Crown Dykman
(NYSDEC Site No. 130054)
Glen Cove, Nassau County, New York
Site Management Plan

Prepared for

New York State Department of Environmental Conservation
Division of Environmental Remediation
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Prepared by

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May 2025

Revisions to Final Approved Site Management Plan

Revision Number	Date Submitted	Summary of Revision	New York State Department of Environmental Conservation Approval Date

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MAY 2025

CERTIFICATION STATEMENT

I, Donald Conan, certify that I am currently a New York State registered Professional Engineer (PE) and that this Site Management Plan (SMP) was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

May 27, 2025

Donald Conan, PE (Signature) Date
New York State Professional Engineer No. 75666

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LIST OF ACRONYMS AND ABBREVIATIONS

µg/L	Microgram(s) per liter
1,1,1-TCA	1,1,1-Trichloroethane
amsl	Above mean sea level
AS	Air sparging
AWQGV	Ambient water quality guidance values
AOC	Area of concern
AWQS	Ambient water quality standards
bgs	Below ground surface
cis-1,2-DCE	*cis*-1,2-Dichloroethene
cm/sec	Centimeter(s) per second
COCs	Contaminant of concern
CVOC	Chlorinated volatile organic compound
CY	Cubic yard(s)
DER	Division of Environmental Remediation
DNAPL	Dense non-aqueous phase liquid
DTW	Depth to water
EA	EA Engineering and Geology, P.C.
EC	Engineering control
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
ft/day	Foot (feet) per day
ft/ft	Foot (feet) per foot (feet)
IC	Institutional control
ID	Identification
IRM	Interim remedial measure
ISCO	In situ chemical oxidation
IW	Injection well
NA	Not available
NCDOH	Nassau County Department of Health
ng/L	Nanogram(s) per liter
NSL	No screening level available
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCB	Polychlorinated biphenyl

PCE	Tetrachloroethene
PE	Professional Engineer
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PFAS	Per- and polyfluoroalkyl substances
PRR	Periodic Review Report
Q1	1st quarter
Q2	2nd quarter
Q3	3rd quarter
Q4	4th quarter
RAO	Remedial action objective
ROD	Record of Decision
RSO	Remedial system optimization
site	Crown Dykman (NYSDEC Site No. 130054)
SMP	Site Management Plan
SSDS	Sub-slab depressurization system
SVE	Soil vapor extraction
TCE	Trichloroethene
VOC	Volatile organic compound

ES. EXECUTIVE SUMMARY

The following provides a summary of the controls implemented for the site, as well as the monitoring, sampling, maintenance, and reporting activities required by this Site Management Plan (SMP).

Site Identification: New York State Department of Environmental Conservation (NYSDEC)

Site No. 130054
Crown Dykman
66 Herb Hill Road
Glen Cove, New York 11542

Institutional Controls

Imposition of an institutional control in the form of an environmental easement for the controlled property that:

1. Requires the Remedial Party or site owner to complete and submit to the NYSDEC a periodic certification of institutional controls in accordance with part 375-1.8(h)(3).
2. Allows the use and development of the controlled property for commercial use as defined by part 375-1.8(g), although land use is subject to local zoning laws.
3. Restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDEC, New York State Department of Health, or County Department of Health.
4. Prohibits agriculture or vegetable gardens on controlled property;
5. Requires compliance with the NYSDEC approved SMP.

Engineering Controls

1. The potential for vapor intrusion must be evaluated for any buildings in the area within the industrial control boundaries noted on **Figure 1-2**, any future on-site buildings, or if site use changes, and appropriate actions to address exposures must be implemented.
2. Injection wells IS-01 through IS-12; injection well headers IW-01 and IW-02.

Site Management Activities	Frequency
Inspections	
1. Site Inspection	Annual
Monitoring	
1. Groundwater Sampling, routine (20 wells; MW-01, MW-01D, MW-01DD, MW-02, MW-04R, MW-05R, MW-07RS, MW-07D, MW-08, MW-11, MW-21S, MW-21D, MW-22RS, MW-22RD, MW-23S, MW-23D, MW-25RS, MW-25RD, MW-30S, and MW-30D)	Bi-annual for volatile organic compounds (U.S. Environmental Protection Agency [EPA] Method 8260), Annually for per- and polyfluoroalkyl substances (EPA Method 1633)
2. Soil vapor intrusion evaluation for new buildings	As needed
Maintenance	
1. Injection wells, injection headers, and monitoring wells	As needed, informed by the results of periodic inspections
Reporting	
1. Groundwater Sampling Reports	Bi-annual, following each groundwater monitoring event
2. Periodic Review Reports	Every 3 years

Further descriptions of the above requirements are provided in detail in the latter sections of this SMP.

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1. INTRODUCTION

1.1 GENERAL

This Site Management Plan (SMP) is a required element of the remedial program for the Crown Dykman Site located in Glen Cove, Suffolk County, New York (hereinafter referred to as the "site") (**Figure 1-1**). The site is currently in the New York State Inactive Hazardous Waste Disposal Site Remedial Program, Site No. 130054, which is administered by the New York State Department of Environmental Conservation (NYSDEC or Department).

Herb Hill Associates (previous owner) entered into an Order on Consent on 6 March 2014 with the NYSDEC to remediate the site. The current owner, BNC Realty, entered into a subsequent Order on Consent on 22 March 2021 with the NYSDEC to remediate the site in accordance with the 2021 Record of Decision (ROD) Amendment (NYSDEC 2021). A figure showing the site location and boundaries of this site is provided on **Figure 1-2**. The boundaries of the site are detailed in the metes and bounds site description, which is part of the Environmental Easement provided in **Appendix A**.

After completion of the remedial work, documented in the Final Engineering Report (Arcadis 2024), some contamination was left at this site, which is hereafter referred to as "remaining contamination." Institutional controls (ICs) and engineering controls (ECs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Nassau County Clerk, requires compliance with this SMP and ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the site until the Environmental Easement is extinguished in accordance with Environmental Conservation Law Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion.

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 New York Codes, Rules, and Regulations (NYCRR) Part 375 and the Order on Consent for the site; and thereby, subject to applicable penalties.

Reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the site is provided in **Appendix B.**

This SMP was prepared by EA Engineering and Geology, P.C. (EA) on behalf of NYSDEC, in accordance with the requirements of the NYSDEC's Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, dated May 2010 (NYSDEC 2010a), and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the site.

1.2 REVISIONS AND ALTERATIONS

Revisions and alterations to this plan will be proposed in writing to the NYSDEC Project Manager. The NYSDEC can also make changes to the SMP or request revisions from the Remedial Party. Revisions will be necessary upon, but not limited to, the following occurring: a change in
media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. Approved alterations must conform with Article 145 Section 7209 of the Education Law regarding the application of professional seals and alterations. For example, any changes to as-built drawings must be stamped by a New York State Professional Engineer (PE). In accordance with the Environmental Easement for the site, the NYSDEC Project Manager will provide a notice of any approved changes to the SMP and append these notices to the SMP that is retained in its files.

1.3 NOTIFICATIONS

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER-10 for the following reasons:

1. A 60-day advance notice of any proposed changes in site use that are required under the terms of the Order on Consents, 6 NYCRR Part 375 and/or Environmental Conservation Law.

2. A 7-day advance notice of any field activity associated with the remedial program.

3. A 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan. If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.

4. Notice within 48 hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.

5. Notice within 48 hours of any non-routine maintenance activities.

6. Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake, that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

7. Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

1. At least 60 days prior to the change, NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the Order on Consent, and all approved work plans and reports, including this SMP.

2. Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1-1 includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in **Appendix B**. Responsibilities of the Owner and Remedial Party are provided in **Appendix C**.

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Table 1-1. Contact List for Notifications*

Company/Organization	Contact Person	Title	Primary Phone Number	Secondary Phone Number/Mailing Address		Required Notification**
NYSDEC	Jasmine Stefansky	Project Manager	518-402-9575	625 Broadway Albany, New York 12233-7017	jasmine.stefansky@dec.ny.gov	All Notifications
NYSDEC	Jeffrey Dyber	Chief, Remedial Section D, Remedial Bureau E	518-402-9621	625 Broadway Albany, New York 12233-7017	Jeffrey.dyber@dec.ny.gov	All Notifications
NYSDEC	Alali Tamuno, Esq.	General Counsel	914-803-8152	47-40 21st Street Long Island City, New York 11101-5401	alali.tamuno@dec.ny.gov	All Notifications
NYSDOH	Kristin Kulow	Public Health Specialist	607-353-4335	28 Hill St Suite 201 Oneonta, NY 13820	kristin.kulow@health.ny.gov	Notifications 4, 6, and 7
NYSDOH	Arunesh Ghosh	Public Health Specialist	518-402-7860	Empire State Plaza, Corning Tower Room 1787 Albany, New York 12237	arunesh.ghosh@health.ny.gov	Notifications 4, 6, and 7
EA	Adam Etringer	Project Manager	315-565-6564	333 West Washington Street, Suite 300 Syracuse, New York 13202	aetringer@eaest.com	All Notifications
BNC Realty	Lisa Colletti	Property Owner	516-250-0914	Not available	lcornide@mac.com	All Notifications

Notes:
* Notifications are subject to change and will be updated, as necessary.
** Numbers in this column reference the numbered bullets in the notification list in this section.
NYSDOH = New York State Department of Health

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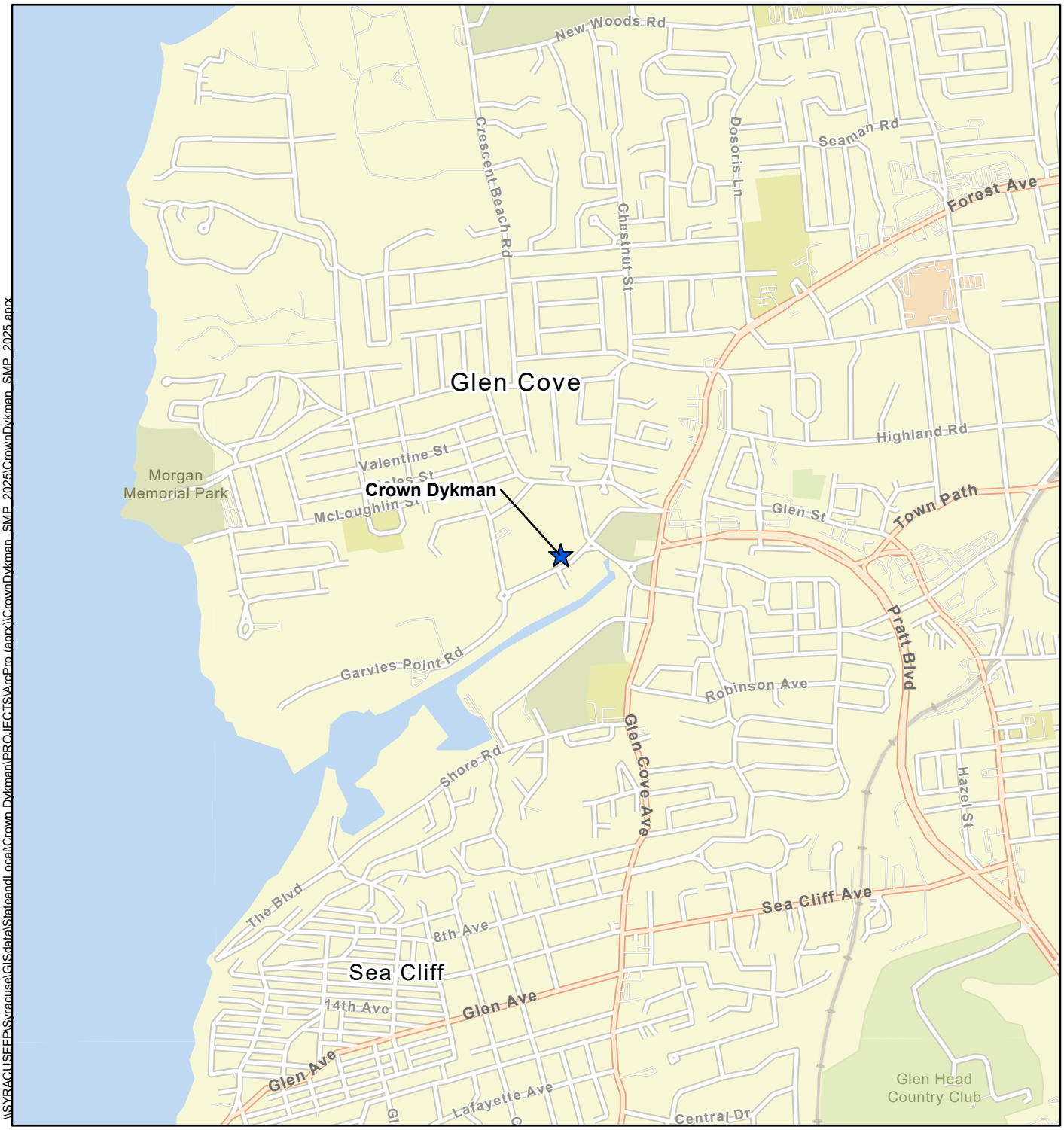

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Feet

N

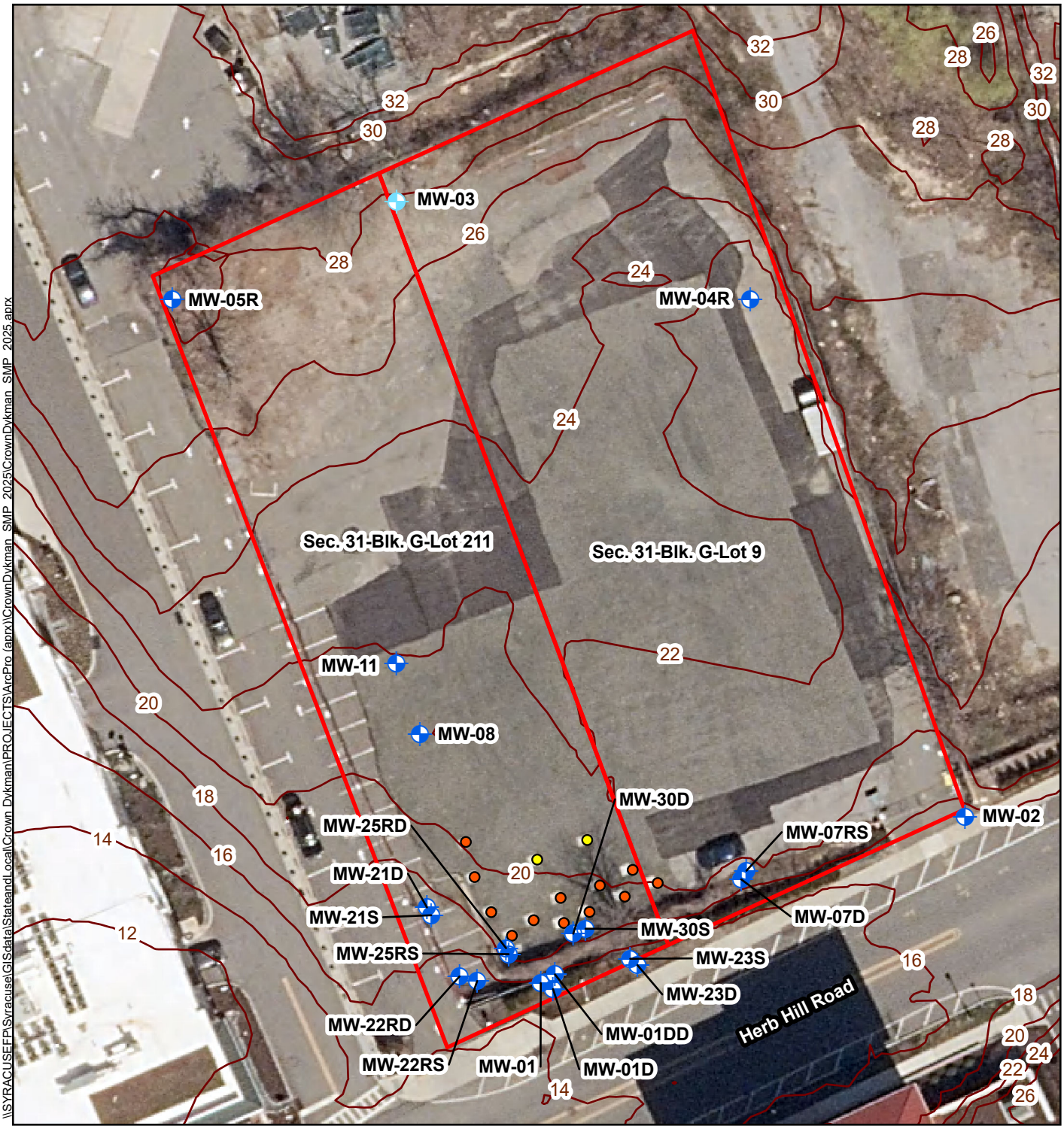
Legend

★ Site Location

Figure 1-1
SITE LOCATION
Crown Dykman (130054)
Glen Cove, NY

Map Date: 1/30/2025
Projection: NAD 1983 (2011) State Plane
New York Long Island (Feet)

NEW YORK STATE | Department of Environmental Conservation



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0 25 50
Feet

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Legend

- Monitoring Well - Found
- Monitoring Well - Not Found
- Injection Well
- Horizontal Injection Gallery Headers
- -12- Elevation Contour (2 foot interval)
- Site Parcels

Figure 1-2
SITE LAYOUT
Crown Dykman (130054)
Glen Cove, NY

Map Date: 1/30/2025
Projection: NAD 1983 (2011) State Plane
New York Long Island (Feet)

NEW YORK STATE | Department of Environmental Conservation

2. SUMMARY OF PREVIOUS INVESTIGATIONS AND INTERIM REMEDIAL ACTION

2.1 SITE LOCATION AND DESCRIPTION

The site is in Glen Cove, Nassau County, New York and is identified as Section 31, Block G, Lots 9 and 211 on the Nassau County Tax Map. The site is an approximately 1-acre area and is bounded by 71 Herb Hill Road (vacant; zoned industrial) to the north and east, a residential structure (condominiums) to the west, and Herb Hill Road to the south (**Figure 1-2**). The boundaries of the site are described in more detail in **Appendix A**. The owner(s) of the site parcel(s) at the time of issuance of this SMP is BNC Realty.

2.2 PHYSICAL SETTING

2.2.1 Land Use

The site consists of a parking area. The site is zoned commercial and is currently vacant.

The properties adjoining the site and in the neighborhood surrounding the site primarily include commercial and residential properties. The properties immediately south of the site include residential properties (apartment building and restaurant), the properties immediately north of the site are currently vacant, the properties immediately east of the site are currently vacant, and the properties to the west of the site include residential and commercial properties (apartment building and deli).

2.2.2 Geology

A geologic cross section from the 2014 Pre-Design Investigation (Arcadis and Malcome Pirnie 2014) is shown on **Figures 2-1 and 2-2**. Site-specific boring logs are provided in **Appendix D**. The construction details of the groundwater monitoring well network at the site is provided in **Table 2-1**.

Surficial geology of the site consists of 25–45 feet of unconsolidated deposits associated with the Harbor Hill terminal moraine, consisting predominantly of zones of fine to medium sand, medium to coarse sand, and silty sand with silt lenses (Arcadis and Malcom Pirnie 2014). Deposits associated with the earlier Ronkonkoma glaciation have not been observed at the site. Beneath the moraine deposits is an extensive confining unit (Port Washington clay) comprised of clay, silt, and a few layers of sand that correlates to the Pleistocene and Holocene epochs (Kilburn 1979). Boring data from wells intersecting the Port Washington clay unit (Malcolm Pirnie 2006, 2009) indicates the presence of a northeast to southwest oriented depression (trough) in the clay underlying the southern portion of the site.

Backfill is present within the footprint of the 2005 Interim Remedial Measure (IRM) excavation and the 2022 source area excavation. New York State Department of Transportation #1A stone was used as backfill in 2022, and the gradation of the 2005 backfill is unknown (Arcadis 2024).

2.2.3 Hydrogeology

A groundwater contour map using groundwater elevation data collected in November 2024 is shown on **Figure 2-3**. Groundwater gauging and elevation data are provided in **Table 2-2**. Available groundwater monitoring well construction logs are provided in **Appendix E**. Construction logs for MW-1, MW-1D, MW-1DD, MW-2, MW-3, MW-8, MW-11, MW-21S, MW-21D, MW-22RS, MW-22RD, MW-23S, and MW-23D are not available. Groundwater flows from the north to the south, following a horizontal hydraulic gradient of 0.0154 foot per foot (ft/ft), as shown in **Table 2-3**.

The horizontal gradient was calculated between MW-5R (northwestern corner of the site) and MW-21S (southwestern corner of the site). The horizontal gradient was calculated by dividing the difference in water table elevation by the distance between the wells.

Slug testing performed by Malcom Pirnie during the remedial investigation identified average hydraulic conductivity values in 11 wells sitewide. Values ranged from $1.09x10^{-4}$ centimeters per second (cm/sec) or 0.31 foot per day (ft/day) in siltier material, to $6.24x10^{-2}$cm/sec or 176.79 ft/day in sand intervals (Malcom Pirnie 2009). Arcadis further refined these data in 2014 during the Pre-Design Investigation (Arcadis and Malcolm Pirnie 2014) and presented average on-site hydraulic conductivity for overburden lithologies observed on-site, including medium to coarse sand ($1.78x10^{-2}$ cm/sec or 50 ft/day), medium to fine sand ($1.69x10^{-3}$ cm/sec or 4.8 ft/day), and fine silty sand ($1.94x10^{-4}$ cm/sec or 0.55 ft/day).

The vertical gradient was calculated by comparing the water table in the MW-21S/MW-21D and MW-7RS/MW-7D well pairs using groundwater elevation data collected in September 2024. The water table was measured at a lower elevation in the deeper well for both well pairs, which correlates to a downward vertical gradient. Based on the calculations shown in **Table 2-4,** the gradient at MW-21S/ MW-21D was -0.0962 ft/ft and the gradient at MW-7RS / MW-7D was -0.0054 ft/ft.

Table 2-1. Monitoring Well Details

Well ID	Northing*	Easting*	Well Diameter (inches)	Screen Length (feet)	Screen Interval (ft bgs)		Total Depth (ft bgs)	Purpose
					Top	Bottom		
MW-01	253425.496	1084111.869	2	5	1.15	6.15	6.15	Downgradient
MW-01D	253427.432	1084108.110	2	10	17.24	27.35	27.35	Downgradient
MW-01DD	253429.929	1084112.501	2	5	28.00	33.00	33.00	Downgradient
MW-02	253477.843	1084236.597	2	10	3.69	13.18	13.18	Downgradient
MW-03	253664.079	1084064.529	2	10	9.90	19.90	19.90	Upgradient (missing)
MW-04R	253634.532	1084171.620	2	10	8.76	18.76	18.76	Upgradient
MW-05R	253634.550	1083998.230	2	10	12.15	22.15	22.15	Upgradient
MW-07RS	253460.794	1084171.266	2	10	9.00	19.00	19.00	Downgradient
MW-07D	253457.982	1084169.784	2	5	19.00	24.00	24.00	Downgradient
MW-08	253502.665	1084071.608	2	10	4.60	14.60	14.60	Source
MW-11	253524.260	1084064.479	1	5	4.56	9.56	9.56	Source
MW-21S	253447.871	1084075.015	2	10	3.00	13.00	13.00	Downgradient
MW-21D	253450.245	1084073.761	2	5	19.00	24.00	24.00	Downgradient
MW-22RD	253429.320	1084083.600	2	10	19.37	29.37	29.37	Downgradient
MW-22RS	253427.930	1084088.950	2	10	10.10	20.10	20.10	Downgradient
MW-23S	253434.646	1084135.271	2	10	2.00	12.00	12.00	Downgradient
MW-23D	253432.695	1084137.450	2	5	14.50	19.50	19.50	Downgradient
MW-25RD	253437.865	1084097.644	2	10	17.00	27.00	27.00	Downgradient
MW-25RS	253436.083	1084098.481	2	10	7.00	17.00	17.00	Downgradient
MW-30S	253443.757	1084121.740	2	10	10.00	20.00	20.00	Downgradient
MW-30D	253442.284	1084118.012	2	10	20.00	30.00	30.00	Downgradient

Notes:
*Coordinate system NAD 1983 (2011) State Plane New York Long Island 3101 FIPS (US Feet)
bgs = below ground surface
ID = identification

Table 2-2. Groundwater Gauging and Elevations

Well ID	Measure Point (ft amsl)	Q3 2024 - Gauging		Q4 2024 - Gauging	
		DTW (ft bgs)	DTW (ft amsl)	DTW (ft bgs)	DTW (ft amsl)
MW-01	14.193	NA	NA	0.80	13.39
MW-01D	14.031	NA	NA	3.92	10.11
MW-01DD	15.26	3.94	11.32	4.19	11.07
MW-02	16.65	3.72	12.93	5.54	11.11
MW-03	27.39	NA	NA	NA	NA
MW-04R	20.7	1.82	18.88	3.58	17.12
MW-05R	25.92	8.17	17.75	8.54	17.38
MW-07RS	NA	7.63	NA	7.93	NA
MW-07D	NA	7.90	NA	8.38	NA
MW-08	20.95	6.54	14.41	NA	NA
MW-11	21.339	6.64	14.70	5.13	16.21
MW-21S	16.71	2.04	14.67	3.21	13.50
MW-21D	16.91	3.17	13.74	4.08	12.83
MW-22RD	15.02	4.27	10.75	4.61	10.41
MW-22RS	14.16	3.01	11.15	3.00	11.16
MW-23S	15.1	3.57	11.53	4.24	10.86
MW-23D	15.01	2.67	12.34	4.06	10.95
MW-25RD	NA	6.57	NA	6.78	NA
MW-25RS	NA	4.28	NA	4.95	NA
MW-30S	NA	4.93	NA	5.37	NA
MW-30D	NA	7.78	NA	10.40	NA

Notes:
amsl = Above mean sea level
DTW = Depth to water
NA = Not available
Q3 = Quarter 3
Q4 = Quarter 4

Table 2-3. Horizontal Hydraulic Gradient

Well ID	Screen interval (ft amsl)	Well Depth (ft)	Depth to Water (ft)	Water Table (ft amsl)	Distance Between Wells (ft)	Horizontal Hydraulic Gradient (ft/ft)
MW-5R	14.20 – 4.20	22.15	8.17	17.75	200	0.0154
MW-21S	13.94 – 3.94	12.80	2.04	14.67		

Table 2-4. Vertical Hydraulic Gradient

Well ID	Screen interval (ft amsl)	Water Table (ft amsl) (H)	Δ H (ft)	Depth of Well (ft)	Vertical Distance Between Center Points of Well Screens	Vertical Hydraulic Gradient (ft/ft)
MW-21S	3.94 – 13.94	14.67	-0.93	12.8	9.67	-0.0962
MW-21D	-5.73 – 4.27	13.74		22.6		
MW-7RS	0.90 – 10.90	11.87	-0.41	19.0	7.54	-0.0544
MW-7D	-4.14 – 0.86	11.46		24.0		

Notes:
Δ H = change in hydraulic head

2.3 INVESTIGATION AND REMEDIAL HISTORY

The following narrative provides a remedial history timeline and summary of the available project records to document key investigative and remedial milestones for the site. Full titles for each of the reports referenced below are provided in Section 8 – References.

In 1987, the site was originally investigated by the Nassau County Department of Health (NCDOH). NCDOH collected a soil sample from inside a 2-feet by 4-feet pit present within the northwestern area of the building, which showed contaminants including tetrachloroethene (PCE), 1,1,1-trichloroethane (1,1,1-TCA), toluene, and xylene (Malcolm Pirnie 2009). In the early 1990s, several underground solvent tanks and a gasoline tank were removed. Based on results from samples collected during the tank removal, the NCDOH sent a letter of violation to the site owner and requested that a remedial investigation be conducted.

A preliminary investigation was completed in 1992 by Herb Hill Associates, who owned the site at that time. In August 1992, the NYSDEC first identified the site as a Class 2a site. As a result of identified on-site hazardous waste disposal, the NYSDEC listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York in November 1992.

Several investigations ensued and one IRM was completed by the property owner prior to the completion of the initial ROD, including the following:

- A Preliminary Site Assessment completed in 1991
- An initial remedial investigation/feasibility study completed in 1997
- Additional site investigations completed in 1999

- Soil removal IRM completed in 2005

The 2005 soil IRM removed approximately 2,200 tons of contaminated soil from beneath the southwestern portion of the building slab (Malcolm Pirnie 2009). Post-excavation sampling indicated that residual PCE contamination remained beneath the slab along the footings of the southwestern wall at concentrations ranging from non-detect to 290 parts per million. Subsequently, a soil vapor extraction (SVE) system was constructed and operated to minimize the potential for soil vapor intrusion into the on-site building.

An off-site sampling program was performed in 2006 to assess groundwater quality in the northern portion of the former Li Tungsten Parcel A property, across Herb Hill Road and to the south of the site. The results of the investigations indicated that concentrations of groundwater contaminants (including PCE and related degradation product 1,1,2-TCA) exceeded NYSDEC Class GA Maximum Allowable Concentrations in all borings at the Parcel A property.

Based on the results of the remedial investigation/feasibility study conducted between 2007 and 2009, the NYSDEC issued an ROD in March 2010 (NYSDEC 2010b) requiring in situ chemical oxidation (ISCO) of the plume area with the highest concentrations of chlorinated volatile organic compounds (CVOCs), implementation of a light non-aqueous phase liquid recovery system, and continued operation of the SVE system/sub-slab depressurization system (SSDS) at the on-site building.

Activities that have been completed to support design include:

- SSDS IRM implementation
- ISCO pilot tests
- Soil and groundwater sampling
- Assessment of underground drainage systems
- Supplemental radiological assessment

Data collected as part of these activities are described in the Supplemental Pre-Design Summary Report (Arcadis 2018).

ISCO pilot tests were implemented in 2012 and 2013 using sodium permanganate as an oxidant. The oxidant application method was changed between pilot tests to evaluate the best application method. The results of the pilot studies concluded that introduction of sodium permanganate to the subsurface via purpose-built injection wells was a suitable reagent delivery strategy. However, delivery could be complicated due to the heterogeneity of the formation, and some areas of the subsurface may prove recalcitrant to ISCO treatment. Results of the study also suggested a continuing CVOC source to groundwater in the southwest corner of building (CVOC Source Area).

In 2013, an SVE performance review was completed. Site components were inspected for damage, presence of proper installation of equipment safety guards, appropriate signage, and the integrity of piping and connections. Indoor air quality was also assessed through the collection of

indoor air and sub-slab vapor testing. Generally, CVOC concentrations in indoor air and sub-slab vapor decreased from the previous vapor monitoring event completed in 2008.

Additional soil investigation was completed in 2014 to evaluate the potential presence of residual dense non-aqueous phase liquid (DNAPL), particularly in the southwestern corner of the on-site building. Results from this study identified residual concentrations of PCE present below the on-site building, within the footprint of the 2005 IRM excavation, but below the vertical extent of that excavation. This area was identified as a continuing source of dissolved-phase contaminants in groundwater at the site. Petroleum-related compounds (ethylbenzene and xylene) were also identified in soil samples.

A supplemental ISCO injection pilot was completed in 2015 to assess the ability of ISCO injections to reduce the CVOC contaminant mass within the CVOC Source Area beneath the building. Results from this pilot showed significant rebound in CVOC concentrations back to near-baseline concentrations. The results of the supplemental ISCO pilot indicated that, while chemical oxidation is an effective remedial solution for the dissolved-phase groundwater plume if implemented in full-scale, the presence of a continuing Source Area would undermine the effectiveness of the remedy and would likely lengthen the remedial timeframe if not addressed (Arcadis 2018). Based on these findings, the NYSDEC concluded that the ROD should be amended to address the soil in the CVOC Source Area.

