	2.0	U	-		2.0	U	2.0	U
cis-1,2-DCE	µg/L	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	-		1.0	U	1.0	U
trans-1,2-DCE	µg/L	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	-		1.0	U	1.0	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	2.2	U	2.2	U	3	U	3	U	2	U	-		2	U	2	U
Lead (Dissolved)	µg/L	2.2	U	2.2	U	25	U	25	U	25	U	2	U	-		-	
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228	pCi/L	-		-		-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-		-		-	
Methane	µg/L	-		-		-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L																
Ferrous Iron, Fe(II)	mg/L																
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	7.48		7.46		7.17		7.75		7.36		7.84				4.77	
Specific Conductance	mS/cm	0.253		0.426		0.446		0.437		0.320		0.288				0.551	
Turbidity	NTU	1.0		1.6		1.8		0.4		5.3		1.4				166.0	
Dissolved Oxygen	mg/L	2.14		1.83		0.78		0.78		1.59		0.81				0.30	
Temperature	^{o}C	8.52		15.23		10.97		11.7		11.47		9.90				14.55	
ORP	mV	-38.3		-128.5		28.8		-186.8		-123.4		-149.3				114.3	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	1-Jun-07		28-Jul-08		29-Oct-08		18-Feb-09		21-May-09		1-Feb-01		1-Aug-01		1-Feb-02	
Well ID		MW-21S		MW-21S		MW-21S		MW-21S		MW-21S		MW-30S		MW-30S		MW-30S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	0.83	U	0.5	U
PCE	µg/L	**1.6**		1.0	U	1.0	U	1.0	U	1.0	U	**67**	**D**	**42**		**23**	**V**
TCE	µg/L	**0.12**	J	1.0	U	1.0	U	1.0	U	1.0	U	**19**		**15**		**8**	
VC	µg/L	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U	2	U	1.0	U	0.5	U
cis-1,2-DCE	µg/L	**0.15**	J	1.0	U	1.0	U	1.0	U	1.0	U	**2.4^**		0.49	U	1	
trans-1,2-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U			0.84	U	0.5	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	1	B	1.0	U	1.0	U	1.0	U	1.0	U	**30.5**		---	**R**	2.8	U
Lead (Dissolved)	µg/L	-		1.0	U	1.0	U	1.0	U	1.0	U	**26.5**		R		2.8	U
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-		**47.39**		1.24	U	-	
Gross Beta	pCi/L	-		-		-		-		-		83.31		8.28		-	
Total Uranium	µg/L	-		-		-		-		-		0.54		0.0551		0.1919	**B**
Combined Radium 226/228	pCi/L	-		-		-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-		-		-	
Methane	µg/L	-		-		-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L																
Ferrous Iron, Fe(II)	mg/L																
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	6.85		9.04		8.55		8.54		5.71		-		-		-	
Specific Conductance	mS/cm	0.195		0.179		0.183		0.147		0.409		-		-		-	
Turbidity	NTU	0.3		0.0		46.8		4.5		0.0		-		-		-	
Dissolved Oxygen	mg/L	3.91		1.89		4.53		47.34		10.11		-		-		-	
Temperature	^{o}C	14.21		12.05		9.24		11.29		11.32		-		-		-	
ORP	mV	205.7		59.8		-87.0		-48.5		-32.7		-		-		-	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	2-Jun-02		1-Mar-03		3-Dec-03		4-Jul-04		1-Dec-04		5-Jun-05		1-Dec-05	
Well ID		MW-30S		MW-30S		MW-30S		MW-30S		MW-30S		MW-30S		MW-30S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U
PCE	µg/L	**29**	**D**	**23**		**21**		**33.0**		**20.0**		**21.0**	J	**23.0**	
TCE	µg/L	**5**		**3**		**3**		**11.0**		**3.5**		**8.8**		**4.3**	
VC	µg/L	0.5	U	0.5	U	0.5	U	2.0	U	2.0	U	2.0	U	2.0	U
cis-1,2-DCE	µg/L	0.3	JJ	0.5	U	**0.6**		**1.7**		**0.5**	**J**	**2.2**		**1.1**	
trans-1,2-DCE	µg/L	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	2.8	U	---	**R**	2.2	U	2	U	3	UJ	2	U	2	U
Lead (Dissolved)	µg/L	2.8	U			2.2	U	25	U	25	U	25	U	2	U
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-0.02	U	0.50	UJ	1.70	UJ	3.80	UJ
Gross Beta	pCi/L	-		-		-		5.70		5.10	J	4.80	J	**35.00**	J
Total Uranium	µg/L	0.2897	**B**	1.2897	**B**	0.16565	**J**	0.30		0.14	U	0.21	U	0.27	U
Combined Radium 226/228	pCi/L	-		-		-		0.78	U	0.92	UJ	0.86	UJ	**1.34**	J
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-		-	
Methane	µg/L	-		-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L														
Ferrous Iron, Fe(II)	mg/L														
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	-		6.44		-		6.22		6.39		6.34		6.30	
Specific Conductance	mS/cm	-		0.991		-		0.777		0.903		0.741		0.527	
Turbidity	NTU	-		18		-		3.7		3		2		12.2	
Dissolved Oxygen	mg/L	-		10.31		-		2.1		5.8		6.88		2.83	
Temperature	^{o}C	-		7.36		-		16.61		10.84		12.93		12.96	
ORP	mV	-		226.7		-		222.6		212.9		191.6		187.8	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	1-Dec-06		1-Jun-07		29-Jul-08		6-Nov-08		17-Feb-09		18-May-09		1-Feb-02		2-Jun-02	
Well ID		MW-30S		MW-30S		MW-30S		MW-30S		MW-30S		MW-30S		MW-32S		MW-32S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	0.5	U	**2**	
PCE	µg/L	**20.0**		**9.7**		**14.0**		**12.0**		**9.0**		**7.8**		**1200**	**D**	**490**	**D**
TCE	µg/L	**8.7**		**3.1**		**5.8**		**5.4**		**2.9**		**3.1**		**420**	**D**	**190**	**D**
VC	µg/L	2.0	U	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**23**		**11**	
cis-1,2-DCE	µg/L	**2.0**		**0.94**	J	**3.2**		**2.7**		**1.4**		**2.4**		**940**	**D**	**440**	**D**
trans-1,2-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**14**		**9**	
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	**2.9**		**1.6**	B	**0.529**	J	**0.881**	**J**	**1.91**		1.0	U	2.8	U	2.8	U
Lead (Dissolved)	µg/L	-		-		1.0	U	1.0	U	1.0	U	1.0	U	2.8	U	2.8	U
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	5.30		1.20	U	0.944	U	2.89	U	2.75	U	0.600	U	-		-	
Gross Beta	pCi/L	8.60		5.90	U	**8.90**		8.35	**J**	**9.61**	**J**	**6.37**	**J**	-		-	
Total Uranium	µg/L	0.14	U	0.41		**0.56**		0.54		**0.48**		**0.475**	**J**	3.7454		28.163	
Combined Radium 226/228	pCi/L	0.51	U	0.48	J	1.755		1.769	J	**0.991**	**J**	3.296	U				
Gross Alpha - Dissolved	pCi/L	-		-1.60	U	0.303	U	1.68	U	0.212	U	-0.162	U	-		-	
Gross Beta - Dissolved	pCi/L	-		0.40	U	**5.85**	J	9.42	**J**	**8.34**	**J**	**9.91**	**J**	-		-	
Total Uranium - Dissolved	µg/L	-		0.22	U	**0.46**		0.49		**0.43**		**0.587**	**J**	-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		0.65	J	1.203		1.197	U	0.407	U	0.512	U	-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-		-		-	
Methane	µg/L	-		-		-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L																
Ferrous Iron, Fe(II)	mg/L																
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	6.07		6.29		5.80		6.22		6.31		6.37		-		-	
Specific Conductance	mS/cm	0.581		0.597		1.114		0.869		0.807		0.956		-		-	
Turbidity	NTU	146.8		110.1		5.0		16.0		0.0		60.5		-		-	
Dissolved Oxygen	mg/L	3.49		5.41		0.93		2.23		4.80		9.67		-		-	
Temperature	^{o}C	12.41		13.72		18.08		14.56		7.49		9.14		-		-	
ORP	mV	102.1		160		452.2		273.6		110.0		239.0		-		-	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	1-Mar-03		3-Dec-03		4-Jul-04		4-Dec-04		5-Jun-05		1-Dec-05		1-Dec-06		1-Jun-07	
Well ID		MW-32S		MW-32S		MW-32S		MW-32S		MW-32S		MW-32S		MW-32S		MW-32S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	**2**		**2**		**1.0**		**0.9**	**J**	1.0	U	**0.31**	J	**0.31**	J	**1.00**	J
PCE	µg/L	**660**	**D**	**440**		**420.0**	**J**	**360.0**	**J**	**200**	J	**140**		**18**		**9.4**	
TCE	µg/L	**310**	**D**	**230**		**200.0**	**J**	**170.0**	**J**	**150**		**89**		6		4.1	
VC	µg/L	**6**		**5**		**2.8**		**2.5**	**J**	**2.3**		**2.4**		**0.4**	J	**0.53**	J
cis-1,2-DCE	µg/L	**550**	**D**	**390**		**9.5**	**J**	**230.0**	**J**	**240**		**260**		**27**		**18**	
trans-1,2-DCE	µg/L	**9**		**9**		**5.2**		**5.3**		**4.0**		**4.2**		**0.7**	J	**0.48**	J
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	**3.5**	**B**	2.2	U	3	U	2	U	2	UJ	**1.2**	J	**2.9**		2	U
Lead (Dissolved)	µg/L	3.2	B	2.2	U	25	U	25	U	1.3	U	2	U	-		-	
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		**221**	J	**322**		**535**	J	**296**	J	**53.40**		**81**	
Gross Beta	pCi/L	-		-		**112**		**128**		**376**	J	**163**	J	34.70		21.30	
Total Uranium	µg/L			**275.83**		**700**	J	**641**		**896**		**592**		**181**		**177**	
Combined Radium 226/228	pCi/L					1.24	J	1.00	J	3.17	J	0.48	UJ	0.50		0.44	U
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-		**64**	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-		19.10	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-		17.60	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-		0.66	U
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-		-		-	
Methane	µg/L	-		-		-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L																
Ferrous Iron, Fe(II)	mg/L																
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	6.52		-		5.86		6.62		6.61		6.48		6.63		6.49	
Specific Conductance	mS/cm	0.606		-		0.975		0.795		0.981		0.795		0.285		0.236	
Turbidity	NTU	115.1		-		1.8		51.8		4.7		15.9		13.8		9.8	
Dissolved Oxygen	mg/L	1.59		-		0.66		0.35		0.35		0.32		4.50		1.42	
Temperature	^{o}C	6.14		-		16.4		11.49		12.93		10.74		10.35		13.65	
ORP	mV	78		-		212		86.8		118.9		108.4		157.4		107.9	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	6-Aug-08		4-Nov-08		23-Feb-09		19-May-09		1-Feb-02		2-Jun-02		1-Mar-03		3-Dec-03		4-Jul-04	
Well ID		MW-32S		MW-32S		MW-32S		MW-32S		MW-34S		MW-34S		MW-34S		MW-34S		MW-34S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	0.5	U	0.5	U	0.5	U	0.5	U	1.0	U
PCE	µg/L	**72.0**		**21.0**		**21**		**9.9**		**250**	**D**	**10**		**1**		**2**		**1.3**	
TCE	µg/L	**23.0**		**7.7**		**6.3**		**4.5**		0.5	U	0.5	U	**0.3**	**J**	0.5	U	**0.27**	**J**
VC	µg/L	**0.93**	J	**0.91**	**J**	**0.59**	**J**	**0.65**	**J**	**2**		**1**		0.5	U	**2**		**1.8**	**J**
cis-1,2-DCE	µg/L	**23.0**		**20.0**		**13**		**11**		**2**		**2**		**1**		**2**		**1.1**	
trans-1,2-DCE	µg/L	**0.98**	J	**0.64**	**J**	**0.42**	**J**	**0.44**	**J**	0.5	U	0.5	U	0.5	U	0.5	U	1.0	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	-		-		-		-		-	
Lead (Dissolved)	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	-		-		-		-		-	
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	**60**	J	50.20		**59.6**		**35.3**	**J**	-		-		-		-		-	
Gross Beta	pCi/L	**31.1**		32.80		**37.7**		**27.0**		-		-		-		-		-	
Total Uranium	µg/L	**160**		110.00		**157**	**J**	**95.2**	**J**	-		-		-		-		-	
Combined Radium 226/228	pCi/L	0.752		2.13	J	**0.461**	**J**	1.21	U	-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	**68.3**	J	43.3		**65.5**		**36.2**	**J**	-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	**31.9**		29.4		**30.3**		**25.8**	**J**	-		-		-		-		-	
Total Uranium - Dissolved	µg/L	**170**	J	108		**185**	**J**	**111**	**J**	-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	0.692		0.728	U	**0.701**	**J**	**1.581**	**J**	-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	**1.80**	J	-		**1.44**	**J**	**1.44**	**J**	-		-		-		-		-	
DOC	mg/L	**1.95**	J	-		**1.62**	**J**	**1.59**		-		-		-		-		-	
Ethane	µg/L	2.0	U	-		2.0	U	2.0	U	-		-		-		-		-	
Ethene	µg/L	2.0	U	-		2.0	U	2.0	U	-		-		-		-		-	
Methane	µg/L	**150**		-		**180**		**120**		-		-		-		-		-	
Nitrate-N	mg/L	**0.0864**	J	-		**0.116**	**J**	**0.202**	**J**	-		-		-		-		-	
Sulfate	mg/L	**16.3**		-		**13.5**		**17.9**		-		-		-		-		-	
Chloride	mg/L	**7.71**		-		**5.63**		**6.71**		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L	0.70				0.70		0.20		-		-		-		-		-	
Ferrous Iron, Fe(II)	mg/L	0.2	U			0.2	U	0.2	U	-		-		-		-		-	
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	4.09		6.38		7.11		6.06		-		-		6.98		6.86		6.86	
Specific Conductance	mS/cm	0.225		0.198		0.292		0.379		-		-		0.68		1.123		1.123	
Turbidity	NTU	63.0		1.0		116.0		0.0		-		-		176		6.6		6.6	
Dissolved Oxygen	mg/L	1.00		0.66		0.00		0.60		-		-		0.68		0.25		0.25	
Temperature	^{o}C	18.02		14.95		6.70		10.74		-		-		8.55		13.93		13.93	
ORP	mV	425.3		111.6		107.0		237.0		-		-		115.3		141.5		141.5	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	4-Dec-04		5-Jun-05		1-Dec-05		1-Dec-06		1-Jun-07		1-Aug-08		30-Oct-08		19-Feb-09		26-May-09	