Emerging contaminant sampling was performed at the site in 2017. Results from site monitoring wells indicate the presence of per- and polyfluoroalkyl substances (PFAS) in groundwater at concentrations up to 310 nanograms per liter (ng/L) for perfluorooctanoic acid (PFOA) and 1,700 ng/L for perfluorooctanesulfonic acid (PFOS). 1,4-Dioxane was also present at a maximum concentration of 0.69 micrograms per liter (µg/L). According to the amended ROD (NYSDEC 2021) the site is not the source of the PFAS contamination. Subsurface radiological screening was performed at the site due to the identification of radiological concerns on adjacent properties related to the former Li Tungsten remediation and redevelopment. The results indicated that radiation levels observed in the subsurface at the site were consistent with background radiation.

As summarized above, the results of the various investigations concluded that a continuing source for CVOCs was present at the site, and the preferred remedy as presented in the 2010 ROD was re-evaluated. A Focused Feasibility Study (Arcadis 2019) was completed between 2017 and 2019, which evaluated approaches to address the potential residual CVOC source and DNAPL in addition to the dissolved-phase plume. Evaluated approaches included electrical resistivity heating and excavation within the CVOC Source Area, and ISCO or directed groundwater recirculation to address the dissolved-phase plume.

The site underwent active remediation between August 2021 and June 2022, which included in sequence:

- Building demolition and debris removal
- Excavation of CVOC-contaminated soil from the CVOC Source Area

- Installation of injection infrastructure

- Full-scale application of an ISCO, sodium permanganate in the region adjacent to the former CVOC Source Area

Building demolition was completed between 9 September and 3 December 2021, which involved asbestos and lead abatement, and building and slab demolition. Waste removed from the building included 170 fluorescent lightbulbs, 78 pounds of polychlorinated biphenyl (PCB) lighting ballasts, and 162 pounds of non-PCB lighting ballasts. Various paints, pesticides, acids, aerosols, propane, and cleaning chemicals/wastes that remained onsite were catalogued and disposed. Four fuel oil aboveground storage tanks were cleaned onsite and recycled. A total of 1,442 tons of brick and concrete were disposed of from building and slab demolition.

Following building demolition between September and December 2021, soil was excavated from five areas of concern (AOC), shown on **Figure 2-4**:

- AOC 1 (DNAPL Source Area) was associated with the known chlorinated solvent release in the southwestern portion of the property. Approximately 563 cubic yards (CY) of soil were excavated to an approximate depth of 17–18 ft bgs. The water table in this area sat at approximately 5 ft bgs. Sheet piling was installed during excavation and dewatering was conducted for the duration of excavation and backfilling. A total of 76,600 gallons of water were treated on-site with a temporary treatment system consisting of a holding tank, bag filters, and granular activated carbon before being discharged to the Nassau County sewer system. Influent and effluent samples were collected to ensure that discharge was compliant with the Nassau County Sewer Ordinance.

- AOC 2 (West Boiler Room Excavation) was associated with a boiler room located in the western portion of the building. Stained, oily soil was identified during demolition. Approximately 235 CY of contaminated soil was removed from AOC 2 and disposed of offsite.

- AOC 3 (East Area) was associated with two underground storage tanks identified during building demolition along the eastern side of the property. Residual water in one of the tanks was pumped out, then the tank was cleaned, removed, cut, and recycled. The other tank had been partially abandoned at some point in the past and was formally abandoned by backfilling the tank with approximately 8 CY of concrete and leaving it in place. Approximately 104 CY of soil surrounding the tanks were excavated to an approximate depth of 4 ft bgs and disposed of off-site.

- AOC 4 (East Boiler Pit Excavation) was associated with a boiler pit identified during building demolition, within the eastern side of building. Excavation ceased after approximately 11 CY of soil were removed to an approximate depth of 4 ft bgs, when there were no visible staining or significant photoionization detector readings.

- AOC 5 (Northeast Excavation) was associated with sub-slab soils in the northeast footprint of the building. Odor and elevated photoionization detector readings were identified during slab removal. Approximately 97 CY were excavated from AOC 5 to an approximate depth of 4 ft bgs and disposed of off-site.

Confirmation soil sampling was conducted on the excavation sidewall and/or bottom after excavation of each AOC. Excavation extents were reached when confirmation samples reported CVOC concentrations below commercial use standards. Further discussion of soil sampling results and residual contamination is included in **Section 2.5.1**. Excavations were backfilled with certified clean New York State Department of Transportation #1A stone.

Groundwater ISCO injections were completed between 14 and 23 March 2022 in the southwest corner of the site. A total of 13,350 gallons of 4 percent sodium permanganate solution was injected into 12 injection wells (screened 15–25 ft bgs) and 2 horizontal injection galleries. A total of 6,890 gallons of injection solution was injected at the 12 injection wells. Approximately 6,460 gallons of injection solution were injected into the two horizontal injection galleries. Performance groundwater monitoring was initiated after completion of injections.

Groundwater was monitored prior to and following the full-scale ISCO application and continues to be monitored as part of site management. A full description of the remedial activities completed between August 2021 and June 2022 are documented in the Final Engineering Report (Arcadis 2024).

2.4 REMEDIAL ACTION OBJECTIVES

The remedial action objectives (RAOs) for the site as listed in the ROD dated March 2010 (NYSDEC 2010b) and maintained in the Amended ROD dated March 2021 (NYSDEC 2021), are as follows.

Groundwater

- RAOs for Public Health Protection:
  - — Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards
  - — Prevent contact with, or inhalation of, volatiles from contaminated groundwater
  - — Prevent inhalation of contaminant vapors from groundwater
- RAOs for Environmental Protection:
  - — Restore the groundwater to meet ambient groundwater quality criteria, to the extent feasible
  - — Prevent the discharge of contaminants to surface water

Soil

- RAOs for Public Health Protection:
  - — Prevent ingestion/direct contact with contaminated soil
  - — Prevent inhalation of contaminant vapors from the soil
- RAOs for Environmental Protection:
  - — Prevent migration of contaminants that would result in groundwater or surface water contamination.
  - — Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Soil Vapor

- RAOs for Public Health Protection:
  - — Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at the site.

2.5 REMAINING CONTAMINATION

2.5.1 Soil

Soil contaminated with CVOCs exceeding Commercial Use Soil Cleanup Objectives were removed during the 2021 excavation; however, post-excavation analytical data indicated the presence of volatile organic compounds (VOCs) greater than Unrestricted Soil Cleanup Objectives in 31 samples adjacent to and beneath excavation areas. **Appendix F** provides the results of soil samples collected at the site after completion of the remedial action (Arcadis 2024). These results are depicted on **Figure 2-4** (originally Figure 3B in the 2024 Arcadis Final Engineering Report).

2.5.2 Groundwater

Long-term groundwater monitoring for VOCs and PFAS is conducted at the site, as required by the NYSDEC. Historical VOC and PFAS data are presented in **Appendix G.** The most recent groundwater sampling for PFAS took place in March 2024 and for VOCs in November 2024. **Table 2-5** and **Figure 2-5** present the reported VOC concentrations spanning the sampling events in December 2023 (EA 2024a), March 2024 (EA 2024b), June 2024 (EA 2024c), September 2024 and November 2024 (EA 2025). Note that data presented in this SMP reflect changes made to correct reporting errors in previous reports. The EQUIS database has also been updated for these corrections.

Table 2-5. 2024 Contaminants of Concern Data

		Location	MW-01D	MW-01D 130054-MW-01D-20241125	MW-01DD	MW-01DD 130054-MW-1DD-06252024	MW-01DD 130054-MW-1DD-09192024	MW-01DD 130054-MW-01DD-20241125	MW-02 130054-MW-2-06242024	MW-02 130054-MW-2-09192024
		Sample Name	MW-1D-03192024		MW-1DD-03192024					
		Parent Sample Name								
		Sample Date	3/19/2024	11/25/2024	3/19/2024	6/25/2024	9/19/2024	11/25/2024	6/24/2024	9/19/2024
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**							
Cis-1,2- DCE	5	µg/L	**161**	**269**	**67.4**	**53**	**24.2**	**22**	< 0.51 U	1.1
PCE	5	µg/L	**17**	**71.2**	**12.8**	**15.5**	**10.2**	**10.7**	1.6	3.3
TCE	5	µg/L	**17.1**	**27.3**	**6.9**	**7.2**	**5.4**	**5.1**	< 0.53 U	0.77
Vinyl Chloride	2	µg/L	**10.2**	**11.4**	1	< 0.52 U	< 0.52 U	0.58 J	< 0.52 U	< 0.52 U

		Location	MW-02 130054-MW-02-20241125	MW-04R 130054-MW-4R-06242024	MW-04R 130054-MW-4R-09192024	MW-04R 130054-MW-04R-20241125	MW-05R	MW-05R 130054-MW-5R-06242024	MW-05R 130054-MW-5R-09192024	MW-05R 130054-MW-05R-20241125
		Sample Name					MW-5R-03182024			
		Parent Sample Name								
		Sample Date	11/25/2024	6/24/2024	9/19/2024	11/25/2024	3/18/2024	6/24/2024	9/19/2024	11/25/2024
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**							
Cis-1,2-DCE	5	µg/L	1.1	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U
PCE	5	µg/L	5	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U
TCE	5	µg/L	1	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U
Vinyl Chloride	2	µg/L	< 0.52 U	< 0.52 U	< 0.52 U	< 0.52 U	< 0.52 U	< 0.52 U	< 0.52 U	< 0.52 U

		Location	MW-07D	MW-07D 130054-MW-7D-06242024	MW-07D 130054-MW-7D-09182024	MW-07D 130054-MW-07D-20241126	MW-07RS	MW-07RS 130054-MW-7S-06242024	MW-07RS 130054-DUP-01-06242024 130054-MW-7S-20240624	MW-07RS 130054-MW-7RS-09182024
		Sample Name	MW-7D-03192024				MW-7S-03192024			
		Parent Sample Name								
		Sample Date	3/19/2024	6/24/2024	9/18/2024	11/26/2024	3/19/2024	6/24/2024	6/24/2024	9/18/2024
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**							
Cis-1,2-DCE	5	µg/L	**212**	**327**	**214**	**181**	**345**	**365**	**354**	**191**
PCE	5	µg/L	**29.9**	**16.9**	2.9	1.9	**174**	**22.5**	**24.7**	**49.1**
TCE	5	µg/L	**50.8**	**23.5**	**9**	**8.1**	**133**	**30**	**29.3**	**44.5**
Vinyl Chloride	2	µg/L	1.1	1.3	**2.2**	1.8	**4.3**	**26.1**	**25.5**	**10**

Table 2-5. 2024 Contaminants of Concern Data

		Location	**MW-08**	**MW-08**	**MW-08**	**MW-08**	**MW-08**	**MW-08**	**MW-11**	**MW-11**
		Sample Name	**MW-8-03182024**	**MW8-FD1-03182024**	**130054-MW-08-06242024**	**130054-MW-08-09182024**	**130054-DUP01-09182024**	**130054-MW-08-20241126**	**MW-11-20240320**	**130054-MW-11-06242024**
		Parent Sample Name		**MW-8-20240318**			**130054-MW-08-20240918**			
		Sample Date	**3/18/2024**	**3/18/2024**	**6/24/2024**	**9/18/2024**	**9/18/2024**	**11/26/2024**	**3/20/2024**	**6/24/2024**
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**							
Cis-1,2-DCE	5	µg/L	**76.6**	**72.1**	**63.8**	**68.8**	**68.1**	2.1	**91**	**163**
PCE	5	µg/L	< 2.8 U	< 1.4 U	< 2.2 U	< 2.8 U	< 2.8 U	< 0.56 U	< 0.56 U	< 0.56 U
TCE	5	µg/L	< 2.6 U	< 1.3 U	< 2.1 U	< 2.6 U	< 2.6 U	< 0.53 U	< 0.53 U	< 0.53 U
Vinyl Chloride	2	µg/L	**11.4**	**11.1**	**6.1**	**9.7**	**8.6**	< 0.52 U	**47**	**55.2**

		Location	**MW-11**	**MW-11**	**MW-21D**	**MW-21D**	**MW-21D**	**MW-21D**	**MW-21S**	**MW-21S**
		Sample Name	**130054-MW-11-09182024**	**130054-MW-11-20241126**	**MW-21D-03182024**	**130054-MW-21D-06252024**	**130054-MW-21D-09182024**	**130054-MW-21D-20241125**	**MW-21S-03182024**	**130054-MW-21S-06252024**
		Parent Sample Name								
		Sample Date	**9/18/2024**	**11/26/2024**	**3/18/2024**	**6/25/2024**	**9/18/2024**	**11/25/2024**	**3/18/2024**	**6/25/2024**
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**							
Cis-1,2-DCE	5	µg/L	**144**	**17.5**	**4770**	**5990**	**5970**	**208**	4.2	4.8
PCE	5	µg/L	< 0.56 U	< 0.56 U	< 11 U	< 11 U	< 5.6 U	< 0.56 U	**44**	2.3
TCE	5	µg/L	< 0.53 U	< 0.53 U	< 11 U	< 11 U	< 5.3 U	< 0.53 U	1.2	0.89 J
Vinyl Chloride	2	µg/L	**83.3**	**5.8**	**235**	**162**	**499**	**16.8**	< 0.52 U	< 0.52 U

		Location	**MW-21S**	**MW-21S**	**MW-22RD**	**MW-22RD**	**MW-22RD**	**MW-22RD**	**MW-22RD**	**MW-22RD**
		Sample Name	**130054-MW-21S-09182024**	**130054-MW-21S-20241125**	**MW-22RD-03182024**	**130054-MW-22RD-06252024**	**130054-MW-22RD-09182024**	**130054-DUP02-09182024**	**130054-MW-22RD-20241125**	**130054-DUP-20241125**
		Parent Sample Name						**130054-MW-22RD-20240918**		**130054-MW-22RD-20241125**
		Sample Date	**9/18/2024**	**11/25/2024**	**3/18/2024**	**6/25/2024**	**9/18/2024**	**9/18/2024**	**11/25/2024**	**11/25/2024**
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**							
Cis-1,2-DCE	5	µg/L	3.6	**1400**	**319**	**653**	**623**	**558**	**518**	**520**
PCE	5	µg/L	2	**49.5**	< 0.56 U	< 0.56 U	< 2.8 U	< 2.2 U	< 2.2 U	< 0.56 U
TCE	5	µg/L	0.65	**53.7**	0.78 J	< 0.53 U	< 2.6 U	< 2.1 U	< 2.1 U	< 0.53 U
Vinyl Chloride	2	µg/L	< 0.52 U	**62.2**	**111**	**147**	**211**	**166**	**170**	**193**

Table 2-5. 2024 Contaminants of Concern Data

		Location	**MW-22RS**	**MW-22RS 130054-MW-22RS-06252024**	**MW-22RS 130054-MW-22RS-09182024**	**MW-22RS 130054-MW-22RS-20241125**	**MW-23D 130054-MW-23D-06252024**	**MW-23D 130054-MW-23D-09192024**	**MW-23D 130054-MW-23D-20241125**	**MW-23D 130054-DUP2-20241125 130054-MW-23D-20241125**
		Sample Name	**MW-22RS-03182024**							
		Parent Sample Name								
		Sample Date	**3/18/2024**	**6/25/2024**	**9/18/2024**	**11/25/2024**	**6/25/2024**	**9/19/2024**	**11/25/2024**	**11/25/2024**
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**							
Cis-1,2-DCE	5	µg/L	**239**	**183**	**166**	**197**	**42.9**	**224**	**154**	**182**
PCE	5	µg/L	1.4	< 0.56 U	< 0.56 U	< 0.56 U	4.2	**35.8**	**19.8**	**20.7**
TCE	5	µg/L	0.66 J	< 0.53 U	< 0.53 U	< 0.53 U	3.8	**23.6**	**16.3**	**17.9**
Vinyl Chloride	2	µg/L	**128**	**108**	**103**	**109**	**6.7**	**13.9**	**3.1**	**3.4**
		Location	**MW-23S 130054-MW-23S-06252024**	**MW-23S 130054-MW-23S-09192024**	**MW-23S 130054-MW-23S-20241125**	**MW-25RD**	**MW-25RD 130054-MW-25RD-06242024**	**MW-25RD 130054-MW-25RD-09182024**	**MW-25RD 130054-MW-25RD-20241126**	**MW-25RS**
		Sample Name				**MW-25RD-03192024**				**MW-25RS-03192024**
		Parent Sample Name								
		Sample Date	**6/25/2024**	**9/19/2024**	**11/25/2024**	**3/19/2024**	**6/24/2024**	**9/18/2024**	**11/26/2024**	**3/19/2024**
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**							
Cis-1,2-DCE	5	µg/L	**175**	**156**	**150**	**351**	**243**	**259**	**248**	**12**
PCE	5	µg/L	**10.7**	2.7	**19**	**13.4**	1.6	0.97	0.73 J	**14**
TCE	5	µg/L	**7.8**	3.7	**7.2**	**11.1**	1.6	1.1	0.78 J	4.8
Vinyl Chloride	2	µg/L	1.2	1.9	1.1	**44.1**	**54.8**	**53.1**	**59.8**	< 0.52 U
		Location	**MW-25RS**	**MW-25RS**	**MW-25RS**	**MW-30D**	**MW-30D**	**MW-30D**	**MW-30D**	**MW-30S**
		Sample Name	**130054-MW-25RS-06242024**	**130054-MW-25RS-09182024**	**130054-MW-25RS-20241126**	**MW-30D-03192024**	**130054-MW-30D-06252024**	**130054-MW-30D-09182024**	**130054-MW-30D-20241126**	**MW-30S-03202024**
		Parent Sample Name								
		Sample Date	**6/24/2024**	**9/18/2024**	**11/26/2024**	**3/19/2024**	**6/25/2024**	**9/18/2024**	**11/26/2024**	**3/20/2024**
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**							
Cis-1,2-DCE	5	µg/L	**12.4**	**46.1**	**9.5**	**146**	**159**	**200**	**261**	**160**
PCE	5	µg/L	2.1	3.9	1.3	4.5	2	1.9	4	< 0.56 U
TCE	5	µg/L	3.1	4.9	1.1	3.7	2.5	3.2	**5.6**	< 0.53 U
Vinyl Chloride	2	µg/L	< 0.52 U	**3.1**	< 0.52 U	**8.8**	**5.9**	**7.4**	**8.7**	< 0.52 U

Table 2-5. 2024 Contaminants of Concern Data

		Location	MW-30S	MW-30S	MW-30S
		Sample Name	130054-MW-30S-06252024	130054-MW-30S-09182024	130054-MW-30S-20241126
		Parent Sample Name			
		Sample Date	6/25/2024	9/18/2024	11/26/2024
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**		
Cis-1,2-DCE	5	µg/L	**109**	**123**	**150**
PCE	5	µg/L	< 0.56 U	< 0.56 U	< 0.56 U
TCE	5	µg/L	< 0.53 U	< 0.53 U	< 0.53 U
Vinyl Chloride	2	µg/L	< 0.52 U	1.3	1.4

Notes:
(1) NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)
µg/L = Microgram(s) per liter
Cis-1,2-DCE = c*is*-1,2-dichloroethene
J = Concentration is estimated
NSL = No screening level available
TCE = Trichloroethene
U = Analyte not detected
Concentrations exceeding the screening level are bolded and shaded gray.

Figure 2-6 summarizes the reported PFAS concentrations from the March 2024 sampling event. The following PFAS compounds exceeded the Class GA Ambient Water Quality Guidance Values (AWQGV):

- **PFOA**—AWQGV is 6.7 ng/L:
  - MW-1D (16.8 ng/L)
  - MW-1DD (35.1 ng/L)
  - MW-5R (66.8 ng/L)
  - MW-7D (27.7 ng/L)
  - MW-7RS (20.6 ng/L)
  - MW-8 (84.6 ng/L)
  - MW-11 (97.3 ng/L)
  - MW-21D (19.7 ng/L)
  - MW-21S (8 ng/L)
  - MW-22RD (13.2 ng/L)
  - MW-22RS (20.3 ng/L)
  - MW-25RD (9.1 ng/L)
  - MW-25RS (10 ng/L)
  - MW-30D (8.5 ng/L)
  - MW-30S (4.4 ng/L)
- **PFOS**—AWQGV is 2.7 ng/L:
  - MW-1D (91.2 ng/L)
  - MW-1DD (90.1 ng/L)
  - MW-5R (59 ng/L)
  - MW-7D (73.4 ng/L)
  - MW-7RS (50.7 ng/L)
  - MW-8 (1,650 ng/L)
  - MW-11 (776 ng/L)
  - MW-21D (48.1 ng/L)
  - MW-21S (43.9 ng/L
  - MW-22RD (49.1 ng/L)
  - MW-22RS (44.9 ng/L)
  - MW-25RD (35.9 ng/L)
  - MW-25RS (36.9 ng/L)
  - MW-30D (19.4 ng/L)
  - MW-30S (2.2 ng/L)

Comprehensive historical data for both VOCs and PFAS are presented in **Appendix G**.

2.5.3 Soil Vapor

No soil vapor pathways are present at the site after the completion of the remedy. It is likely, however, that interstitial vapors in the on-site vadose zone could contain volatilized site

contaminants from the residual groundwater contamination. As a result, if site redevelopment occurs, there is the potential that soil vapor mitigation will be required as part of any enclosed and/or occupied structures.

ARCADIS
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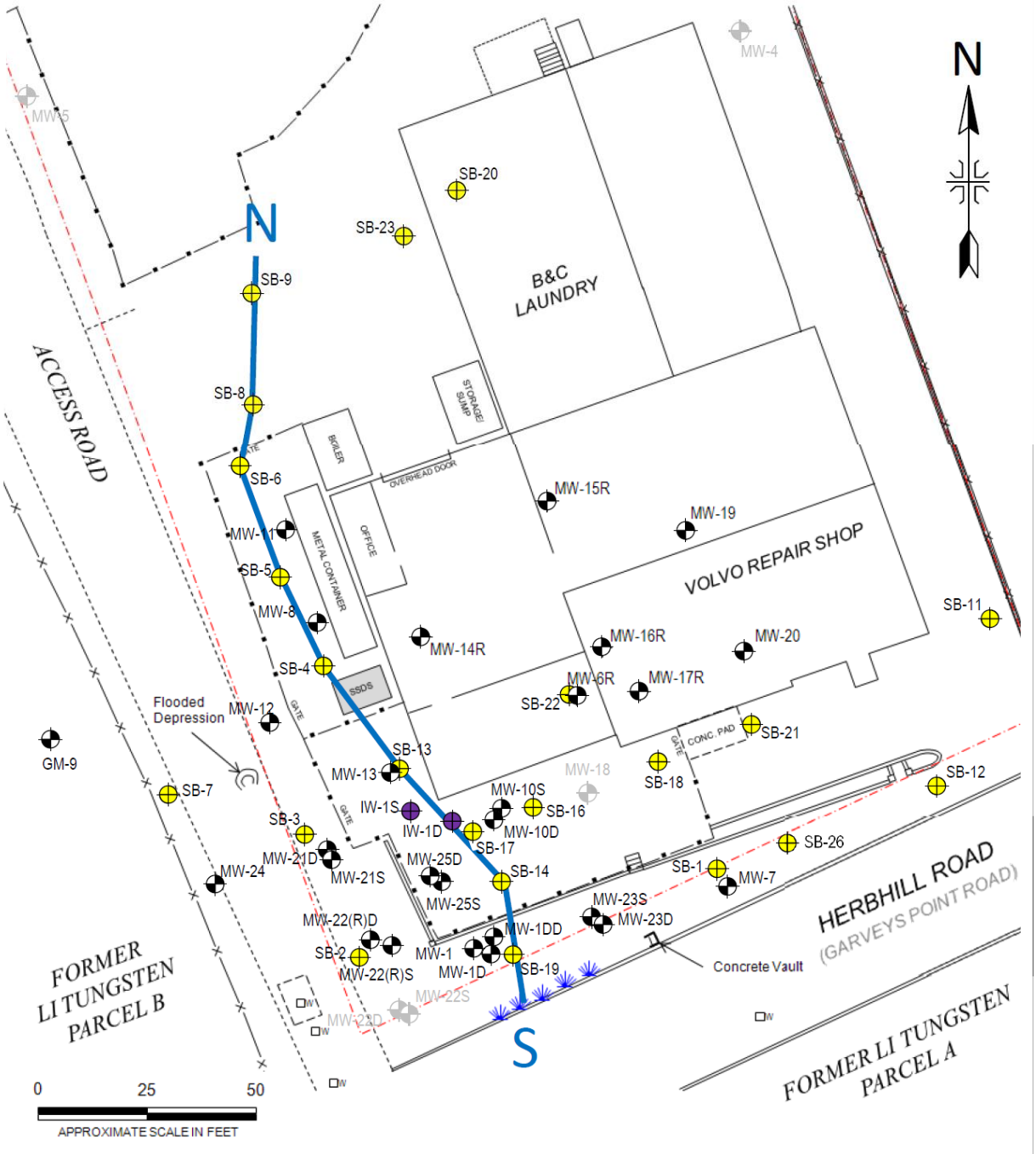
Geologic Cross-Section Location
(Cross-Section N-S)

Pre-Design Investigation Report
Crown Dykman (NYSDEC Site No.130054)
Glen Cove, New York



Crown Dykman (NYSDEC Site 130544)
66 Herb Hill Rd, Glen Cove NY 11542
Source: 2014 Pre-Design Investigation Report (Arcadis)

Figure 2-1
Geologic Cross-Section Location

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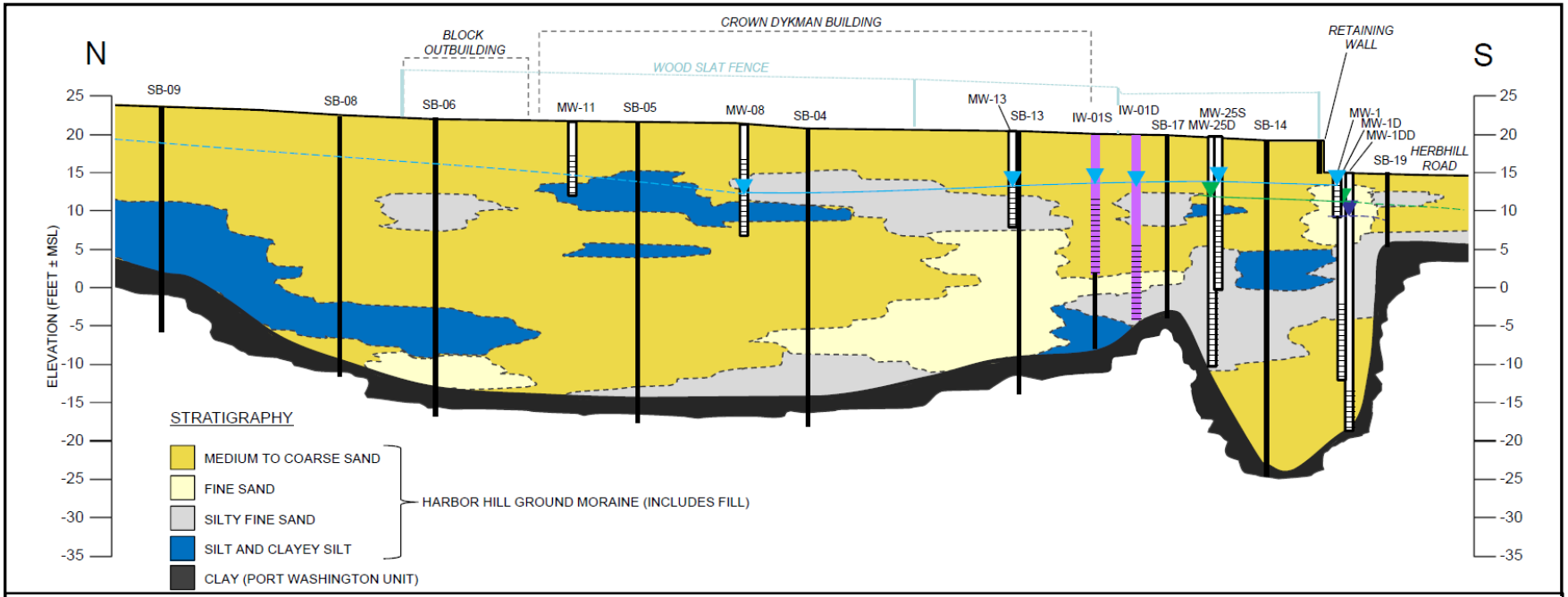

LEGEND

GROUNDWATER TABLE (DASHED WHERE INFERRED)

WELL WATER LEVEL OBSERVATION

SOIL BORING

SB-22 IDENTIFIER

BORING

MONITORING WELL

MW-08 IDENTIFIER

RISER

SCREENED INTERVAL

ISCO INJECTION WELL

IW-01S IDENTIFIER

RISER

INJECTION INTERVAL

NOTES

1. CROSS-SECTION INFORMATION FROM 2008-2009 REMEDIAL INVESTIGATION DATA, INCLUDING DIRECT-PUSH SOIL BORINGS AND GROUNDWATER MONITORING WELL BORING LOGS (MALCOLM PIRNIE, INC, 2009a).
2. GROUNDWATER ELEVATIONS FROM NOVEMBER 2013 POST-PILOT GROUNDWATER SAMPLING EVENT.

0 12.5 25

APPROXIMATE SCALE IN FEET (1" = 12.5')
NO VERTICAL EXAGGERATION

Pre-Design Investigation Report
Crown Dykman
(NYSDEC Site No.130054)
Glen Cove, New York

Geologic Cross-Section (North-South)

ARCADIS
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Crown Dykman (NYSDEC Site 130054)

66 Herb Hill Road, Glen Cove New York 11542

Source: 2014 Pre-Design Investigation Report (Arcadis)

Figure 2-2
Geologic Cross-Section
(North-South)

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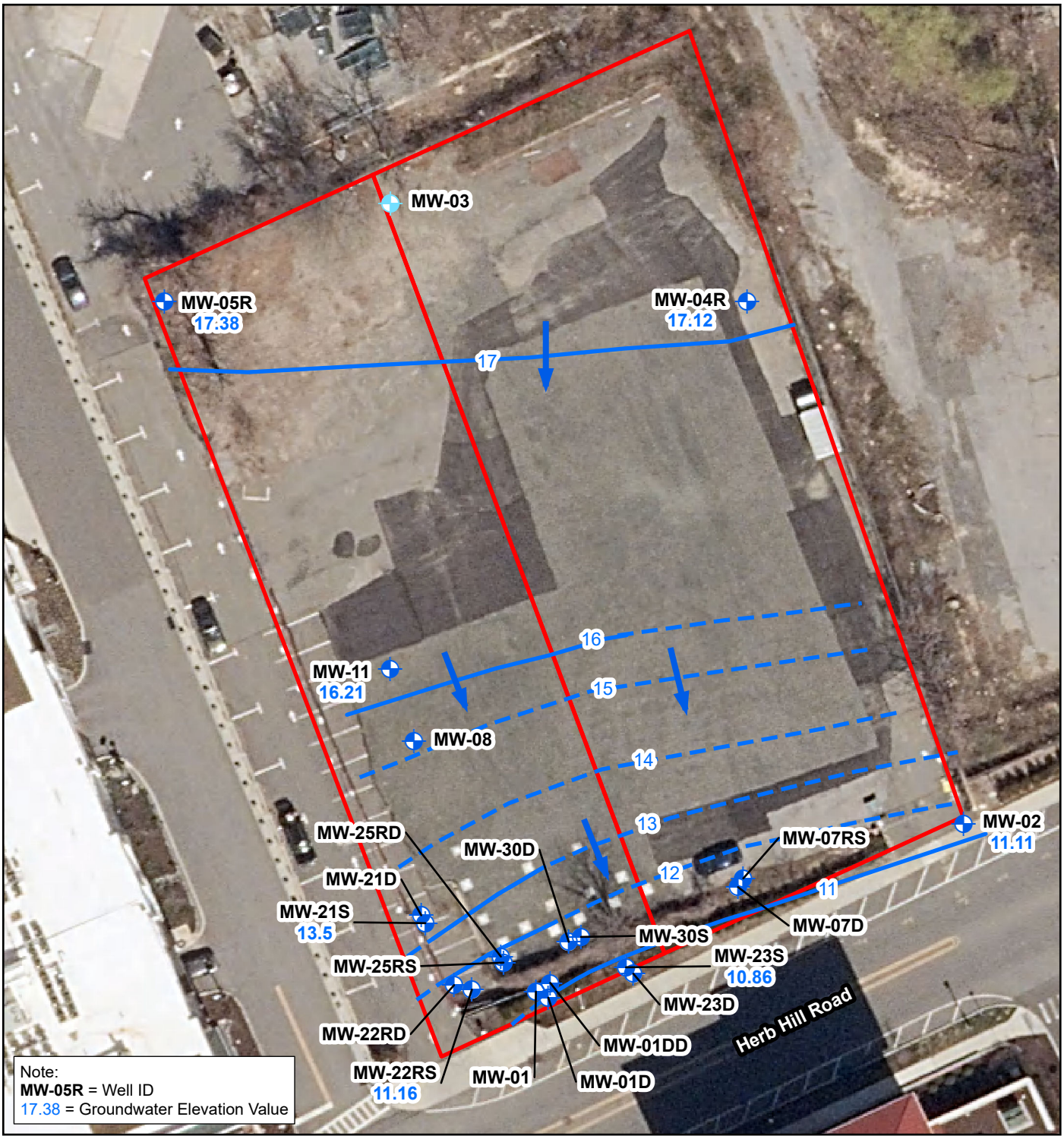

\\SYRACUSEFP\Syracuse\GISdata\StateandLocal\Crown Dykman\PROJECTS\ArcPro (aprx)\CrownDykman_SMP_2025\CrownDykman_SMP_2025.aprx

0 25 50
Feet

N

Legend

- Monitoring Well - Found
- Monitoring Well - Not Found
- Groundwater Elevation Contour (1 foot interval)
- Dashed where Inferred
- Direction of Groundwater Flow
- Site Parcels

Figure 2-3
Q4 2024 GROUNDWATER ELEVATION CONTOURS (Shallow Wells)
Crown Dykman (130054)
Glen Cove, NY

Map Date: 1/30/2025
Projection: NAD 1983 (2011) State Plane New York Long Island (Feet)

NEW YORK STATE | Department of Environmental Conservation

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SUBSLAB–03			
Sample Depth	8–10	8–10	33–35
2–Butanone (MEK)	< 22.5 U	26.2	< 32.1 U
Acetone	< 22.5 U	**99.5**	34.3
cis–1,2–Dichloroethene	< 4.5 U	< 3.9 U	< 6.4 U
Ethylbenzene	< 4.5 U	< 3.9 U	< 6.4 U
Tetrachloroethene	< 4.5 U	< 3.9 U	< 6.4 U
trans–1,2–Dichloroethene	< 4.5 U	< 3.9 U	< 6.4 U
Trichloroethene	< 4.5 U	< 3.9 U	< 6.4 U
Vinyl chloride	< 4.5 U	< 3.9 U	< 6.4 U
Chrysene	< 190 U	< 590 U	< 220 U

LAUNDRY ROOM	
Sample Depth	0–0
2–Butanone (MEK)	< 20.7 U
Acetone	< 20.7 U
cis–1,2–Dichloroethene	< 4.1 U
Ethylbenzene	< 4.1 U
Tetrachloroethene	< 4.1 U
trans–1,2–Dichloroethene	< 4.1 U
Trichloroethene	< 4.1 U
Vinyl chloride	< 4.1 U
Chrysene	< 190 U

SUPUST–05			
Sample Depth	6–8	23–25	23–25
2–Butanone (MEK)	< 1200 U	< 24.2 U	< 1200 U
Acetone	< 1200 U	< 24.2 U	< 1200 U
cis–1,2–Dichloroethene	< 230 U	< 4.8 U	< 250 U
Ethylbenzene	< 230 U	< 4.8 U	< 250 U
Tetrachloroethene	< 230 U	< 4.8 U	< 250 U
trans–1,2–Dichloroethene	< 230 U	< 4.8 U	< 250 U
Trichloroethene	< 230 U	< 4.8 U	< 250 U
Vinyl chloride	< 230 U	< 4.8 U	< 250 U
Chrysene	< 180 U	< 200 U	< 210 U

NE–CORNER–EXC–W	
Sample Depth	0–0
2–Butanone (MEK)	< 26.6 U
Acetone	37.6
cis–1,2–Dichloroethene	< 5.3 U
Ethylbenzene	< 5.3 U
Tetrachloroethene	< 5.3 U
trans–1,2–Dichloroethene	< 5.3 U
Trichloroethene	< 5.3 U
Vinyl chloride	< 5.3 U
Chrysene	< 230 U

SUBSLAB–07		
Sample Depth	5–7	8–9
2–Butanone (MEK)	< 24.6 U	< 21.7 U
Acetone	< 24.6 U	< 21.7 U
cis–1,2–Dichloroethene	< 4.9 U	< 4.3 U
Ethylbenzene	< 4.9 U	< 4.3 U
Tetrachloroethene	< 4.9 U	< 4.3 U
trans–1,2–Dichloroethene	< 4.9 U	< 4.3 U
Trichloroethene	< 4.9 U	< 4.3 U
Vinyl chloride	< 4.9 U	< 4.3 U
Chrysene	< 190 U	< 190 U

NE–CORNER–EXC–S	
Sample Depth	0–0
2–Butanone (MEK)	< 23.8 U
Acetone	32.8
cis–1,2–Dichloroethene	< 4.8 U
Ethylbenzene	< 4.8 U
Tetrachloroethene	< 4.8 U
trans–1,2–Dichloroethene	< 4.8 U
Trichloroethene	< 4.8 U
Vinyl chloride	< 4.8 U
Chrysene	< 210 U

NE–CORNER–EXC–N	
Sample Depth	0–0
2–Butanone (MEK)	**130**
Acetone	**560**
cis–1,2–Dichloroethene	< 4.3 U
Ethylbenzene	< 5.4 U
Tetrachloroethene	< 4.3 U
trans–1,2–Dichloroethene	< 4.3 U
Trichloroethene	< 4.3 U
Vinyl chloride	< 4.3 U
Chrysene	< 200 U

NE–CORNER–EXC–E	
Sample Depth	0–0
2–Butanone (MEK)	< 27 U
Acetone	11.5 J
cis–1,2–Dichloroethene	< 5.4 U
Ethylbenzene	< 5.4 U
Tetrachloroethene	4.7 J
trans–1,2–Dichloroethene	< 5.4 U
Trichloroethene	< 5.4 U
Vinyl chloride	< 5.4 U
Chrysene	< 200 U

SUBSLAB–06		
Sample Depth	0.5–2.6	6–8
2–Butanone (MEK)	< 23.2 U	< 24.8 U
Acetone	**51.6**	25.6
cis–1,2–Dichloroethene	< 4.6 U	< 5 U
Ethylbenzene	< 4.6 U	< 5 U
Tetrachloroethene	< 4.6 U	< 5 U
trans–1,2–Dichloroethene	< 4.6 U	< 5 U
Trichloroethene	< 4.6 U	< 5 U
Vinyl chloride	< 4.6 U	< 5 U
Chrysene	< 200 U	< 220 U

SUBSLAB–05		
Sample Depth	0.5–2.6	6–8
2–Butanone (MEK)	< 20.8 U	< 23 U
Acetone	< 20.8 U	< 23 U
cis–1,2–Dichloroethene	< 4.2 U	< 4.6 U
Ethylbenzene	< 4.2 U	< 4.6 U
Tetrachloroethene	< 4.2 U	< 4.6 U
trans–1,2–Dichloroethene	< 4.2 U	< 4.6 U
Trichloroethene	< 4.2 U	< 4.6 U
Vinyl chloride	< 4.2 U	< 4.6 U
Chrysene	< 190 U	< 190 U

W–BOILER–ROOM–N	
Sample Depth	0–0
2–Butanone (MEK)	< 28.8 U
Acetone	37.6
cis–1,2–Dichloroethene	< 5.8 U
Ethylbenzene	87.3
Tetrachloroethene	< 5.8 U
trans–1,2–Dichloroethene	< 5.8 U
Trichloroethene	< 5.8 U
Vinyl chloride	< 5.8 U
Chrysene	< 200 U

EAST–SIDEWALL	
Sample Depth	0–0
2–Butanone (MEK)	< 24 U
Acetone	**75**
cis–1,2–Dichloroethene	< 4.8 U
Ethylbenzene	1.9 J
Tetrachloroethene	< 4.8 U
trans–1,2–Dichloroethene	< 4.8 U
Trichloroethene	< 4.8 U
Vinyl chloride	< 4.8 U
Chrysene	**5900 J**

SUBSLAB–04		
Sample Depth	0.5–2.6	6–8
2–Butanone (MEK)	< 23.6 U	< 23.4 U
Acetone	41.3	11.8 J
cis–1,2–Dichloroethene	< 4.7 U	< 4.7 U
Ethylbenzene	< 4.7 U	< 4.7 U
Tetrachloroethene	21.1	< 4.7 U
trans–1,2–Dichloroethene	< 4.7 U	< 4.7 U
Trichloroethene	< 4.7 U	< 4.7 U
Vinyl chloride	< 4.7 U	< 4.7 U
Chrysene	< 210 U	< 200 U

SUPUST–01			
Sample Depth	5–7	10–12	13–15	13–15
2–Butanone (MEK)	< 20 U	11 J	< 26.1 U	< 19.3 U
Acetone	21.9	47.6	30	17.3 J
cis–1,2–Dichloroethene	< 4 U	< 4 U	39.5	< 3.9 U
Ethylbenzene	11.7	96.1	< 5.2 U	2.9 J
Tetrachloroethene	< 4 U	< 4 U	25.3	< 3.9 U
trans–1,2–Dichloroethene	< 4 U	< 4 U	< 5.2 U	< 3.9 U
Trichloroethene	< 4 U	< 4 U	14.9	< 3.9 U
Vinyl chloride	< 4 U	< 4 U	4.9 J	< 3.9 U
Chrysene	< 190 U	< 190 U	< 210 U	< 200 U

SUPUST–04		
Sample Depth	6–8	13–15
2–Butanone (MEK)	< 21.9 U	< 31.7 U
Acetone	19.6 J	**91.8**
cis–1,2–Dichloroethene	6.3	70.6
Ethylbenzene	< 4.4 U	< 6.3 U
Tetrachloroethene	< 4.4 U	< 6.3 U
trans–1,2–Dichloroethene	< 4.4 U	< 6.3 U
Trichloroethene	< 4.4 U	25.4
Vinyl chloride	< 4.4 U	3.1 J
Chrysene	< 200 U	< 250 U

W–BOILER–ROOM–BOTTOM	
Sample Depth	0–0
2–Butanone (MEK)	< 30 U
Acetone	13.5 J
cis–1,2–Dichloroethene	< 6 U
Ethylbenzene	13.1
Tetrachloroethene	< 6 U
trans–1,2–Dichloroethene	< 6 U
Trichloroethene	< 6 U
Vinyl chloride	< 6 U
Chrysene	< 210 U

EAST–AREA–BOTTOM	
Sample Depth	0–0
2–Butanone (MEK)	< 31 U
Acetone	< 31 U
cis–1,2–Dichloroethene	9.6
Ethylbenzene	5.9 J
Tetrachloroethene	750 J
trans–1,2–Dichloroethene	< 6.2 U
Trichloroethene	5.2 J
Vinyl chloride	< 6.2 U
Chrysene	< 210 U

UST–7–NORTH–SIDEWALL	
Sample Depth	0–0
2–Butanone (MEK)	< 17.6 U
Acetone	17.8
cis–1,2–Dichloroethene	< 3.5 U
Ethylbenzene	< 3.5 U
Tetrachloroethene	53.4
trans–1,2–Dichloroethene	< 3.5 U
Trichloroethene	1.2 J
Vinyl chloride	< 3.5 U
Chrysene	< 190 U

W–BOILER–ROOM–W	
Sample Depth	0–0
2–Butanone (MEK)	< 27.4 U
Acetone	30.9
cis–1,2–Dichloroethene	< 5.5 U
Ethylbenzene	23.4
Tetrachloroethene	< 5.5 U
trans–1,2–Dichloroethene	< 5.5 U
Trichloroethene	< 5.5 U
Vinyl chloride	< 5.5 U
Chrysene	< 190 U

EAST–AREA–E–SIDEWALL	
Sample Depth	0–0
2–Butanone (MEK)	< 28.7 U
Acetone	33.5
cis–1,2–Dichloroethene	< 5.7 U
Ethylbenzene	2.1 J
Tetrachloroethene	1.7 J
trans–1,2–Dichloroethene	< 5.7 U
Trichloroethene	< 5.7 U
Vinyl chloride	< 5.7 U
Chrysene	630 J

SUBSLAB–08			
Sample Depth	6–8	12–14	20–22
2–Butanone (MEK)	< 21.3 U	< 23.3 U	< 23 U
Acetone	20.3 J	36.9	< 23 U
cis–1,2–Dichloroethene	2.2 J	65.5	2.1 J
Ethylbenzene	< 4.3 U	< 4.7 U	< 4.6 U
Tetrachloroethene	13.3	110 JD	2.2 J
trans–1,2–Dichloroethene	< 4.3 U	< 4.7 U	< 4.6 U
Trichloroethene	2.9 J	94.4	2.6 J
Vinyl chloride	< 4.3 U	1.8 J	< 4.6 U
Chrysene	< 200 U	< 200 U	< 200 U

UST–7–EAST–SIDEWALL	
Sample Depth	0–0
2–Butanone (MEK)	< 20.3 U
Acetone	**130**
cis–1,2–Dichloroethene	< 4.1 U
Ethylbenzene	< 4.1 U
Tetrachloroethene	< 4.1 U
trans–1,2–Dichloroethene	< 4.1 U
Trichloroethene	< 4.1 U
Vinyl chloride	< 4.1 U
Chrysene	720 J

SUPUST–02		
Sample Depth	5–7	7–10
2–Butanone (MEK)	13.7 J	< 23.6 U
Acetone	**92.2**	**250**
cis–1,2–Dichloroethene	4.7	< 4.7 U
Ethylbenzene	< 4.1 U	< 4.7 U
Tetrachloroethene	3.3 J	< 4.7 U
trans–1,2–Dichloroethene	< 4.1 U	< 4.7 U
Trichloroethene	< 4.1 U	< 4.7 U
Vinyl chloride	< 4.1 U	< 4.7 U
Chrysene	170 J	< 210 U

SUPUST–03	
Sample Depth	5–7
2–Butanone (MEK)	25.5
Acetone	**74.1**
cis–1,2–Dichloroethene	< 4.6 U
Ethylbenzene	< 4.6 U
Tetrachloroethene	< 4.6 U
trans–1,2–Dichloroethene	< 4.6 U
Trichloroethene	< 4.6 U
Vinyl chloride	< 4.6 U
Chrysene	< 1100 U

W–BOILER–ROOM–S	
Sample Depth	0–0
2–Butanone (MEK)	9.9 J
Acetone	**52.2**
cis–1,2–Dichloroethene	< 6 U
Ethylbenzene	43.3
Tetrachloroethene	< 6 U
trans–1,2–Dichloroethene	< 6 U
Trichloroethene	< 6 U
Vinyl chloride	< 6 U
Chrysene	< 210 U

W–BOILER–ROOM–E	
Sample Depth	0–0
2–Butanone (MEK)	< 28.9 U
Acetone	23.2 J
cis–1,2–Dichloroethene	< 5.8 U
Ethylbenzene	< 5.8 U
Tetrachloroethene	< 5.8 U
trans–1,2–Dichloroethene	< 5.8 U
Trichloroethene	< 5.8 U
Vinyl chloride	< 5.8 U
Chrysene	< 200 U

UST–7–WEST–SIDEWALL	
Sample Depth	0–0
2–Butanone (MEK)	< 1900 U
Acetone	< 1900 U
cis–1,2–Dichloroethene	< 390 U
Ethylbenzene	84.2 J
Tetrachloroethene	< 390 U
trans–1,2–Dichloroethene	< 390 U
Trichloroethene	< 390 U
Vinyl chloride	< 390 U
Chrysene	650 J

NAPL–01			
Sample Depth	8–10	18–20	25–27
2–Butanone (MEK)	< 18.8 U	< 26.2 U	< 24.1 U
Acetone	**74.9**	**110**	16.1 J
cis–1,2–Dichloroethene	**620 D**	< 5.2 U	130
Ethylbenzene	< 3.8 U	< 5.2 U	< 4.8 U
Tetrachloroethene	**1300 D**	26.6	1.1 J
trans–1,2–Dichloroethene	< 3.8 U	< 5.2 U	1.4 J
Trichloroethene	280 D	< 5.2 U	1.1 J
Vinyl chloride	15.7	< 5.2 U	1.1 J
Chrysene	< 190 U	< 190 U	< 210 U

UST–7–SOUTH–SIDEWALL	
Sample Depth	0–0
2–Butanone (MEK)	13.2 J
Acetone	37.8
cis–1,2–Dichloroethene	< 4.4 U
Ethylbenzene	< 4.4 U
Tetrachloroethene	< 4.4 U
trans–1,2–Dichloroethene	< 4.4 U
Trichloroethene	< 4.4 U
Vinyl chloride	< 4.4 U
Chrysene	870 J

NAPL–05			
Sample Depth	10–12	20–22	29–31
2–Butanone (MEK)	< 1100 U	< 21.5 U	< 24.7 U
Acetone	< 1100 U	< 21.5 U	24.5 J
cis–1,2–Dichloroethene	**37800 D**	1.2 J	9.2
Ethylbenzene	59.6 J	< 4.3 U	< 4.9 U
Tetrachloroethene	**88500 D**	23.5	100
trans–1,2–Dichloroethene	**210 J**	< 4.3 U	< 4.9 U
Trichloroethene	**19100 D**	1.4 J	9.6
Vinyl chloride	**200 J**	< 4.3 U	< 4.9 U
Chrysene	< 200 U	< 190 U	< 210 U

NAPL–02			
Sample Depth	5–8	8–10	25–27
2–Butanone (MEK)	< 20.5 U	< 19.6 U	< 25.6 U
Acetone	< 20.5 U	< 19.6 U	44.2
cis–1,2–Dichloroethene	9.2	**8800 D**	**4700 D**
Ethylbenzene	< 4.1 U	< 3.9 U	< 5.1 U
Tetrachloroethene	3.3 J	**2600 D**	4.9 J
trans–1,2–Dichloroethene	< 4.1 U	22.6	40.2
Trichloroethene	< 4.1 U	**1400 D**	18.5
Vinyl chloride	1.3 J	**160**	1.5 J
Chrysene	< 190 U	< 180 U	< 220 U

Post–Ex–Bottom–West	
Sample Depth	0–0
2–Butanone (MEK)	< 24.7 U
Acetone	**52.3**
cis–1,2–Dichloroethene	**1200 D**
Ethylbenzene	< 4.9 U
Tetrachloroethene	360 D
trans–1,2–Dichloroethene	4.1 J
Trichloroethene	230 J
Vinyl chloride	8.4
Chrysene	< 200 U

NAPL–03			
Sample Depth	5–8	10–12	25–27
2–Butanone (MEK)	< 22.6 U	< 21.5 U	< 22.9 U
Acetone	32.6	< 21.5 U	22 J
cis–1,2–Dichloroethene	**12200 D**	100	32
Ethylbenzene	< 4.5 U	< 4.3 U	< 4.6 U
Tetrachloroethene	**3100 D**	11.7	4.6
trans–1,2–Dichloroethene	24.7	< 4.3 U	< 4.6 U
Trichloroethene	**3200 D**	10.2	4.3 J
Vinyl chloride	**230 D**	15.4	10.3
Chrysene	< 200 U	< 190 U	< 210 U

Post–Ex–Bottom	
Sample Depth	0–0
2–Butanone (MEK)	< 23.6 U
Acetone	< 23.6 U
cis–1,2–Dichloroethene	**540 D**
Ethylbenzene	< 4.7 U
Tetrachloroethene	37.1
trans–1,2–Dichloroethene	1.4 J
Trichloroethene	42.2
Vinyl chloride	< 4.7 U
Chrysene	< 200 U

NAPL–04			
Sample Depth	5–7	8–10	25–27
2–Butanone (MEK)	< 20.4 U	< 20.6 U	< 26.7 U
Acetone	< 20.4 U	12.5 J	20 J
cis–1,2–Dichloroethene	**1000 D**	84.5	**490 D**
Ethylbenzene	< 4.1 U	< 4.1 U	< 5.3 U
Tetrachloroethene	16	27.8	380 D
trans–1,2–Dichloroethene	2.3 J	< 4.1 U	1.6 J
Trichloroethene	27.4	22.1	100
Vinyl chloride	**120**	**21.7**	10.9
Chrysene	< 190 U	< 200 U	< 230 U

NAPL–06			
Sample Depth	8–10	15–18	30–32
2–Butanone (MEK)	< 1100 U	< 960 U	< 24.6 U
Acetone	< 1100 U	< 960 U	34
cis–1,2–Dichloroethene	< 220 U	**1000**	7
Ethylbenzene	**1200**	< 190 U	< 4.9 U
Tetrachloroethene	< 220 U	< 190 U	< 4.9 U
trans–1,2–Dichloroethene	< 220 U	< 190 U	< 4.9 U
Trichloroethene	< 220 U	60.7 J	< 4.9 U
Vinyl chloride	< 220 U	**71 J**	2.8 J
Chrysene	140 J	< 190 U	< 210 U

Post–Ex–Bottom–East	
Sample Depth	0–0
2–Butanone (MEK)	< 24.6 U
Acetone	< 24.6 U
cis–1,2–Dichloroethene	**270 J**
Ethylbenzene	< 4.9 U
Tetrachloroethene	160 J
trans–1,2–Dichloroethene	< 4.9 U
Trichloroethene	86.5
Vinyl chloride	5.4
Chrysene	< 210 U

NAPL–07			
Sample Depth	8–10	15–18	22–24
2–Butanone (MEK)	< 1000 U	< 22 U	< 22.4 U
Acetone	< 1000 U	< 22 U	12.4 J
cis–1,2–Dichloroethene	< 200 U	88.2	8.3
Ethylbenzene	230	< 4.4 U	< 4.5 U
Tetrachloroethene	< 200 U	1.4 J	21.6
trans–1,2–Dichloroethene	< 200 U	< 4.4 U	< 4.5 U
Trichloroethene	< 200 U	3.2 J	4.3 J
Vinyl chloride	< 200 U	6.8	< 4.5 U
Chrysene	< 190 U	< 200 U	< 210 U

SUBSLAB–09			
Sample Depth	8.5–9	20–21	0.5–2.6
2–Butanone (MEK)	< 24.4 U	< 22.7 U	< 22.4 U
Acetone	37.8	10.3 J	< 22.4 U
cis–1,2–Dichloroethene	< 4.9 U	2.9 J	< 4.5 U
Ethylbenzene	< 4.9 U	< 4.5 U	< 4.5 U
Tetrachloroethene	< 4.9 U	1.3 J	4.5
trans–1,2–Dichloroethene	< 4.9 U	< 4.5 U	< 4.5 U
Trichloroethene	< 4.9 U	< 4.5 U	< 4.5 U
Vinyl chloride	< 4.9 U	< 4.5 U	< 4.5 U
Chrysene	< 190 U	< 190 U	< 210 U

SUBSLAB–01			
Sample Depth	5–8	5–8	15–17
2–Butanone (MEK)	< 21.9 U	< 21.7 U	< 20.7 U
Acetone	45.4	10 J	< 20.7 U
cis–1,2–Dichloroethene	24.7	6.7	7.7
Ethylbenzene	< 4.4 U	< 4.3 U	< 4.1 U
Tetrachloroethene	< 4.4 U	< 4.3 U	< 4.1 U
trans–1,2–Dichloroethene	< 4.4 U	< 4.3 U	< 4.1 U
Trichloroethene	< 4.4 U	< 4.3 U	< 4.1 U
Vinyl chloride	5.1	< 4.3 U	1.5 J
Chrysene	< 200 U	< 190 U	< 190 U

SUBSLAB–02			
Sample Depth	5–7	43–45	
2–Butanone (MEK)	< 29.1 U	< 22.6 U	
Acetone	19.7 J	10.4 J	
cis–1,2–Dichloroethene	1.7 J	< 4.5 U	
Ethylbenzene	< 5.8 U	< 4.5 U	
Tetrachloroethene	15.5	< 4.5 U	
trans–1,2–Dichloroethene	< 5.8 U	< 4.5 U	
Trichloroethene	< 5.8 U	< 4.5 U	
Vinyl chloride	3.8 J	< 4.5 U	
Chrysene	< 220 U	< 190 U	

NORTH-EAST-CORNER-EXCAVATION-NORTH-SIDEWALL (22.22)
NORTH-EAST-CORNER-EXCAVATION-EAST-SIDEWALL (21.43)
NORTH-EAST-CORNER-EXCAVATION-WEST-SIDEWALL (21.73)
NORTH-EAST-CORNER-EXCAVATION-SOUTH-SIDEWALL (21.26)
AOC-5
SUBSLAB-07 (22.35)
SUPUST-05 (22.25)
LAUNDRYROOM-PIT-BOTTOM
SUBSLAB-03 (22.97)
LAUNDRY PIT
WEST-BOILER-ROOM-NORTH-SIDEWALL (22.46)
SUBSLAB-06 (22.07)
EAST-SIDEWALL
SUPUST-01 (22.09)
WEST-BOILER-ROOM-BOTTOM (21.79)
WEST-BOILER-ROOM-WEST-SIDEWALL (21.58)
WEST-BOILER-ROOM-EAST-SIDEWALL (21.79)
SUBSLAB-05 (22.03)
SUPUST-04 (21.43)
AOC-2
SUBSLAB-08 (22.33)
EAST-BOILER-PIT-BOTTOM (20.71)
AOC-4
WEST-BOILER-ROOM-SOUTH-SIDEWALL (20.70)
AOC-3
SUBSLAB-04 (22.16)
UST-7-NORTH-SIDEWALL (17.38)
EAST-AREA-BOTTOM (17.09)
UST-7-BOTTOM (15.49)
EAST-AREA-EAST-SIDEWALL (17.26)
UST-7-EAST-SIDEWALL (17.24)
UST-7-WEST-SIDEWALL (17.16)
SUPUST-03 (21.16)
SUPUST-02 (21.07)
UST-7-SOUTH-SIDEWALL (17.41)
NAPL-01 (19.89)
NAPL-05 (21.73)
NAPL-06 (21.99)
POST-EXCAVATION-BOTTOM-1
SUBSLAB-09 (21.98)
NAPL-02 (19.91)
SOURCE AREA
POST-EXCAVATION BOTTOM WEST (1.83)
NAPL-07 (21.86)
SUBSLAB-01 (21.93)
POST-EXCAVATION BOTTOM EAST (2.31)
NAPL-03 (19.62)
NAPL-04 (19.77)
SUBSLAB-02 (20.14)
6' CHAINLINK FENCE
GATE
6' CHAINLINK FENCE
B/B CURB
CONCRETE CURB
CONCRETE SIDEWALK
HERBHILL ROAD
(GARVEYS POINT ROAD)

LEGEND

- SITE BOUNDARY
- FENCE LINE
- SOURCE AREA
- SUBSLAB-08 NO EXCEEDANCE
- SUBSLAB-08 UNRESTRICTED SCO EXCEEDANCE
- (22.33) SAMPLE ELEVATION
- FORMER AREA OF EXCAVATION

Figure 2-4
Post Excavation Soil Sampling Results
Crown Dykman Glen Cove, New York

Source: Arcadis

NOTES:

1. No post-excavation samples exceeded NYSDEC Part 375 Commercial Soil Clean-up Objectives. Locations where at least one constituent exceeded at least one Unrestricted Soil Clean-up Objective (SCO) --> Soil Clean-Up Objective(SCO) is indicated in blue text.
2. Minor excavation was completed adjacent to the sample EAST-SIDEWALL. Due to limited extent, a post excavation survey was not completed.
3. AOC - area of concern
4. SUBSLAB, SUPUST, and NAPL labeled samples were collected prior to excavation to support remedy execution. For these samples, surface elevation is shown.
5. Results are shown in microgram per kilogram.
6. Full analytical tables for soil and groundwater are provided in the Final Engineering Report.

0 10' 20'
GRAPHIC SCALE

CROWN DYKMAN (NYSDEC SITE NO. 130054)
GLEN COVE, NEW YORK

POST EXCAVATION SOIL SAMPLING RESULTS

ARCADIS

FIGURE 3B

C:\Users\mwalewski\DOCAD\Docs\Arcadis ACC USA\US-99999999\MYSDEC_130054_CROWN DYKMAN_GLEN COVE_NY\Project Files\10_WP\101_ARC_ENV2024401-DWG\GEN F02 - SITE PLAN.dwg LAYOUT: 2 SAVED: 3/26/2024 2:53 PM ACADVER: 24.1S (LMS TECH) PAGESETUP:----
PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 4/4/2024 3:31 PM BY WASILEWSKI, MACIEJ
XREFS: IMAGES: PROJECTNAME:----
X-BASE-2111 (A2000344.dgn) (A2000344.dgn) (A2000344.dgn)
CID-2022_100x.jpg
CID-2022_150_04.jpg
LKM-Post-Demo Survey.jpg

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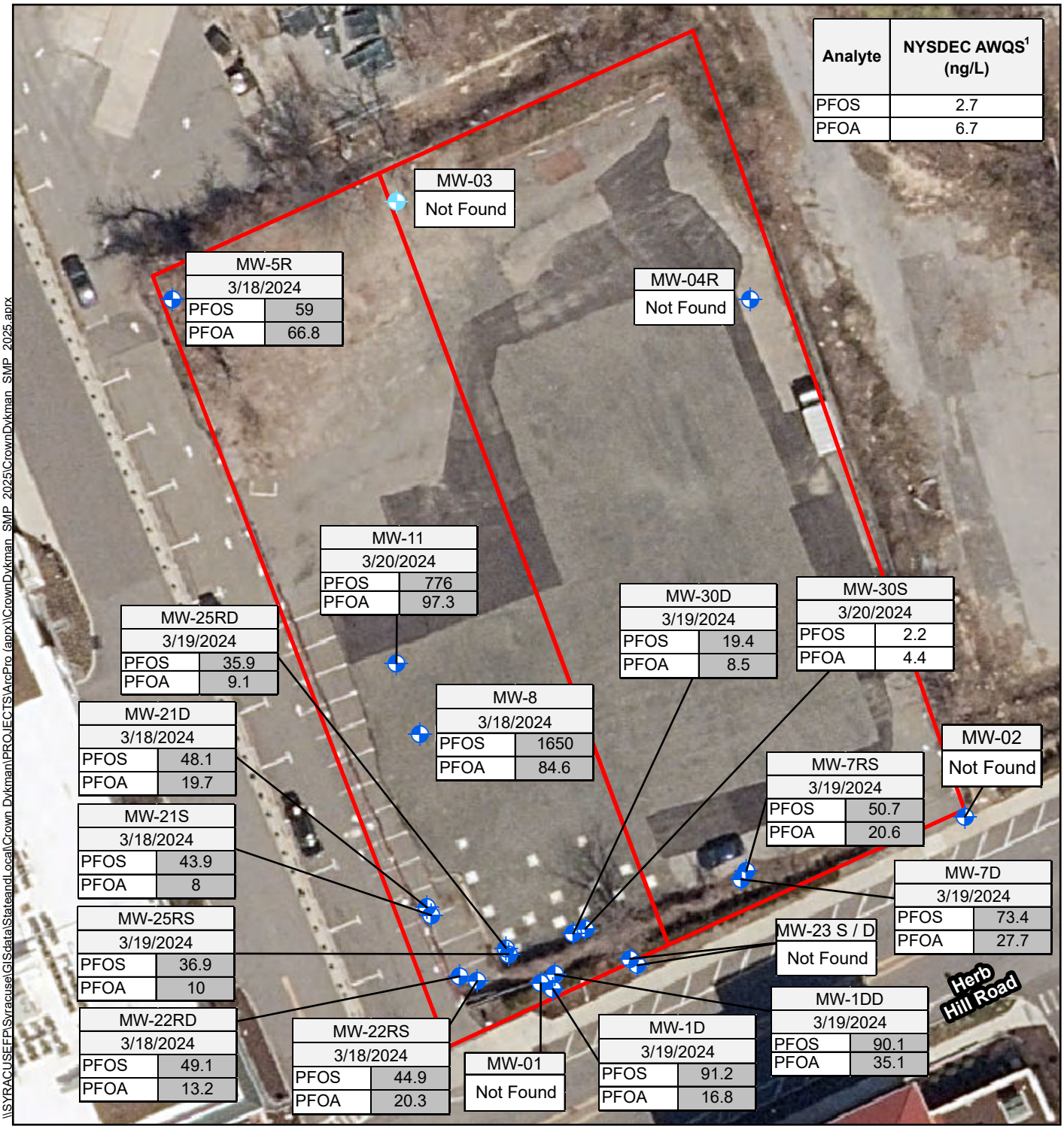

\\SYRACUSEFP\Syracuse\GISdata\StateandLocal\Crown Dykman\PROJECTS\ArcPro (aprx)\CrownDykman_SMP_2025\CrownDykman_SMP_2025.aprx

0 25 50
Feet

N

Legend

- Monitoring Well - Found
- Monitoring Well - Not Found
- Site Parcels

Notes:
(1) NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1).
Concentrations are recorded in nanograms per liter (ng/L).
AWQS = Ambient Water Quality Standards
NYSDEC = New York State Department of Environmental Conservation
PFAS = Per- and Poly- Fluoroalkyl Substances
PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctanesulfonic acid

Figure 2-6
Q1 2024 PFAS DETECTIONS
Crown Dykman (130054)
Glen Cove, NY

Map Date: 1/22/2025
Projection: NAD 1983 (2011) State Plane New York Long Island (Feet)

NEW YORK STATE Department of Environmental Conservation

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3. INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 GENERAL

Since remaining contamination exists at the site, ICs are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of ICs at the site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC Project Manager.