Well ID		MW-34S		MW-34S		MW-34S		MW-34S		MW-34S		MW-34S		MW-34S		MW-34S		MW-34S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
PCE	µg/L	**1.1**		0.6	J	**1.1**		**1.9**		**0.41**	J	**0.92**	J	**1.0**		**0.94**	**J**	**0.85**	**J**
TCE	µg/L	**0.2**	**J**	1.0	U	1.0	U	**0.4**	J	**0.16**	J	1.0	U	1.0	U	1.0	U	1.0	U
VC	µg/L	**1.7**	**J**	1.3	J	**1.8**	J	**1.0**	J	**1.3**	J	**1.6**		**1.8**		**1.6**		**2.0**	
cis-1,2-DCE	µg/L	**1.0**		0.6	J	**1.3**		**2.1**		**0.75**	J	**0.93**	J	**1.3**		**0.89**	**J**	**0.85**	**J**
trans-1,2-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	-		-		-		-		-		-		-		-		-	
Lead (Dissolved)	µg/L	-		-		-		-		-		-		-		-		-	
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-		-		-		-		-	
Gross Beta	pCi/L	-		-		-		-		-		-		-		-		-	
Total Uranium	µg/L	-		-		-		-		-		-		-		-		-	
Combined Radium 226/228	pCi/L	-		-		-		-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		2.31	J	2.25	J	2.16		2.19	J
DOC	mg/L	-		-		-		-		-		3.13	J	2.55	J	2.4		2.65	J
Ethane	µg/L	-		-		-		-		-		2	U	2	U	2	U	2	U
Ethene	µg/L	-		-		-		-		-		2	U	2	U	2	U	2	U
Methane	µg/L	-		-		-		-		-		13		13		13		15	
Nitrate-N	mg/L	-		-		-		-		-		0.161		0.13	J	0.239		0.229	
Sulfate	mg/L	-		-		-		-		-		92		95		79		84	
Chloride	mg/L	-		-		-		-		-		96		108		73		109	
Soluble Manganese, Mn(II)	mg/L	-		-		-		-		-		1		1		0	U	1	
Ferrous Iron, Fe(II)	mg/L	-		-		-		-		-		0		0		0		0	U
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	6.74		7.16		7.05		6.87		7.91		6.42		6.91		7.15		7.10	
Specific Conductance	mS/cm	0.707		0.833		0.500		0.353		0.620		0.414		0.507		0.582		0.527	
Turbidity	NTU	67.2		33.3		86.0		24.1		0.0		0.0		0.0		>1000		1287.0	
Dissolved Oxygen	mg/L	0.82		0.53		0.35		0.62		0.09		0.48		0.31		0.00		0.61	
Temperature	°C	11.65		10.96		11.72		11.98		13.51		13.58		13.78		8.90		10.73	
ORP	mV	181.9		50		101.3		89.2		259.4		283.0		13.1		150.0		121.8	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	Feb-02		Jun-02		Mar-03		Dec-03		Jul-04		Dec-04		Jun-05		Dec-05		Dec-06	
Well ID		MW-35S		MW-35S		MW-35S		MW-35S		MW-35S		MW-35S		MW-35S		MW-35S		MW-35S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
PCE	µg/L	**0.2**	**J**	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U
TCE	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
VC	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
cis-1,2-DCE	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
trans-1,2-DCE	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	-		-		-		-		-		-		-		-		-	
Lead (Dissolved)	µg/L	-		-		-		-		-		-		-		-		-	
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-		-		-		-		-	
Gross Beta	pCi/L	-		-		-		-		-		-		-		-		-	
Total Uranium	µg/L	-		-		-		-		-		-		-		-		-	
Combined Radium 226/228	pCi/L	-		-		-		-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-		-		-		-	
Methane	mg/L	-		-		-		-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L	-		-		-		-		-		-		-		-		-	
Ferrous Iron, Fe(II)	mg/L	-		-		-		-		-		-		-		-		-	
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	-		-		7.11		6.97		7.25		6.58		6.02		6.54		6.70	
Specific Conductance	mS/cm	-		-		0.308		0.995		4.37		0.948		0.311		0.397		0.777	
Turbidity	NTU	-		-		1.4		2.2		74.3		6.5		0.0		19.5		18.6	
Dissolved Oxygen	mg/L	-		-		10.82		4.05		4.31		2.37		5.36		3.32		2.19	
Temperature	°C	-		-		7.41		12.72		10.37		11.88		11.76		10.65		12.90	
ORP	mV	-		-		120.4		179.6		231.1		206.6		226.7		64.2		82.7	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	Jun-07		Aug-08		Oct-08		Feb-09		May-09		Feb-02		Jun-02		Mar-03		Dec-03	
Well ID		MW-35S		MW-35S		MW-35S		MW-35S		MW-35S		MW-37S		MW-37S		MW-37S		MW-37S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	0.5	U	0.5	U	0.5	U	0.5	U
PCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	0.5	U	0.5	U	0.5	U	0.5	U
TCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	0.5	U	0.5	U	0.5	U	0.5	U
VC	µg/L	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	0.5	U	0.5	U	**0.4**	**J**	**0.7**	
trans-1,2-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	0.5	U	0.5	U	0.5	U	0.5	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	-		-		-		-		-		-		-		-		-	
Lead (Dissolved)	µg/L	-		-		-		-		-		-		-		-		-	
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-									
Gross Beta	pCi/L	-		-		-		-		-									
Total Uranium	µg/L	-		-		-		-		-		1.5309	B	0.6003	B			0.2418	J
Combined Radium 226/228	pCi/L	-		-		-		-		-									
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-									
Gross Beta - Dissolved	pCi/L	-		-		-		-		-									
Total Uranium - Dissolved	µg/L	-		-		-		-		-									
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-									
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		1.01	J	1.53		1.13	J	0.847	J	-		-		-		-	
DOC	mg/L	-		1.32	J	1.6		1.06	J	1.22	J	-		-		-		-	
Ethane	µg/L	-		2	U	2	U	2	U	2	U	-		-		-		-	
Ethene	µg/L	-		2	U	2	U	2	U	2	U	-		-		-		-	
Methane	mg/L	-		2	U	2	U	2	U	2	U	-		-		-		-	
Nitrate-N	mg/L	-		0.1	U	0.0571	J	0.0588	J	0.1	U	-		-		-		-	
Sulfate	mg/L	-		11		12		10		18		-		-		-		-	
Chloride	mg/L	-		115		50		35		136		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L	-		0		0	U	0	U	0	U	-		-		-		-	
Ferrous Iron, Fe(II)	mg/L	-		0	U	0	U	0	U	0	U	-		-		-		-	
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	5.16		6.65		6.75		6.56		6.56		-		-		7.22		-	
Specific Conductance	mS/cm	0.383		0.237		0.184		0.446		0.446		-		-		0.863		-	
Turbidity	NTU	10.8		1.0		9.2		0.0		0.0		-		-		1.7		-	
Dissolved Oxygen	mg/L	6.22		9.41		13.13		3.00		3.00		-		-		0.65		-	
Temperature	°C	15.73		13.76		7.12		10.78		10.78		-		-		10.09		-	
ORP	mV	545.2		192.7		68.8		61.0		61.0		-		-		-95.7		-	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	Jul-04		Dec-04		Jun-05		Dec-05		Dec-06		Jun-07		Aug-08		Oct-08		Feb-09	
Well ID		MW-37S		MW-37S		MW-37S		MW-37S		MW-37S		MW-37S		MW-37S		MW-37S		MW-37S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
PCE	µg/L	1.0	U	**0.6**	**J**	**0.4**	J	1.0	U	**0.3**	J	1.0	U	**0.22**	J	**0.23**	**J**	**0.51**	**J**
TCE	µg/L	**0.18**	**J**	**0.28**	**J**	**0.4**	J	1.0	U	**0.9**	J	**0.3**	J	**0.33**	J	**0.38**	**J**	**0.71**	**J**
VC	µg/L	**0.41**	**J**	**0.7**	**J**	**1.0**	J	**1.0**	J	**1.1**	J	2.0	U	**0.99**	J	**1.1**	**J**	**0.85**	**J**
cis-1,2-DCE	µg/L	**0.98**	**J**	**0.98**	**J**	**3.1**	J	**2.7**		**5.5**		**2.1**		**1.6**		**2.3**		**3.6**	
trans-1,2-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	-		-		-		-		-		-		-		-		-	
Lead (Dissolved)	µg/L	-		-		-		-		-		-		-		-		-	
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	2.4	U	10	J	0	UJ	3.2	UJ	6.9	U	4.2	U	1.26	U	1.9	J	1.26	U
Gross Beta	pCi/L	13		13.4		11.2	J		R	18		19.9		22.3		13.5		14.1	
Total Uranium	µg/L	0.5		0.24		0.61		0.21	U	0.27	U	NA	U	0.24		0.21	U	1.1	
Combined Radium 226/228	pCi/L	0.81	U	1.55	J	0.98	UJ	4.58	J	1.92	U	1.36	J	2.013		2.13	J	2.596	J
Gross Alpha - Dissolved	pCi/L											0.06	U	1.78	J	0.974	U	0.443	U
Gross Beta - Dissolved	pCi/L											11.6		16.1		9.05	J	11.2	
Total Uranium - Dissolved	µg/L											0	U	0		0	U	0	J
Combined Radium 226/228 - Dissolved	pCi/L											1	J	2		2	J	1	J
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		1.01	J	1.53		1.13	J
DOC	mg/L	-		-		-		-		-		-		1.32	J	1.6		1.06	J
Ethane	µg/L	-		-		-		-		-		-		2	U	2	U	2	U
Ethene	µg/L	-		-		-		-		-		-		2	U	2	U	2	U
Methane	mg/L	-		-		-		-		-		-		2	U	2	U	2	U
Nitrate-N	mg/L	-		-		-		-		-		-		0.1	U	0.0571	J	0.0588	J
Sulfate	mg/L	-		-		-		-		-		-		11		12		10	
Chloride	mg/L	-		-		-		-		-		-		115		50		35	
Soluble Manganese, Mn(II)	mg/L	-		-		-		-		-		-		0		0	U	0	U
Ferrous Iron, Fe(II)	mg/L	-		-		-		-		-		-		0	U	0	U	0	U
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	7.12		7.04		6.99		7.12		6.99		6.83		6.67		7.25		7.05	
Specific Conductance	mS/cm	0.919		0.987		1.066		0.755		0.659		0.611		0.676		0.630		0.565	
Turbidity	NTU	22.6		29.9		6.2		318.4		91.0		53.5		54.2		6.5		2085.8	
Dissolved Oxygen	mg/L	7.34		1.3		0.3		2.36		0.47		1.68		1.71		5.10		0.94	
Temperature	^{o}C	13.82		11.3		11.6		10.29		11.76		12.32		12.30		12.62		10.09	
ORP	mV	-83.6		-33.8		-74.3		-66.5		-83.8		-85.9		-77.9		-96.4		-48.9	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	26-May-09		2-Jun-02		1-Mar-03		3-Dec-03		4-Jul-04		4-Dec-04		5-Jun-05		1-Dec-05	
Well ID		MW-37S		MW-39S		MW-39S		MW-39S		MW-39S		MW-39S		MW-39S		MW-39S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	1.0	U	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U
PCE	µg/L	**0.27**	**J**	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	UJ	1.0	U
TCE	µg/L	**0.36**	**J**	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U
VC	µg/L	**1.2**	**J**	0.5	U	0.5	U	0.5	U	2.0	U	2.0	U	2.0	U	2.0	U
cis-1,2-DCE	µg/L	**1.9**		0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U
trans-1,2-DCE	µg/L	1.0	U	0.5	U	0.5	U	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	-		-		-		-		-		-		-		-	
Lead (Dissolved)	µg/L	-		-		-		-		-		-		-		-	
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	1.47	J	-		-		-		-		-		-		-	
Gross Beta	pCi/L	11.8		-		-		-		-		-		-		-	
Total Uranium	µg/L	0.285		-		-		-		-		-		-		-	
Combined Radium 226/228	pCi/L	2.74	U	-		-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	2.29	J	-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	1.58	J	-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	0		-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	0	U	-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	0.847	J	-		-		-		-		-		-		-	
DOC	mg/L	1.22	J	-		-		-		-		-		-		-	
Ethane	µg/L	2	U	-		-		-		-		-		-		-	
Ethene	µg/L	2	U	-		-		-		-		-		-		-	
Methane	mg/L	2	U	-		-		-		-		-		-		-	
Nitrate-N	mg/L	0.1	U	-		-		-		-		-		-		-	
Sulfate	mg/L	18		-		-		-		-		-		-		-	
Chloride	mg/L	136		-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L	0	U	-		-		-		-		-		-		-	
Ferrous Iron, Fe(II)	mg/L	0	U	-		-		-		-		-		-		-	
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	6.41		-		7.96		-		7.6		7.62		7.34		8	
Specific Conductance	mS/cm	0.717		-		0.254		-		0.754		0.514		1.603		0.448	
Turbidity	NTU	76.0		-		721.6		-		194		745.1		854		701	
Dissolved Oxygen	mg/L	1.14		-		2.06		-		1.58		3		2.13		4.57	
Temperature	^{o}C	11.48		-		7.83		-		11.25		10.37		10.88		12.67	
ORP	mV	-56.3		-		71.1		-		167.1		59.8		90		-71.5	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Sampling Date	Units	1-Dec-06		1-Jun-07		1-Aug-08		30-Oct-08		19-Feb-09		May-09	
Well ID		MW-39S		MW-39S		MW-39S		MW-39S		MW-39S		MW-39S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
PCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
TCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
VC	µg/L	2.0	U	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U
cis-1,2-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
trans-1,2-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	-		-		-		-		-		-	
Lead (Dissolved)	µg/L	-		-		-		-		-		-	
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-		-	
Gross Beta	pCi/L	-		-		-		-		-		-	
Total Uranium	µg/L	-		-		-		-		-		-	
Combined Radium 226/228	pCi/L	-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-	
Methane	mg/L	-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L	-		-		-		-		-		-	
Ferrous Iron, Fe(II)	mg/L	-		-		-		-		-		-	
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	7.9		3.38		7.12		7.65		7.89		7.64	
Specific Conductance	mS/cm	0.335		2.074		0.427		0.384		0.418		0.703	
Turbidity	NTU	681		335.0		1350.3		473.0		559.6		495.0	
Dissolved Oxygen	mg/L	3.81		0.12		1.60		1.23		10.77		5.05	
Temperature	^{o}C	10.78		11.31		12.66		9.86		8.59		8.96	
ORP	mV	-10.2		369.2		351.5		25.2		-152.7		38.2	