This plan provides:

- A description of all ICs/ECs on the site
- The basic implementation and intended role of each IC/EC
- A description of the key components of the ICs set forth in the Environmental Easement
- A description of the controls to be evaluated during each required inspection and periodic review
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (as provided in **Appendix H** for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site)
- Any other provisions necessary to identify or establish methods for implementing the ICs/ECs required by the site remedy, as determined by the NYSDEC Project Manager.

3.2 INSTITUTIONAL CONTROLS

A series of ICs is required by the Amended ROD (NYSDEC 2021) to: (1) implement, maintain, and monitor EC systems, (2) prevent future exposure to remaining contamination, and (3) limit the use and development of the site to commercial uses only. Adherence to these ICs on the site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on **Figure 1-2**. These ICs are:

- The Remedial Party or Site Owner must complete and submit to the NYSDEC a periodic certification of institutional controls in accordance with part 375-1.8(h)(3).
- Allows the use and development of the controlled property for commercial use as defined by Part 375-1.8(g), although land use is subject to local zoning laws.

- Restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDEC, NYSDOH, or County Department of Health.

- Prohibits agriculture or vegetable gardens on controlled property.

- Includes a provision for evaluation of the potential for soil vapor intrusion in future buildings developed onsite, including a provision for implementing actions recommended to address exposures related to soil vapor intrusion

- Requires compliance with the NYSDEC approved Site Management Plan.

3.3 ENGINEERING CONTROLS

3.3.1 Injection Well Infrastructure

The ISCO injection system infrastructure consists of a series of onsite injection wells IS-01 through IS-12, and two injection well (IW) headers, IW-01 and IW-02, as shown on **Figure 1-2**. Periodic inspections of the injection system infrastructure will need to be completed, as described in **Section 4**.

3.3.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the RAOs identified by the Decision Document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10. Unless waived by the NYSDEC, confirmation samples of applicable environmental media are required before terminating any remedial actions at the site. Confirmation samples require Category B deliverables and a Data Usability Summary Report.

As discussed below, the NYSDEC may approve termination of a groundwater monitoring program. When a Remedial Party receives this approval, the Remedial Party will decommission site-related monitoring, injection and recovery wells as per the NYSDEC CP-43 policy.

The Remedial Party will also conduct any needed site restoration activities, such as asphalt patching and decommissioning treatment system equipment. In addition, the Remedial Party will conduct any necessary restoration of vegetation coverage, and trees, and will comply with NYSDEC regulations and guidance. The Remedial Party will also ensure that no ongoing erosion is occurring on the site.

3.3.2.1 Monitoring Wells Associated with Monitored Natural Attenuation and In-Situ Chemical Oxidation

Groundwater monitoring activities to assess natural attenuation and ISCO will continue, as determined by the NYSDEC Project Manager in consultation with NYSDOH Project Manager, until residual groundwater concentrations are found to be consistently below ambient water quality standards; the site Standards, Criteria, and Guidance; or have become asymptotic at an

acceptable level over an extended period. In the event that monitoring data indicate that monitoring for natural attenuation or ISCO may no longer be required, a proposal to discontinue the monitoring will be submitted by the Remedial Party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC Project Manager. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional injections, source removal, treatment and/or control measures will be evaluated.

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4. MONITORING AND SAMPLING PROGRAM

4.1 GENERAL

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC Project Manager. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for samples collected as part of site management for the site are included in the Quality Assurance Project Plan provided in **Appendix I.** Additionally, a site-specific Health and Safety Plan has been provided as **Appendix J**, detailing protection standards and mandatory safety practices, procedures, and contingencies to be followed while performing field activities

This Monitoring and Sampling Plan describes the methods to be used for the following:

- Sampling and analysis of appropriate media (e.g., groundwater, indoor air, soil vapor, soils)
- Assessing compliance with applicable NYSDEC Standards, Criteria, and Guidance, particularly groundwater standards
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol, and frequency
- Information on designed monitoring systems
- Analytical sampling program requirements
- Inspection and maintenance requirements for monitoring wells
- Monitoring well decommissioning procedures
- Annual inspection and periodic certification
- Reporting requirements are provided in **Section 7**.

4.2 SITEWIDE INSPECTION

Sitewide inspections will be performed at a minimum of once per year. These periodic inspections must be conducted when the ground surface is visible (i.e., no snow cover). Sitewide inspections will be performed by a qualified environmental professional as defined in 6 NYCRR

Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or duration of the inspections will require approval from the NYSDEC Project Manager. Sitewide inspections will also be performed after severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in **Appendix K.** The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage
- An evaluation of the condition and continued effectiveness of ECs
- General site conditions at the time of inspection
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection
- Confirm that site records are up to date

Inspections of remedial components installed at the site will be conducted. A comprehensive sitewide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report (PRR). The inspections will determine and document the following:

- Inspect the integrity of the ISCO injection infrastructure (ECs)
- Compliance with requirements of this SMP and the Environmental Easement
- Achievement of remedial performance criteria
- If site records are complete and up to date

Reporting requirements are outlined in **Section 7**.

4.3 POST-REMEDIATION MEDIA MONITORING AND SAMPLING

Samples shall be collected from selected monitoring wells on a routine basis. Sampling locations, required analytical parameters, and schedule are provided in **Table 4-1** Modification to the frequency or sampling requirements will require approval from the NYSDEC Project Manager.

Detailed sample collection and analytical procedures and protocols are provided in **Appendix L** (Field Activities Plan) and **Appendix I** (Quality Assurance Project Plan).

Table 4-1. Post-Remediation Sampling Requirements and Schedule

Sampling Location	Analytical Parameters and Sampling Methods	
	VOCs (EPA Method 8260D)	PFAS (EPA Method 1633)
MW-1	Bi-Annual	Annually
MW-1D		
MW-1DD		
MW-2		
MW-3[X]		
MW-4R		
MW-5R		
MW-7RS		
MW-7D		
MW-8		
MW-11		
MW-21S		
MW-21D		
MW-22RS		
MW-22RD		
MW-23S		
MW-23D		
MW-25RS		
MW-25RD		
MW-30S		
MW-30D		

Notes:
[X] Presumed destroyed
EPA = U.S. Environmental Protection Agency

4.3.1 Groundwater Sampling

Groundwater monitoring will be performed quarterly to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC Project Manager.

Table 2-1 summarizes the wells' identification numbers, as well as the location, depths, diameter, and screened intervals of the wells. As part of the groundwater monitoring, 18 on-site wells can be sampled to evaluate the effectiveness of the remedial system (3 of the original 21 wells cannot be located). The Remedial Party will measure depth to the water table for each monitoring well in the network before sampling.

Monitoring well construction logs are included in **Appendix E**. Construction logs for MW-1, MW-1D, MW-1DD, MW-2, MW-3, MW-8, MW-11, MW-21S, MW-21D, MW-22RS, MW-22RD, MW-23S, and MW-23D are not available.

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC Project Manager will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent PRR. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC Project Manager. Well abandonment will be performed in accordance with NYSDEC's guidance entitled CP-43: Groundwater Monitoring Well Decommissioning Procedures. Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC Project Manager.

The sampling frequency may only be modified with the approval of the NYSDEC Project Manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC Project Manager.

Deliverables for the groundwater monitoring program are specified in **Section 7** (Reporting Requirements).

4.3.2 Monitoring and Sampling Protocol

Sampling activities will be recorded in a field book and associated sampling log as provided in **Appendix K** (Site Management Forms). Other observations (e.g., groundwater monitoring well integrity) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the site-specific Field Activities Plan provided as **Appendix L**.

5. OPERATION AND MAINTENANCE PLAN

5.1 GENERAL

The site remedy does not rely on any mechanical systems, such as groundwater treatment systems, SSDSs, or air sparging (AS)/SVE systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP. If future SSDS or AS/SVE systems are installed due to site redevelopment, and operation and maintenance plan will be prepared for the installed systems.

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6. PERIODIC ASSESSMENTS/EVALUATIONS

6.1 CLIMATE CHANGE VULNERABILITY ASSESSMENT

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns, and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness, and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a current vulnerability assessment that evaluates the vulnerability of the site and/or ECs to severe storms/weather events and associated flooding. This section also identifies vulnerability assessment updates that will be conducted for the site in PPRs.

Flood Plain—The site is located in an area of minimal flood hazard as designated by the Federal Emergency Management Agency (FEMA) National Flood Hazard. The adjacent property to the south (Harbor Landing, 300 Herb Hill Road), across Herb Hill Road; however, borders Glen Cove Creek and is located within the 500- and 100-year storm floodplain. The FEMA National Flood Hazard Layer FIRMette report is attached as **Appendix M**.

Sea Level Rise—The site is located approximately 415 feet north Glen Cove Creek, a small coastal inlet of Hempstead Bay and Long Island Sound. Although close in proximity to coastal waters, recorded surface elevations range from approximately 14 ft amsl at the southern end of the site, to approximately 30 ft amsl at the northern end. The storm surge recorded during Hurricane Sandy was reported at 10.96-ft amsl at the nearby West Pond, Glen Cove, New York U.S. Geological Survey monitoring station. As stated above, the site is situated above the 500-year floodplain. Simulated sea level rise of 10 feet above current sea level, as shown by National Oceanic and Atmospheric Administration's Sea Level Rise Viewer (https://coast.noaa.gov/slr/#) would not impact the site directly, but adjacent properties to the south and to the west would be inundated.

Site Drainage and Stormwater Management—The site is gently sloping and has drainage along Herb Hill Road. Due to artesian conditions in the southwestern border, some standing water may be encountered even during dry periods.

Erosion—Due to the gentle sloping nature of the site, and gravel and asphalt surfacing, erosion is anticipated to be minimal.

High Wind—The site is currently vacant with no structures. As such, high winds and/or falling objects do not pose a risk to the site infrastructure.

Drought—Nassau County has a very low risk for drought as designated by the FEMA National Risk Index. The FEMA National Risk Index report for Nassau County is provided in **Appendix M**.

Electricity—There are no active treatment or monitoring systems requiring electricity onsite that would be impacted by power loss, voltage dips/surges, or lightning strikes.

Spill/Contaminant Release—Remaining contamination is limited to the subsurface. Minimal release is anticipated due to storm-related damage.

Wildfires—Nassau County has a very low risk for wildfires as designated by the FEMA National Risk Index. The FEMA National Risk Index report for Nassau County is provided in **Appendix M**.

6.2 GREEN REMEDIATION EVALUATION

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the site during site management, and as reported in the PRR.

Waste Generation—Groundwater sampling tubing will be reused to the extent practical. After each sampling event, tubing will be placed back in the well.

Energy Usage—As the site is vacant and there is no treatment system in operation, there is no energy usage at the site.

Emissions—There are no treatment systems onsite; and therefore, there are no active sources of emissions. The major source of site-related emissions is travel to and from the site and operation of gas-powered generators during groundwater sampling events. Field staff will carpool to the extent possible and will avoid unnecessary idling of vehicles and equipment when onsite.

Water Usage—Decontamination water will be sourced from potable sources or laboratories, as required. Groundwater purged from monitoring wells will be drummed and disposed of offsite unless surface discharge with or without filtration is approved of by NYSDEC.

Land and/or Ecosystems—The site is a vacant lot comprised of asphalt and gravel. Methods proposed to reduce energy consumption, resource usage, waste generation, water usage, etc., will be included in the PRR.

6.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal remedial system optimization (RSO), or at any time that the NYSDEC Project Manager feels appropriate, e.g., during significant maintenance events or in conjunction with storm recovery activities.

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities. Reporting of these modifications will be presented in the PRR.

6.2.2 Remedial Systems

There are currently no active remedial systems; however, existing remedial components will be preserved for potential future use and to conserve materials and resources to the extent possible. This form of re-use may serve to reduce the carbon footprint of any future remedial activities.

Components of the on-site remedial system ISCO injection infrastructure include:

- Injection wells
- Former CVOC Source Area Injection Header
- Site groundwater monitoring well network

The remaining components may be used to conduct one or more injection events, each of which will be followed by periodic monitoring to inform the decision-making regarding the necessity and nature of additional injections.

6.2.3 Frequency of System Checks, Sampling, and Other Periodic Activities

Transportation to and from the site, use of consumables in relation to visiting the site to conduct system checks and/or collect samples, and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources.

6.2.4 Metrics and Reporting

As discussed in Section 7 and as shown in Appendix K (Site Management Forms), information on energy usage, solid waste generation, transportation and shipping, water usage, and land use and ecosystems will be recorded to facilitate and document consistent implementation of green remediation during site management and to identify corresponding benefits. A set of metrics has been developed.

6.3 REMEDIAL SYSTEM OPTIMIZATION

An RSO study will be conducted any time that the NYSDEC Project Manager or the Remedial Party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- Remedial actions have not met or are not expected to meet RAOs in the timeframe estimated in the Decision Document

- Management and operation of the remedial system is exceeding the estimated costs.
- The remedial system is not performing as expected or as designed.
- Previously unidentified source material may be suspected.
- Plume shift has potentially occurred.
- Site conditions change due to development, changes in land use or groundwater use, etc.
- There is an anticipated transfer of the site management to another Remedial Party or agency.
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a site's conceptual model, a summary of past performance, document current cleanup practices, summarize progress made toward the site's cleanup goals, gather additional performance or media specific data, and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

The RSO study will focus on overall site cleanup strategy, process optimization, and management with the intent of identifying impediments to cleanup and improvements to site operations to increase efficiency, cost effectiveness and remedial timeframes. Green remediation technology and principals are to be considered when performing the RSO.

7. REPORTING REQUIREMENTS

7.1 SITE MANAGEMENT REPORTS

All site management inspection, maintenance, and monitoring events will be recorded on the appropriate site management forms provided in **Appendix K**. These forms are subject to NYSDEC revision. All site management inspection, maintenance, and monitoring events will be conducted by a Qualified Environmental Professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements in **Table 7-1** and summarized in the PRR.

Table 7-1. Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Groundwater Sampling Report	Bi-annually following groundwater sampling events
Periodic Review Report	Every 3 years, or as otherwise determined by the NYSDEC

Notes:
*The frequency of events will be conducted as specified until otherwise approved by the NYSDEC Project Manager.

All interim monitoring/inspections reports will include, at a minimum, the following:

- Date of event or reporting period
- Name, company, and position of person(s) conducting monitoring/inspection activities
- Description of the activities performed
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet)
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air)
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation)
- Sampling results in comparison to appropriate standards/criteria
- A figure illustrating sample type and sampling locations

- Copies of all laboratory data sheets and the required laboratory data deliverables required for points sampled (to be submitted electronically in the NYSDEC-identified format)
- Any observations, conclusions, or recommendations
- A determination as to whether contaminant conditions have changed since the last reporting event

Routine maintenance event reporting forms will include, at a minimum:

- Date of event
- Name, company, and position of person(s) conducting maintenance activities
- Description of maintenance activities performed
- Any modifications to the system
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet)
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form)

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities
- Description of non-routine activities performed
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet)
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form)

Data will be reported in digital format as determined by the NYSDEC. Currently, data are to be supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

7.2 PERIODIC REVIEW REPORTS

A PRR will be submitted to the NYSDEC Project Manager beginning 16 months after the Certificate of Completion or equivalent document is issued. After submittal of the initial PRR, the next PRR shall be submitted every 5 years to the NYSDEC Project Manager or at another frequency as may be required by the NYSDEC Project Manager. In the event that the site is subdivided into separate parcels with different ownership, a single PRR will be prepared that addresses the site described in **Appendix A**. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the PRR. The report will include:

- Identification, assessment, and certification of all ECs/ICs required by the remedy for the site
- Results of the required annual site inspections, fire inspections, and severe condition inspections, if applicable
- Description of any change of use, import of materials, or excavation that occurred during the certifying period
- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted
- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted; these tables and figures will include a presentation of past data as part of an evaluation of contaminant concentration trends, including but not limited to:
    - — Trend monitoring graphs that present groundwater contaminant levels from before the start of the remedy implementation to the most current sampling data
    - — Trend monitoring graphs depicting system influent analytical data on a per event and cumulative basis
    - — Operation and maintenance data summary tables
    - — A current plume map for sites with remaining groundwater contamination
    - — A groundwater elevation contour map for each gauging event

- Results of all analyses, copies of laboratory data sheets, and the required laboratory data deliverables for samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data are supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

- A site evaluation, which includes the following:

  — The compliance of the remedy with the requirements of the site-specific Remedial Action Work Plan, ROD, or Decision Document.

  — The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications.

  — Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored.

  — Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan.

  — An update to the climate change vulnerability assessment if site or external conditions have changed since the previous assessment, and recommendations to address vulnerabilities.

  — A summary of the Green Remediation evaluation, including a quantitative and qualitative overview of a site's environmental impacts and recommendations to improve the remedy's environmental footprint. The PRR will include the completed Summary of Green Remediation Metrics form provided in **Appendix K**

  — An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving remedial goals as specified by the Remedial Action Work Plan, ROD, or Decision Document.

  — The overall performance and effectiveness of the remedy.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a Qualified Environmental Professional or PE licensed to practice in New York State will prepare, and include in the PRR, the following certification as per the requirements of NYSDEC's DER-10:

"For each institutional or engineering control 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 institutional and engineering controls required by the remedial program was performed under my direction;*

- *The institutional control and/or engineering control 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;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the site is compliant with the environmental easement.*
- *The engineering control systems are performing as designed and are effective;*
- *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; and*
- *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, [name], of [business address], am certifying as [Owner or Owner's Designated Site Representative] [and I have been authorized and designated by all site owners to sign this certification] for the site."

The signed certification will be included in the PRR.

The PRR will be submitted, in electronic format, to the NYSDEC Project Manager and the NYSDOH Project Manager. The PRR may also need to be submitted in hard-copy format if requested by the NYSDEC Project Manager.

7.3 CORRECTIVE MEASURE WORK PLAN

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an IC or EC or failure to conduct site management activities, a Corrective Measures Work Plan will be submitted to the NYSDEC Project Manager for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC Project Manager.

7.4 REMEDIAL SYSTEM OPTIMIZATION REPORT

If an RSO is to be performed (**Section 6.3**), upon completion of an RSO, an RSO report must be submitted to the NYSDEC Project Manager for approval. A general outline for the RSO report is provided in **Appendix N**. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, Health and Safety Plans, etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A Final Engineering Report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC Project Manager and the NYSDOH Project Manager.

8. REFERENCES

Arcadis. 2018. *Supplemental Pre-Design Summary Report*. Crown Dykman Site, Glen Cove, New York; Arcadis CE, Inc., for: New York State Department of Environmental Conservation, Division of Environmental Remediation. July.

———. 2019. *Focused Feasibility Study*. Crown Dykman Site, Glen Cove, New York; Arcadis CE, Inc., for: New York State Department of Environmental Conservation, Division of Environmental Remediation, November 2019.

———. 2024. *Final Engineering Report Crown Dykman Site, Glen Cove, New York; Arcadis CE, Inc.*, for: New York State Department of Environmental Conservation, Division of Environmental Remediation, May.

Arcadis and Malcolm Pirnie. 2014. *Pre-Design Investigation Report. Crown Dykman Site, Glen Cove, New York; Arcadis/Malcolm Pirnie, Inc.*, for: New York State Department of Environmental Conservation, Division of Environmental Remediation, October 2014.

EA Engineering and Geology, P.C. (EA). 2024a. *Groundwater Monitoring Report (December 2023 Event) Crown Dykman (130054) Glen Cove, New York*. September.

———. 2024b. *Groundwater Monitoring Report (March 2024 Event) Crown Dykman (130054) Glen Cove, New York*. July.

———. 2024c. *Groundwater Monitoring Report (June 2024 Event) Crown Dykman (130054) Glen Cove, New York*. July.

———. 2025. *Groundwater Monitoring Report (September & November 2024 Event) Crown Dykman (130054) Glen Cove, New York*. February.

Kilburn, C. 1979. *Hydrogeology of the Town of North Hempstead, Nassau County, Long Island, New York*: Long Island Water Resources Bulletin 12, 87 p., scale approx.1:107,000.

Malcolm Pirnie. 2006. *Pre-project Management Work Plan Investigation Results – Crown Dykman Site (Site #1-30-054), Glen Cove, New York.* Malcolm Pirnie, Inc., September.

———. 2009. *Remedial Investigation Report – Crown Dykman Site (Site #1-30-054), Glen Cove, New York. Malcolm Pirnie, Inc.* December.

New York State Department of Conservation (NYSDEC). 2010. Crown Dykman Site (Site No. 130054), Record of Decision. March 2010.

———. 2010. DER-10, Technical Guidance for Site Investigation and Remediation. May.

———. 2021. *Crown Dykman Site (Site No. 130054), Amended Record of Decision*. March.

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Appendix A.
Environmental Easement

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New York State Department Environmental Conservation

Property Owner Acknowledgment/Consent for Demolition of the Structure and Remediation of the Property Located at 66 Herbhill Road, City of Glen Cove, Nassau County, New York

ARTICLE 27 OF THE ENVIRONMENTAL CONSERVATION LAW

This agreement made this 22nd day of March, 2021 between BNC REALTY LLC. hereinafter referred to as "OWNER", and the COMMISSIONER OF THE DEPARTMENT OF ENVIRONMENTAL CONSERVATION FOR THE PEOPLE OF THE STATE OF NEW YORK, hereinafter referred to as "DEPARTMENT" pursuant to the above cited law,

WITNESSETH:

WHEREAS, the owner represents as follows:

a. That the OWNER owns the real property, or some right, title or interest therein, which property is referred to as the "Crown Dykman Site" or "Property" or "Site" or some right, title or interest therein, which property has a street address at 66 Herbhill Road, City of Glen Cove, Nassau County, New York and shown on a survey attached as Schedule "A" and being more particularly described within the Deed dated March 3, 2014 which is contained within Appendix "A" attached hereto, and made a part hereof;

b. That said ownership consists of fee title interest which was acquired by the OWNER at the time and in the manner following:

By the Deed dated March 3, 2014 contained within Appendix "A" hereto and recorded in the Office of the Nassau County Clerk on March 26, 2014 at Liber 13058/pages 494-497.

WHEREAS, Environmental Conservation Law (ECL) § 27-1309 (3)-(4) and § 27-1313 (8) authorizes the DEPARTMENT and its contractors (or the duly authorized Responsible Person, its employees, agents, consultants, contractors and subcontractors acting at the direction of the DEPARTMENT, so authorized by the DEPARTMENT in writing) to enter any inactive hazardous waste disposal site and properties near such site to inspect and collect samples, and to implement an inactive hazardous waste disposal site remedial program for such site. This is not a notice that the DEPARTMENT intends to acquire the above specified property nor is it an offer to acquire it.

WHEREAS, the Site is listed in the *Registry of Inactive Hazardous Waste Disposal Sites in New York* State with a Class "2" classification indicating that the Site is a significant threat to the public health or the environment. The DEPARTMENT issued a Record of Decision (the "ROD") for the Site dated March 2010 (the "ROD"). The selected remedy is "Source Area In-

Situ Chemical Oxidation and Natural Attenuation". The DEPARTMENT is conducting a state funded remedial program for the Site.

WHEREAS, the OWNER executed a Consent Order with the DEPARTMENT (Index No. W1-1160-11-11) dated March 5, 2014, which provides for, among other things, compliance with the Environmental Easement for the Site dated March 5, 2014, which provides for, among other things, access to the Site for the purpose of completing the remedial program for the Site, including the design, construction, and maintenance and monitoring of the remedy selected in the ROD, and the restriction of the future use of the Site; exercise of due care as it concerns existing contamination at the Site; cooperation with the DEPARTMENT and the provision of access to the DEPARTMENT in the implementation of response actions at the Site.

WHEREAS, the DEPARTMENT has completed but not yet approved a Focused Feasibility Study for the Site. The DEPARTMENT will prepare and issue a Proposed Amended Record of Decision for the Site, subject to a minimum thirty-day public comment period. Following the public comment period, an Amended Record of Decision for the Site will be issued. The DEPARTMENT anticipates completing a Remedial Design, followed by procurement of a remedial construction contractor to implement the amended remedy for the Site.

WHEREAS, the demolition of the building situated on the Site will allow the DEPARTMENT to remove a greater quantity of contamination beneath the Site building. New York State Division of the Budget approval to procure the contract for the Site building demolition and remediation has been obtained. Barring any unforeseen circumstances, the DEPARTMENT expects that the Office of the New York State Comptroller approval of the Site building demolition and remediation contract will be obtained no later than the third quarter of 2021 and anticipates that procurement and implementation of building demolition and remediation will be substantially completed by the first quarter of 2022. Upon approval, the Office of the New York State Comptroller's approval of the Site building demolition and remediation contract is available on the Office of the New York State Comptroller's website at Open Book NY webpage at https://wwe2.osc.state.ny.us/transparency/contracts/contractsearch.cfm. The DEPARTMENT's building demolition and remediation contract is expected to specify that work must be substantially completed within 124 plus 20 days from when the contract is executed and final completion must be obtained 138 plus 20 days from the effective date of this Agreement. An assessment of the building to support the demolition has been initiated by the DEPARTMENT. The actual schedule is dependent on receipt of Office of New York State Comptroller approval of the Site building demolition and remediation contract described in paragraph 2 below.

WHEREAS, the DEPARTMENT has appropriate funding for the remaining remediation at the Site, including Site building demolition and engineering services. Demolition of the Site building will not commence until the construction contract for the Site's remediation, which will include Site building demolition work, is approved by the Office of the State Comptroller and the DEPARTMENT has provided written notice described in Paragraph 1 and 2(C) below to the OWNER.

NOW **THEREFORE**, SUBJECT to the immediately preceding "WHEREAS" clause and the following terms, the parties hereto agree as follows:

1. Conditioned on the DEPARTMENT providing the Owner with prior written notice by certified mail, return receipt requested as required below sent to:

Lisa Colletti
27 Jaegger Drive
Glen Head, NY 11545

AND VIA EMAIL ONLY TO

Frederick Eisenbud Esq.
feisenbud@cmmllp.com
Campolo, Middleton & McCormick, LLP
4175 Veterans Memorial Highway
Suite 400
Ronkonkoma, New York 11779

Based on the Departments agreement to comply with the requirements of paragraph 2 of this Agreement, OWNER hereby acknowledges and provides consent to the DEPARTMENT for the demolition of the Site building noted on the attached survey and remediation of the property upon which the Site building is located on, to wit:

Site Address: 66 Herbhill Road, City of Glen Cove, Nassau County, New York

Legal Description: Section: 31

Block: G

Lots: 211 and 9

2. The DEPARTMENT hereby agrees as follows:

A. All plans required for remediation of the premises shall be approved by the DEPARTMENT prior to approval of the construction contract for the Site's building demolition and remediation; and

B. To aid OWNER's ability to timely remove property from the building before demolition, and to schedule the timing for the termination of any tenant occupancy of the building, the DEPARTMENT shall provide OWNER with concurrent written notice to the public of the 30 day period for comment on the proposed Amended ROD for the Site, as well as written notice of the DEPARTMENT's issuance of a notice of intent to award the contract for the Site building demolition and remediation of the Site; and

C. Entry on the Site to commence demolition shall not occur less than 90 days from the effective date of this Agreement nor before written notice of commencement of demolition is provided to the OWNER at least fourteen (14) days before demolition is to commence. The Department may provide the minimum fourteen days prior notification for commencement of the Site building demolition work in its written notification that the Comptroller has approved the contract; and

D. Remediation required by the construction contract shall commence promptly upon completion of the demolition of the Site building and shall continue until the DEPARTMENT determines that no further action to complete remediation of the Site is required other than Site management including groundwater monitoring, maintenance of a cover, and additional injections if warranted based on periodic monitoring results; and

E. To promptly remove all construction and demolition debris generated by the demolition of the Site building and to dispose of the debris in accordance with applicable statutory and regulatory requirements; and

F. Any equipment, supplies or materials on-Site at the time of the Site building demolition will be disposed of by the DEPARTMENT's contractor as part of the construction and demolition debris in accordance with applicable laws and regulations; and

G. The building demolition and remediation contract will require that all contaminated soil removed will be replaced with clean fill and properly compacted, all monitoring wells damaged by the demolition and remediation will be properly removed in compliance with DEPARTMENT requirements, or replaced as directed by the DEPARTMENT, and any asphalt removed or damaged in order to complete the demolition or remediation will be replaced by the same thickness and grade of asphalt.

3. The effective date of this Agreement is the date it is signed by the DEPARTMENT's Director, Division of Environmental Remediation (the "DER Director") or the DER Director's designee.

BNC REALTY LLC., OWNER _____

By: Robert Comide

Title: Member

Date: 3/8/21

STATE OF NEW YORK)
) ss:
COUNTY OF)

Deletion Approved

[redacted]

On the 8th day of March in the year 2021, before me, the undersigned, personally appeared Robert Cornide *(full name)* personally known to me who, being duly sworn, did depose and say that he/she/they reside at 66 Herbhill Rd Glen Cove NY *(full mailing address)* and that he/she/they is (are) the Member *(president or other officer or director or attorney in fact duly appointed)* of the BNC Realty LLC *(full legal name of corporation)*, the corporation described in and which executed the above instrument; and that he/she/they signed his/her/their name(s) thereto by the authority of the board of directors of said corporation.

Notary Public, State of New York

KELLYN L CARMONA
NOTARY PUBLIC, STATE OF NEW YORK
NO. 01CA6336370
Qualified in Suffolk County
My Commission Expires Feb 1, 2024

Dated: 3/8/21

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

By: MAR 22 2021
Michael Ryan, P.E.
Director
Division of Environmental Remediation

NASSAU COUNTY CLERK'S OFFICE

ENDORSEMENT COVER PAGE

Recorded Date: 03-19-2014
Recorded Time: 10:22:58 a

Liber Book: D 13055
Pages From: 948
To: 960

Control Number: 359
Ref #: RE 015079
Doc Type: D02 EASEMENT

Location:	Section	Block	Lot	Unit
GLEN COVE (2806)	0031	0000G-00	00009	
GLEN COVE (2806)	0031	0000G-00	00211	

	Taxes Total	.00
	Recording Totals	255.00
MXP001	Total Payment	255.00

THIS PAGE IS NOW PART OF THE INSTRUMENT AND SHOULD NOT BE REMOVED.
MAUREEN O'CONNELL
County Clerk

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 5th day of ~~February~~ March, 2014, between Owner(s) Herbhill Associates, a New York limited partnership, having an office at 66 Herbhill Road, Glen Cove, New York 11542, County of Nassau, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233.

Sec: 31

BK: G

Lots: 9 + 211

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and WHEREAS, in a Record of Decision dated March 2010, the Department set forth a remedy to eliminate or mitigate all significant threats to public health and the environment presented by the Crown Dykman Site currently listed in the Registry of Inactive Hazardous Waste Disposal Sites in New York State as Site Number 130054 ("Site"); and

WHEREAS, the selected remedy for the Site includes, among other things, remediation of contaminated groundwater using in-situ chemical oxidation of the plume area that has the highest amounts of VOC groundwater contamination; using a LNAPL recovery system to address groundwater contamination in a portion of the Site; continued use of the soil vapor extraction/ sub slab depressurization system to address the remaining soil contamination at the Site and to lessen the possibility for soil vapor intrusion; and the placement of an Environmental Easement that will require that the owner (a) comply with the approved SMP that includes an Institutional and Engineering Control Plan, a Monitoring Plan, and an Operation and Maintenance Plan that will provide for the continued proper operation and maintenance of the components of the selected remedy for the Site; (b) restrict the use of groundwater as a source of

potable or process water, without necessary water quality treatment as determined by the Department, New York State Department of Health (NYSDOH) or Nassau County DOH; (c) complete and submit to the Department, a periodic certification regarding institutional and engineering controls; (d) prohibit agriculture or vegetable gardens on the Controlled Property; and (e) limit the use and development of the Site to commercial use, which will also permit industrial use; and

WHEREAS, Grantor, is the owner of real property located at 66 Herbhill Road in the City of Glen Cove, County of Nassau and State of New York, known and designated on the tax map of the County Clerk of Nassau as tax map parcel numbers: Section 31, Block G, Lots 9 and 211, being the same as that property conveyed to Grantor by deed dated December 29, 1980 in Liber 9318 of Deeds at Page 177. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately +/- 1 acre, and is hereinafter more fully described in the Land Title Survey dated September 21, 1994, and revised on March 15, 2013, prepared by A. Agujo Surveying, Inc., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of the Order on Consent and Settlement Agreement dated on or about February 24, 2014, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide access for the construction of the remedy selected in the ROD and performance of operation, maintenance, and/or monitoring; and to provide an effective and enforceable means of ensuring compliance with the restrictions and the performance of the obligations contained herein; and to ensure the potential restriction of future uses of the land for the protection of human health and the environment.

2. Institutional and Engineering Controls. The following controls apply to the use of the Controlled Property, run with the land, are binding run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property:

A. (1) The Controlled Property may be used for commercial uses, as defined in 6 NYCRR Part 375-1.8(g)(2)(iii) and industrial use, as described in 6 NYCRR Part 375-1.8(g)(2)(iv), as long as the following long-term engineering controls are employed:

(i) No activity that will, or could be reasonably to, interfere with the remedial program at the Controlled Property (i.e., damage to the Site, groundwater monitoring wells or soil vapor extraction/sub-slab depressurization systems) and the performance of operation, maintenance, and/or monitoring or otherwise result in an increased threat of harm to human health or the environment, shall be conducted on the Controlled Property without prior written approval from the Department or if the Department shall no longer exist, any New York State agency or agencies subsequently created to protect the environment of the State and the health of the State's citizens, hereinafter referred to as "the Relevant Agency," shall be notified prior to proceeding with any additional work.

(ii) No physical construction, including, inter-alia, excavation below the pavement or buildings, or change of use, as defined in ECL 27-1425, within the Controlled Property shall be undertaken without prior written approval from the Department.

(iii) If there is any construction, or use or occupancy of the Controlled Property, that results in the disturbance or excavation of soils on the Controlled Property, extra caution should be taken to be alert of any previously unidentified environmental conditions that may exist, which include stained soil, odors and fill material. If any suspect material is uncovered, work will be stopped and the Relevant Agency shall be notified prior to proceeding with any additional work.

(iv) Grantors hereby acknowledge that the ROD requires a soil vapor intrusion evaluation if buildings arc developed on the Controlled Property or changes are made to the existing building on the Controlled Property and the provision for mitigation of any impacts identified. Grantors assume on behalf of Grantors and their successors and assigns such evaluation and mitigation with respect to soil vapor intrusion.

(v) The Controlled Property shall not be used for the purposes of agriculture or vegetable gardens.

(vi) The Controlled Property shall not be used as a source of potable or process water, without necessary water quality treatment as determined by the Department; NYSDOH or Nassau County DOH.

B. 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 this Environmental Easement.

C. The Controlled Property shall not be used for Residential or Restricted Residential purposes as defined in 6 NYCRR 375-1.8(g)(2)(i) and (ii), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall annually, or such time as NYSDEC may allow, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable, which may at the Department's sole discretion, include Grantors or Grantors' successors, certifying under penalty of perjury that the institutional controls employed at the Control Property are in-place and are unchanged from the previous certification or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format, that the engineering controls employed at the Controlled Property remain undisturbed and accessible, that nothing has occurred that would impair the ability of such controls to protect the public health and environment or constitute a violation or failure to comply with any Site Management Plan for such controls and the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by

Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: 130054
Office of General Counsel NYSDEC
625 Broadway
Albany, New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

Herbhill Associates

By: Doris Toffler Cohen

Print Name: Doris Toffler Cohen

Title: General Partner

Date: 2/24, 2014

STATE OF FLORIDA)
) ss:
COUNTY OF PALM BEACH)

On the 24 day of FEBRUARY, in the year 2014, before me, the undersigned, personally appeared DORIS T COHEN personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Pamela Blanchard

Signature and Office of Individual taking acknowledgment

Pamela Blanchard
Commission #EE010743
Expires August 16, 2014
Bonded Thru Notary Public Underwriters
Notary Public
State of Florida

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9, Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10, Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Herbhill Associates

By: _____

Print Name: Harold S Samuels

Title: General Partner

Date: 2/24, 2014

STATE OF FLORIDA)
) ss:
COUNTY OF Palm Beach)

On the 24 day of February, in the year 2014, before me, the undersigned, personally appeared Harold Samuels personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Pamela Blanchard
Signature and Office of Individual taking acknowledgment

Pamela Blanchard
Commission Expires 010742
Expires August 16, 2014
Bonded thru Notary Public Underwriters
Notary Public
State of Florida

Herbhill Associates

By: _____

Print Name: AUDREY BAUER

Title: GENERAL PARTNER

Date: 2/24, 2014

STATE OF FLORIDA)
) ss:
COUNTY OF PALM BEACH)

On the 24 day of FEBRUARY, in the year 2014, before me, the undersigned, personally appeared AUDREY BAUER personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Signature and Office of Individual
taking acknowledgment

Pamela Blanchard
Commission # EE 010742
Expires August 16, 2014
Bonded thru Notary Public Underwriters
Notary Public
State of Florida

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
Robert W. Schick, Director
Division of Environmental Remediation

STATE OF NEW YORK)
) ss:
COUNTY OF Albany)

On the 6th day of March, in the year 2014, before me, the undersigned, personally appeared Robert W. Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2014

SCHEDULE "A" PROPERTY DESCRIPTION

Schedule A Description

Title Number **TDA-12-1376** Policy Number: **LX-10196049** Page **1**

ALL that certain plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the City of Glen Cove, County of Nassau, State of New York, and known as Section 31, Block G, Lot 9 and 211 bounded and described as follows:

BEGINNING at a point on the northerly side of Herbhill Road (formerly Garvies Point Boulevard) distant 340.61 feet (tax map) from the corner formed by the intersection of the northerly side of Herbhill Road and the easterly side of Dickson lane;

RUNNING THENCE northerly along the land now or formerly of Konica Imaging U.S.A. as surveyed by Sidney B. Bowne & Son dated September 21, 1994, North 10 degrees 09 minutes 00 seconds West, 240 feet to a point;

THENCE easterly still along lands now or formerly of Konica Imaging U.S.A. as surveyed by Sidney B. Bowne & Son dated September 21, 1994, North 74 degrees 29 minutes 30 seconds East, 178.66 feet (actual) 175.00 feet (tax map) to a point;

THENCE southerly still along the land now or formerly of Konica Imaging U.S.A. as surveyed by Sidney B. Bowne & Son dated September 21, 1994, South 10 degrees 09 minutes 00 seconds East, 250.00 feet to a point on the northerly side of Herbhill Road;

THENCE westerly along the northerly side of Herbhill Road, South 74 degrees, 29 minutes and 30 seconds West, 178.66 feet (actual) 175.00 feet (tax map) to the point or place of BEGINNING.

For information only

Said premises being known as 66 Herbhill Road, Glen Cove, New York 11542

Section 31, Block G, Lots 9 and 211

RECORD AND RETURN TO:
Touchdown Abstract Services, Inc.
350 Moffitt Blvd, 2nd Floor
Islip, New York 11751

MAUREEN O'CONNELL COUNTY CLERK
NASSAU COUNTY CLERK'S OFFICE
E-RECORDED

Appendix B.
List of Site Contacts

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Table 1-1. Contact List for Notifications*

Company/Organization	Contact Person	Title	Primary Phone Number	Secondary Phone Number/Mailing Address		Required Notification**
NYSDEC	Jasmine Stefansky	Project Manager	518-402-9575	625 Broadway Albany, New York 12233-7017	jasmine.stefansky@dec.ny.gov	All Notifications
NYSDEC	Jeffrey Dyber	Chief, Remedial Section D, Remedial Bureau E	518-402-9621	625 Broadway Albany, New York 12233-7017	Jeffrey.dyber@dec.ny.gov	All Notifications
NYSDEC	Alali Tamuno, Esq.	General Counsel	914-803-8152	47-40 21st Street Long Island City, New York 11101-5401	alali.tamuno@dec.ny.gov	All Notifications
NYSDOH	Kristin Kulow	Public Health Specialist	607-353-4335	28 Hill St Suite 201 Oneonta, NY 13820	kristin.kulow@health.ny.gov	Notifications 4, 6, and 7
NYSDOH	Arunesh Ghosh	Public Health Specialist	518-402-7860	Empire State Plaza, Corning Tower Room 1787 Albany, New York 12237	arunesh.ghosh@health.ny.gov	Notifications 4, 6, and 7
EA	Adam Etringer	Project Manager	315-565-6564	333 West Washington Street, Suite 300 Syracuse, New York 13202	aetringer@eaest.com	All Notifications
BNC Realty	Lisa Colletti	Property Owner	516-250-0914	Not available	lcornide@mac.com	All Notifications

Notes:
* Notifications are subject to change and will be updated, as necessary.
** Numbers in this column reference the numbered bullets in the notification list in this section.
NYSDOH = New York State Department of Health

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Appendix C.
Responsibilities of the Owner and Remedial Party

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Responsibilities of the Owner and Remedial Party

The responsibilities for implementing the Site Management Plan (SMP) for the Crown Dykman site, No. 130054, are divided between the site owner(s) and a Remedial Party, as defined below. The owner(s) is/are currently listed as:

BNC Realty, Lisa Colletti.

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party (RP) refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation (NYSDEC) is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf.
The RP is:

NYSDEC

Nothing on this page shall supersede the provisions of an Environmental Easement, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the site.

Site Owner's Responsibilities:

- The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the site.

- In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls and Engineering Controls set forth in an Environmental Easement remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon the RP's request, in order to allow the RP to include the certification in the site's Periodic Review Report (PRR) certification to the NYSDEC.

- In the event the site is delisted, the owner remains bound by the Environmental Easement and shall submit, upon request by the NYSDEC, a written certification that the Environmental Easement is still in place and has been complied with.

- The owner is responsible for the proper maintenance of any installed vapor intrusion mitigation systems associated with the site, as required in Section 5 of the SMP.

- The owner is responsible for conducting a vapor intrusion investigation of the existing site building, if reoccupied, and/or of any new buildings that are constructed on the site.

- The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.

- The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. If damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated in Section 1.3 of the SMP – Notifications.

- If some action or inaction by the owner adversely impacts the site, the owner must notify the site's RP and the NYSDEC in accordance with the time frame indicated in Section 1.3 of the SMP – Notifications and coordinate the performance of necessary corrective actions with the RP.

- The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site property. 6 New York Code of Rules and Regulations Part contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 1.3 of the SMP. A change of use includes, but is not limited to, any activity that may increase direct human or environmental exposure (e.g., day care, school or park). A 60-Day Advance Notification Form and Instructions are found at: http://www.dec.ny.gov/chemical/76250.html.

- In accordance with the tenant notification law, within 15 days of receipt, the owner must supply a copy of any vapor intrusion data, that is produced with respect to structures and that exceeds New York State Department of Health (NYSDOH) or Occupational Safety and Health Administration guidelines on the site, whether produced by the NYSDEC, RP, or owner, to the tenants on the property. The owner must otherwise comply with the tenant and occupant notification provisions of Environmental Conservation Law Article 27, Title 24.

- Until such time as the NYSDEC deems the vapor mitigation system unnecessary, the owner shall operate the system, pay for the utilities and report any maintenance issues to the RP and the NYSDEC.

- In accordance with the tenant notification law, within 15 days of receipt, the owner must supply a copy of any vapor intrusion data, that is produced with respect to structures and that exceeds NYSDOH or Occupational Safety and Health Administration guidelines on the site, whether produced by the NYSDEC, RP, or owner, to the tenants on the property. The owner must otherwise comply with the tenant and occupant notification provisions of Environmental Conservation Law Article 27, Title 24.

- Notification detailing the indoor air investigations must be provided no less than 10 days before tenant occupancy to the respective tenants and the Department. Before occupancy of any kind, NYSDOH must provide an approval letter that indoor air is safe for occupancy.

Remedial Party Responsibilities:

- The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.

- The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.

- Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.

- If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).

- The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html .

- The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section 1.1- Notifications of the SMP.

- Prior to a change in use that impacts the requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.

- Any change in use, change in ownership, change in site classification (e.g., delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the NYSDEC Project Manager to discuss the need to update such documents.

Change in RP ownership and/or control and/or site ownership does not affect the RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future site owners and RPs and their successors and assigns are required to carry out the activities set forth above.

Appendix D.
Soil Boring Logs

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MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-1

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 15.42
PURPOSE	Remedial Investigation					GROUND ELEV. 15.4
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 6/19/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 6/19/07
GROUND WATER DEPTH	6.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	6/19/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
2	38"		0		Gray SAND with fine to coarse Gravel. Dry.	12.4		
4					Brown fine to coarse SAND. Moist.	3.0		
6	60"		0-0.4		Wet.			▼
8								
10						4.4		
12	60"		0-1.9		Orange/brown fine to medium SAND. Wet.	11.0		
14								
16								
18	60"		0-1.8					

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-1
PROJECT Crown Dykman	LOCATION Glen Cove, NY	SHEET 2 OF 2
CLIENT NYSDEC		PROJECT No. 0266351

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
22	60"		0					
24								
26	60"		0					
28								
30						-14.6		
					Gray fine SAND.	30.0		
32	60"		0-0.7					
34						-18.6		
					Gray CLAY, trace sand.	34.0		
						-19.6		
						35.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-2

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 15.04
PURPOSE	Remedial Investigation					GROUND ELEV. 15.0
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 6/20/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 6/20/07
GROUND WATER DEPTH	8.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	6/20/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
2	40"		1.8-7.7		Dark brown fine to medium SAND, trace fine gravel.	13.0		
4					Orange/brown Silty SAND.	2.0 10.0		
6	60"		0.2-2.4		Gray SILT, trace sand.	5.0		▼
8								
10								
12	60"		0.2-2.2			2.0		
14					Gray CLAY.	13.0 0.0		
16	60"		0.1-2.1		Gray SILT, trace sand.	15.0		
18								

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-2
PROJECT **Crown Dykman**	LOCATION **Glen Cove, NY**	SHEET **2** OF **2**
CLIENT **NYSDEC**		PROJECT No. **0266351**

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
22	60"		0.4-8.3					
24						-10.0		
					Gray fine to coarse SAND.	25.0		
26						-12.0		
	60"		0.9-2.2		Orange/brown fine to coarse SAND.	27.0		
28						-15.0		
30						30.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-3

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 17.01
PURPOSE	Remedial Investigation					GROUND ELEV. 17.0
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 6/20/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 6/20/07
GROUND WATER DEPTH	7.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	6/20/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. DEPTH	WELL Constr.	REMARKS
2	60"		0.2-1.3		Brown fine to coarse SAND, trace fine angular gravel. Dry.	15.0		
4					Gray SAND with Silt. Dry.	2.0		
6	60"				Orange/brown SAND, trace silt. Moist.	12.0 5.0		▼
8			0-0.3		Orange/brown SAND, some Silt. Wet.	10.0 7.0		
10	60"				Gray SAND, some Silt, trace fine angular gravel. Wet.	7.0 10.0		
12			0					
14						2.0		
16	60"		0		Gray SAND, some Silt. Wet.	15.0		
18						-3.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-3
PROJECT **Crown Dykman**	LOCATION **Glen Cove, NY**	SHEET **2** OF **2**
CLIENT **NYSDEC**		PROJECT No. **0266351**

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
22	60"		0.3-1.4		Gray SILT, trace sand. Wet.	20.0		
24								
26						-10.0		
28	60"		0.5-1.9		Gray CLAY, trace silt. Wet.	27.0 -12.0		
30					Gray Silty SAND. Wet.	29.0 -13.0 30.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-4

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY		SHEET	1 OF 2
CLIENT	NYSDEC				PROJECT No.	0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.				MEAS. PT. ELEV.	20.62
PURPOSE	Remedial Investigation				GROUND ELEV.	20.6
WELL MATERIAL	N/A				DATUM	NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE / CASING	DATE STARTED	6/20/07
DRILL RIG TYPE	Geoprobe	TYPE	MC		DATE FINISHED	6/20/07
GROUND WATER DEPTH	10.0'	DIA.	"		DRILLER	Jeff
MEASURING POINT	Visual	WEIGHT	#		PIRNIE STAFF	C. Goldsmith
DATE OF MEASUREMENT	6/20/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
0					Brown fine to coarse SAND, trace fine angular gravel. Moist.	19.6		
1					Dark brown Silty SAND, trace fine angular gravel. Moist.	1.0		
2	34"		0-12.8					
3								
4								
5						14.6		
6					Gray Silty SAND. Moist.	6.0		
7	55"		25.9-386			13.1		
8					Black SAND, trace silt. Moist.	7.5		Product at 7.5'
9						11.6		
					Gray Silty SAND, trace fine sub-rounded gravel. Moist.	9.0		
10						10.6		▼
11					Gray SILT. Wet.	10.0		
12	56"		0.3-1.7			8.6		
13					Gray fine to coarse SAND, some fine angular Gravel. Wet.	12.0		
14						6.6		
15					Orange/brown fine to coarse SAND, trace silt. Wet.	14.0		
16								
17	60"		0-2.2			3.1		
18					Brown fine to coarse SAND. Wet.	17.5		
						0.6		

MALCOLM PIRNIE

TEST BORING LOG

BORING No.SB-4

PROJECT **Crown Dykman** | LOCATION **Glen Cove, NY** | SHEET **2** OF **2**

CLIENT **NYSDEC** | PROJECT No. **0266351**

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
22	60"		0		Brown coarse SAND. Moist.	20.0		
24						-4.4		
26					White/brown coarse quartz SAND with fine rounded Gravel. Moist.	25.0		
	60"		0			-6.4		
28					Gray fine SAND. Moist.	27.0		
30						-9.4		
					Gray Silty SAND. Moist.	30.0		
32	60"		0					
34								
36						-15.4		
	60"		0		Gray CLAY. Moist.	36.0		
38						-17.4		
					Gray Silty SAND. Moist.	38.0		
40						-19.4		
						40.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-5

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 21.42
PURPOSE	Remedial Investigation					GROUND ELEV. 21.4
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 6/21/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 6/21/07
GROUND WATER DEPTH	6.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	6/21/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. DEPTH	WELL Constr.	REMARKS
2	36"		0-54		Dark brown fine to medium SAND, trace fine angular gravel. Moist.	19.4		
4					Black-stained medium SAND, trace silt and fine angular gravel. Moist.	2.0		
6						15.4		▼
8	50"		43.8-436		Gray SILT. Wet.	6.0		
10						9.4		
12	52"		1.2-39.6		Gray SAND, some Silt. Wet.	12.0		
14					Orange medium SAND. Wet.	7.4 14.0		
16					Gray SILT. Wet.	5.4 16.0		
18	55"		0-1.7		Orange fine to coarse SAND. Wet.	3.4 18.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-5
PROJECT **Crown Dykman**	LOCATION **Glen Cove, NY**	SHEET **2** OF **2**
CLIENT **NYSDEC**		PROJECT No. **0266351**

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
22	60"		0					
24						-3.6		
					Brown fine SAND. Wet.	25.0		
26	60"		0					
28								
30								
32	60"		0-1.9					
34						-13.6		
					Gray Silty SAND. Wet.	35.0		
36						-15.6		
	60"		0		Gray CLAY.	37.0		
38						-17.6		
					Gray Silty SAND.	39.0		
						-18.6		
40						40.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-6

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 22.03
PURPOSE	Remedial Investigation					GROUND ELEV. 22.0
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 6/21/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 6/22/07
GROUND WATER DEPTH	7.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	6/21/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
2	36"		0-1.1		Brown fine to medium SAND, trace fine to coarse subangular gravel. Moist.	20.0		
4					Gray/black SAND, trace fine subrounded gravel. Moist.	2.0		
6						15.0		
8	50"		0.5-11.7		Orange/brown fine to coarse SAND. Wet.	7.0		▼
10						12.0		
12	55"		1.9-29.9		Gray Silty SAND. Wet.	10.0		
14						7.0		
16	60"		0		Orange/brown fine to coarse SAND. Wet.	15.0		
18								

MALCOLM PIRNIE

TEST BORING LOG

BORING No.SB-6

PROJECT **Crown Dykman** | LOCATION **Glen Cove, NY** | SHEET **2** OF **2**

CLIENT **NYSDEC** | PROJECT No. **0266351**

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV DEPTH	WELL Constr.	REMARKS
22	60"		0			-3.0		
24					Gray SILT, trace fine sand. Wet.	25.0		
26								
28	60"		0					
30						-10.0		
32	60"		0		Gray fine SAND, trace silt. Wet.	32.0		
34								
36						-14.5		
38	60"		0		Gray CLAY, trace silt. Wet.	36.5		
						-16.0		
40					Gray medium SAND. Wet.	38.0		
						-18.0		
						40.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-7

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 17.91
PURPOSE	Remedial Investigation					GROUND ELEV. 17.9
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 6/25/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 6/25/07
GROUND WATER DEPTH	7.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	6/25/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
2	36"		0		Brown fine to coarse SAND, some fine to coarse subrounded Gravel. Moist.			
4								
6						10.9		
8	40"		0-1.6		Brown fine to coarse SAND, some fine to coarse subrounded Gravel. Wet.	7.0		▼
10						7.9		
12	50"		0		Brown fine SAND. Wet.	10.0		
14								
16	55"		0					
18								

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-7
PROJECT Crown Dykman	LOCATION Glen Cove, NY	SHEET 2 OF 2
CLIENT NYSDEC		PROJECT No. 0266351

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
22	55"		0					
24								
26						-8.1		
					Gray CLAY. Wet.	26.0		
	55"		0			-10.1		
28					Gray Silty SAND. Wet.	28.0		
						-12.1		
30						30.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-8

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 22.43
PURPOSE	Remedial Investigation					GROUND ELEV. 22.4
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 6/25/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 6/25/07
GROUND WATER DEPTH	10.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	6/25/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
					Brown SAND, trace fine gravel. Dry.	21.4		
					Black Silty SAND. Moist.	1.0 20.4		
2	32"		0		Brown Silty SAND, trace fine gravel. Moist.	2.0		
4								
6	55"		0			14.4		
8					Orange/brown SAND, some silt. Moist.	8.0		
10								▼
12	50"		0					
14						7.4		
16					No Recovery.	15.0		
18	0"		0			2.4		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-8
PROJECT **Crown Dykman**	LOCATION **Glen Cove, NY**	SHEET **2** OF **2**
CLIENT **NYSDEC**		PROJECT No. **0266351**

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
					Brown SAND, trace silt. Wet.	20.0		
22	50"		0					
24						-2.6		
					Gray SILT, trace sand. Wet.	25.0		
26								
28	60"		0					
						-7.6		
30					Brown fine to coarse SAND, trace silt. Wet.	30.0		
32	60		0					
						-10.6		
					Gray CLAY, trace silt. Wet.	33.0		
34						-12.1		
					Gray Silty SAND. Wet.	34.5		
						-12.6		
						35.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-9

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 23.38
PURPOSE	Remedial Investigation					GROUND ELEV. 23.4
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 6/26/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 6/26/07
GROUND WATER DEPTH	10.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	6/26/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. DEPTH	WELL Constr.	REMARKS
2	36"		0		Brown fine to coarse SAND, some angular fine to coarse Gravel. Dry.	21.4		
4					Orange/brown fine to coarse SAND. Moist.	2.0 18.4		
6	55"		0		Orange/brown Silty SAND. Moist.	5.0 16.4		
8					Concrete Fill.	7.0 15.4		
10	60"		0		Dark Brown fine to coarse SAND. Moist.	8.0 13.4		▼
12					Orange/brown SILT, trace sand. Wet.	10.0 11.4		
14					Gray SILT, trace sand. Wet.	12.0		
16	60"		0					
18								

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-9
PROJECT **Crown Dykman**	LOCATION **Glen Cove, NY**	SHEET **2** OF **2**
CLIENT **NYSDEC**		PROJECT No. **0266351**

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
22	60"		0			1.4		
					Gray CLAY. Wet.	22.0		
24						-1.6		
					Gray SILT. Wet.	25.0		
26	60"		0			-4.6		
28					Gray coarse SAND. Wet.	28.0		
						-6.6		
30						30.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-10

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET	1 OF 2
CLIENT	NYSDEC					PROJECT No.	0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV.	23.54
PURPOSE	Remedial Investigation					GROUND ELEV.	23.5
WELL MATERIAL	N/A					DATUM	NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED	6/26/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED	6/27/07
GROUND WATER DEPTH	7.0'	DIA.	"			DRILLER	Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF	C. Goldsmith
DATE OF MEASUREMENT	6/26/2007	FALL	"				

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
2	60"		0		Brown fine to medium SAND, trace fine angular gravel. Dry.	16.5		▼
6	60"		0-7.8		White/gray fine to coarse quartz SAND. Wet.	7.0 13.5		
10	60"		0		No Recovery.	10.0 8.5		
16	60"		0		Gray fine to medium SAND. Wet.	15.0 3.5		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-10
PROJECT Crown Dykman	LOCATION Glen Cove, NY	SHEET 2 OF 2
CLIENT NYSDEC		PROJECT No. 0266351

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
22	60"		0		Gray fine to medium SAND, trace silt. Wet.	20.0		
24						-1.5		
26	60"		0		Gray fine to medium SAND, some Silt. Wet.	25.0		
28								
30								
32	60"		0			-9.0		
34					Gray CLAY. Wet.	32.5		
36	60"		0		Gray fine to medium SAND, some Silt. Wet.	-11.5		
38						35.0		
40						-16.5		
						40.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-11

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 21.52
PURPOSE	Remedial Investigation					GROUND ELEV. 19.6
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 6/27/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 6/27/07
GROUND WATER DEPTH	9.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Thomas
DATE OF MEASUREMENT	6/27/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
					Asphalt	19.1		
					White fine SAND with coarse angular Gravel. Dry.	0.5 18.6		
2	36"		0		Brown SILT, trace sand and subrounded gravel. Dry, Compact.	1.0 17.6		
					Brown fine to medium SAND, some Silt. Dry, Loose.	2.0 16.1		
4					White Quartz GRAVEL. Dry.	3.5 15.6		
					Brown fine to medium SAND, some Silt. Dry, Compact.	4.0 14.6		
6					Brown/orange medium to coarse SAND, some Silt and subrounded Gravel. Moist, Loose.	5.0		
8	36"		0					
						10.6		▼
10					Light brown medium to coarse SAND. Wet, Loose.	9.0		
12	60"		0					
14						4.6		
					Brown fine to medium SAND, some Silt. Wet, Loose.	15.0		
16								
18	60"		0-0.3			-0.4		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-11
PROJECT **Crown Dykman**	LOCATION **Glen Cove, NY**	SHEET **2** OF **2**
CLIENT **NYSDEC**		PROJECT No. **0266351**

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
					Brown SILT with fine Sand. Wet, Compact.	20.0 -0.9		
					Red/brown medium SAND. Wet, Loose.	20.5 -1.9		
22	60"		3.0-17.7		Brown SILT with fine Sand. Wet, Compact.	21.5 -2.9		
					Red fine to medium SAND. Wet, Loose.	22.5		
24						-5.4		
					Brown SILT with fine Sand. Wet, Compact.	25.0		
26								
	60"		0			-8.4		
28					Gray CLAY. Wet, Compact.	28.0 -9.4		
					Brown SILT with fine Sand. Wet, Compact.	29.0 -10.4		
30						30.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-12

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 22.39
PURPOSE	Remedial Investigation					GROUND ELEV. 16.4
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 6/27/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 6/28/07
GROUND WATER DEPTH	8.5'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Thomas
DATE OF MEASUREMENT	6/27/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
					Asphalt	15.9		
					Brown medium SAND, some pieces of angular Gravel. Dry.	0.5 15.4		
2	30"		0		Orange/brown medium to coarse SAND, trace coarse subrounded quartz Gravel. Dry.	1.0		
4						11.4		
6	18"		0		No Recovery.	5.0		
8						7.9		▼
					Brown medium to coarse SAND. Wet, Loose.	8.5		
10	60"		0		Brown medium to coarse SAND with coarse subrounded quartz gravel. Wet, Loose.	6.4 10.0		
12								
14						1.4		
16	60"		0		Brown medium SAND. Wet, Loose.	15.0		
18						-3.6		

MALCOLM PIRNIE

TEST BORING LOG

BORING No.SB-12

PROJECT **Crown Dykman** | LOCATION **Glen Cove, NY** | SHEET **2** OF **2**

CLIENT **NYSDEC** | PROJECT No. **0266351**

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
22 24	60"		0		Brown medium SAND, trace medium subrounded gravel. Wet, Loose.	20.0 -8.6 25.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-13