Table C-1
Historical Analytical Results - Upper Aquifer
DOE Colonie New York, Site (continued)

Notes:
Boldface values indicate that the result was detected above the method detection limits.
^ Total value of cDCE and trans-1,2-dichloroethene.
* Standard applies to each isomer individually.

Abbreviations:
B = blank
DOC = dissolved organic carbon
E = exceeding the calibration range
J = estimated value
JB = estimated, blank value
mg/L = milligrams per liter
µg/L = micrograms per liter
mS/cm = microsiemens per centimeter
mV = millivolts
N = spiked sample recovery not within control limits
NM = analyte not measured
NTU = nephelometric turbidity unit
ORP = oxidation-reduction potential
pCi/L = picocuries per liter
Q = data qualifier
SU = standard unit
TOC = total organic carbon
U = nondetect as less than method reporting limit
UJ = estimated, not detected
V = presumptive evidence of a compound

Table C-2
Historical Analytical Results - Upper Groundwater Zone
2016 - 2017 Annual LTM Report
Colonie FUSRAP Site, Colonie New York

Sampling Date	Units	Dec-98		May-99		Oct-99		Mar-00		Aug-00		Feb-01		Aug-01		Feb-02	
Well ID		MW-40S		MW-40S		MW-40S		MW-40S		MW-40S		MW-40S		MW-40S		MW-40S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	10	U	5	U	0.5	U	10	U	20	U	2	U	0.83	U	0.5	U
PCE	µg/L	**1**	**J**	**1**	**J**	**3**		**2**	**J**	**6**	**JD**	2	U	0.78	U	0.5	U
TCE	µg/L	**2**	**J**	5	U	**1**		10	U	20	U	2	U	0.49	U	0.5	U
VC	µg/L	**14**		**4**	**J**	**10**		**8**	**J**	20	U	**2.3**	**J**	1.0	U	**3**	
cis-1,2-DCE	µg/L	**14^**		**8^**		**10^**		**6^**	**J**	20^	U	**2^**	**J**	**2**	**J**	**2**	
trans-1,2-DCE	µg/L													0.84	U	0.5	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	**16**		**3,120**		**151**		**339**		**701**		**1,180**		**133**		**95.1**	**NV**
Lead (Dissolved)	µg/L	-		-		-		-		-		-		-		-	
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228	pCi/L	-		-		-		-		-		-		-		-	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		-		-	
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		-		-	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-		-	
DOC	mg/L	-		-		-		-		-		-		-		-	
Ethane	µg/L	-		-		-		-		-		-		-		-	
Ethene	µg/L	-		-		-		-		-		-		-		-	
Methane	µg/L	-		-		-		-		-		-		-		-	
Nitrate-N	mg/L	-		-		-		-		-		-		-		-	
Sulfate	mg/L	-		-		-		-		-		-		-		-	
Chloride	mg/L	-		-		-		-		-		-		-		-	
Soluble Manganese, Mn(II)	mg/L	-		-		-		-		-		-		-		-	
Ferrous Iron, Fe(II)	mg/L	-		-		-		-		-		-		-		-	
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	-		-		-		-		-		-		-		-	
Specific Conductance	mS/cm	-		-		-		-		-		-		-		-	
Turbidity	NTU	-		-		-		-		-		-		-		-	
Dissolved Oxygen	mg/L	-		-		-		-		-		-		-		-	
Temperature	^{o}C	-		-		-		-		-		-		-		-	
ORP	mV	-		-		-		-		-		-		-		-	

Table C-2
Historical Analytical Results - Upper Groundwater Zone
2016 - 2017 Annual LTM Report
Colonie FUSRAP Site, Colonie New York (continued)

Sampling Date	Units	Jun-02		Jul-04		Dec-04		Jun-05		Dec-05		Dec-06		Jun-07		Aug-08	
Well ID		MW-40S		MW-40S		MW-40S		MW-40S		MW-40S		MW-40S		MW-40S		MW-40S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
PCE	µg/L	0.5	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U
TCE	µg/L	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
VC	µg/L	**3**		2.0	U	2.0	U	2.0	U	2.0	UJ	2.0	U	2.0	U	1.0	U
cis-1,2-DCE	µg/L	**4**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
trans-1,2-DCE	µg/L	0.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	**206**		**61.7**		**247**	J	**125**		**3.9**		**424**		**170**		**77.5**	
Lead (Dissolved)	µg/L	-		-		-		-		-		-		-		**0.541**	J
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	-		0.37	U	8.80	J	4.70	J	1.00	UJ	3.70		4.70		**25.3**	
Gross Beta	pCi/L	-		0.80	U	4.20	U	5.10	J	1.30	U	3.50	J	3.10	U	**52.2**	
Total Uranium	µg/L	-		0.50		0.50		0.42	J	-		0.20	U	0.87		**2.3**	
Combined Radium 226/228	pCi/L	-		0.32	U	0.73	UJ	0.10	UJ	-		0.39	U	0.54	J	2.083	
Gross Alpha - Dissolved	pCi/L	-		-		-		-		-		-		0.40	U	**2.85**	J
Gross Beta - Dissolved	pCi/L	-		-		-		-		-		-		0.90	U	**10.6**	
Total Uranium - Dissolved	µg/L	-		-		-		-		-		-		1.00		**0.51**	J
Combined Radium 226/228 - Dissolved	pCi/L	-		-		-		-		-		-		0.53	U	1.235	
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	-		-		-		-		-		-		-		**0.801**	
DOC	mg/L	-		-		-		-		-		-		-		**1.12**	J
Ethane	µg/L	-		-		-		-		-		-		-		**0.680**	J
Ethene	µg/L	-		-		-		-		-		-		-		2.0	U
Methane	µg/L	-		-		-		-		-		-		-		**53.0**	
Nitrate-N	mg/L	-		-		-		-		-		-		-		**0.243**	
Sulfate	mg/L	-		-		-		-		-		-		-		**13.8**	J
Chloride	mg/L	-		-		-		-		-		-		-		**38.0**	
Soluble Manganese, Mn(II)	mg/L	-		-		-		-		-		-		-		0.35	
Ferrous Iron, Fe(II)	mg/L	-		-		-		-		-		-		-		0.2	U
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	-		7.02		7.84		7.95		8.16		7.73		7.64		6.91	
Specific Conductance	mS/cm	-		0.399		0.326		0.321		0.224		0.211		0.223		0.201	
Turbidity	NTU	-		16.7		146.8		83		18.9		97.1		64.7		1555.0	
Dissolved Oxygen	mg/L	-		0.82		0.9		5.99		2.21		1.75		2.38		1.68	
Temperature	^{o}C	-		37.97		12.94		12.56		11.92		13.29		13.07		18.00	
ORP	mV	-		-23.9		87.1		29.3		-113.8		-47.9		-78.9		389.5	

Table C-2
Historical Analytical Results - Upper Groundwater Zone
2016 - 2017 Annual LTM Report
Colonie FUSRAP Site, Colonie New York (continued)

Sampling Date	Units	Nov-08		Feb-09		May-09		Dec-06		Jan-07		Jun-07		Aug-08		Nov-08	
Well ID		MW-40S		MW-40S		MW-40S		MW-41S		MW-41S		MW-41S		MW-41S		MW-41S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	-		1.0	U	1.0	U	1.0	U
PCE	µg/L	1.0	U	1.0	U	1.0	U	**53**	D	-		**45**	E	**33.0**		**31.0**	
TCE	µg/L	1.0	U	1.0	U	1.0	U	**8.3**		-		**10.0**		**7.3**		**6.7**	
VC	µg/L	1.0	U	1.0	U	1.0	U	**0.6**	J	-		**0.6**	J	**0.78**	J	**0.77**	**J**
cis-1,2-DCE	µg/L	1.0	U	1.0	U	1.0	U	**6.4**		-		**8.3**		**4.7**		**4.6**	
trans-1,2-DCE	µg/L	1.0	U	1.0	U	1.0	U	1.0	U	-		0.2	J	1.0	U	1.0	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	**129**		**41.8**		**110**		**20.3**		-		**6.2**		**13.8**		**3.16**	
Lead (Dissolved)	µg/L	**3.38**		**0.654**	**J**	1.0	U	-		-		-		1.0	U	1.0	U
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	7	**J**	**38.9**		**40.7**	**J**	-		**56**		4.60	J	**17.5**		4.58	**J**
Gross Beta	pCi/L	10		**72.1**		**55.5**	**J**	-		**103**		9.60	J	**51.2**	J	15.1	
Total Uranium	µg/L	1		**0.87**		**3.55**		-		3.50		0.90		**1.7**		0.81	
Combined Radium 226/228	pCi/L	1.182	U	**1.07**	**J**	3.13	U	-		1.69		0.93	J	1.285		1.889	**J**
Gross Alpha - Dissolved	pCi/L	1.110	U	1.36	U	**1.73**	**J**	-		-		2.00	U	1.55	U	2	U
Gross Beta - Dissolved	pCi/L	1.200	U	-0.395	U	1.33	U	-		-		4.40		**6.63**	J	4.75	**J**
Total Uranium - Dissolved	µg/L	0.190	**J**	**0.31**		**2.57**		-		-		0.30	U	**0.38**		0.28	
Combined Radium 226/228 - Dissolved	pCi/L	0.897	U	**0.826**	**J**	0.775	U	-		-		1.16	J	0.901		0.743	U
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	**0.678**	**J**	**0.677**	**J**	**0.713**	**J**	-		-		-		**2.89**		**2.64**	**J**
DOC	mg/L	**0.962**	**J**	**0.698**	**J**	**0.882**	**J**	-		-		-		**3.21**		**3.09**	**J**
Ethane	µg/L	0.63	J	2.0	U	**12**		-		-		-		**1.4**	J	0.84	J
Ethene	µg/L	2.0	U	2.0	U	2.0	U	-		-		-		2.0	U	2.0	U
Methane	µg/L	**57**		**55**		**190**		-		-		-		**78.0**		**56**	
Nitrate-N	mg/L	**0.117**	**J**	**0.0839**	**J**	0.10	U	-		-		-		**0.114**	J	**0.106**	**J**
Sulfate	mg/L	**15.4**		**14.4**		**13.8**		-		-		-		**75.6**		**80.1**	
Chloride	mg/L	**42.1**		**43.2**		**45**		-		-		-		**49.0**		**63.1**	
Soluble Manganese, Mn(II)	mg/L	0.25		0.025		0.025		-		-		-		0.68		0.68	
Ferrous Iron, Fe(II)	mg/L	0.2	U	0.2	U	0.2	U	-		-		-		0.6		0.6	
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	7.88		7.88		7.50		7.14		-		7.08		3.89		7.12	
Specific Conductance	mS/cm	0.176		0.261		0.255		0.484		-		0.390		0.471		0.415	
Turbidity	NTU	491		202.4		1866.0		910.1		-		48.3		676.0		378	
Dissolved Oxygen	mg/L	1.79		8.16		5.93		2.70		-		1.40		2.37		0.31	
Temperature	^{o}C	15.14		11.21		10.52		12.83		-		13.48		14.44		14.17	
ORP	mV	78.8		-88.5		-52.0		16.8		-		-50.0		413.1		-33.7	

Table C-2
Historical Analytical Results - Upper Groundwater Zone
2016 - 2017 Annual LTM Report
Colonie FUSRAP Site, Colonie New York (continued)

Sampling Date	Units	Feb-09		May-09		Dec-06		1-Jan-07		1-Jun-07		5-Aug-08		4-Nov-08		17-Feb-09	
Well ID		MW-41S		MW-41S		MW-42S		MW-42S		MW-42S		MW-42S		MW-42S		MW-42S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	1.0	U	1.0	U	1.0	U	-		1.0	U	1.0	U	1.0	U	1.0	U
PCE	µg/L	**37**		**37**		**0.8**	J	-		1.0	U	**0.51**	J	**0.34**	**J**	**0.30**	**J**
TCE	µg/L	**6.9**		**6.5**		**0.3**	J	-		1.0	U	**1.1**		**1.0**	**J**	**1.0**	
VC	µg/L	1.0	U	**0.56**	**J**	2.0	U	-		2.0	U	1.0	U	1.0	U	1.0	U
cis-1,2-DCE	µg/L	**4.7**		**4.7**		**2.9**		-		**2.2**		**2.2**		**2.3**		**2.0**	
trans-1,2-DCE	µg/L	1.0	U	**0.24**	**J**	1.0	U	-		1.0	U	1.0	U	1.0	U	1.0	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	**2.02**		**2.96**		**2.4**		-		**1.6**	B	**3.56**		**3.26**		**3.69**	
Lead (Dissolved)	µg/L	1.0	U	1.0	U	-		-		-		1.0	U	1.0	U	1.0	U
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	2.86	U	**11.8**		-		1.40	U	1.10	U	**4.51**	J	2.95	J	**12.1**	
Gross Beta	pCi/L	**6.26**		**31.3**		-		8.00	U	0.20	U	**15.5**		2.08	U	**27.1**	
Total Uranium	µg/L	**0.49**		**2.01**	**J**	-		0.90		0.37		**0.59**		0.43		**0.44**	
Combined Radium 226/228	pCi/L	**0.586**	**J**	2.183	U	-		1.20	J	0.87	J	1.622		1.501	U	**1.97**	
Gross Alpha - Dissolved	pCi/L	-0.063	U	**1.80**	**J**	-		-		2.30	U	1.17	U	2.9	J	0.0717	U
Gross Beta - Dissolved	pCi/L	**5.56**	**J**	**5.11**		-		-		1.30	U	**14.4**		2.71	U	1.65	U
Total Uranium - Dissolved	µg/L	**0.33**		**2.93**	**J**	-		-		0.69		**0.23**	J	0.27		**0.40**	
Combined Radium 226/228 - Dissolved	pCi/L	**0.772**	**J**	0.952	U	-		-		0.41	U	0.751		0.89	U	**0.638**	**J**
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	**2.72**		**2.88**		-		-		-		**14.5**		**12.1**		**9.53**	
DOC	mg/L	**2.48**		**2.79**		-		-		-		**14.9**		**12.7**		**9.48**	
Ethane	µg/L	2.0	U	**0.65**	**J**	-		-		-		**1.2**	J	2.0	U	2.0	U
Ethene	µg/L	2.0	U	2.0	U	-		-		-		2.0	U	2.0	U	2.0	U
Methane	µg/L	**66**		**110**		-		-		-		**230**		**400**		**510**	
Nitrate-N	mg/L	**0.112**	**J**	0.10	U	-		-		-		0.10	U	**0.118**	**J**	**0.0789**	**J**
Sulfate	mg/L	**74.2**		**70.8**		-		-		-		**98.6**		**96.1**		**75.2**	
Chloride	mg/L	**68.1**		**90.4**		-		-		-		**55**		**69.5**		**87.4**	
Soluble Manganese, Mn(II)	mg/L	0.05		0.68		-		-		-		0.70		0.70		0.05	
Ferrous Iron, Fe(II)	mg/L	0.8		1.8		-		-		-		2.2		2.2		2.6	
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	6.94		6.92		6.89		-		6.75		6.10		6.83		6.93	
Specific Conductance	mS/cm	0.545		0.773		0.703		-		0.691		0.592		0.603		0.674	
Turbidity	NTU	154.3		17.6		32.1		-		29.4		466.0		155		261.0	
Dissolved Oxygen	mg/L	2.74		3.18		0.41		-		3.12		1.11		6.38		0.89	
Temperature	^{o}C	9.11		10.19		12.56		-		13.57		15.82		14.66		9.49	
ORP	mV	-8.1		18.0		-60.1		-		-83.7		-173.3		-62.7		-87.1	