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY		SHEET	1 OF 2
CLIENT	NYSDEC				PROJECT No.	0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.				MEAS. PT. ELEV.	20.09
PURPOSE	Remedial Investigation				GROUND ELEV.	20.1
WELL MATERIAL	N/A				DATUM	NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE / CASING	DATE STARTED	9/10/07
DRILL RIG TYPE	Geoprobe	TYPE	MC		DATE FINISHED	9/10/07
GROUND WATER DEPTH	8.0'	DIA.	"		DRILLER	Jeff
MEASURING POINT	Visual	WEIGHT	#		PIRNIE STAFF	C. Goldsmith
DATE OF MEASUREMENT	9/10/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
2	39"		0		Dark brown SAND, trace subrounded gravel and silt. Moist.	16.1		
4					Orange/brown fine SAND, trace subrounded gravel and silt. Moist.	4.0		
6	31"		0					
8						11.6		
10					Gray Silty fine SAND. Wet.	8.5 10.1		
12	37"		7.4-3024		Brown Silty SAND, trace fine angular gravel. Wet.	10.0 7.1		
14					Brown medium SAND. Wet.	13.0 5.1		
16	40"		0-196		White/gray fine to medium SAND. Wet.	15.0		
18						0.1		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-13
PROJECT **Crown Dykman**	LOCATION **Glen Cove, NY**	SHEET **2** OF **2**
CLIENT **NYSDEC**		PROJECT No. **0266351**

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. DEPTH	WELL Constr.	REMARKS
22	50"		0		White/gray fine to coarse SAND, trace fine gravel. Wet.	20.0 -2.9		
24					Gray fine SAND. Wet.	23.0		
26	50"		0					
28								
30						-9.9		
32	50"		0		Gray CLAY, trace sand. Wet.	30.0		
34						-13.9		
					Gray Silty SAND. Wet.	34.0 -14.9		
						35.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-14

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 19.10
PURPOSE	Remedial Investigation					GROUND ELEV. 19.1
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 9/10/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 9/10/07
GROUND WATER DEPTH	9.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	9/10/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. DEPTH	WELL Constr.	REMARKS
2	35"		0		Brown fine to medium SAND, trace subrounded gravel. Moist.			
4								
6	16"		0					
8						10.1		▼
10					Brown fine to medium SAND, trace Silt and subrounded gravel. Wet.	9.0		
12	38"		0					
14						4.1		
16					Gray SILT, trace fine sand. Wet.	15.0		
18	42"		0					
						-0.9		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-14
PROJECT Crown Dykman	LOCATION Glen Cove, NY	SHEET 2 OF 2
CLIENT NYSDEC		PROJECT No. 0266351

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
					Gray Silty SAND. Wet.	20.0		
22	44"		0					
24								
26								
28	48"		0			-9.9		
					Orange/brown fine to medium SAND. Wet.	29.0		
30								
32	40"		0			-13.9		
					Orange/brown fine to coarse SAND. Wet.	33.0		
34								
36								
38	42"		0					
40								
42	43"		0			-24.4		
					Gray CLAY. Moist.	43.5		
44						-25.9		
						45.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-15

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 3
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 19.21
PURPOSE	Remedial Investigation					GROUND ELEV. 19.2
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 9/11/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 9/12/07
GROUND WATER DEPTH	9.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	9/11/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
2	36"		0		Brown fine to medium SAND, some fine subangular Gravel. Moist.	14.2		
4								
6	39"		0		Brown fine to medium SAND, trace fine subangular gravel. Moist.	5.0 10.2		▼
8								
10					Orange/brown fine to coarse SAND. Wet.	9.0 8.2		
12	42"		0		Gray fine to medium SAND. Wet.	11.0		
14						4.2		
16					Gray Silty SAND. Wet.	15.0 2.2		
18	55"		0		Gray fine SAND. Wet.	17.0 -0.8		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-15
PROJECT Crown Dykman	LOCATION Glen Cove, NY	SHEET 2 OF 3
CLIENT NYSDEC		PROJECT No. 0266351

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
					Orange fine to medium SAND. Wet.	20.0		
22	60"		0					
						-4.8		
24					Orange fine to coarse SAND, some fine angular Gravel. Wet.	24.0		
26								
	60"		0					
28								
30								
32	60"		0					
						-14.8		
34					Gray CLAY.	34.0		
					Gray Silty SAND. Wet.	-14.9		
					Orange/brown fine to coarse SAND, trace fine angular gravel. Wet.	34.1		
36						-15.8		
						35.0		
38	60"		0					
40								
42	60"		0					
44								

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-15
PROJECT Crown Dykman	LOCATION Glen Cove, NY	SHEET 3 OF 3
CLIENT NYSDEC		PROJECT No. 0266351

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
48	60"		0					
						-30.8		
50					Orange/brown fine to medium SAND. Wet.	50.0		
52	60"		0					
54						-35.8		
					Brown fine SAND. Wet.	55.0		
56								
	60"		0					
58						-38.8		
					Gray fine SAND. Wet.	58.0		
60						-40.8		
						60.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-16

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 19.48
PURPOSE	Remedial Investigation					GROUND ELEV. 19.5
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 9/12/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 9/12/07
GROUND WATER DEPTH	8.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	9/12/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
2	42"		0		Dark brown fine to coarse SAND, some fine to medium Gravel. Moist.			
4								
6	39"		0					
8								▼
10						9.5		
12	38"		0		Gray fine to coarse SAND, some fine white quartz Gravel. Wet.	10.0		
14								
16								
18	22"		0					

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-16
PROJECT Crown Dykman	LOCATION Glen Cove, NY	SHEET 2 OF 2
CLIENT NYSDEC		PROJECT No. 0266351

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
						-2.5		
22	24"		0		Brown fine SAND. Wet.	22.0		
24								
26	60"		0					
28						-8.5		
					Gray Silty SAND. Wet.	28.0		
						-10.0		
30					Gray CLAY. Wet.	29.5		
						-10.5		
						30.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-17

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 19.57
PURPOSE	Remedial Investigation					GROUND ELEV. 19.6
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 9/12/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 9/12/07
GROUND WATER DEPTH	8.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	9/12/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV / DEPTH	WELL Constr.	REMARKS
2	46"		0		Dark brown Silty SAND, trace fine angular gravel. Moist.	12.6		
6	48"		0		Brown Silty SAND, some fine to medium angular Gravel. Moist.	7.0 / 11.6		▼
8					Brown Silty SAND. Wet.	8.0		
10						7.6		
12	50"		0		Gray/white fine to coarse SAND, some fine to medium quartz angular Gravel. Wet.	12.0		
14								
16								
18	60"		0			1.6		
					Brown fine SAND, trace silt. Wet.	18.0		
						-0.4		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-17
PROJECT Crown Dykman	LOCATION Glen Cove, NY	SHEET 2 OF 2
CLIENT NYSDEC		PROJECT No. 0266351

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
22	60"		0		Gray Silty SAND. Moist.	20.0 -3.9		
24					Gray CLAY, trace fine sand. Moist.	23.5 -4.9		
					Gray Silty SAND. Moist.	24.5 -5.4 25.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-18

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 20.65
PURPOSE	Remedial Investigation					GROUND ELEV. 20.7
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 9/13/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 9/13/07
GROUND WATER DEPTH	8.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	9/13/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
					Asphalt	20.2		
2	30"		0		Brown fine to coarse SAND, some fine angular Gravel. Moist.	0.5		
4						15.7		
6	32"		0		Orange/brown SAND, some fine to medium angular Gravel, trace silt. Moist to Wet.	5.0		▼
8								
10								
12	15"		0					
14						5.7		
					Orange/brown Silty SAND. Wet.	15.0		
16					Brown SILT with Sand. Wet.	5.2 / 15.5		
					Gray CLAY. Moist.	4.2 / 16.5		
18	60"		0			1.7		
					White fine quartz SAND. Wet.	19.0		
					Gray Silty SAND. Wet.	1.2		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-18
PROJECT Crown Dykman	LOCATION Glen Cove, NY	SHEET 2 OF 2
CLIENT NYSDEC		PROJECT No. 0266351

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
						19.5 0.6 20.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-19

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 1
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 14.51
PURPOSE	Remedial Investigation					GROUND ELEV. 14.5
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 9/14/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 9/14/07
GROUND WATER DEPTH	7.5'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	9/14/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
2	38"				Dark brown fine to coarse SAND, trace fine angular gravel. Moist.	12.5		
					Gray Silty SAND, trace fine angular gravel. Moist.	2.0		
4						10.5		
					Orange/brown SAND, some fine to medium Gravel. Moist to Wet.	4.0		
6	60"					7.0		▼
8					Brown/gray Silty SAND, trace fine angular gravel. Wet.	7.5		
						5.3		
					Gray CLAY. Moist.	9.3		
10					Gray Silty SAND. Moist.	4.8		
						9.8		
						4.5		
						10.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-20

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 22.01
PURPOSE	Remedial Investigation					GROUND ELEV. 22.0
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 9/17/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 9/17/07
GROUND WATER DEPTH	9.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	9/17/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
					Concrete	21.0		
2	42"		0		Light brown fine to coarse SAND. Dry.	1.0		
4						17.0		
6	36"		0		Light brown fine to coarse SAND, some white fine angular quartz Gravel. Moist.	5.0		
8						14.0		
10	34"		0		Light brown fine to coarse SAND, some white fine angular quartz Gravel. Wet.	8.0		▼
12								
14								
16	60"		0			4.0		
18					Gray fine to coarse SAND, trace white fine angular quartz gravel. Wet.	18.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-20
PROJECT **Crown Dykman**	LOCATION **Glen Cove, NY**	SHEET **2** OF **2**
CLIENT **NYSDEC**		PROJECT No. **0266351**

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
22	60"		0			-1.0		
					Gray fine Silty SAND. Wet.	23.0		
24						-3.0		
					Brown fine Silty SAND. Wet.	25.0		
26								
	60"		0					
28								
						-8.0		
30					Gray SILT, trace sand. Wet.	30.0		
32	60"		0			-11.0		
					Gray CLAY, trace sand. Moist.	33.0		
34						-13.0		
						35.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-21

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 3
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 21.01
PURPOSE	Remedial Investigation					GROUND ELEV. 21.0
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 9/18/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 9/18/07
GROUND WATER DEPTH	9.0'	DIA.	"			DRILLER Jeff
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	9/18/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
					Asphalt and Gravel.	20.5		
					Brown fine to medium SAND. Dry.	0.5		
2	38"		0					
4								
6								
8	14"		0					▼
						12.0		
					Dark brown fine to medium SAND. Wet.	9.0		
10					Orange/brown fine to coarse SAND.	11.5		
					Wet.	9.5		
12	32"		0					
14								
16								
18	60"		0					

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-21
PROJECT Crown Dykman	LOCATION Glen Cove, NY	SHEET 2 OF 3
CLIENT NYSDEC		PROJECT No. 0266351

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
22	60"		0					
24								
26						-5.0		
					Orange/brown fine SAND. Wet.	26.0		
28	60"		0					
30								
32	60"		0					
34								
36	60"		0			-17.0		
38					Orange/brown fine to medium SAND. Moist.	38.0		
40								
	60"		0					

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-21
PROJECT Crown Dykman	LOCATION Glen Cove, NY	SHEET 3 OF 3
CLIENT NYSDEC		PROJECT No. 0266351

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
	60"		0			-26.0		
					Gray fine SAND.	47.0		
	60"		0			-33.9		
					Gray CLAY (in tip of sample barrel).	54.9		
						-34.0		
						55.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-22

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 21.82
PURPOSE	Remedial Investigation					GROUND ELEV. 21.8
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 10/1/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 10/1/07
GROUND WATER DEPTH	10.0'	DIA.	"			DRILLER Tim
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	10/1/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
					Concrete	21.3		
					Dark brown fine to coarse SAND, trace silt and fine angular gravel. Moist.	0.5		
2	42"		0			18.3		
4					Brown fine SAND, trace silt. Moist.	3.5		
6						15.3		
					Concrete	6.5		
	60"		0-442		Brown fine SAND. Moist.	14.8		
8						7.0		
					Gray with black staining, fine to coarse SAND, some fine to medium angular Gravel, trace silt. Wet.	13.8 / 8.0 / 12.8		
					Gray fine to medium SAND. Moist.	9.0		
10						11.8		
					Gray fine to medium SAND, some Silt. Wet.	10.0		
12	60"		0-350			8.3		
14					Orange/brown fine to coarse SAND, trace fine angular gravel. Wet.	13.5		
16								
	60"		0					
18								

MALCOLM PIRNIE

TEST BORING LOG

BORING No.SB-22

PROJECT **Crown Dykman** | LOCATION **Glen Cove, NY** | SHEET **2** OF **2**

CLIENT **NYSDEC** | PROJECT No. **0266351**

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
						-0.2		
22	60"		0		Orange/brown SILT, some fine Sand. Wet.	22.0		
24								
26						-5.2		
	60"		0		Gray SILT, some fine Sand. Wet.	27.0		
28						-7.8		
30					Gray CLAY, trace fine sand. Moist.	29.6		
						-8.2		
						30.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-23

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 23.80
PURPOSE	Remedial Investigation					GROUND ELEV. 23.8
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 10/2/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 10/2/07
GROUND WATER DEPTH	12.0'	DIA.	"			DRILLER Tim
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	10/2/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV / DEPTH	WELL Constr.	REMARKS
					Black ASPHALT and angular GRAVEL. Dry.	22.8		
2	52"		0		Brown Silty SAND. Dry.	1.0 / 21.3		
					Light brown fine SAND. Dry.	2.5		
4					Brown fine to coarse SAND, trace silt. Dry.	20.8 / 3.0		
6						16.8		
8	60"		0		Brown fine to coarse SAND and fine to coarse round GRAVEL. Dry.	7.0 / 15.8		
					Brown fine to medium SAND, trace fine to coarse subrounded gravel. Dry.	8.0		
10						11.8		
12	60"		0		Dark brown fine to coarse SAND, some fine to coarse rounded Gravel, trace silt. Wet.	12.0		▼
14						8.8		
					Brown fine to coarse SAND. Wet.	15.0		
16								
18	60"		0					

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-23
PROJECT Crown Dykman	LOCATION Glen Cove, NY	SHEET 2 OF 2
CLIENT NYSDEC		PROJECT No. 0266351

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
						2.3		
22	60"		0		White fine to coarse angular Gravel. Wet.	21.5 0.8		
24					Gray fine SAND. Wet.	23.0 -1.2		
26	60"		0		Brown fine Silty SAND. Wet.	25.0 -5.2		
28					Gray fine SAND, trace silt. Moist.	29.0 -7.2		
30					Gray CLAY. Moist.	31.0 -8.2		
32	60"		0		Gray Silty SAND. Moist.	32.0 -10.2		
34					Gray CLAY. Moist.	34.0 -10.7		
					Gray Silty SAND. Moist.	34.5 -11.2 35.0		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-24

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 1
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 13.17
PURPOSE	Remedial Investigation					GROUND ELEV. 13.2
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 10/2/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 10/2/07
GROUND WATER DEPTH	6.0'	DIA.	"			DRILLER Tim
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	10/2/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
					Dark brown SAND, some fine to coarse subangular Gravel. Moist.	12.2		
					Concrete.	1.0		
2	44"		0		Brown fine to coarse SAND, trace fine angular gravel. Moist.	11.8 1.4		
4						8.7		
					Orange/brown fine to coarse SAND, trace fine to coarse angular gravel. Moist.	4.5		
6						7.2		▼
	60"		0		Orange/brown fine to coarse SAND, trace silt and fine to coarse angular gravel. Wet.	6.0		
8								
10						3.2		
					Orange/brown fine to coarse SAND and fine angular GRAVEL. Wet.	10.0		
12	60"		0			1.2		
					Orange/brown Silty SAND. Wet.	12.0		
						-0.3		
14					Gray CLAY. Wet.	13.5		
						-1.8		
						15.0		

MALCOLM PIRNIE

TEST BORING LOG

BORING No.SB-25

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY	SHEET	1 OF 1
CLIENT	NYSDEC			PROJECT No.	0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.			MEAS. PT. ELEV.	13.19
PURPOSE	Remedial Investigation			GROUND ELEV.	13.2
WELL MATERIAL	N/A			DATUM	NAVD88
DRILLING METHOD(S)	Direct Push	SAMPLE	CORE / CASING	DATE STARTED	10/1/07
DRILL RIG TYPE	Geoprobe	TYPE: MC		DATE FINISHED	10/1/07
GROUND WATER DEPTH	7.0'	DIA.: "		DRILLER	Tim
MEASURING POINT	Visual	WEIGHT: #		PIRNIE STAFF	C. Goldsmith
DATE OF MEASUREMENT	10/1/2007	FALL: "			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION (KEY - Color, Major, Minor Moisture, Etc.)	ELEV. / DEPTH	WELL Constr.	REMARKS
					Asphalt. Dry.	12.7		
					Concrete. Dry.	0.5 / 11.7		
					Brown fine to coarse SAND. Dry.	1.5		
2	45"		0		Dark gray/brown SILT, some fine to coarse Sand. Moist.	11.2 / 2.0		
4								
6						6.2		▼
	60"		0		Gray Silty SAND. Wet.	7.0		
8						3.6		
10					Gray CLAY, some Sand. Wet.	9.6		
						3.2 / 10.0		
12	60"		0					
14								

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-26

PROJECT	Crown Dykman	LOCATION	Glen Cove, NY			SHEET 1 OF 2
CLIENT	NYSDEC					PROJECT No. 0266351
DRILLING CONTRACTOR	Aztech Technologies, Inc.					MEAS. PT. ELEV. 15.67
PURPOSE	Remedial Investigation					GROUND ELEV. 15.7
WELL MATERIAL	N/A					DATUM NAVD88
DRILLING METHOD(S)	Direct Push		SAMPLE	CORE	CASING	DATE STARTED 10/2/07
DRILL RIG TYPE	Geoprobe	TYPE	MC			DATE FINISHED 10/2/07
GROUND WATER DEPTH	7.0'	DIA.	"			DRILLER Tim
MEASURING POINT	Visual	WEIGHT	#			PIRNIE STAFF C. Goldsmith
DATE OF MEASUREMENT	10/2/2007	FALL	"			

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
					Light brown fine SAND and fine to coarse subrounded GRAVEL. Dry.	14.7		
					Dark orange/brown fine to medium SAND, trace fine to coarse subrounded gravel.	1.0 13.7		
2	32"		0		Dry.	2.0		
					Gray angular GRAVEL. Dry.	12.7		
4					Orange/brown fine to medium SAND, trace fine angular gravel. Moist.	3.0		
6								
						8.7		▼
8	60"		0		Orange/brown Silty SAND. Wet.	7.0		
10								
12	60"		0					
14								
16								
18	60"		0			-2.3		
					Orange fine SAND. Moist.	18.0		
						-4.3		

MALCOLM PIRNIE	TEST BORING LOG	BORING No.SB-26
PROJECT **Crown Dykman**	LOCATION **Glen Cove, NY**	SHEET **2** OF **2**
CLIENT **NYSDEC**		PROJECT No. **0266351**

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
22	60"		0		Gray fine SAND, trace silt. Moist.	20.0		
24						-9.3		
26	60"		0		Gray SILT, some Sand. Wet.	25.0		
28					Gray CLAY. Wet.	-11.8 27.5		
30						-14.3 30.0		

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Appendix E.
Monitoring Well Construction Diagrams

DRAFT

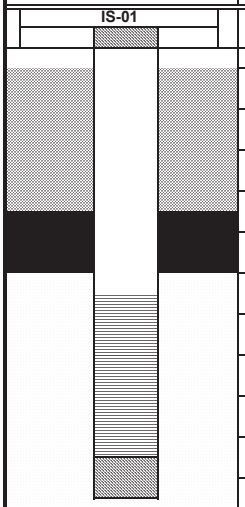
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Injection Well - IS-01

Client: NYSDEC		Depth to Water (ft. from measuring pt.)	Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date / DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)		Measuring Point Elevation
Date Started: 1/13/2022	Date Completed: 1/14/2022		
Completion Depth: 27' 6"	EnviroTrac Scientist: Donald Tesoriero		NM



WELL CONSTRUCTION (NTS)	DEPTH (ft below grade)	SAMPLES Recovery (inches)	SAMPLES Blow per 6 in.	SAMPLES PID (ppm)	SOIL DESCRIPTION
	0	12	NA	4.0	0-5' Brown to dark brown fine grained **SILTY SAND**, with some mixed size gravel. Moist. No odor.
	5	30	NA	24.0	5-10' Light gray medium to fine grained **SILTY SAND**, with some mixed size gravel. Moist. Slight odor.
	10	36	NA	14.4	10-15' Light to dark brown medium to fine grained **SILTY SAND**, with some mixed size gravel. Wet. Slight odor.
	15	45	NA	43.1	15-20' Light gray medium to corse grained **SAND**, with some small gravel. Wet. Slight odor.
	20	38	NA	14.8	20-25' Light gray **SILTY SAND**. Wet. No odor.
	25	22	NA	10.0	25-27' Dark brown **SILTY SAND**, with some small gravel. Wet. No odor.
	30				

LEGEND:
- Concrete Pad
- Grout
- Bentonite Seal
- Gravel Pack (Morie #00)
- Screen Zone
- Sump/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	27'
well Sump:	27-25'
Screen Zone:	25-15'
Morie Sand #00:	27.6"-14'
Bentonite Seals:	14-11'
Grout:	11-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Measured DTW - Depth to Water NA - Not Applicable

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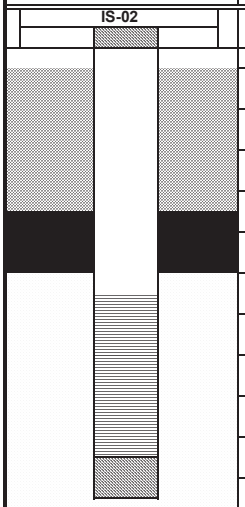
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Injection Well - IS-02

Client: NYSDEC		Depth to Water (ft. from measuring pt.)	Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date / DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)		Measuring Point Elevation
Date Started: 1/13/2022	Date Completed: 1/14/2022		
Completion Depth: 27' 6"	EnviroTrac Scientist: Donald Tesoriero		NM



DEPTH (ft below grade)	SAMPLES Recovery (inches)	SAMPLES Blow per 6 in.	SAMPLES PID (ppm)	SOIL DESCRIPTION
0	30	NA	0.5	0-5' 0-3'= Gray gravel fill material. 3-5'= Light brown medium to fine grained **SAND.** Dry. No odor.
5	30	NA	3.2	5-10' Light to dark brown medium to fine grained **SILTY SAND**, with some small gravel. Moist. No odor.
10	45	NA	2.1	10-15' Light brown to gray medium to corse grained **SAND**, with some small gravel. Moist. No odor.
15	45	NA	1.7	15-20' Dark brown medium to corse grained **SAND**, with small gravel. Wet. No odor.
20	38	NA	32.4	20-25' Light gray **SILTY SAND**. Wet. No odor.
25	22	NA	6.2	25-27' Light gray **SILTY SAND**. Wet. No odor.
30				

LEGEND:
- Concrete Pad
- Grout
- Bentonite Seal
- Gravel Pack (Morie #00)
- Screen Zone
- Sump/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	27'
well Sump:	27-25'
Screen Zone:	25-15'
Morie Sand #00:	27.6"-14'
Bentonite Seals:	14-11'
Grout:	11-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Measured DTW - Depth to Water NA - Not Applicable

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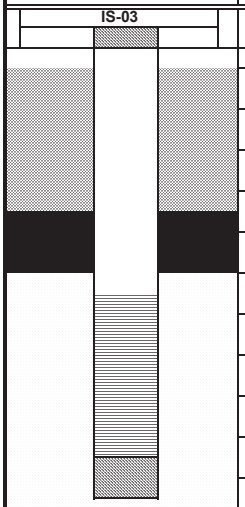
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Injection Well - IS-03

Client: NYSDEC		Depth to Water (ft. from measuring pt.)	Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date / DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)		Measuring Point Elevation
Date Started: 1/13/2022	Date Completed: 1/17/2022		NM
Completion Depth: 27' 6"	EnviroTrac Scientist: Donald Tesoriero		



DEPTH (ft below grade)	SAMPLES Recovery (inches)	SAMPLES Blow per 6 in.	SAMPLES PID (ppm)	SOIL DESCRIPTION
0	18	NA	0.5	0-5' Gray gravel fill material. Dry. No odor.
5	30	NA	236.2	5-10' Light brown medium to fine grained **SILTY SAND**, with some small gravel. Moist. Strong odor.
10	36	NA	98.2	10-15' 10-13'= Light brown medium to fine grained **SILTY SAND**, with some small gravel. 13-15'= Dark brown medium to coarse grained **SAND**, with small gravel. Wet. Slight odor.
15	40	NA	6.3	15-20' Light gray to brown medium to fine grained **SILTY SAND**, with small gravel. Wet. No odor.
20	40	NA	2.2	20-25' Gray fine grained **SILTY SAND**. Wet. No odor.
25	8	NA	2.0	25-27' Gray fine grained **SILTY SAND**. Wet. No odor.
30				

LEGEND:
- Concrete Pad
- Grout
- Bentonite Seal
- Gravel Pack (Morie #00)
- Screen Zone
- Sump/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	27'
well Sump:	27-25'
Screen Zone:	25-15'
Morie Sand #00:	27.6"-14'
Bentonite Seals:	14-11'
Grout:	11-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Measured DTW - Depth to Water NA - Not Applicable

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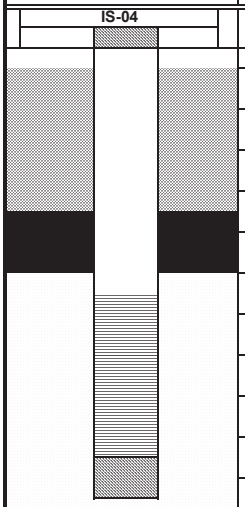
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Injection Well - IS-04

Client: NYSDEC		Depth to Water (ft. from measuring pt.)	Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date / DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)		Measuring Point Elevation
Date Started: 1/13/2022	Date Completed: 1/17/2022		
Completion Depth: 27' 6"	EnviroTrac Scientist: Donald Tesoriero		NM



DEPTH (ft below grade)	SAMPLES Recovery (inches)	SAMPLES Blow per 6 in.	SAMPLES PID (ppm)	SOIL DESCRIPTION
0	18	NA	0.5	0-5' Gray gravel fill material. Dry. No odor.
5	10	NA	177.8	5-10' Light brown medium to fine grained **SILTY SAND**, with some small gravel. Moist. Slight odor.
10	32	NA	12.1	10-15' Light brown fine grained **SILTY SAND**, with some small gravel. Wet. No odor.
15	46	NA	8.7	15-20' Light brown fine grained **SILTY SAND**, with some small gravel. Wet. No odor.
20	50	NA	3.4	20-25' Light brown to gray fine grained **SILTY SAND**, with some small gravel. Wet. No odor.
25	10	NA	2.0	25-27' Light brown to gray fine grained **SILTY SAND**, with some small gravel. Wet. No odor.
30				

LEGEND:
- Concrete Pad
- Grout
- Bentonite Seal
- Gravel Pack (Morie #00)
- Screen Zone
- Sump/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	27'
well Sump:	27-25'
Screen Zone:	25-15'
Morie Sand #00:	27.6"-14'
Bentonite Seals:	14-11'
Grout:	11-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Measured DTW - Depth to Water NA - Not Applicable

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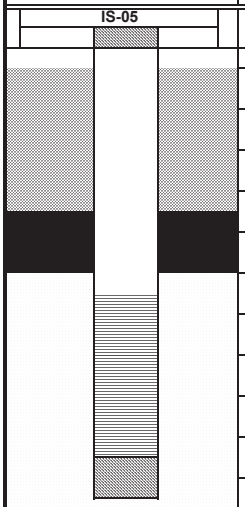
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Injection Well - IS-05

Client: NYSDEC		Depth to Water (ft. from measuring pt.)	Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date / DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)		Measuring Point Elevation
Date Started: 1/17/2022	Date Completed: 1/21/2022		NM
Completion Depth: 27' 6"	EnviroTrac Scientist: Donald Tesoriero		



DEPTH (ft below grade)	SAMPLES Recovery (inches)	SAMPLES Blow per 6 in.	SAMPLES PID (ppm)	SOIL DESCRIPTION
0	22	NA	0.0	0-5' Gray gravel fill material. Dry. No odor.
5	30	NA	0.0	5-10' 5-7'= Brown to tan medium to fine grained **SAND**, with some small gravel. 13-15'= Tan medium to coarse grained **SAND**, with small gravel. Wet. No odor.
10	26	NA	0.0	10-15' Brown to tan medium to coarse grained **SAND**, with small gravel. Wet. No odor.
15	48	NA	0.0	15-20' 15-17'= Tan to brown medium to coarse grained **SAND**, with some small gravel. 17-20'= Brown to gray fine grained **SILTY SAND**. Wet. No odor.
20	48	NA	0.0	20-25' Brown to gray fine grained **SILTY SAND,** with trace medium grained **SAND**. Wet. No odor.
25	8	NA	0.0	25-27' Gray fine grained **SILTY SAND,** trace gray **CLAY.** Wet. No odor.
30				

LEGEND:
- Concrete Pad
- Grout
- Bentonite Seal
- Gravel Pack (Morie #00)
- Screen Zone
- Sump/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	27'
well Sump:	27-25'
Screen Zone:	25-15'
Morie Sand #00:	27.6"-14'
Bentonite Seals:	14-11'
Grout:	11-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Measured DTW - Depth to Water NA - Not Applicable

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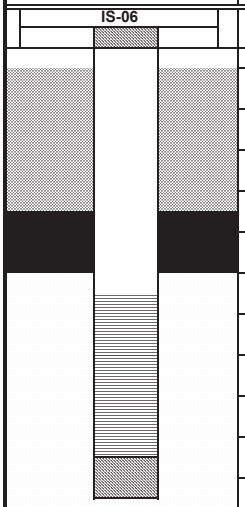
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Injection Well - IS-06

Client: NYSDEC		Depth to Water (ft. from measuring pt.)	Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date / DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)		Measuring Point Elevation
Date Started: 1/17/2022	Date Completed: 1/20/2022		NM
Completion Depth: 27' 6"	EnviroTrac Scientist: Donald Tesoriero		



DEPTH (ft below grade)	SAMPLES Recovery (inches)	SAMPLES Blow per 6 in.	SAMPLES PID (ppm)	SOIL DESCRIPTION
0	13	NA	0.0	0-5' 0-1'= Gray gravel fill material. 1-5'= Brown fine grained **SILTY SAND**. Dry, No odor
5	38	NA	0.0	5-10' 5-7'= Brown fine grained **SAND** with trace medium grained **SAND**, with some small gravel. 7-10'= Brown to tan medium to coarse grained **SAND**, with small gravel. Wet. No odor.
10	33	NA	0.0	10-15' Brown to tan medium to coarse grained **SAND**, with small gravel. Wet. No odor.
15	6	NA	0.0	15-20' Tan medium to coarse grained **SAND**, with some small gravel. Rock fragments noted in sampler. Wet. No odor.
20	36	NA	0.0	20-25' Brown to tan fine to medium grained **SAND,** with some small gravel. Wet. No odor.
25	9	NA	0.0	25-27' Tan to brown fine grained **SILTY SAND,** trace gray **CLAY.** Wet. No odor.
30				

LEGEND:
- Concrete Pad
- Grout
- Bentonite Seal
- Gravel Pack (Morie #00)
- Screen Zone
- Sump/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	27'
well Sump:	27-25'
Screen Zone:	25-15'
Morie Sand #00:	27.6"-14'
Bentonite Seals:	14-11'
Grout:	11-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Measured DTW - Depth to Water NA - Not Applicable

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Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Injection Well - IS-07

Client: NYSDEC		Depth to Water (ft. from measuring pt.)	Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date / DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)		Measuring Point Elevation
Date Started: 1/17/2022	Date Completed: 1/19/2022		NM
Completion Depth: 27' 6"	EnviroTrac Scientist: Donald Tesoriero		

WELL CONSTRUCTION (NTS)	DEPTH (ft below grade)	SAMPLES Recovery (inches)	Blow per 6 in.	PID (ppm)	SOIL DESCRIPTION
IS-07	0	24	NA	0.0	0-5' Gray gravel fill material. Dry. No odor.
	5	14	NA	0.0	5-10' Brown fine grained **SILTY SAND**, with some small gravel. Wet. No odor.
	10	30	NA	0.0	10-15' 10-13'= Brown medium to fine grained **SILTY SAND**, with some small gravel. 13-15'= Tan medium to coarse grained **SAND**, with small gravel. Wet. No odor.
	15	22	NA	0.0	15-20' Brown to tan medium to coarse with some fine grained **SILTY SAND**, with small gravel. Wet. No odor.
	20	40	NA	0.0	20-25' Brown fine grained **SILTY SAND,** with trace medium grained **SAND**. Wet. No odor.
	25	6	NA	0.0	25-27' Gray fine grained **SILTY SAND,** trace gray **CLAY.** Wet. No odor.
	30				

LEGEND:
- Concrete Pad
- Grout
- Bentonite Seal
- Gravel Pack (Morie #00)
- Screen Zone
- Sump/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	27'
well Sump:	27-25'
Screen Zone:	25-15'
Morie Sand #00:	27.6"-14'
Bentonite Seals:	14-11'
Grout:	11-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Measured DTW - Depth to Water NA - Not Applicable

DRAFT

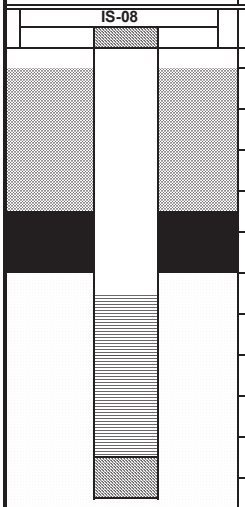
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Injection Well - IS-08

Client: NYSDEC		Depth to Water (ft. from measuring pt.)		Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date	DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)			Measuring Point Elevation
Date Started: 1/18/2022	Date Completed: 2/1/2022			NM
Completion Depth: 27' 6"	EnviroTrac Scientist: Donald Tesoriero			

WELL CONSTRUCTION (NTS)	DEPTH (ft below grade)	SAMPLES Recovery (inches)	SAMPLES Blow per 6 in.	SAMPLES PID (ppm)	SOIL DESCRIPTION
	0	36	NA	0.3	0-5' 0-1'= Gray gravel fill material. 1-5'= Brown medium to fine grained **SAND**, with some small gravel. Dry. No odor.
	5	30	NA	1.1	5-10' Brown medium to fine grained **SAND**, with some small gravel. Moist. No odor.
	10	36	NA	1.6	10-15' 10-12'= Brown medium to fine grained **SAND**, with some small gravel. 12-15'= Gray medium to fine grained **SILTY SAND**. Wet. No odor.
	15	60	NA	0.0	15-20' 15-16'= Gray medium to fine grained **SILTY SAND**. 16-20'= Gray fine grained **SILTY SAND,** with trace **CLAY.** Wet. No odor.
	20	50	NA	0.0	20-25' 20-24'= Gray fine grained **SILTY SAND**, with trace **CLAY**. 24-25'= Light brown medium to fine grained **SAND**. Wet. No odor.
	25	10	NA	0.0	25-27' Light brown medium to fine grained **SAND**. Wet. No odor.
	30				

LEGEND:
- Concrete Pad
- Grout
- Bentonite Seal
- Gravel Pack (Morie #00)
- Screen Zone
- Sump/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	27'
well Sump:	27-25'
Screen Zone:	25-15'
Morie Sand #00:	27.6"-14'
Bentonite Seals:	14-11'
Grout:	11-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Measured DTW - Depth to Water NA - Not Applicable

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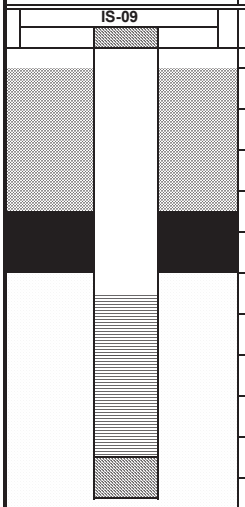
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Injection Well - IS-09

Client: NYSDEC		Depth to Water (ft. from measuring pt.)	Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date / DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)		Measuring Point Elevation
Date Started: 1/18/2022	Date Completed: 1/25/2022		NM
Completion Depth: 27' 6"	EnviroTrac Scientist: Donald Tesoriero		

WELL CONSTRUCTION (NTS)	DEPTH (ft below grade)	SAMPLES Recovery (inches)	SAMPLES Blow per 6 in.	SAMPLES PID (ppm)	SOIL DESCRIPTION
	0	30	NA	0.0	0-5' 0-1'= Gray gravel fill material. 1-5'= Light to dark brown medium to fine grained **SAND**, with some small gravel. Dry. No odor.
	5	30	NA	0.2	5-10' Brown medium to fine grained **SILTY SAND**, with some small gravel. Moist. No odor.
	10	48	NA	0.7	10-15' 10-14'= Light Brown medium to coarse grained **SAND**. 14-15'= Gray fine grained **SILTY SAND**. Wet. No odor.
	15	36	NA	0.0	15-20' 15-17'= Dark brown coarse grained **SAND**. 17-20'= Gray fine grained **SILTY SAND,** with trace **CLAY.** Wet. No odor.
	20	50	NA	0.0	20-25' Gray fine grained **SILTY SAND**, with trace **CLAY**. Wet. No odor.
	25	10	NA	0.0	25-27' Gray fine grained **SILTY SAND**, with trace **CLAY**. Wet. No odor.
	30				

LEGEND:
- Concrete Pad
- Grout
- Bentonite Seal
- Gravel Pack (Morie #00)
- Screen Zone
- Sump/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	27'
well Sump:	27-25'
Screen Zone:	25-15'
Morie Sand #00:	27.6"-14'
Bentonite Seals:	14-11'
Grout:	11-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Measured DTW - Depth to Water NA - Not Applicable

DRAFT

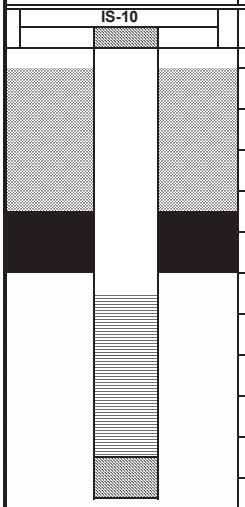
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Injection Well - IS-10

Client: NYSDEC		Depth to Water (ft. from measuring pt.)	Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date / DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)		Measuring Point Elevation
Date Started: 1/17/2022	Date Completed: 1/24/2022		
Completion Depth: 27' 6"	EnviroTrac Scientist: Donald Tesoriero		NM



DEPTH (ft below grade)	SAMPLES Recovery (inches)	SAMPLES Blow per 6 in.	SAMPLES PID (ppm)	SOIL DESCRIPTION
0	30	NA	0.0	0-5' Brown medium to fine grained **SAND,** with some small gravel. Dry. No odor.
5	27	NA	0.0	5-10' Brown to tan medium to coarse with trace fine grained **SAND**, with some small gravel. Moist to wet, No odor.
10	36	NA	0.0	10-15' 10-12'= Tan to brown medium to coarse grained **SAND,** with some small gravel. 12-15'= Brown fine grained **SILTY SAND**. Wet. No odor.
15	45	NA	0.0	15-20' Gray fine grained **SILTY SAND.** Wet. No odor.
20	48	NA	0.0	20-25' Gray to brown fine grained **SILTY SAND,** with trace medium grained **SAND**. Wet. No odor.
25	12	NA	0.0	25-27' Brown medium to coarse grained **SAND,** with some small gravel. Wet. No odor.
30				

LEGEND:
- Concrete Pad
- Grout
- Bentonite Seal
- Gravel Pack (Morie #00)
- Screen Zone
- Sump/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	27'
well Sump:	27-25'
Screen Zone:	25-15'
Morie Sand #00:	27.6"-14'
Bentonite Seals:	14-11'
Grout:	11-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Measured DTW - Depth to Water NA - Not Applicable

DRAFT

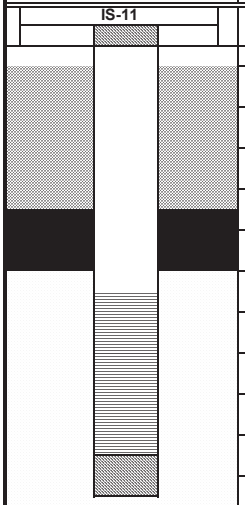
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Injection Well - IS-11

Client: NYSDEC		Depth to Water (ft. from measuring pt.)	Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date / DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)		Measuring Point Elevation
Date Started: 1/17/2022	Date Completed: 1/24/2022		
Completion Depth: 27' 6"	EnviroTrac Scientist: Donald Tesoriero		NM



DEPTH (ft below grade)	SAMPLES Recovery (inches)	SAMPLES Blow per 6 in.	SAMPLES PID (ppm)	SOIL DESCRIPTION
0	28	NA	0.0	0-5' Brown medium to fine grained **SAND,** with some small gravel. Dry. No odor.
5	27	NA	0.0	5-10' Brown to black medium to coarse grained **SAND**, with some small gravel. Moist to wet, No odor.
10	40	NA	0.0	10-15' 10-13'= Tan medium to coarse grained **SAND,** with some small gravel. 13-15'= Brown fine grained **SILTY SAND**. Wet. No odor.
15	28	NA	0.0	15-20' Gray fine grained **SILTY SAND.** Wet. No odor.
20	30	NA	0.0	20-25' Brown medium to fine grained **SAND,** with some small grave**l.** Wet. No odor.
25	10	NA	0.0	25-27' Brown to gray fine grained **SILTY SAND.** Wet. No odor.
30				

LEGEND:
- Concrete Pad
- Grout
- Bentonite Seal
- Gravel Pack (Morie #00)
- Screen Zone
- Sump/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	27'
well Sump:	27-25'
Screen Zone:	25-15'
Morie Sand #00:	27.6"-14'
Bentonite Seals:	14-11'
Grout:	11-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Measured DTW - Depth to Water NA - Not Applicable

DRAFT

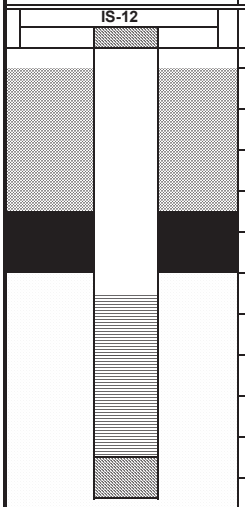
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Injection Well - IS-12

Client: NYSDEC		Depth to Water (ft. from measuring pt.)	Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date / DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)		Measuring Point Elevation
Date Started: 1/17/2022	Date Completed: 1/20/2022		NM
Completion Depth: 27' 6"	EnviroTrac Scientist: Donald Tesoriero		



DEPTH (ft below grade)	SAMPLES Recovery (inches)	SAMPLES Blow per 6 in.	SAMPLES PID (ppm)	SOIL DESCRIPTION
0	36	NA	0.0	0-5' Brown medium to fine grained **SAND,** with some small gravel. Dry. No odor.
5	31	NA	0.0	5-10' Brown to black medium to coarse grained **SAND**, with some small gravel. Moist, No odor.
10	60	NA	0.0	10-15' 10-12'= Tan medium to coarse grained **SAND,** with some small gravel. 12-15'= Brown fine grained **SILTY SAND,** with trace medium grained **SAND**, with small gravel. Wet. No odor.
15	60	NA	0.0	15-20' 15-17'= Gray fine grained **SILTY SAND**. 17-20'= Orange medium to coarse with trace fine grained **SAND**, with small gravel. Wet. No odor.
20	18	NA	0.0	20-25' Gray fine grained **SILTY SAND.** Wet. No odor.
25	9	NA	0.0	25-27' Gray fine grained **SILTY SAND.** Wet. No odor.
30				

LEGEND:
- Concrete Pad
- Grout
- Bentonite Seal
- Gravel Pack (Morie #00)
- Screen Zone
- Sump/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	27'
well Sump:	27-25'
Screen Zone:	25-15'
Morie Sand #00:	27.6"-14'
Bentonite Seals:	14-11'
Grout:	11-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Measured DTW - Depth to Water NA - Not Applicable

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TEST BORING LOG

BORING No.IW-02

PROJECT **Crown Dykman**	LOCATION **Glen Cove, NY**	SHEET **1** OF **1**	
CLIENT **NYSDEC**		PROJECT No. **00266417.0000**	
DRILLING CONTRACTOR **LAWES**		MEAS. PT. ELEV.	
PURPOSE **Injection Wells**		GROUND ELEV.	
WELL MATERIAL **Stainless steel**		DATUM	
DRILLING METHOD(S) **Direct push**	SAMPLE / CORE / CASING	DATE STARTED **10/19/15**	
DRILL RIG TYPE	TYPE	DATE FINISHED **10/19/15**	
GROUND WATER DEPTH **8.0'**	DIA. **"**	DRILLER **Kevin**	
MEASURING POINT	WEIGHT **#**	PIRNIE STAFF **B. Quaglieri**	
DATE OF MEASUREMENT	FALL **"**		

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Moisture, Etc.	ELEV. DEPTH	WELL Constr.	REMARKS
2	5		0		Concrete, coring device was used.	0.3		
4					Brown, Medium-fine grained SAND with trace pieces of brick, and trace sub-rounded, high sphericity gravel. Dry.			Neat cement 0-6'
6					Light Brown, Fine grained SAND. Moist. Odor present.	5.0		6.0
8	3.2		493.2		White, Sub-rounded, High sphericity GRAVEL, with trace brown, medium grained sand. Moist.	7.0		Choke sand 6-8'
10					Brown Medium grained SAND. Wet. Odor present.	7.2		8.0
12	3.5		4427		Brown Medium grained SAND. Very wet. Odor present.	10.0		
14					Gray Fine grained SAND. Wet. Odor present.	12.6		Filter pack sand 8-20'
16					Gray Medium-fine grained SAND. Wet. Odor present.	13.1		
18	3.2		42.5		Gray, Medium-fine grained SAND, with some iron precipitation. Wet. Odor present.	14.5		
20					White, Sub-rounded, High sphericity GRAVEL, with trace gray medium grained sand. Wet.	15.0		
					White and Light brown, Sub-rounded, High sphericity GRAVEL. Wet.	15.8		
					White, Sub-rounded, High sphericity GRAVEL. Wet.	16.1		
					White and Light brown, Sub-rounded, High sphericity GRAVEL, with trace gray medium grained sand. Wet.	18.9		20.0
						20.0		

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TEST BORING LOG

BORING No.IW-03

PROJECT **Crown Dykman**	LOCATION **Glen Cove, NY**	SHEET **1** OF **1**	
CLIENT **NYSDEC**		PROJECT No. **00266417.0000**	
DRILLING CONTRACTOR **LAWES**		MEAS. PT. ELEV.	
PURPOSE **Injection Wells**		GROUND ELEV.	
WELL MATERIAL **Stainless steel**		DATUM	
DRILLING METHOD(S) **Direct push**	SAMPLE / CORE / CASING	DATE STARTED **10/19/15**	
DRILL RIG TYPE	TYPE	DATE FINISHED **10/19/15**	
GROUND WATER DEPTH **8.0'**	DIA. **"**	DRILLER **Kevin**	
MEASURING POINT	WEIGHT **#**	PIRNIE STAFF **B. Quaglieri**	
DATE OF MEASUREMENT	FALL **"**		

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION (KEY - Color, Major, Minor Moisture, Etc.)	ELEV. DEPTH	WELL Constr.	REMARKS
2	5		0		Concrete, coring device was used.	0.3		
4					Brown, Medium-fine grained SAND with trace pieces of brick, and trace sub-rounded, high sphericity gravel. Dry.			Neat cement 0-5'
6	3.8		366.8		Brown, Medium-fine grained SAND. Moist. Odor present.	5.0		
8					Gray, Medium-fine grained SAND. Moist. Odor present.	6.1		Choke sand 5-7'
10	2.5		183.3		White and brown, Sub-rounded, High sphericity GRAVEL with some gray medium grained sand. Moist. Odor present.	6.9 7.4		
12					Gray, medium-fine grained SAND. Moist. Odor present.	10.0		
14					Gray, medium-fine grained SAND. Wet. Odor present.			
16	3.7		4.3		White and brown, Sub-rounded, High sphericity GRAVEL with Some Gray Medium grained Sand. Wet. Odor present.	14.3 15.0		Filter pack sand 7-19'
18					Red-brown Medium grained SAND with some iron precipitation. Very wet. Odor present.	16.3 17.3		
					Red-brown Medium-fine grained SAND with some iron precipitation. Wet. Odor present.	19.1		
					Red-brown Medium-fine grained SAND with some iron precipitation. Very wet. Odor present.	19.3 20.0		
					White, Sub-rounded, High sphericity GRAVEL with some iron precipitation. Wet. Odor present.			
					Red-brown, Medium grained SAND with some iron precipitation. Very wet. Odor present.			

5.0
7.0
19.0

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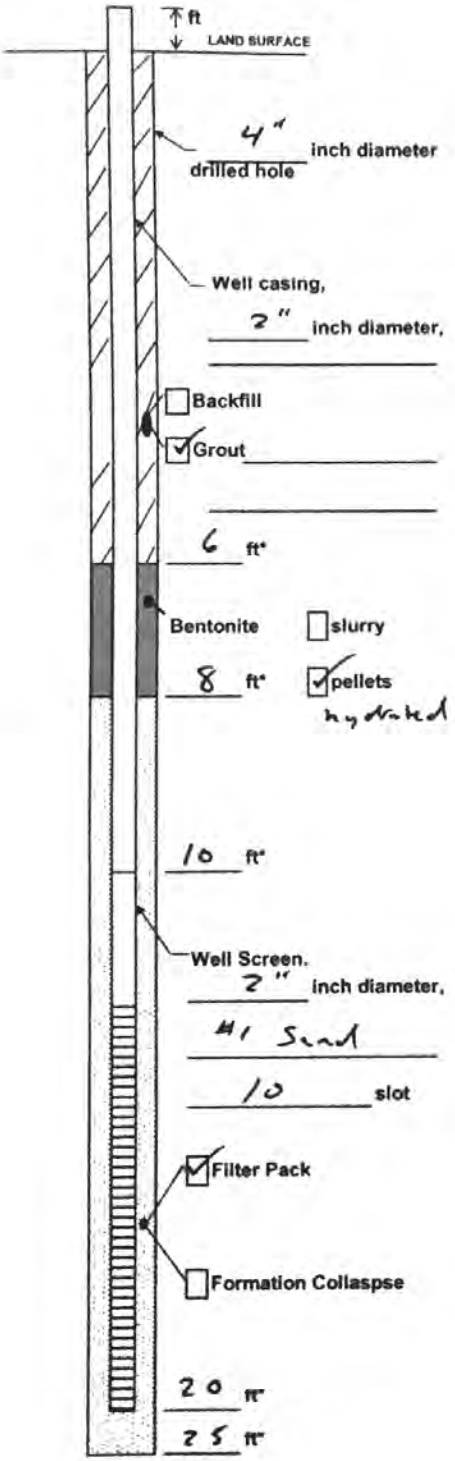
Well Construction Log

(Unconsolidated)



Project Name and No. Crown Dykman 0026647.0000

Well MW-4R Town/City Glen Cove

County _____ State NY

Permit No. _____

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 11/1/17

Drilling Method Direct Push

Drilling Contractor LAWES

Drilling Fluid N/A

Development Technique(s) and Date(s)

Fluid Loss During Drilling _____ gallons

Water Removed During Development ~55 gallons

Static Depth to Water _____ feet below M.P.**

Pumping Depth to Water _____ feet below M.P.**

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring Well

Remarks _____

* Depth Below Land Surface

**Measuring Point is Top of Well Casing Unless Otherwise Noted.

Prepared by ES

ARCADIS

Sample Log (Cont.d)

Well/Boring MW-412 Project Name and No. Crown Dykman 00266417.0000

Prepared By ES 11/1/17 1305 7822DT 5' macro direct push

Sample Depth (feet below land surface) From	To	Sample Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample Description	PID (ppm)
0'	1'			Asphault ~ 7" / Concrete ~10"	0
1'	5'			Tan Coarse sand w/ small pebbles	0
5'	10'	2'		Tan Coarse Sand w/ small pebbles	0
10'	15'	3'		light Tan Pale Coarse Sand w/ small pebbles	0
		↓		and some med pebbles	↓
15'	20'	4.5'		Same as Above	0
20'	23'	4'		Same as Above	0
23'	25'	↓		Grey fine Sand w/ little silt	0

Water @ ~3 ft.

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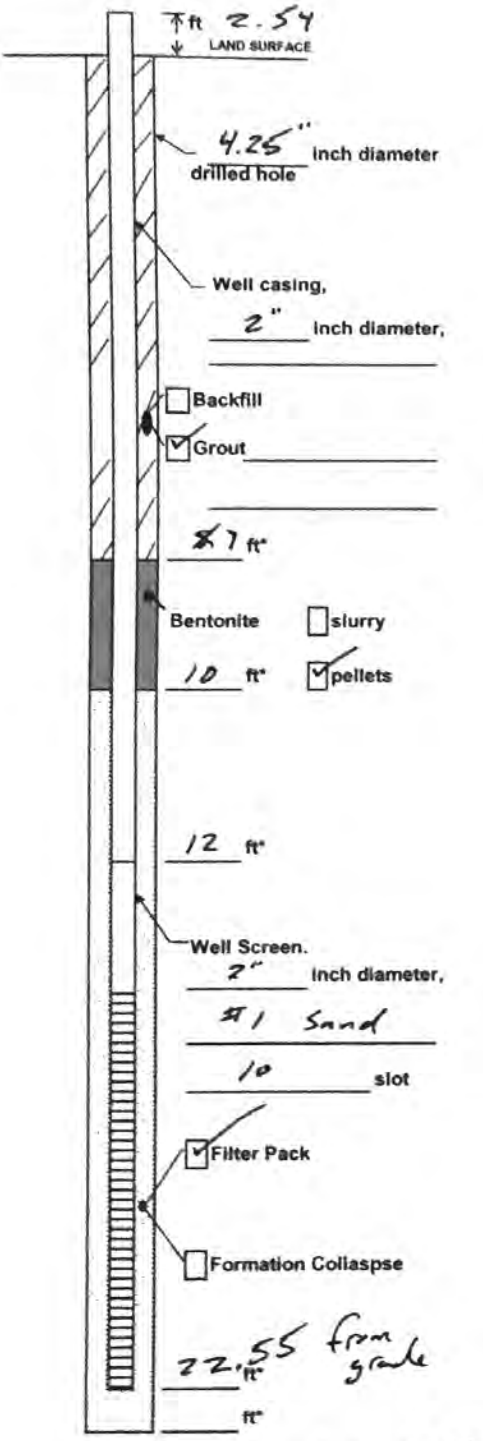
Well Construction Log
(Unconsolidated)



Project Name and No. Crown Dykman 002664I2.0000

Well MW-5R Town/City Glen Cove

County _____ State NY

Permit No. _____

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 11/3/17

Drilling Method 4.25" HSA

Drilling Contractor LAWES

Drilling Fluid _____

Development Technique(s) and Date(s)

Surge and Purge 11/3/17

Fluid Loss During Drilling _____ gallons

Water Removed During Development ~30 gallons

Static Depth to Water _____ feet below M.P.**

Pumping Depth to Water _____ feet below M.P.**

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring Well

Remarks _____

* Depth Below Land Surface

**Measuring Point is Top of Well Casing Unless Otherwise Noted.

Prepared by ES

ARCADIS Page 1 of ____

Sample Log (Cont.d)

Well/Boring MW-5R Project Name and No. Crown Dykman 00266417.0000

Prepared By ED 11/1/17 0855 LAWES - 7822DT

5' Macro core

Sample Depth (feet below land surface) From	To	Sample Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample Description	PID (ppm)
0	3'	3		Dark brown silty sand w/ some med gravel and small pebbles	0
3'	5'	2		Grey Silty ~~Clay~~ Sand w/ small gravel	
5'	7~~8~~'	4.5		Grey Silty Sand w/ small gravel and Pebbles	0
~~7~~	~~8~~			Water ~~table~~ @ ~6' (~~perched~~ perched on dense silt)	
~~7~~ 7'	8'			Grey Silt w/ mottling	0
8'	10'			Dense Brown Silt w/ some small gravel, mottling observed	0
10'	11'	4.5		Dense Brown Silt transitioning to Med Brown Silty Sand	0
~~11~~					0
11'	13'			Dense Grey Silt w/ some small pebbles	
13'	14'			Coarse Grey Sand w/ med gravel	
				Water Table @ ~13'	
14'	15'			Off White/Tan fine silty Sand w/ some small pebbles and	
15	18'	3.5		Same as above	0
18'	20'			Brown fine Sand w/ silt some small gravel and pebbles	

Precleared w/ hand tools

11/1/17 0855

10/31/17

Sample Log (Cont.d)

Well/Boring MW-5R Project Name and No. _____

Prepared By ES

Sample Depth (feet below land surface) From	To	Sample Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample Description	PID (ppm)
20'	25'	4.5		Med Sand w/ small pebbles	0
		↓		and gravel throughout, Tan in color	↓
		↓		very saturated	↓
25'	26'	2'		Tan fine sand w/ small gravel	0
26'	30'	↓		Grey Silty Clay, Dense	↓

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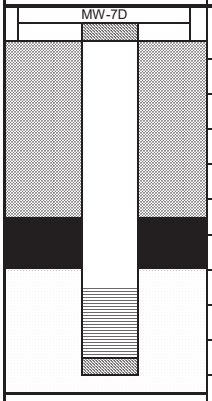
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Monitoring Well - MW-7D

Client: NYSDEC		Depth to Water (ft. from measuring pt.)		Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date	DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)			Measuring Point Elevation
Date Started: 2/2/2022	Date Completed: 2/2/2022			
Completion Depth: 24'	EnviroTrac Scientist: Donald Tesoriero			NM

WELL CONSTRUCTION (NTS)	DEPTH (ft below grade)	SAMPLES Recovery (Inches)	SAMPLES Blow per 6 in.	SAMPLES PID (ppm)	SOIL DESCRIPTION
	0	50	NA	2.7	0-5' 0-2' = Dark brown to red medium to fine grained **SAND**, with mixed size gravel. 2-5' = Gray gravel fill material. Dry. No odor.
	5	40	NA	1.8	5-10' Dark to light brown medium to coarse grained **SAND**, with small sized gravel. Dry. No odor.
	10	60	NA	3.1	10-15' 10-12' = Dark to light brown medium to coarse grained SAND, with small sized gravel. 12-13' = Cobble. 13-15' = Red to dark brown medium to fine grained **SILTY SAND**. Moist. No odor.
	15	60	NA	1.1	15-20' Red to light brown medium to fine grained **SILTY SAND**. Wet. No odor.
	20				20-25' Red to light brown medium to fine grained **SILTY SAND**. Wet. No odor.
	25				

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	24'
Screen Zone:	24-19'
Morie Sand #00:	24-18'
Bentonite Seals:	18-15'
Grout:	15-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Monitored DTW - Depth to Water NA - Not Applicable

DRAFT

Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Monitoring Well - MW-7 (R)S

Client: NYSDEC		Depth to Water (ft. from measuring pt.)		Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date	DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)			Measuring Point Elevation
Date Started: 2/2/2022	Date Completed: 2/2/2022			
Completion Depth: 19'	EnviroTrac Scientist: Donald Tesoriero			NM

WELL CONSTRUCTION (NTS)	DEPTH (ft below grade)	SAMPLES Recovery (Inches)	Blow per 6 in.	PID (ppm)	SOIL DESCRIPTION
MW-7S	0	40	NA	1.8	0-5' 0-2' = Dark brown to red medium to fine grained **SAND**, with mixed size gravel. 2-5' = Gray gravel fill material. Dry. No odor.
	5	35	NA	3.1	5-10' light to dark brown medium to coarse grained **SAND**, with small sized gravel. Dry. No odor.
	10	60	NA	2.6	10-15' Red to dark brown medium to fine grained **SILTY SAND,** with some gravel and cobble. Moist. No odor.
	15	60	NA	1.1	15-20' Red to light brown medium to fine grained **SILTY SAND**. Wet. No odor.
	20				

Grout
Bentonite Seal
Gravel Pack (Morie #00)
Screen Zone
End/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	19'
Screen Zone:	19-9'
Morie Sand #00:	19-8'
Bentonite Seals:	8-5'
Grout:	5-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Monitored DTW - Depth to Water NA - Not Applicable

DRAFT

Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Monitoring Well - MW-25(R)D

Client: NYSDEC		Depth to Water (ft. from measuring pt.)		Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date	DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)			Measuring Point Elevation
Date Started: 1/28/2022	Date Completed: 1/28/2022			
Completion Depth: 27'	EnviroTrac Scientist: Donald Tesoriero			NM

WELL CONSTRUCTION (NTS)	DEPTH (ft below grade)	SAMPLES Recovery (Inches)	SAMPLES Blow per 6 in.	SAMPLES PID (ppm)	SOIL DESCRIPTION
MW-25D	0	40	NA	0.9	0-5' 0-2' = Gray gravel fill material. 2-5' = Brown medium to fine grained SAND. Dry. No odor.
	5	30	NA	2.3	5-10' Dark to light brown medium to fine grained **SAND**, with small sized gravel. Dry. No odor.
	10	60	NA	2.0	10-15' 10-12' = Dark to light brown medium to fine grained SAND, with small sized gravel. 12-15' = Gray medium to fine grained **SILTY SAND**, with trace **CLAY**. Moist. No odor.
	15	60	NA	2.6	15-20' Dark brown medium to fine grained **SILTY SAND,** with some small gravel**.** Wet. No odor.
	20	30		0.1	20-25' Dark brown to gray fine grained **SILTY SAND,** with some small gravel**.** Wet. No odor.
	25	30		0.2	20-25' Dark brown to gray fine grained **SILTY SAND,** with some small gravel**.** Wet. No odor.
	30				

Grout
Bentonite Seal
Gravel Pack (Morie #00)
Screen Zone
End/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	27'
Screen Zone:	27-17'
Morie Sand #00:	27-16'
Bentonite Seals:	16-13'
Grout:	13-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Monitored DTW - Depth to Water NA - Not Applicable

DRAFT

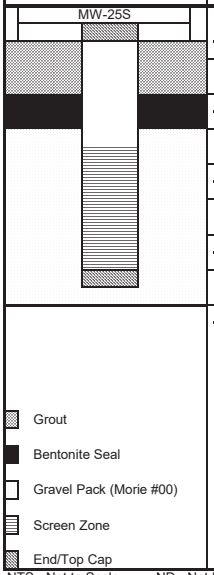
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Monitoring Well - MW-25 (R)S

Client: NYSDEC		Depth to Water (ft. from measuring pt.)		Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date	DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)			Measuring Point Elevation
Date Started: 1/28/2022	Date Completed: 1/28/2022			
Completion Depth: 17'	EnviroTrac Scientist: Donald Tesoriero			NM

WELL CONSTRUCTION (NTS)	DEPTH (ft below grade)	SAMPLES Recovery (Inches)	Blow per 6 in.	PID (ppm)	SOIL DESCRIPTION
	0	36	NA	1.6	0-5' 0-3' = Gray gravel fill material. 2-5' = Dark brown medium to fine grained SAND, with mixed size gravel. Dry. No odor.
	5	40	NA	2.8	5-10' light to dark brown medium to fine grained **SAND**. Moist. No odor.
	10	60	NA	1.9	10-15' 10-12' = Gray fine grained **SILTY SAND**, with trace **CLAY**. 12-15' = Brown medium to fine grained **SILTY SAND**. Wet. No odor.
	15	20	NA	0.2	15-18' Light brown medium to fine grained **SILTY SAND**. Wet. No odor.
	20				
Grout Bentonite Seal Gravel Pack (Morie #00) Screen Zone End/Top Cap					Well Construction Details: Screen material: 2" Sch 40 PVC 10 Slot Casing material: 2" Sch 40 PVC Bottom of Well: 17' Screen Zone: 17-7' Morie Sand #00: 17-6' Bentonite Seals: 6-3' Grout: 3-1' Concrete: 1-0'

NTS - Not to Scale ND - Not Detected NM - Not Monitored DTW - Depth to Water NA - Not Applicable

DRAFT

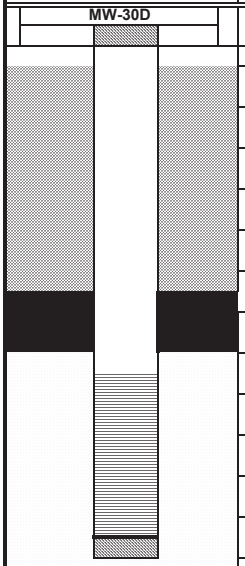
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Injection Well - MW-30D

Client: NYSDEC		Depth to Water (ft. from measuring pt.)		Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date	DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)			Measuring Point Elevation
Date Started: 1/18/2022	Date Completed: 1/28/2022			NM
Completion Depth: 30'	EnviroTrac Scientist: Donald Tesoriero			

WELL CONSTRUCTION (NTS)	DEPTH (ft below grade)	SAMPLES Recovery (inches)	Blow per 6 in.	PID (ppm)	SOIL DESCRIPTION
	0	36	NA	0.0	0-5' 0-1' = Gray gravel fill material. 1-5' = Brown medium to fine grained **SAND**, with some small size gravel. Dry. No odor.
	5	24	NA	2.2	5-10' Red to brown medium to fine grained **SILTY SAND**, with some small gravel. Moist, No odor.
	10	40	NA	0.3	10-15' 10-12'= Red to brown medium to fine grained **SILTY SAND**, with some small gravel. 12-15'= Gray fine grained **SILTY SAND,** with trace **CLAY**. Wet. No odor.
	15	60	NA	0.0	15-20' Gray fine grained **SILTY SAND**, with trace **CLAY**. Wet. No odor.
	20	40	NA	0.0	20-25' Gray fine grained **SILTY SAND**, with trace **CLAY**. Wet. No odor.
	25	40	NA	0.0	25-30' Brown medium to coarse grained SAND, with some small gravel. Wet. No odor.
	30				

LEGEND:
- Concrete Pad
- Grout
- Bentonite Seal
- Gravel Pack (Morie #00)
- Screen Zone
- Sump/Top Cap

Well Construction Details:

Screen material:	2" Sch 40 PVC 10 Slot
Casing material:	2" Sch 40 PVC
Bottom of Well:	30'
Screen Zone:	30-20'
Morie Sand #00:	30.6"-19'
Bentonite Seals:	19-16'
Grout:	16-1'
Concrete:	1-0'

NTS - Not to Scale ND - Not Detected NM - Not Measured DTW - Depth to Water NA - Not Applicable

DRAFT

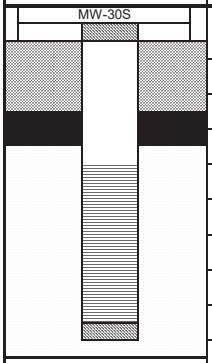
Geologic Log & Well Construction Details

EnviroTrac Ltd.