Table C-2
Historical Analytical Results - Upper Groundwater Zone
2016 - 2017 Annual LTM Report
Colonie FUSRAP Site, Colonie New York (continued)

Sampling Date	Units	19-May-09		1-Dec-06		1-Jan-07		1-Jun-07		5-Aug-08		4-Nov-08		17-Feb-09		19-May-09	
Well ID		MW-42S		MW-43S		MW-43S		MW-43S		MW-43S		MW-43S		MW-43S		MW-43S	
VOCs		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
1,1-DCE	µg/L	1.0	U	1.0	U	-		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
PCE	µg/L	**0.28**	**J**	1.0	U	-		1.0	U	1.0	U	**0.22**	**J**	1.0	U	1.0	U
TCE	µg/L	**0.78**	**J**	1.0	U	-		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
VC	µg/L	1.0	U	2.0	U	-		2.0	U	1.0	U	1.0	U	1.0	U	1.0	U
cis-1,2-DCE	µg/L	**1.5**		1.0	U	-		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
trans-1,2-DCE	µg/L	1.0	U	1.0	U	-		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Metals		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Lead (Total)	µg/L	**3.59**		**1.0**	B	-		2.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Lead (Dissolved)	µg/L	1.0	U	-		-		-		1.0	U	1.0	U	1.0	U	1.0	U
Radiological Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Gross Alpha	pCi/L	**10.7**	**J**	-		13.60		4.10	U	-0.0578	U	1.1	U	-0.343	U	-0.0199	U
Gross Beta	pCi/L	**20.1**	**J**	-		11.20		5.20	U	**14.0**		7.4	**J**	**3.62**	**J**	**2.11**	**J**
Total Uranium	µg/L	**0.834**		-		7.40		1.09		**0.74**		0.86		**0.64**		**0.449**	**J**
Combined Radium 226/228	pCi/L	1.749	U	-		1.38	J	0.85	J	0.82035		1.019	U	0.258	U	0.653	U
Gross Alpha - Dissolved	pCi/L	**1.78**	**J**	-		-		1.90	U	1.57	U	1.79	U	0.237	U	-0.245	U
Gross Beta - Dissolved	pCi/L	**1.93**	**J**	-		-		4.10	U	**5.71**	J	4.64	**J**	**2.72**	**J**	**2.76**	**J**
Total Uranium - Dissolved	µg/L	**0.344**		-		-		0.70		**0.74**		0.78		**0.89**		**0.507**	**J**
Combined Radium 226/228 - Dissolved	pCi/L	**0.931**	**J**	-		-		0.62	J	**1.206**		1.445	U	0.465	U	**0.947**	**J**
MNA Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TOC	mg/L	**8.79**		-		-		-		**1.68**	J	**1.64**		**1.66**		**1.09**	**J**
DOC	mg/L	**8.90**		-		-		-		**1.93**	J	**1.74**		**1.49**	**J**	**1.19**	**J**
Ethane	µg/L	**1.2**	**J**	-		-		-		2.0	U	2.0	U	2.0	U	2.0	U
Ethene	µg/L	2.0	U	-		-		-		2.0	U	2.0	U	2.0	U	2.0	U
Methane	µg/L	**470**		-		-		-		**6.6**		**1.8**	**J**	**5.8**		**6.5**	
Nitrate-N	mg/L	0.10	U	-		-		-		**0.345**		**0.320**		**0.135**	**J**	**0.164**	
Sulfate	mg/L	**66.3**		-		-		-		**44.3**		**45.0**		**46.1**		**37.2**	
Chloride	mg/L	**101**		-		-		-		**108**		**94.2**		**71.5**		**97.6**	
Soluble Manganese, Mn(II)	mg/L	0.68		-		-		-		0.50		0.46		0.175		0.500	
Ferrous Iron, Fe(II)	mg/L	1.2		-		-		-		0.2	U	0.2	U	0.2	U	0.0	
Field Parameters		Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
pH	SU	4.84		7.07		-		7.01		5.90		7.15		7.34		8.56	
Specific Conductance	mS/cm	0.681		1.100		-		0.824		0.560		0.371		0.458		0.150	
Turbidity	NTU	66.5		43.4		-		41.5		28.0		14		20.0		1305.0	
Dissolved Oxygen	mg/L	17.39		1.52		-		1.41		NM		2.54		2.24		1.32	
Temperature	°C	9.77		10.29		-		12.43		14.23		13.05		7.18		12.59	
ORP	mV	-28.5		42.9		-		-14.9		176.1		58.2		12.0		84.4	

Table C-2
Historical Analytical Results - Upper Groundwater Zone
2016 - 2017 Annual LTM Report
Colonie FUSRAP Site, Colonie New York (continued)

Notes:
Boldface values indicate that the result was detected above the method detection limits.
^ Total value of cDCE and trans-1,2-dichloroethene.
* Standard applies to each isomer individually.

Abbreviations:
B = blank
DOC = dissolved organic carbon
E = exceeding the calibration range
J = estimated value
JB = estimated, blank value
mg/L = milligrams per liter
µg/L = micrograms per liter
mS/cm = microsiemens per centimeter
mV = millivolts
N = spiked sample recovery not within control limits
NM = analyte not measured
NTU = nephelometric turbidity unit
ORP = oxidation-reduction potential
pCi/L = picocuries per liter
Q = data qualifier
SU = standard unit
TOC = total organic carbon
U = nondetect as less than method reporting limit
UJ = estimated, not detected
V = presumptive evidence of a compound

Appendix D

Public Notice of Long-Term Periodic Review

Albany Times Union
News Plaza
Box 15000
Albany, New York 12212

RSI ENTECH
99 RESEARCH PARK RD.
MORGANTOWN, WV 26505

Account Number: 600133359
Order Number: 0004213913
Order Invoice Text: Review for soil and

D LaCoppola / T Duquette / C Finnegan / A Tunstall of the city of Albany, being duly sworn, says that he/she is principal Clerk of THE TIMES UNION, a daily newspaper printed in the county of Albany, Town of Colonie, and Published in the County of Albany, Town of Colonie and the city of Albany, aforesaid and that notice of which a printed copy is annexed has been regulary published in the said ALBANY TIMES UNION on the following dates

07-11-2022

Dena L LaCoppola 07/11/2022

Denise R. LaCoppola

Sworn to before me, this 11 day of July 2022.

SUSAN QUINE
NOTARY PUBLIC-STATE OF NEW YORK
No. 01QU6396414
Qualified in Rensselaer County
My Commission Expires 08-19-2023

Notary Public
Albany County

DOE to Conduct a
Long-Term Periodic Review
of the Colonie, New York, Site

The U.S. Department of Energy Office of Legacy Management (LM) is conducting a long-term periodic review of the soil and groundwater remedies for the Colonie Formerly Utilized Sites Remedial Action Program (FUSRAP) Site located at 1130 Central Avenue, Town of Colonie, New York. The purpose of the review is to ensure that the implemented groundwater and soil remedies remain protective of human health and the environment. The review will include a technical assessment of monitoring data, inspection reports, potential changes in site conditions, and other relevant information.

The soil remedy included the excavation and offsite disposal of contaminated soil. All radioactive contamination has been removed. Three small subsurface areas were inaccessible to excavation and are now protected by environmental easements to prohibit excavation. Two of these areas have residual lead concentrations and a third contains residual arsenic concentrations.

The groundwater remedy includes monitoring groundwater to ensure that natural attenuation processes are reducing contamination to safe levels, and the use of institutional controls to restrict access to site groundwater or soil vapors. Natural attenuation is the combination of physical, chemical, and biological processes that result in reductions in contaminants over time. The groundwater contaminants are the chlorinated solvents tetrachloroethene and its breakdown products trichloroethene, 1,2-dichloroethene, and vinyl chloride.

It is anticipated that the long-term periodic review will be completed in September 2022. Once the review is complete, a report will be made available on the LM Colonie Site webpage. The webpage contains additional project information and can be found here: https://www.energy.gov/lm/colonie-new-york-site.

For further information on the long-term periodic review process, or the Colonie site, please contact:

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Westminster, CO 80021
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TU1t 4213913

Appendix E

Plume Attenuation Modeling Results

Site Information Parameters		
Parameter	**Value**	**Units**
Current Plume Length	120	Feet
Current Plume Width	120	Feet
Maximum Plume Length	300	Feet
Seepage Velocity	22	ft/year
Source Treatment	None	---
Plume Type	Chlorinated Solvent	---
NAPL Present	No	---
GW Fluctuations?	Yes	---
Distance from Tail to Nearest Down-gradient Receptor	150	Feet
Distance from Tail to Nearest Down-gradient Property	0.1	Feet
Distance from Source to Nearest Down-gradient Receptor	210	Feet
Distance from Source to Nearest Down-gradient Property	60	Feet
Spatial Parameters		
Parameter	**Value**	**Units**
Groundwater Flow Direction	S/SW (250)	---
Porosity	0.4	---
Source X-Coordinate	679647.7992	East NY State plane
Source Y-Coordinate	1405470.673	East NY State plane
Saturated Thickness	17.5	feet
Screening Levels		
Parameter	**Value**	**Units**
cis-1,2-Dichloroethylene: Cleanup Goal	1.8	mg/l
cis-1,2-Dichloroethylene: Low Rate	0.9	
cis-1,2-Dichloroethylene: Medium Rate	1.8	
cis-1,2-Dichloroethylene: High Rate	3.6	
Tetrachloroethylene: Cleanup Goal	0.0055	
Tetrachloroethylene: Low Rate	0.00275	
Tetrachloroethylene: Medium Rate	0.0055	
Tetrachloroethylene: High Rate	0.011	
Trichloroethylene: Cleanup Goal	0.018	
Trichloroethylene: Low Rate	0.009	
Trichloroethylene: Medium Rate	0.018	
Trichloroethylene: High Rate	0.036	
Vinyl Chloride: Cleanup Goal	0.0014	
Vinyl Chloride: Low Rate	0.0007	
Vinyl Chloride: Medium Rate	0.0014	
Vinyl Chloride: High Rate	0.0028	

Abbreviations:
ft = feet
GW = groundwater
mg/l = milligrams per liter
NAPL = nonaqueous phase liquid

MAROS Site Results

Project: Colonie
User Name: ARR
Location: Colonie
State: New York

User Defined Site and Data Assumptions:

Hydrogeology and Plume Information:

Groundwater Seepage Velocity: 22 ft/yr
Current Plume Length: 120 ft
Current Plume Width 120 ft
Number of Tail Wells: 2
Number of Source Wells: 4

Source Information:

Source Treatment: No Current Site Treatment

NAPL is not observed at this site.

Down-gradient Information:

Distance from Edge of Tail to Nearest:
Down-gradient receptor: 150 ft
Down-gradient property: 0.1 ft
Distance from Source to Nearest:
Down-gradient receptor: 210 ft
Down-gradient property: 60 ft

Data Consolidation Assumptions:

Time Period: 8/1/2008 **to** 7/20/2021
Consolidation Period: No Time Consolidation
Consolidation Type: Median
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value

Plume Information Weighting Assumptions:

Consolidation Step 1. Weight Plume Information by Chemical
Summary Weighting: Weighting Applied to All Chemicals Equally
Consolidation Step 2. Weight Well Information by Chemical
Well Weighting: No Weighting of Wells was Applied.
Chemical Weighting: No Weighting of Chemicals was Applied.

Note: These assumptions were made when consolidating the historical montoring data and lumping the Wells and COCs.

1. Compliance Monitoring/Remediation Optimization Results:

Preliminary Monitoring System Optimization Results: Based on site classification, source treatment and Monitoring System Category the following suggestions are made for site Sampling Frequency, Duration of Sampling before reassessment, and Well Density. These criteria take into consideration: Plume Stability, Type of Plume, and Groundwater Velocity.

COC	Tail Stability	Source Stability	Level of Effort	Sampling Duration	Sampling Frequency	Sampling Density
cis-1,2-DICHLOROETHYLENE	PI	S	E	Sample Indefinitely	Biannually (6 months)	11
TETRACHLOROETHYLENE(PCE)	D	D	L	End Sampling	Close site	11
TRICHLOROETHYLENE (TCE)	PD	D	L	Sample 1 more year	Annually	11
VINYL CHLORIDE	D	D	L	End Sampling	Close site	11

Note:

Plume Status: (I) Increasing; (PI)Probably Increasing; (S) Stable; (NT) No Trend; (PD) Probably Decreasing; (D) Decreasing
Design Categories: (E) Extensive; (M) Moderate; (L) Limited (N/A) Not Applicable, Insufficient Data Available

Level of Monitoring Effort Indicated by Analysi Extensive

2. Spatial Moment Analysis Results:

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	cis-1,2-DICHLOROETHYLENE	1.48	65	99.3%	I
	TETRACHLOROETHYLENE(PCE)	1.76	67	99.5%	I
	TRICHLOROETHYLENE (TCE)	1.74	65	99.3%	I
	VINYL CHLORIDE	1.59	65	99.3%	I
1st Moment: Distance to Source					
	cis-1,2-DICHLOROETHYLENE	0.00	11	97.2%	I
	TETRACHLOROETHYLENE(PCE)	0.00	-5	76.5%	S
	TRICHLOROETHYLENE (TCE)	0.00	1	50.0%	NT
	VINYL CHLORIDE	0.00	1	50.0%	NT
2nd Moment: Sigma XX					
	cis-1,2-DICHLOROETHYLENE	0.18	-13	99.2%	D
	TETRACHLOROETHYLENE(PCE)	0.25	7	86.4%	NT
	TRICHLOROETHYLENE (TCE)	0.37	-3	64.0%	S
	VINYL CHLORIDE	0.35	-1	50.0%	S
2nd Moment: Sigma YY					
	cis-1,2-DICHLOROETHYLENE	0.18	-13	99.2%	D
	TETRACHLOROETHYLENE(PCE)	0.25	7	86.4%	NT
	TRICHLOROETHYLENE (TCE)	0.37	-3	64.0%	S
	VINYL CHLORIDE	0.35	-1	50.0%	S

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.40 **Saturated Thickness:** Uniform: 17.5 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events).

Appendix F

Site Inspection Checklists

DOE Office of Legacy Management Colonie NY SiteSite Inspection Checklist

Date of this Inspection: JULY 26, 2022 Date of the last inspection: JULY 19, 2021

Names of Inspector(s): CARL YOUNG

Other persons present and roles: DARINA CASTILLO - LM OVERSIGHT, PAUL ARMANI-NYSDEC
TRICA GOSS & TOMMY CHRISTOPHER - ANTRAK OVERSIGHT

1) Pre-Trip – note whether this is an annual inspection			
1.1 Was a readiness review conducted?	☒yes	☐no	☐n/a
1.2 Were deficiencies or issues identified on the previous inspection form?	☒yes	☐no	☐n/a
1.3 Does this inspection include the annual inspection for the soil easement areas?	☒yes	☐no	☐n/a
1.4 Has this form been revised since the previous inspection?	☐yes	☒no	☐n/a
1.5 Is right-of entry in effect for offsite locations? If not, do not access off-site locations	☒yes	☐no	☐n/a
Notes: 1.2 DAMAGE TO BARBED WIRE			

2) General Observations – including weather conditions			
2.1 Was a Plan of the Day / Week prepared?	☒yes	☐no	☐n/a
2.2 Was a Job Safety Analysis reviewed onsite?	☒yes	☐no	☐n/a
Notes: WARM AND DRY. WOODCHUCK BURROWS PRESENT. NO TICKS SEEN. NO POISON IVY NOTED.			

3) Fencing – Inspector will walk along the entire interior fence line. Photograph all deficiencies			
3.1 Missing or damaged fence components, including gates and locks?	☒yes	☐no	☐n/a
3.2 Excessive corrosion of fence components?	☐yes	☒no	☐n/a
3.3 Trees or vegetation either contacting or damaging any fence component?	☒yes	☐no	☐n/a
3.4 Erosion or other soil loss that would allow human access?	☒yes	☐no	☐n/a
3.5 Indications of vandalism or unauthorized entry?	☒yes	☐no	☐n/a
Notes (include photo numbers): 3.1 CONTRACTOR LOCK SHOWED ATTEMPTED CUT			
3.3 SOME TREE BRANCHES REST ON BARBED WIRE ON WEST FENCE LINE IN SW CORNER.			
3.4 ANIMAL BURROW NEAR SOUTH GATE COULD ALLOW HUMAN ENTRY.			
3.5 CUT IN CHAIN LINK FENCE BEHIND RESTAURANT'S EAST PARKING AREA.			

4) Signs – Reference the locations in the signage plan shown in Figure 1. Photograph all deficiencies			
4.1 Missing or damaged signs?	☒yes	☐no	☐n/a
4.2 Excessive corrosion of signs?	☐yes	☒no	☐n/a
4.3 Indications of vandalism?	☒yes	☐no	☐n/a
Notes (include photo numbers): 4.1 & 4.2 SPRAY PAINT OF "GENERAL PROPERTY" SIGNS P2 - P3			

5) Locks – Reference the locations of defects or issues. Will locks are reviewed with wells in Section 10. Photograph all deficiencies.			
5.1 Missing or damaged lock at front entrance?	☒yes	☐no	☐n/a

5.2 Missing or damaged lock at rear entrance?	☐yes ☒no ☐n/a
5.3 Missing or damaged lock at west pedestrian entrance?	☐yes ☐no ☒n/a
Notes (include photo numbers): CONTRACTOR LOCK WAS DAMAGED BY INCOMPLETE CUTTING.	

6) Vegetation – Reference lawn care, tree growth, signs of stress		
6.1 Has the grass along Central Avenue been recently mown?	Grass height: 2"	☒yes ☐no ☐n/a
6.2 Is the vegetation along Central Avenue fence line trimmed?	Grass height: 2"	☒yes ☐no ☐n/a
6.3 Is there trash on the lawn on Central Avenue?		☐yes ☒no ☐n/a
6.4 Has the grass in the site interior been recently mown?	Grass height: 4"	☒yes ☐no ☐n/a
6.5 Is there trash on the site?		☐yes ☒no ☐n/a
6.6 Are there signs of stressed vegetation?		☒yes ☐no ☐n/a
6.7 Are there dead trees or downed branches within the property?		☐yes ☒no ☐n/a
6.8 Are there any areas of erosion on the grounds?		☒yes ☐no ☐n/a
Notes (include photo numbers): 6-6 DROUGHT HAS MADE GRASS YELLOW 6-8 ANIMAL BURROWS UNDER FENCE IN 2 LOCATIONS		

7) Roads and Parking Area – Review driveability and vegetation ingress	
7.1 Are there any driving hazards in the road or parking area?	☐yes ☒no ☐n/a
7.2 Do any conditions make the road unsafe or unusable?	☐yes ☒no ☐n/a
Notes (include photo numbers):	

8) Storm Drain System – Inspect for blockage	
8.1 Is the northern catch basin intact and undamaged?	☒yes ☐no ☐n/a
8.2 Is the eastern catch basin intact and undamaged?	☒yes ☐no ☐n/a
8.3 Is the central catch basin intact and undamaged?	☒yes ☐no ☐n/a
8.4 Are there any obstructions in the unnamed tributary?	☐yes ☒no ☐n/a
8.5 Are there any signs of erosion in the unnamed tributary?	☐yes ☒no ☐n/a
Notes (include photo numbers): 8-4 A FEW SMALL BRANCHES WHERE TRIBUTARY EXITS SITE IN KEYHOLE AREA.	

9) Environmental Easement Areas – Inspect and photo-document	
9.1 Is this an annual inspection where the Site Management Plan Checklist will be used? If 'yes' then do not complete the remainder of this section.	☒yes ☐no ☐n/a
9.2 Are there signs that digging has occurred in any of the easement areas?	☐yes ☐no ☐n/a
9.3 Are there any signs of dumping, staining, or vegetative stress?	☐yes ☐no ☐n/a

Notes (include photo numbers): GSA SIGNS IS ON EDGE OF EASEMENT AREA.

10) Monitoring Wells – Photograph all wells if possible and list photo numbers	
10.1 Are separate well inspection forms being used? If yes, do not complete this section.	☐yes ☒no ☐n/a
10.2 Are there signs of damage to the wells or bollards?	☐yes ☑no ☐n/a
10.3 Are the locks installed and undamaged?	☑yes ☐no ☐n/a
Notes (include photo numbers): ALL WELLS ARE IN GOOD CONDITION. THE EDGE OF THE PAD AT NW-44S IS CRACKED.	

11) Storage Shed – Inspect for wear and damage	
11.1 Is the shed locked and secure?	☐yes ☑no ☐n/a
11.2 Are there signs of vandalism or damage?	☐yes ☑no ☐n/a
11.2 Are there signs of water damage inside the shed?	☐yes ☑no ☐n/a
Notes (include photo numbers): FEDERAL PROPERTY NOT CONVEYING IS REMOVED LOCK TO SHED IS MISSING.	

12) Mailbox – photo-document	
12.1 Is the mail box present and intact?	☒yes ☐no ☐n/a
12.2 Are there signs of vandalism or damage?	☒yes ☐no ☐n/a
Notes (include photo numbers): 12.2 SAME WRINKLE AS PREVIOUS YEAR.	

13) Personal Property	
12.1 Refer to the Personal Property inventory. Is all equipment accounted for?	☑yes ☐no ☐n/a
12.2 Are there signs of vandalism or damage?	☐yes ☑no ☐n/a
Notes (include photo numbers):	

14) Additional Notes – Summarize Notable Issues
Notes (include photo numbers):

Annual Site Inspection Form
Colonie FUSRAP Site
Town of Colonie, Albany County, New York

I. COLONIE SITE INFORMATION

Date of Inspection:	Type of Inspection (site walk, windshield):
JULY 26, 2022	SITE WALK
General Site Conditions:	Inspection Team Names/Affiliation (print): CARL YOUNG - LEGACY MGMT SUPPORT (RSI); DARINA CASTILLO - LEGACY MGMT; PAJU ARMANI - NYSDEC
Weather/Temperature: CLOUDY, 90°F	

Deed Holder: DOE

If the property is owned by the DOE, is it currently leased? Yes (No)

Site Records, Inspections, and Reports up to date? (Yes) No

Institutional Controls:

1. Excavation is restricted in the Easement Areas.
2. Data and information pertinent to Site management must be reported at the frequency and in a manner as defined in this SMP.
3. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP.
4. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP.
5. Maintenance, monitoring, inspection, and reporting of any physical component of the remedy shall be performed as defined in this SMP.
6. Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the Property Owner to assure compliance with the restrictions identified by the Environmental Easement.
7. Gardening and farming are prohibited in the Easement Areas.

Agency or company conducting the inspection: RSI - ENTECH

Primary Inspector CARL YOUNG (Name) SITE LEAD (Title) 410-816-4029 (Phone No.)

Signature [signature] Date 07-26-22

Use the following to document current changed Site Conditions, include as Attachments:
(Photographs) Maps Other (sketches, etc.)

Annual Site Inspection Form
Colonie FUSRAP Site
Town of Colonie, Albany County, New York
(Page 1 of 2)

II. INSTITUTIONAL CONTROLS (ICs)

**If deficiencies are noted, the locations should be documented on a site map and photographed.*

1. Property Use:

Are all ICs being complied with?	(Yes)	No
Easement Areas disturbed in any manner?	Yes	(No)
Changes in Site Conditions?	(Yes)	No
Is there any Gardening or Farming?	Yes	(No)
Is the property used for industrial purposes?	Yes	(No)
Is the property used for commercial purposes?	Yes	(No)
Is the property currently vacant?	(Yes)	No
Any evidence of new construction?		Yes
(No)		

Remarks: FENCE WAS CUT FOR ENTRY BEHIND RESTAURANT PARKING LOT. POSTS FOR A GSA SIGN WERE INSTALLED AT EDGE OF NORTH LAWN EASEMENT AREA.

2. Soil Conditions:

Is there any evidence of digging or soil excavation? Yes (No)
Authorization/Permit #: _____
Any signs of dumping, staining, or vegetative stress? (Yes) No

Remarks: VEGETATIVE STRESS TO LAWN DUE TO DROUGHT

3. **Real Property Assets:**

Do any property assets need maintenance? (Yes) No

Remarks: CUT IN CHAIN-LINK FENCE AS NOTED IN ITEM 1.

III. EVALUATION OF INSTITUTIONAL CONTROLS (ICs)

1. Implementation and Enforcement:

Site conditions imply ICs have been properly implemented. (Yes) No
Site conditions imply ICs are fully enforced. (Yes) No

Remarks: _____

2. Observations, Conclusions, Recommendations (including changes needed and overall performance and effectiveness of the remedy):

Remarks: THE FENCE DAMAGE DOES NOT AFFECT EASEMENT.

Appendix G

Stakeholder Interview

From: Castillo, Darina
Sent: Thursday, June 2, 2022 4:40 PM
To: Castillo, Darina; Abunaw, John (DEC)
Cc: Elizabeth Romano (CONTR)
When: Thursday, June 9, 2022 11:30 AM-12:30 PM (UTC-07:00) Mountain Time (US & Canada).
Where: Microsoft Teams Meeting
Subject: Colonie, NY Site Long Term Periodic Review Interview of Mr. John Abunaw.

1. **What is your overall impression of the project?**
   Since the transfer everything looks good so far. LM followed the Site Management Plan so there is no serious issue of any kind.

2. **Have you been to the Site recently, and if so, what are your overall thoughts regarding its condition?**
   Sometimes I pass by and see that the site is locked. Overall the conditions are acceptable.

3. **Do you believe that the groundwater remedy is functioning as intended by the decision documents?**
   Yes. From the last review done by Kent, the attenuation is going on.
   Question from Mr. Abunaw: How will the project be handled after the sale.
   Answer from LM: The groundwater program and well network remain the responsibility of the DOE.

4. **Have there been routine communications or activities (site visits, inspections, reporting activities) conducted by your office regarding the site?**
   Yes. Inspections have been conducted when DOE is onsite. There haven't been independent visits. DEC isn't allowed to enter the vicinity properties without LM.

5. **Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details.**
   No.

6. **Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.**
   No.

7. **Do you feel well informed about the Site's activities and progress?**
   Yes.

8. **Do you have any recommendations or suggestions regarding the Site in general, or regarding the groundwater remedy?**
   No, not right now.

Appendix H

Lead Modeling Results

LEAD MODEL FOR WINDOWS Version 2.0

These IEUBK Model results are valid as long as they were produced with an official, unmodified version of the IEUBK Model with a software certificate.

While IEUBK Model output is generally written with three digits to the right of the decimal point, the true precision of the output is strongly influenced by least precise input values.

==========

Model Version: 2.0 Build1
User Name: CYoung
Date: 08/18/2022
Site Name: DOE Colonie NY
Operable Unit: SU104
Run Mode: Research

==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Month	Time Outdoors (hours)	Ventilation Rate (m³/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m³)
6-12	1.000	3.216	32.000	0.100
12-24	2.000	4.970	32.000	0.100
24-36	3.000	6.086	32.000	0.100
36-48	4.000	6.954	32.000	0.100
48-60	4.000	7.682	32.000	0.100
60-72	4.000	8.318	32.000	0.100
72-84	4.000	8.887	32.000	0.100

****** Diet ******

Month	Diet Intake(µg/day)
6-12	2.660
12-24	5.030
24-36	5.210
36-48	5.380
48-60	5.640
60-72	6.040

```
72-84       5.950

****** Drinking Water ******

Water Consumption:
Month     Water (L/day)
-----------------------------------
  6-12       0.400
12-24       0.430
24-36       0.510
36-48       0.540
48-60       0.570
60-72       0.600
72-84       0.630

Drinking Water Concentration: 4.000 µg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 45.000 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Month          Soil (µg Pb/g)       House Dust (µg Pb/g)
-----------------------------------------------------------
  6-12               50.000               45.000
12-24               50.000               45.000
24-36               50.000               45.000
36-48               50.000               45.000
48-60               50.000               45.000
60-72               50.000               45.000
72-84               50.000               45.000

****** Alternate Intake ******

Month      Alternate (µg Pb/day)
-----------------------------------
  6-12       0.000
12-24       0.000
24-36       0.000
36-48       0.000
48-60       0.000
60-72       0.000
72-84       0.000

****** Maternal Contribution: Infant Model ******
```

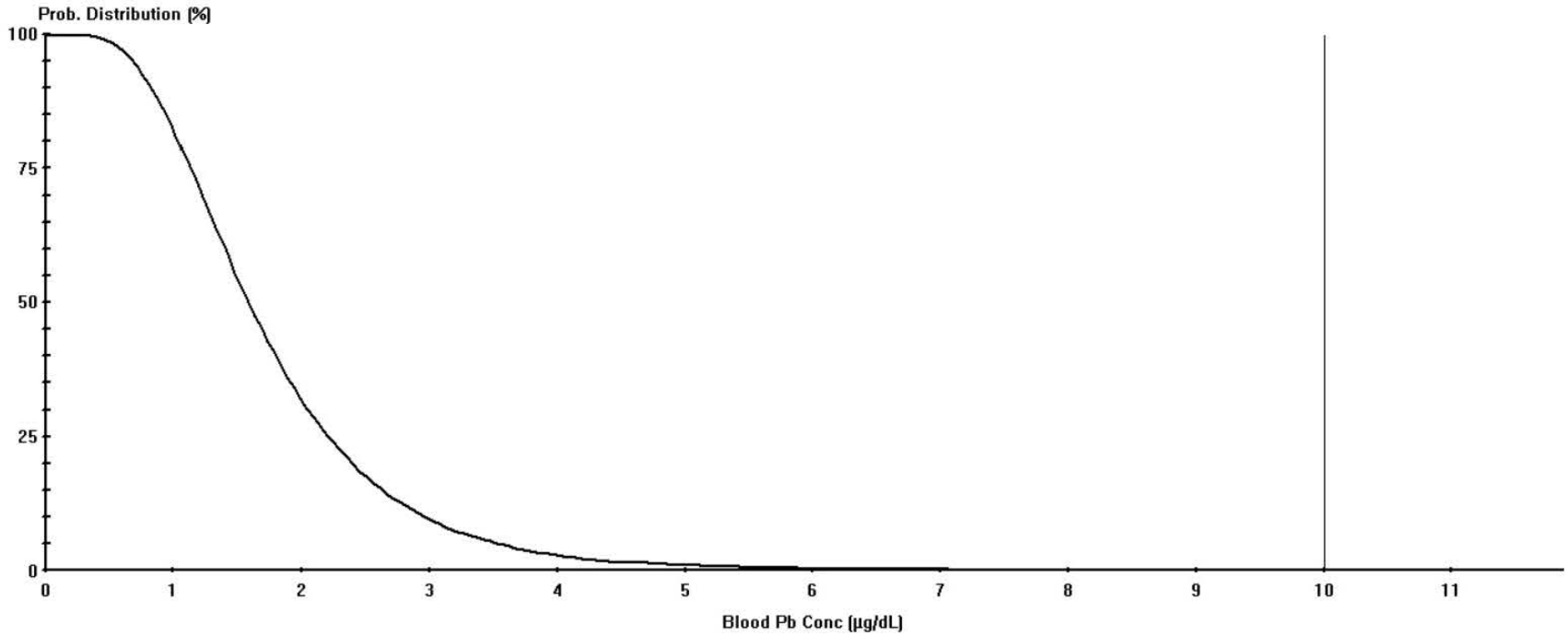
Maternal Blood Concentration: 1.000 µg Pb/dL

****

CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Month	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
6-12	0.034	1.282	0.000	0.771
12-24	0.057	2.417	0.000	0.826
24-36	0.075	2.521	0.000	0.987
36-48	0.093	2.614	0.000	1.049
48-60	0.102	2.747	0.000	1.111
60-72	0.111	2.950	0.000	1.172
72-84	0.118	2.911	0.000	1.233

Month	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
6-12	1.286	3.293	1.8
12-24	1.314	4.615	1.9
24-36	0.943	4.526	1.7
36-48	0.891	4.646	1.6
48-60	0.950	4.910	1.6
60-72	0.739	4.972	1.5
72-84	0.783	5.045	1.4



Cutoff = 10.000 µg/dl
Geo Mean = 1.666
GSD = 1.600
% Above = 0.007

Age Range = 12 to 72 months

Run Mode = Research
Comment = SU104

These IEUBK Model results are valid as long as they were produced with an official, unmodified version of the IEUBK Model with a software certificate.
While IEUBK Model output is generally written with three digits to the right of the decimal point, the true precision of the output is strongly influenced by least precise input values.

LEAD MODEL FOR WINDOWS Version 2.0

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==========

Model Version: 2.0 Build1
User Name: CYoung
Date: 08/18/2022
Site Name: DOE Colonie NY
Operable Unit: SU109
Run Mode: Research

==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Month	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
6-12	1.000	3.216	32.000	0.100
12-24	2.000	4.970	32.000	0.100
24-36	3.000	6.086	32.000	0.100
36-48	4.000	6.954	32.000	0.100
48-60	4.000	7.682	32.000	0.100
60-72	4.000	8.318	32.000	0.100
72-84	4.000	8.887	32.000	0.100

****** Diet ******

Month	Diet Intake(µg/day)
6-12	2.660
12-24	5.030
24-36	5.210
36-48	5.380
48-60	5.640
60-72	6.040

72-84 5.950

****** Drinking Water ******

Water Consumption:

Month	Water (L/day)
6-12	0.400
12-24	0.430
24-36	0.510
36-48	0.540
48-60	0.570
60-72	0.600
72-84	0.630

Drinking Water Concentration: 4.000 µg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 160.500 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Month	Soil (µg Pb/g)	House Dust (µg Pb/g)
6-12	215.000	160.500
12-24	215.000	160.500
24-36	215.000	160.500
36-48	215.000	160.500
48-60	215.000	160.500
60-72	215.000	160.500
72-84	215.000	160.500

****** Alternate Intake ******

Month	Alternate (µg Pb/day)
6-12	0.000
12-24	0.000
24-36	0.000
36-48	0.000
48-60	0.000
60-72	0.000
72-84	0.000

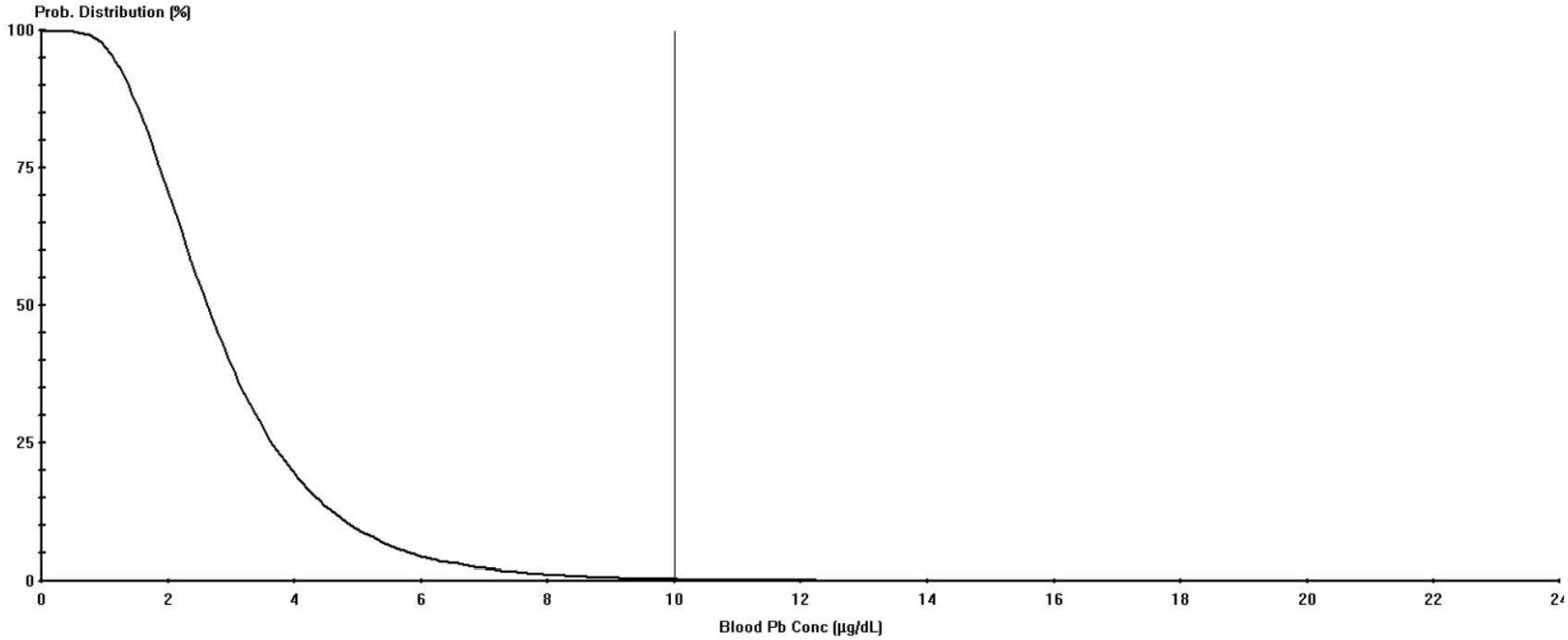
****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Month	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
6-12	0.034	1.232	0.000	0.741
12-24	0.057	2.337	0.000	0.799
24-36	0.075	2.469	0.000	0.967
36-48	0.093	2.570	0.000	1.032
48-60	0.102	2.705	0.000	1.093
60-72	0.111	2.918	0.000	1.160
72-84	0.118	2.880	0.000	1.220

Month	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
6-12	4.746	6.753	3.6
12-24	5.206	8.400	3.5
24-36	3.784	7.295	2.9
36-48	3.587	7.282	2.6
48-60	3.830	7.730	2.5
60-72	2.994	7.183	2.3
72-84	3.173	7.392	2.1



Cutoff = 10.000 µg/dl
Geo Mean = 2.749
GSD = 1.600
% Above = 0.300

Age Range = 12 to 72 months

Run Mode = Research
Comment = SU109

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LEAD MODEL FOR WINDOWS Version 2.0

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input values.

==========

Model Version: 2.0 Build1
User Name: CYoung
Date: 08/18/2022
Site Name: DOE Colonie NY
Operable Unit: SU124
Run Mode: Research

==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Month	Time Outdoors (hours)	Ventilation Rate (m³/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m³)
6-12	1.000	3.216	32.000	0.100
12-24	2.000	4.970	32.000	0.100
24-36	3.000	6.086	32.000	0.100
36-48	4.000	6.954	32.000	0.100
48-60	4.000	7.682	32.000	0.100
60-72	4.000	8.318	32.000	0.100
72-84	4.000	8.887	32.000	0.100

****** Diet ******

Month	Diet Intake(µg/day)
6-12	2.660
12-24	5.030
24-36	5.210
36-48	5.380
48-60	5.640
60-72	6.040

72-84 5.950

****** Drinking Water ******

Water Consumption:

Month	Water (L/day)
6-12	0.400
12-24	0.430
24-36	0.510
36-48	0.540
48-60	0.570
60-72	0.600
72-84	0.630

Drinking Water Concentration: 4.000 µg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 269.700 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Month	Soil (µg Pb/g)	House Dust (µg Pb/g)
6-12	371.000	269.700
12-24	371.000	269.700
24-36	371.000	269.700
36-48	371.000	269.700
48-60	371.000	269.700
60-72	371.000	269.700
72-84	371.000	269.700

****** Alternate Intake ******

Month	Alternate (µg Pb/day)
6-12	0.000
12-24	0.000
24-36	0.000
36-48	0.000
48-60	0.000
60-72	0.000
72-84	0.000

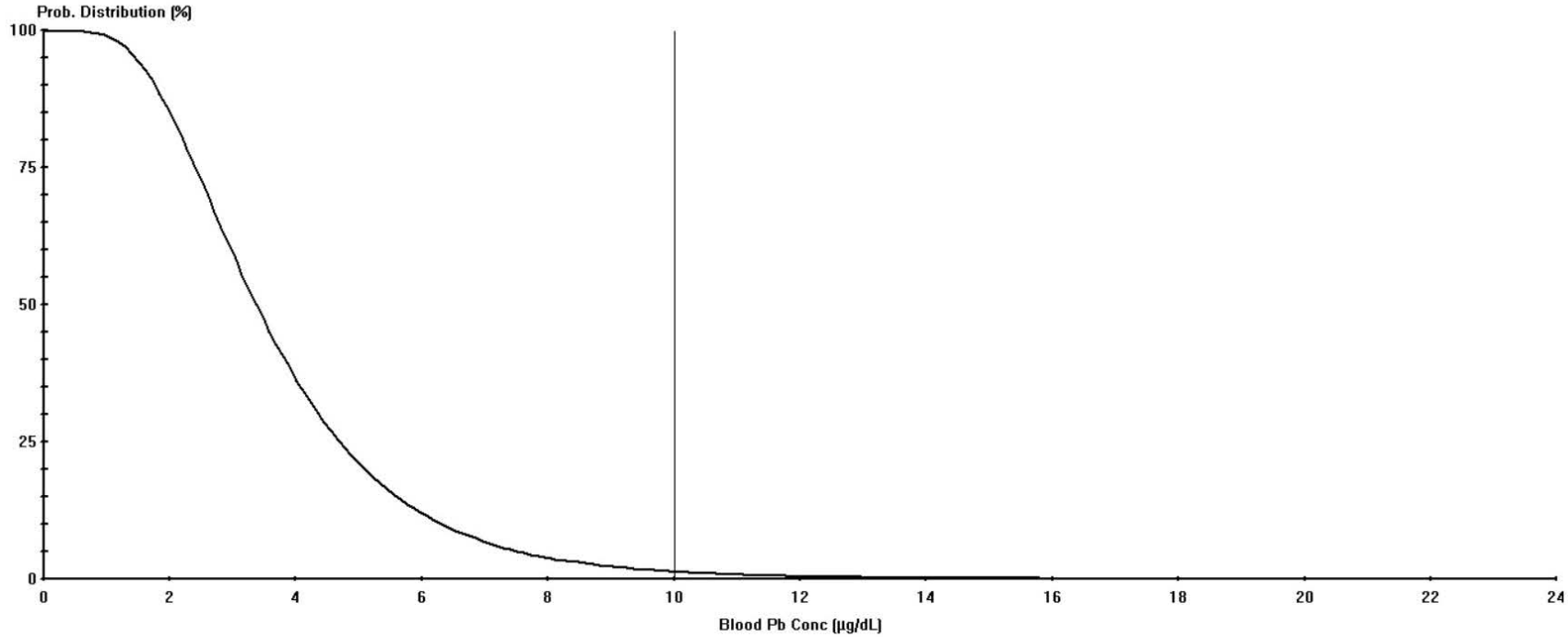
****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Month	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
6-12	0.034	1.189	0.000	0.715
12-24	0.057	2.268	0.000	0.775
24-36	0.075	2.422	0.000	0.948
36-48	0.093	2.531	0.000	1.016
48-60	0.102	2.666	0.000	1.078
60-72	0.111	2.889	0.000	1.148
72-84	0.118	2.852	0.000	1.208

Month	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
6-12	7.855	9.792	5.2
12-24	8.661	11.761	5.0
24-36	6.366	9.812	3.9
36-48	6.056	9.695	3.4
48-60	6.473	10.319	3.3
60-72	5.083	9.231	3.0
72-84	5.388	9.567	2.7



Cutoff = 10.000 µg/dl
Geo Mean = 3.546
GSD = 1.600
% Above = 1.370

Age Range = 12 to 72 months

Run Mode = Research
Comment = SU124

These IEUBK Model results are valid as long as they were produced with an official, unmodified version of the IEUBK Model with a software certificate.
While IEUBK Model output is generally written with three digits to the right of the decimal point, the true precision of the output is strongly influenced by least precise input values.

LEAD MODEL FOR WINDOWS Version 2.0

These IEUBK Model results are valid as long as they were produced with an official, unmodified version of the IEUBK Model with a software certificate.

While IEUBK Model output is generally written with three digits to the right of the decimal point, the true precision of the output is strongly influenced by least precise input values.

==========

Model Version: 2.0 Build1
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research

==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Month	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
6-12	1.000	3.216	32.000	0.100
12-24	2.000	4.970	32.000	0.100
24-36	3.000	6.086	32.000	0.100
36-48	4.000	6.954	32.000	0.100
48-60	4.000	7.682	32.000	0.100
60-72	4.000	8.318	32.000	0.100
72-84	4.000	8.887	32.000	0.100

****** Diet ******

Month	Diet Intake(µg/day)
6-12	2.660
12-24	5.030
24-36	5.210
36-48	5.380
48-60	5.640
60-72	6.040
72-84	5.950

****** Drinking Water ******

Water Consumption:

Month	Water (L/day)
6-12	0.400
12-24	0.430
24-36	0.510
36-48	0.540
48-60	0.570
60-72	0.600
72-84	0.630

Drinking Water Concentration: 4.000 µg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 871.000 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Month	Soil (µg Pb/g)	House Dust (µg Pb/g)
6-12	1230.000	871.000
12-24	1230.000	871.000
24-36	1230.000	871.000
36-48	1230.000	871.000
48-60	1230.000	871.000
60-72	1230.000	871.000
72-84	1230.000	871.000

****** Alternate Intake ******

Month	Alternate (µg Pb/day)
6-12	0.000
12-24	0.000
24-36	0.000
36-48	0.000
48-60	0.000
60-72	0.000
72-84	0.000

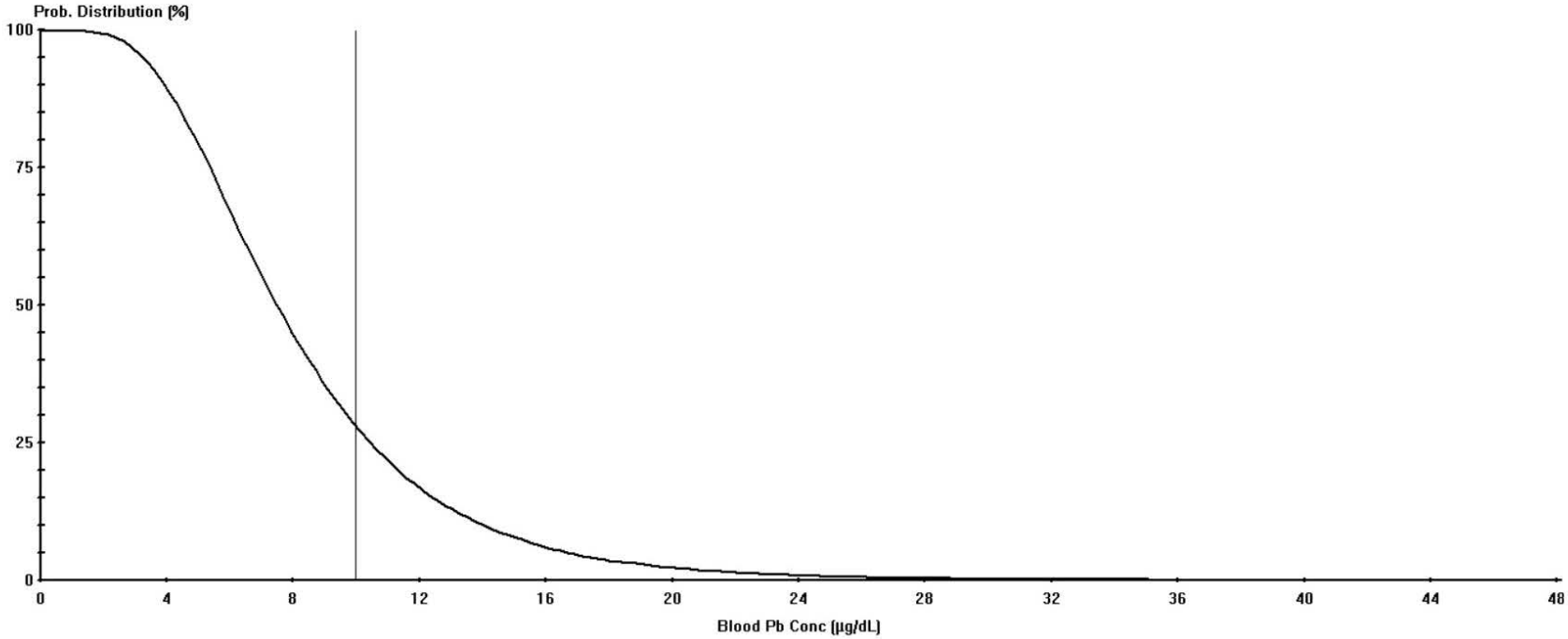
****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Month	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
6-12	0.034	1.007	0.000	0.606
12-24	0.057	1.963	0.000	0.671
24-36	0.075	2.201	0.000	0.862
36-48	0.093	2.338	0.000	0.938
48-60	0.102	2.477	0.000	1.001
60-72	0.111	2.741	0.000	1.089
72-84	0.118	2.710	0.000	1.148

Month	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
6-12	21.934	23.581	12.1
12-24	24.707	27.398	11.5
24-36	19.063	22.202	8.8
36-48	18.432	21.801	7.6
48-60	19.811	23.392	7.5
60-72	15.890	19.831	6.5
72-84	16.866	20.842	5.9



Cutoff = 10.000 µg/dl
Geo Mean = 7.877
GSD = 1.600
% Above = 30.584

Age Range = 12 to 72 months

Run Mode = Research
Comment = North Lawn

These IEUBK Model results are valid as long as they were produced with an official, unmodified version of the IEUBK Model with a software certificate.
While IEUBK Model output is generally written with three digits to the right of the decimal point, the true precision of the output is strongly influenced by least precise input values.

Appendix I

Calculated Regional Screening Levels

Site-specific Resident Soil Inputs - Colonie Exposure Unit SU104 Arsenic

Variable	Resident Soil Default Value	Site-Specific Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - mass limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - mass limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - mass limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on U $_{mt}$/U$_{ms}$) unitless	0.194	0.194
n (total soil porosity) L $_{pore}$/L$_{soil}$	0.43396	0.43396
ρ_b (dry soil bulk density) g/cm ^{3}	1.5	1.5
ρ_b (dry soil bulk density - mass limit) g/cm ^{3}	1.5	1.5
PEF (particulate emission factor) m ^{3}/kg	1359344438	1359344438
ρ_s (soil particle density) g/cm ^{3}	2.65	2.65
Q/C$_{unc}$ (g/m^2-s per kg/m^3)	93.77	93.77
Q/C$_{vol}$ (g/m^2-s per kg/m^3)	68.18	68.18
Q/C$_{vol}$ (g/m^2-s per kg/m^3 - mass limit)	68.18	68.18
A$_s$ (PEF acres)	0.5	0.5
A$_s$ (VF acres)	0.5	0.5
A$_s$ (VF mass-limit acres)	0.5	0.5
AF$_{0-2}$ (mutagenic skin adherence factor) mg/cm ^{2}	0.2	0.2
AF$_{2-6}$ (mutagenic skin adherence factor) mg/cm ^{2}	0.2	0.2
AF$_{6-16}$ (mutagenic skin adherence factor) mg/cm ^{2}	0.07	0.07
AF$_{16-26}$ (mutagenic skin adherence factor) mg/cm ^{2}	0.07	0.07
AF$_{adult}$ (skin adherence factor - adult) mg/cm ^{2}	0.07	0.07
AF$_{child}$ (skin adherence factor - child) mg/cm ^{2}	0.2	0.2
AT$_{res}$ (averaging time - resident carcinogenic)	365	365

Output generated 09SEP2022:14:53:47

Site-specific
Resident Soil Inputs

Variable	Resident Soil Default Value	Site-Specific Value
BW$_{..}$ (mutagenic body weight) kg	15	13.3
BW$_{..}$ (mutagenic body weight) kg	15	13.3
BW$_{...}$ (mutagenic body weight) kg	80	80
BW$_{...}$ (mutagenic body weight) kg	80	80
BW$_{..}$ (body weight - adult) kg	80	80
BW$_{...}$ (body weight - child) kg	15	13.3
DFS$_{....}$ (age-adjusted soil dermal factor) mg/kg	103390	85544.076
DFSM$_{....}$ (mutagenic age-adjusted soil dermal factor) mg/kg	428260	245713.244
ED$_{..}$ (exposure duration) years	26	70
ED$_{..}$ (mutagenic exposure duration) years	2	2
ED$_{..}$ (mutagenic exposure duration) years	4	4
ED$_{..}$ (mutagenic exposure duration) years	10	10
ED$_{...}$ (mutagenic exposure duration) years	10	54
ED$_{....}$ (exposure duration - adult) years	20	64
ED$_{....}$ (exposure duration - child) years	6	6
EF$_{..}$ (exposure frequency) days/year	350	155
EF$_{..}$ (mutagenic exposure frequency) days/year	350	155
EF$_{..}$ (mutagenic exposure frequency) days/year	350	155
EF$_{...}$ (mutagenic exposure frequency) days/year	350	155
EF$_{...}$ (mutagenic exposure frequency) days/year	350	155
EF$_{....}$ (exposure frequency - adult) days/year	350	155
EF$_{....}$ (exposure frequency - child) days/year	350	155
ET$_{..}$ (exposure time) hours/day	24	24
ET$_{..}$ (mutagenic exposure time) hours/day	24	24
ET$_{..}$ (mutagenic exposure time) hours/day	24	24
ET$_{...}$ (mutagenic exposure time) hours/day	24	24
ET$_{...}$ (mutagenic exposure time) hours/day	24	24
ET$_{..}$ (adult exposure time) hours/day	24	24
ET$_{...}$ (child exposure time) hours/day	24	24
THQ (target hazard quotient) unitless	0.1	1
IFS$_{....}$ (age-adjusted soil ingestion factor) mg/kg	36750	20790.977

Output generated 09SEP2022:14:53:47

Site-specific
Resident Soil Inputs

Variable	Resident Soil Default Value	Site-Specific Value
IFSM_ _ (mutagenic age-adjusted soil ingestion factor) mg/kg	166833.3	61026.88
IRS_ (mutagenic soil intake rate) mg/day	200	120
IRS_ (mutagenic soil intake rate) mg/day	200	120
IRS_ _ (mutagenic soil intake rate) mg/day	100	100
IRS_ _ (mutagenic soil intake rate) mg/day	100	100
IRS_ (soil intake rate - adult) mg/day	100	100
IRS_ (soil intake rate - child) mg/day	200	120
LT (lifetime) years	70	70
SA_ (mutagenic skin surface area) cm ²/day	2373	2373
SA_ (mutagenic skin surface area) cm ²/day	2373	2373
SA_ (mutagenic skin surface area) cm ²/day	6032	6032
SA_ _ (mutagenic skin surface area) cm ²/day	6032	6032
SA_ _ (skin surface area - adult) cm ²/day	6032	6032
SA_ (skin surface area - child) cm ²/day	2373	2373
TR (target risk) unitless	1.0E-06	1.0E-04
T_ (groundwater temperature) Celsius	25	25
Theta (air-filled soil porosity) L _/L_	0.28396	0.28396
Theta_ (water-filled soil porosity) L _/L_	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U_ (mean annual wind speed) m/s	4.69	4.69
U (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

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Site-specific Colonie Exposure Unit SU104 Arsenic

Resident Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = OW; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF_o (mg/kg-day)$^{-1}$	SF_o Ref	IUR (ug/m^3)$^{-1}$	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	GIABS
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1

ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K_{os}\ (cm^3/g)	K_s\ (cm^3/g)	HLC (atm-m^3/mole)	Henry's Law Constant Used in Calcs (unitless)	H` and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature T_c\ (K)	T_c\ Ref
0.03	0.6	-	-	-	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC

Chemical Type	D_{ia}\ (cm^2/s)	D_{iw}\ (cm^2/s)	D_A\ (cm^2/s)	Particulate Emission Factor (m^3/kg)	Volatilization Factor Unlimited Reservoir (m^3/kg)	Volatilization Factor Mass Limit (m^3/kg)	Volatilization Factor Selected (m^3/kg)	Ingestion SL TR=0.0001 (mg/kg)	Dermal SL TR=0.0001 (mg/kg)	Inhalation SL TR=0.0001 (mg/kg)
INORGANIC	-	-	-	1.36E+09	-	-	-	1.37E+02	6.64E+02	7.44E+04

Carcinogenic SL TR=0.0001 (mg/kg)	Ingestion SL Child THQ=1 (mg/kg)	Dermal SL Child THQ=1 (mg/kg)	Inhalation SL Child THQ=1 (mg/kg)	Noncarcinogenic SL Child THI=1 (mg/kg)	Ingestion SL Adult THQ=1 (mg/kg)	Dermal SL Adult THQ=1 (mg/kg)	Inhalation SL Adult THQ=1 (mg/kg)	Noncarcinogenic SL Adult THI=1 (mg/kg)	Screening Level (mg/kg)
1.13E+02	1.30E+02	6.60E+02	4.80E+04	1.09E+02	9.42E+02	4.46E+03	4.80E+04	7.65E+02	1.09E+02 nc

Output generated 09SEP2022:14:53:47

Site-specific Resident Risk for Soil
Colonie Exposure Unit SU104 Arsenic

Chemical	SF_o $(mg/kg\text{-}day)^{-1}$	SF_o Ref	IUR $(ug/m^3)^{-1}$	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K_{oc} (cm^3/g)	K_s (cm^3/g)	HLC $(atm\text{-}m^3/mole)$	Henry's Law Constant Used in Calcs (unitless)
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-	-	2.90E+01	-	-
*Total Risk/HI	-		-		-		-		-	-	-	-	-	-	-	-	-

H` and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature T_c (K)	T_c Ref	Chemical Type	D_a (cm^2/s)	D_w (cm^2/s)	D_A (cm^2/s)	Particulate Emission Factor (m^3/kg)	Volatilization Factor Unlimited Reservoir (m^3/kg)	Volatilization Factor Mass Limit (m^3/kg)	Volatilization Factor Selected (m^3/kg)	Concentration (mg/kg)	Ingestion Risk
	888.15	PHYSPROP	1673	CRC	INORGANIC	-	-	-	1.36E+09	-	-	-	8.54E+01	6.25E-05
	-		-			-	-	-	-	-	-	-	-	6.25E-05

Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Inhalation Child HQ	Noncarcinogenic Child HI	Ingestion Adult HQ	Dermal Adult HQ	Inhalation Adult HQ	Noncarcinogenic Adult HI
1.29E-05	1.15E-07	7.55E-05	6.54E-01	1.29E-01	1.78E-03	7.86E-01	9.07E-02	1.91E-02	1.78E-03	1.12E-01
1.29E-05	1.15E-07	7.55E-05	6.54E-01	1.29E-01	1.78E-03	7.86E-01	9.07E-02	1.91E-02	1.78E-03	1.12E-01

Output generated 09SEP2022:14:53:47

Appendix J

Vapor Intrusion Modeling Results

Table of Inputs and Outputs for Multiple Chemicals

Note: Parameters other than the chemical concentration must be entered in the MODEL sheet and must be the same for all chemicals. Warnings and errors are displayed in only on the MODEL sheet.

Clear Values

2022 Tox Values

Source Characteristics:	Units	Symbol	Dichloroethylene, 1,2-cis- Value	Tetrachloroethylene Value	Trichloroethylene Value	Vinyl Chloride Value
Source medium		Source	Groundwater	Groundwater	Groundwater	Groundwater
Groundwater concentration	(ug/L)	Cmedium	1800	5.5	18	1.4
Depth below grade to water table	(m)	Ls	4.00	4.00	4.00	4.00
Average groundwater temperature	(°C)	Ts	10	10	10	10
Calc: Source vapor concentration	(ug/m3)	Cs	159383	1783	3550	1071
Calc: % of pure component saturated vapor concentration	(%)	%Sat	0.015%	0.001%	0.001%	0.000%
Chemical:	**Units**	**Symbol**	**Value**	**Value**	**Value**	**Value**
Chemical Name		Chem	Dichloroethylene, 1,2-cis-	Tetrachloroethylene	Trichloroethylene	Vinyl Chloride
CAS No.		CAS	156-59-2	127-18-4	79-01-6	75-01-4
Toxicity Factors						
Unit risk factor	$(ug/m^3)^{-1}$	IUR	Not Available	2.60E-07	see note	4.40E-06
Mutagenic compound		Mut	No	No	Yes	VC
Reference concentration	(ug/m^3)	RfC	Not Available	4.00E-02	2.00E-03	1.00E-01
Chemical Properties:	**Units**	**Symbol**	**Value**	**Value**	**Value**	**Value**
Pure component water solubility	(mg/L)	S	6.41E+03	2.06E+02	1.28E+03	8.80E+03
Henry's Law Constant @ 25°C	$(atm\text{-}m^3/mol)$	Hc	4.08E-03	1.77E-02	9.85E-03	2.78E-02
Calc: Henry's Law Constant @ 25°C	(dimensionless)	Hr	1.67E-01	7.24E-01	4.03E-01	1.14E+00
Calc: Henry's Law Constant @ system temperature	(dimensionless)	Hs	8.85E-02	3.24E-01	1.97E-01	7.65E-01
Diffusivity in air	(cm2/s)	Dair	8.84E-02	5.05E-02	6.87E-02	1.07E-01
Diffusivity in water	(cm2/s)	Dwater	1.13E-05	9.46E-06	1.02E-05	1.20E-05

Building Characteristics:	Units	Symbol	Value	Value	Value	Value
Building setting		Bldg_Setting	Residential	Residential	Residential	Residential
Foundation type		Found_Type	Basement w/ slab	Basement w/ slab	Basement w/ slab	Basement w/ slab
Depth below grade to base of foundation	(m)	Lb	2.00	2.00	2.00	2.00
Foundation thickness	(m)	Lf	0.10	0.10	0.10	0.10
Fraction of foundation area with cracks	(-)	eta	0.001	0.001	0.001	0.001
Enclosed space floor area	(m2)	Ab	150.00	150.00	150.00	150.00
Enclosed space mixing height	(m)	Hb	3.66	3.66	3.66	3.66
Indoor air exchange rate	(1/hr)	ach	0.45	0.45	0.45	0.45
Qsoil/Qbuilding	(-)	Qsoil_Qb	0.0030	0.0030	0.0030	0.0030
Calc: Building ventilation rate	(m3/hr)	Qb	247.05	247.05	247.05	247.05
Calc: Average vapor flow rate into building	(m3/hr)	Qsoil	0.74	0.74	0.74	0.74

Vadose zone characteristics:	Units	Symbol	Value	Value	Value	Value
Stratum A (Top of soil profile):						
Stratum A SCS soil type		SCS_A	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand
Stratum A thickness (from surface)	(m)	hSA	4.00	4.00	4.00	4.00
Stratum A total porosity	(-)	nSA	0.390	0.390	0.390	0.390
Stratum A water-filled porosity	(-)	nwSA	0.076	0.076	0.076	0.076
Stratum A bulk density	(g/cm^3)	rhoSA	1.620	1.620	1.620	1.620
Stratum B (Soil layer below Stratum A):						
Stratum B SCS soil type		SCS_B	Not Present	Not Present	Not Present	Not Present
Stratum B thickness	(m)	hSB	0.00	0.00	0.00	0.00
Stratum B total porosity	(-)	nSB				
Stratum B water-filled porosity	(-)	nwSB				
Stratum B bulk density	(g/cm^3)	rhoSB				
Stratum C (Soil layer below Stratum B):						
Stratum C SCS soil type		SCS_C	Not Present	Not Present	Not Present	Not Present
Stratum C thickness	(m)	hSC	0.00	0.00	0.00	0.00
Stratum C total porosity	(-)	nSC				
Stratum C water-filled porosity	(-)	nwSC				
Stratum C bulk density	(g/cm^3)	rhoSC				
Stratum directly above the water table						
Stratum A, B, or C		src_soil	Stratum A	Stratum A	Stratum A	Stratum A
Height of capillary fringe	(m)	hcz	0.188	0.188	0.188	0.188
Capillary zone total porosity	(-)	ncz	0.390	0.390	0.390	0.390
Capillary zone water filled porosity	(-)	nwcz	0.303	0.303	0.303	0.303

Exposure Parameters:	Units	Symbol	Value	Value	Value	Value
Target risk for carcinogens	(-)	Target_CR	1.00E-06	1.00E-06	1.00E-06	1.00E-06
Target hazard quotient for non-carcinogens	(-)	Target_HQ	1	1	1	1
Exposure Scenario		Scenario	Residential	Residential	Residential	Residential
Averaging time for carcinogens	(yrs)	ATc	70	70	70	70
Averaging time for non-carcinogens	(yrs)	ATnc	26	26	26	26
Exposure duration	(yrs)	ED	26	26	26	26
Exposure frequency	(days/yr)	EF	350	350	350	350
Exposure time	(hrs/24 hrs)	ET	24	24	24	24
Mutagenic mode-of-action factor	(yrs)	MMOAF	72	72	72	72

Source to Indoor Air Attenuation Factor	Units	Symbol	Value	Value	Value	Value
Groundwater to indoor air attenuation coefficient	**(-)**	**alpha**	**2.9E-04**	**1.6E-04**	**2.2E-04**	**3.2E-04**
		Range	8.3E-05 - 3.2E-04	6.4E-05 - 1.7E-04	7.3E-05 - 2.4E-04	8.9E-05 - 3.6E-04
Predicted Indoor Air Concentration			**Value**	**Value**	**Value**	**Value**
Indoor air concentration due to vapor intrusion	**(ug/m3)**	**Cia**	**4.6E+01**	**2.9E-01**	**7.8E-01**	**3.4E-01**
		Range	1.3E+01 - 5.0E+01	1.1E-01 - 3.1E-01	2.6E-01 - 8.4E-01	9.5E-02 - 3.8E-01
	(ppbv)	**Cia**	**1.2E+01**	**4.3E-02**	**1.5E-01**	**1.3E-01**
		Range	3.3E+00 - 1.3E+01	1.7E-02 - 4.5E-02	4.8E-02 - 1.6E-01	3.7E-02 - 1.5E-01
Predicted Vapor Concentration Beneath the Foundation			**Value**	**Value**	**Value**	**Value**
Subslab vapor concentration	**(ug/m3)**	**Css**	**1.5E+04**	**9.7E+01**	**2.6E+02**	**1.1E+02**
		Range	1.0E+03 - 1.3E+05	6.2E+00 - 1.1E+03	1.7E+01 - 2.6E+03	7.6E+00 - 9.5E+02
	(ppbv)	**Css**	**3.8E+03**	**1.4E+01**	**4.9E+01**	**4.5E+01**
		Range	2.5E+02 - 3.3E+04	9.1E-01 - 1.7E+02	3.1E+00 - 4.8E+02	3.0E+00 - 3.7E+02
Diffusive Transport Upward Through Vadose Zone			**Value**	**Value**	**Value**	**Value**
Effective diffusion coefficient through Stratum A	(cm2/sec)	DeffA	1.2E-02	7.0E-03	9.5E-03	1.5E-02
Effective diffusion coefficient through Stratum B	(cm2/sec)	DeffB				
Effective diffusion coefficient through Stratum C	(cm2/sec)	DeffC				
Effective diffusion coefficient through capillary zone	(cm2/sec)	DeffCZ	1.9E-04	1.0E-04	1.4E-04	2.1E-04
Effective diffusion coefficient through unsaturated zone	(cm2/sec)	DeffT	1.8E-03	9.6E-04	1.3E-03	2.0E-03

Critical Parameters			Value	Value	Value	Value
α for diffusive transport from source to building with dirt floor foundation	(-)	A_Param	3.2E-04	1.7E-04	2.4E-04	3.6E-04
Pe (Peclet Number) for transport through the foundation (advection / diffusion)	(-)	B_Param	6.8E+01	1.2E+02	8.7E+01	5.6E+01
α for convective transport from subslab to building	(-)	C_Param	3.0E-03	3.0E-03	3.0E-03	3.0E-03

Interpretation						
Critical Parameters						
			Hb, Ls, DeffT, ach, Qsoil_Qb	Hb, Ls, DeffT, ach	Hb, Ls, DeffT, ach	Hb, Ls, DeffT, ach, Qsoil_Qb
Non-Critical Parameters						
			Lf, DeffA, eta	Qsoil_Qb, Lf, DeffA, e	Qsoil_Qb, Lf, DeffA, e	Lf, DeffA, eta
Risk Calculations	**Units**	**Symbol**	**Value**	**Value**	**Value**	**Value**
Risk-Based Target Screening Levels						
Target risk for carcinogens	(-)	Target_CR	1E-06	1E-06	1E-06	1E-06
Target hazard quotient for noncarcinogens	(-)	Target_HQ	1	1	1	1
Target indoor air concentration	**(ug/m3)**	**Target_IA**	**No tox data available**	**1.08E+01**	**4.78E-01**	**1.68E-01**
	(ppbv)	**Target_IA**	**No tox data available**	**1.59E+00**	**8.91E-02**	**6.56E-02**
Target groundwater concentration	**(ug/L)**	**Target_GW**	**No tox data available**	**2.03E+02**	**1.10E+01**	**6.82E-01**
Incremental Risk Estimates						
Incremental cancer risk from vapor intrusion (at TCG)	**(-)**	**Cancer_Risk**	**No IUR**	**2.71E-08**	**1.64E-06**	**2.05E-06**
		Range	-	1.1E-08 - 2.9E-08	5.4E-07 - 1.8E-06	5.7E-07 - 2.3E-06
Hazard quotient from vapor intrusion	**(-)**	**HQ**	**No RfC Available**	**0.007007371**	**0.375550544**	**0.003298128**
		Range	No RfC Available - No RfC Available	2.7E-03 - 7.4E-03	1.2E-01 - 4.0E-01	9.1E-04 - 3.7E-03
				Noncancer Risk-Based Values*		
			2022 values at HQ=1:	785	48	340
			SUM of Cancer Risks:	3.72E-06		
			*Reflects use of current 2022 vinyl chloride RfC (0.08 mg/m3) instead of value provided by model (0.1 mg/m3).			