5 Old Dock Road, Yaphank, NY, 11980

Log of Monitoring Well - MW-30S

Client: NYSDEC		Depth to Water (ft. from measuring pt.)		Site Elevation Datum
Site Name: Former Crown Dykman.	Address: 66 Herb Hill Road, Glen Cove, NY	Date	DTW	NM
Drilling Company: Associated Environmental Services Ltd.	Method: Geo-Probe (Hollow Stem Augers)			Measuring Point Elevation
Date Started: 1/18/2022	Date Completed: 1/27/2022			NM
Completion Depth: 20'	EnviroTrac Scientist: Donald Tesoriero			

WELL CONSTRUCTION (NTS)	DEPTH (ft below grade)	SAMPLES Recovery (Inches)	SAMPLES Blow per 6 in.	SAMPLES PID (ppm)	SOIL DESCRIPTION
	0	40	NA	1.8	0-5' 0-2' = Dark brown to red medium to fine grained **SAND**, with mixed size gravel. 2-5' = Gray gravel fill material. Dry. No odor.
	5	35	NA	3.1	5-10' light to dark brown medium to coarse grained **SAND**, with small sized gravel. Dry. No odor.
	10	60	NA	2.6	10-15' Red to dark brown medium to fine grained **SILTY SAND,** with some gravel and cobble. Moist. No odor.
	15	60	NA	1.1	15-20' Red to light brown medium to fine grained **SILTY SAND**. Wet. No odor.
	20				
Grout Bentonite Seal Gravel Pack (Morie #00) Screen Zone End/Top Cap					Well Construction Details: Screen material: 2" Sch 40 PVC 10 Slot Casing material: 2" Sch 40 PVC Bottom of Well: 20' Screen Zone: 20-10' Morie Sand #00: 20.6"-9' Bentonite Seals: 9-6' Grout: 6-1' Concrete: 1-0'

NTS - Not to Scale ND - Not Detected NM - Not Monitored DTW - Depth to Water NA - Not Applicable

Appendix F.
Remaining Soil Contamination

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Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	BLUE-GREEN-CLAY	BOILER-PIT-3-5	EAST-AREA-BOTTOM	EAST-AREA-BOTTOM	EAST-AREA-E-SIDEWALL
				Sample ID	BLUE-GREEN-CLAY-20211216	BOILER-PIT-3-5-20210924	EAST-AREA-BOTTOM-20220112	EAST-AREA-BOTTOMME-20220112	EAST-AREA-EAST-SIDEWALL-20220112
				Sample Date	12/16/2021	9/24/2021	1/12/2022	1/12/2022	1/12/2022
				Start Depth	0	3	0	0	0
				End Depth	0	5	0	0	0
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 23.7 U	< 23.7 U	< 31 U	--	< 28.7 U
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 23.7 U	< 23.7 U	< 31 U	< 3100 UD	< 28.7 U
Acetone	67-64-1	**50**	500000	ug/kg	**100**	**150**	< 31 U	< 3100 UD	33.5
Benzene	71-43-2	60	44000	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
Bromoform	75-25-2	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
Bromomethane	74-83-9	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
Carbon Disulfide	75-15-0	--	--	ug/kg	< 4.7 U	2.1 J	< 6.2 U	< 620 UD	< 5.7 U
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
CFC-11	75-69-4	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
CFC-12	75-71-8	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
Chloroethane	75-00-3	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
Chloroform	67-66-3	370	350000	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
Chloromethane	74-87-3	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	< 4.7 U	24.2	9.6	< 620 UD	< 5.7 U
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
Cyclohexane	110-82-7	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
Dichloromethane	75-09-2	50	500000	ug/kg	< 9.5 U	16.6	< 12.4 U	< 1200 UD	< 11.5 U
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 4.7 U	< 4.7 U	5.9 J	< 620 UD	2.1 J
Isopropylbenzene	98-82-8	--	--	ug/kg	< 4.7 U	< 4.7 U	27.8	< 620 UD	6.9
m&p-Xylenes	--	--	--	ug/kg	< 9.5 U	< 9.5 U	28.5	< 1200 UD	2.2 J
Methyl Acetate	79-20-9	--	--	ug/kg	< 4.7 U	7.3	< 6.2 U	< 620 UD	< 5.7 U
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 23.7 U	< 23.7 U	< 31 U	< 3100 UD	< 28.7 U
Methylcyclohexane	108-87-2	--	--	ug/kg	< 4.7 U	< 4.7 U	2.9 J	< 620 UD	17.4
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
o-Xylene	95-47-6	--	--	ug/kg	< 4.7 U	< 4.7 U	4.9 J	< 620 UD	< 5.7 U
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	< 4.7 U	11.2	--	--	1.7 J
Toluene	108-88-3	700	500000	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 4.7 U	< 4.7 U	< 6.2 U	< 620 UD	< 5.7 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 4.7 U	2 J	5.2 J	< 620 UD	< 5.7 U
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 4.7 U	2.5 J	< 6.2 U	< 620 UD	< 5.7 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	EAST-SIDEWALL	LAUNDRY ROOM	LAUNDRY ROOM	NAPL-01	NAPL-01
				Sample ID	EAST-SIDEWALL-20211207	LAUNDRYROOM-PIT-BOTTOM-20211207	LAUNDRYROOM-PIT-BOTTOM-20211207	NAPL-01-(8-10)-END-POINT-20210913	NAPL-01-(8-10)-END-POINTME-20210913
				Sample Date	12/7/2021	12/7/2021	12/7/2021	9/13/2021	9/13/2021
				Start Depth	0	0	0	8	8
				End Depth	0	0	0	10	10
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 24 U	< 20.7 U	< 20.2 U	< 18.8 U	< 960 UD
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 24 U	< 20.7 U	< 20.2 U	< 18.8 U	< 960 UD
Acetone	67-64-1	**50**	500000	ug/kg	**75**	< 20.7 U	< 20.2 U	**74.9**	< 960 UD
Benzene	71-43-2	60	44000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Bromochloromethane	74-97-5	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Bromodichloromethane	75-27-4	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Bromoform	75-25-2	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Bromomethane	74-83-9	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Carbon Disulfide	75-15-0	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
CFC-11	75-69-4	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
CFC-12	75-71-8	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Chloroethane	75-00-3	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Chloroform	67-66-3	370	350000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Chloromethane	74-87-3	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	--	**620 D**
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Cyclohexane	110-82-7	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Dichloromethane	75-09-2	50	500000	ug/kg	< 9.6 U	< 8.3 U	< 8.1 U	< 7.5 U	< 380 UD
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	1.9 J	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Isopropylbenzene	98-82-8	--	--	ug/kg	3.3 J	< 4.1 U	< 4 U	8.2	< 190 UD
m&p-Xylenes	--	--	--	ug/kg	< 9.6 U	< 8.3 U	< 8.1 U	< 7.5 U	< 380 UD
Methyl Acetate	79-20-9	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 24 U	< 20.7 U	< 20.2 U	< 18.8 U	< 960 UD
Methylcyclohexane	108-87-2	--	--	ug/kg	9.7	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
o-Xylene	95-47-6	--	--	ug/kg	1.7 J	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	--	1300 D
Toluene	108-88-3	700	500000	ug/kg	1.5 J	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 4.8 U	< 4.1 U	< 4 U	< 3.8 U	< 190 UD
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	--	280 D
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 4.8 U	< 4.1 U	< 4 U	15.7	< 190 UD

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	NAPL-01	NAPL-01	NAPL-02	NAPL-02	NAPL-02
				Sample ID	NAPL-AREA-01-(18-20)-20210913	NAPL-AREA-01-(25-27)-20210913	NAPL-02-(8-10)-END-POINT-20210913	NAPL-02-(8-10)-END-POINTME-20210913	NAPL-02-(8-10)-END-POINTME-20210913
				Sample Date	9/13/2021	9/13/2021	9/13/2021	9/13/2021	9/13/2021
				Start Depth	18	25	8	8	8
				End Depth	20	27	10	10	10
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 5.2 U	< 4.8 U	2.8 J	< 190 UD	--
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 26.2 U	< 24.1 U	< 19.6 U	< 930 UD	--
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 26.2 U	< 24.1 U	< 19.6 U	< 930 UD	--
Acetone	67-64-1	**50**	500000	ug/kg	**110**	16.1 J	< 19.6 U	< 930 UD	--
Benzene	71-43-2	60	44000	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Bromochloromethane	74-97-5	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Bromodichloromethane	75-27-4	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Bromoform	75-25-2	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Bromomethane	74-83-9	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Carbon Disulfide	75-15-0	--	--	ug/kg	< 5.2 U	1.8 J	0.89 J	< 190 UD	--
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
CFC-11	75-69-4	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
CFC-12	75-71-8	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Chloroethane	75-00-3	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Chloroform	67-66-3	370	350000	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Chloromethane	74-87-3	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	< 5.2 U	130	--	--	**8800 D**
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Cyclohexane	110-82-7	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Dichloromethane	75-09-2	50	500000	ug/kg	< 10.5 U	< 9.6 U	< 7.8 U	< 370 UD	--
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Isopropylbenzene	98-82-8	--	--	ug/kg	2.1 J	< 4.8 U	3.6 J	< 190 UD	--
m&p-Xylenes	--	--	--	ug/kg	< 10.5 U	< 9.6 U	< 7.8 U	< 370 UD	--
Methyl Acetate	79-20-9	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 26.2 U	< 24.1 U	< 19.6 U	< 930 UD	--
Methylcyclohexane	108-87-2	--	--	ug/kg	< 5.2 U	< 4.8 U	4.1	< 190 UD	--
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
o-Xylene	95-47-6	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	26.6	1.1 J	--	**2600 D**	--
Toluene	108-88-3	700	500000	ug/kg	< 5.2 U	< 4.8 U	1.2 J	< 190 UD	--
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 5.2 U	1.4 J	22.6	< 190 UD	--
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 5.2 U	< 4.8 U	< 3.9 U	< 190 UD	--
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 5.2 U	1.1 J	--	**1400 D**	--
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 5.2 U	1.1 J	--	--	--

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	NAPL-02	NAPL-02	NAPL-02	NAPL-03	NAPL-03
				Sample ID	NAPL-AREA-02-(25-27)-20210913	NAPL-AREA-02-(25-27)ME-20210913	NAPL-AREA-02-(5-8)-20210913	NAPL-AREA-03-(10-12)-END-POINT-20210914	NAPL-AREA-03-(25-27)-20210914
				Sample Date	9/13/2021	9/13/2021	9/13/2021	9/14/2021	9/14/2021
				Start Depth	25	25	5	10	25
				End Depth	27	27	8	12	27
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	5.2	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 25.6 U	< 1300 UD	< 20.5 U	< 21.5 U	< 22.9 U
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 25.6 U	< 1300 UD	< 20.5 U	< 21.5 U	< 22.9 U
Acetone	67-64-1	**50**	500000	ug/kg	44.2	< 1300 UD	< 20.5 U	< 21.5 U	22 J
Benzene	71-43-2	60	44000	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Bromoform	75-25-2	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Bromomethane	74-83-9	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Carbon Disulfide	75-15-0	--	--	ug/kg	2.4 J	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
CFC-11	75-69-4	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
CFC-12	75-71-8	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Chloroethane	75-00-3	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Chloroform	67-66-3	370	350000	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Chloromethane	74-87-3	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	--	**4700 D**	9.2	100	32
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Cyclohexane	110-82-7	--	--	ug/kg	9.9	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Dichloromethane	75-09-2	50	500000	ug/kg	< 10.2 U	< 520 UD	< 8.2 U	< 8.6 U	< 9.2 U
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Isopropylbenzene	98-82-8	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
m&p-Xylenes	--	--	--	ug/kg	< 10.2 U	< 520 UD	< 8.2 U	< 8.6 U	< 9.2 U
Methyl Acetate	79-20-9	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	1.3 J
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 25.6 U	< 1300 UD	< 20.5 U	< 21.5 U	< 22.9 U
Methylcyclohexane	108-87-2	--	--	ug/kg	4.3 J	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
o-Xylene	95-47-6	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	4.9 J	--	3.3 J	11.7	4.6
Toluene	108-88-3	700	500000	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	40.2	--	< 4.1 U	< 4.3 U	< 4.6 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 5.1 U	< 260 UD	< 4.1 U	< 4.3 U	< 4.6 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	18.5	< 260 UD	< 4.1 U	10.2	4.3 J
Vinyl chloride	75-01-4	**20**	13000	ug/kg	1.5 J	< 260 UD	1.3 J	15.4	10.3

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	NAPL-03	NAPL-03	NAPL-03	NAPL-04	NAPL-04
				Sample ID	NAPL-AREA-03-(8-10)-20210914	NAPL-AREA-03-(8-10)ME-20210914	NAPL-AREA-03-(8-10)ME-20210914	NAPL-AREA-04-(25-27)-20210914	NAPL-AREA-04-(25-27)ME-20210914
				Sample Date	9/14/2021	9/14/2021	9/14/2021	9/14/2021	9/14/2021
				Start Depth	8	8	8	25	25
				End Depth	10	10	10	27	27
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	3 J	< 210 UD	--	< 5.3 U	< 350 UD
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 22.6 U	< 1000 UD	--	< 26.7 U	< 1800 UD
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 22.6 U	< 1000 UD	--	< 26.7 U	< 1800 UD
Acetone	67-64-1	**50**	500000	ug/kg	32.6	< 1000 UD	--	20 J	< 1800 UD
Benzene	71-43-2	60	44000	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Bromochloromethane	74-97-5	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Bromodichloromethane	75-27-4	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Bromoform	75-25-2	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Bromomethane	74-83-9	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Carbon Disulfide	75-15-0	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
CFC-11	75-69-4	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
CFC-12	75-71-8	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Chloroethane	75-00-3	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Chloroform	67-66-3	370	350000	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Chloromethane	74-87-3	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	--	--	**12200 D**	--	**490 D**
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Cyclohexane	110-82-7	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Dichloromethane	75-09-2	50	500000	ug/kg	< 9.1 U	< 420 UD	--	< 10.7 U	< 700 UD
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Isopropylbenzene	98-82-8	--	--	ug/kg	1.3 J	< 210 UD	--	< 5.3 U	< 350 UD
m&p-Xylenes	--	--	--	ug/kg	< 9.1 U	< 420 UD	--	< 10.7 U	< 700 UD
Methyl Acetate	79-20-9	--	--	ug/kg	1.3 J	< 210 UD	--	1.6 J	< 350 UD
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 22.6 U	< 1000 UD	--	< 26.7 U	< 1800 UD
Methylcyclohexane	108-87-2	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
o-Xylene	95-47-6	--	--	ug/kg	0.99 J	< 210 UD	--	< 5.3 U	< 350 UD
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	--	**3100 D**	--	--	380 D
Toluene	108-88-3	700	500000	ug/kg	1.9 J	< 210 UD	--	< 5.3 U	< 350 UD
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	24.7	< 210 UD	--	1.6 J	< 350 UD
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 4.5 U	< 210 UD	--	< 5.3 U	< 350 UD
Trichloroethene	79-01-6	**470**	200000	ug/kg	--	**3200 D**	--	100	--
Vinyl chloride	75-01-4	**20**	13000	ug/kg	--	**230 D**	--	10.9	< 350 UD

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location Sample ID Sample Date Start Depth End Depth Units	NAPL-04 NAPL-AREA-04-(5-7)-20210914 9/14/2021 5 7	NAPL-04 NAPL-AREA-04-(5-7)ME-20210914 9/14/2021 5 7	NAPL-04 NAPL-AREA-04-(8-10)-END-POINT-20210914 9/14/2021 8 10	NAPL-04 NAPL-AREA-04-(8-10)-END-POINTME-20210914 9/14/2021 8 10	NAPL-05 NAPL-05-(20-22)-20210915 9/15/2021 20 22
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 20.4 U	< 1200 UD	< 20.6 U	< 1200 UD	< 21.5 U
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 20.4 U	< 1200 UD	< 20.6 U	< 1200 UD	< 21.5 U
Acetone	67-64-1	**50**	500000	ug/kg	< 20.4 U	< 1200 UD	12.5 J	< 1200 UD	< 21.5 U
Benzene	71-43-2	60	44000	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Bromoform	75-25-2	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Bromomethane	74-83-9	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Carbon Disulfide	75-15-0	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	1.8 J
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
CFC-11	75-69-4	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
CFC-12	75-71-8	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Chloroethane	75-00-3	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Chloroform	67-66-3	370	350000	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Chloromethane	74-87-3	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	--	**1000 D**	--	--	1.2 J
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Cyclohexane	110-82-7	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Dichloromethane	75-09-2	50	500000	ug/kg	< 8.2 U	< 470 UD	< 8.3 U	< 500 UD	< 8.6 U
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Isopropylbenzene	98-82-8	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
m&p-Xylenes	--	--	--	ug/kg	< 8.2 U	< 470 UD	< 8.3 U	< 500 UD	< 8.6 U
Methyl Acetate	79-20-9	--	--	ug/kg	1.2 J	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 20.4 U	< 1200 UD	< 20.6 U	< 1200 UD	< 21.5 U
Methylcyclohexane	108-87-2	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
o-Xylene	95-47-6	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	16	--	27.8	< 250 UD	23.5
Toluene	108-88-3	700	500000	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	2.3 J	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 4.1 U	< 230 UD	< 4.1 U	< 250 UD	< 4.3 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	27.4	--	22.1	< 250 UD	1.4 J
Vinyl chloride	75-01-4	**20**	13000	ug/kg	**120**	--	**21.7**	< 250 UD	< 4.3 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	NAPL-05	NAPL-05	NAPL-05	NAPL-06	NAPL-06
				Sample ID	NAPL-05-(29-31)-20210915	NAPL-5-SIDEWALL-END-POINT-(10-12)-202109	NAPL-5-SIDEWALL-END-POINT-(10-12)-202109	NAPL-06-(15-18)-20210916	NAPL-06-(30-32)-20210916
				Sample Date	9/15/2021	9/15/2021	9/15/2021	9/16/2021	9/16/2021
				Start Depth	29	10	10	15	30
				End Depth	31	12	12	18	32
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 24.7 U	< 1100 U	--	< 960 U	< 24.6 U
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 24.7 U	< 1100 U	--	< 960 U	< 24.6 U
Acetone	67-64-1	**50**	500000	ug/kg	24.5 J	< 1100 U	--	< 960 U	34
Benzene	71-43-2	60	44000	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Bromoform	75-25-2	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Bromomethane	74-83-9	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Carbon Disulfide	75-15-0	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
CFC-11	75-69-4	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
CFC-12	75-71-8	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Chloroethane	75-00-3	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Chloroform	67-66-3	370	350000	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Chloromethane	74-87-3	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	9.2	--	**37800 D**	**1000**	7
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Cyclohexane	110-82-7	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Dichloromethane	75-09-2	50	500000	ug/kg	< 9.9 U	< 440 U	--	< 390 U	< 9.8 U
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 4.9 U	59.6 J	--	< 190 U	< 4.9 U
Isopropylbenzene	98-82-8	--	--	ug/kg	< 4.9 U	59 J	--	< 190 U	< 4.9 U
m&p-Xylenes	--	--	--	ug/kg	< 9.9 U	160 J	--	< 390 U	< 9.8 U
Methyl Acetate	79-20-9	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 24.7 U	< 1100 U	--	< 960 U	< 24.6 U
Methylcyclohexane	108-87-2	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	3.3 J
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
o-Xylene	95-47-6	--	--	ug/kg	< 4.9 U	170 J	--	< 190 U	< 4.9 U
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	100	--	**88500 D**	< 190 U	< 4.9 U
Toluene	108-88-3	700	500000	ug/kg	< 4.9 U	46.8 J	--	< 190 U	< 4.9 U
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 4.9 U	**210 J**	--	< 190 U	< 4.9 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 4.9 U	< 220 U	--	< 190 U	< 4.9 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	9.6	--	**19100 D**	60.7 J	< 4.9 U
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 4.9 U	**200 J**	--	**71 J**	2.8 J

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

DRAFT

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location Sample ID Sample Date Start Depth End Depth Units	NAPL-06 NAPL-06-(8-10)-END-POINT-20210916 9/16/2021 8 10	NAPL-07 NAPL-07-(15-18)-20210916 9/16/2021 15 18	NAPL-07 NAPL-07-(22-24)-20210916 9/16/2021 22 24	NAPL-07 NAPL-07-(8-10)-END-POINT-20210916 9/16/2021 8 10	NE-CORNER-EXC-E NORTH-EAST-CORNER-EXCAVATION-EAST-SIDEWA 1/12/2022 0 0
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 1100 U	< 22 U	< 22.4 U	< 1000 U	< 27 U
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 1100 U	< 22 U	< 22.4 U	< 1000 U	< 27 U
Acetone	67-64-1	**50**	500000	ug/kg	< 1100 U	< 22 U	12.4 J	< 1000 U	11.5 J
Benzene	71-43-2	60	44000	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	1.1 J
Bromoform	75-25-2	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
Bromomethane	74-83-9	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
Carbon Disulfide	75-15-0	--	--	ug/kg	< 220 U	< 4.4 U	3 J	< 200 U	< 5.4 U
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
CFC-11	75-69-4	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
CFC-12	75-71-8	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
Chloroethane	75-00-3	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
Chloroform	67-66-3	370	350000	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	9.5
Chloromethane	74-87-3	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	< 220 U	88.2	8.3	< 200 U	< 5.4 U
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
Cyclohexane	110-82-7	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	1.8 J
Dichloromethane	75-09-2	50	500000	ug/kg	< 450 U	< 8.8 U	< 8.9 U	< 400 U	8.2 J
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	**1200**	< 4.4 U	< 4.5 U	230	< 5.4 U
Isopropylbenzene	98-82-8	--	--	ug/kg	1500	3.7 J	< 4.5 U	1100 Q	< 5.4 U
m&p-Xylenes	--	--	--	ug/kg	7000	< 8.8 U	< 8.9 U	< 400 U	< 10.8 U
Methyl Acetate	79-20-9	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 1100 U	< 22 U	< 22.4 U	< 1000 U	< 27 U
Methylcyclohexane	108-87-2	--	--	ug/kg	530	2.5 J	< 4.5 U	340	< 5.4 U
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
o-Xylene	95-47-6	--	--	ug/kg	1100	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	< 220 U	1.4 J	21.6	< 200 U	4.7 J
Toluene	108-88-3	700	500000	ug/kg	53.5 J	< 4.4 U	< 4.5 U	< 200 U	1.8 J
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 220 U	< 4.4 U	< 4.5 U	< 200 U	< 5.4 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 220 U	3.2 J	4.3 J	< 200 U	< 5.4 U
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 220 U	6.8	< 4.5 U	< 200 U	< 5.4 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

DRAFT

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location / Sample ID / Sample Date / Start Depth / End Depth / Units	NE-CORNER-EXC-N NORTH-EAST-CORNER-EXCAVATION-NORTH-SIDEW 1/12/2022 0 0	NE-CORNER-EXC-N NORTH-EAST-CORNER-EXCAVATION-NORTH-SIDEW 1/12/2022 0 0	NE-CORNER-EXC-S NORTH-EAST-CORNER-EXCAVATION-SOUTH-SIDEW 1/12/2022 0 0	NE-CORNER-EXC-W NORTH-EAST-CORNER-EXCAVATION-WEST-SIDEWA 1/12/2022 0 0	Post-Ex-Bottom POST-EXCAVATION-BOTTOM-1-20211220 12/20/2021 0 0
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	**130**	< 1300 UD	< 23.8 U	< 26.6 U	< 23.6 U
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 21.7 U	< 1300 UD	< 23.8 U	< 26.6 U	< 23.6 U
Acetone	67-64-1	**50**	500000	ug/kg	**560**	< 1300 UD	32.8	37.6	< 23.6 U
Benzene	71-43-2	60	44000	ug/kg	1.8 J	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
Bromoform	75-25-2	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
Bromomethane	74-83-9	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
Carbon Disulfide	75-15-0	--	--	ug/kg	1.4 J	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
CFC-11	75-69-4	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
CFC-12	75-71-8	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 UQ	< 5.3 U	< 4.7 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
Chloroethane	75-00-3	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
Chloroform	67-66-3	370	350000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	5 J	< 4.7 U
Chloromethane	74-87-3	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	--
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
Cyclohexane	110-82-7	--	--	ug/kg	--	630 D	< 4.8 U	< 5.3 U	< 4.7 U
Dichloromethane	75-09-2	50	500000	ug/kg	< 8.7 U	< 530 UD	< 9.5 U	< 10.6 U	< 9.4 U
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	--	**1200 D**	< 4.8 U	< 5.3 U	< 4.7 U
Isopropylbenzene	98-82-8	--	--	ug/kg	--	630 D	< 4.8 U	< 5.3 U	< 4.7 U
m&p-Xylenes	--	--	--	ug/kg	33	--	1.6 J	< 10.6 U	< 9.4 U
Methyl Acetate	79-20-9	--	--	ug/kg	< 4.3 U	--	< 4.8 U	< 5.3 U	< 4.7 U
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 21.7 U	< 1300 UD	< 23.8 U	< 26.6 U	< 23.6 U
Methylcyclohexane	108-87-2	--	--	ug/kg	--	900 D	< 4.8 U	< 5.3 U	< 4.7 U
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
o-Xylene	95-47-6	--	--	ug/kg	3.3 J	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	37.1
Toluene	108-88-3	700	500000	ug/kg	2.4 J	--	1.2 J	< 5.3 U	< 4.7 U
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	1.4 J
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	42.2
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 4.3 U	< 260 UD	< 4.8 U	< 5.3 U	< 4.7 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	Post-Ex-Bottom	Post-Ex-Bottom-East	Post-Ex-Bottom-East	Post-Ex-Bottom-West	Post-Ex-Bottom-West
				Sample ID	POST-EXCAVATION-BOTTOM-1ME-20211220	POST-EXCAVATION-BOTTOM-EAST-20211220	POST-EXCAVATION-BOTTOM-EASTME-20211220	POST-EXCAVATION-BOTTOM-WEST-20211220	POST-EXCAVATION-BOTTOM-WESTME-20211220
				Sample Date	12/20/2021	12/20/2021	12/20/2021	12/20/2021	12/20/2021
				Start Depth	0	0	0	0	0
				End Depth	0	0	0	0	0
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 1300 UD	< 24.6 U	< 1500 UD	< 24.7 U	< 1200 UD
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 1300 UD	< 24.6 U	< 1500 UD	< 24.7 U	< 1200 UD
Acetone	67-64-1	**50**	500000	ug/kg	< 1300 UD	< 24.6 U	< 1500 UD	**52.3**	< 1200 UD
Benzene	71-43-2	60	44000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Bromochloromethane	74-97-5	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Bromodichloromethane	75-27-4	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Bromoform	75-25-2	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Bromomethane	74-83-9	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Carbon Disulfide	75-15-0	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
CFC-11	75-69-4	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
CFC-12	75-71-8	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Chloroethane	75-00-3	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Chloroform	67-66-3	370	350000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Chloromethane	74-87-3	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	**540 D**	--	--	--	**1200 D**
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Cyclohexane	110-82-7	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Dichloromethane	75-09-2	50	500000	ug/kg	< 520 UD	< 9.8 U	< 580 UD	< 9.9 U	< 490 UD
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Isopropylbenzene	98-82-8	--	--	ug/kg	< 260 UD	2.5 J	< 290 UD	< 4.9 U	< 250 UD
m&p-Xylenes	--	--	--	ug/kg	< 520 UD	< 9.8 U	< 580 UD	< 9.9 U	< 490 UD
Methyl Acetate	79-20-9	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 1300 UD	< 24.6 U	< 1500 UD	< 24.7 U	< 1200 UD
Methylcyclohexane	108-87-2	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
o-Xylene	95-47-6	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	--	--	--	--	360 D
Toluene	108-88-3	700	500000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 260 UD	< 4.9 U	< 290 UD	4.1 J	< 250 UD
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 260 UD	< 4.9 U	< 290 UD	< 4.9 U	< 250 UD
Trichloroethene	79-01-6	**470**	200000	ug/kg	--	86.5	--	--	--
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 260 UD	5.4	< 290 UD	8.4	< 250 UD

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	SUBSLAB-01	SUBSLAB-01	SUBSLAB-01	SUBSLAB-02	SUBSLAB-02
				Sample ID	DUPLICATE-2-20210917	SUB-SLAB-01-(15-17)-20210917	SUB-SLAB-01-(5-8)-20210917	SUB-SLAB-02-(43-45)-20210922	SUB-SLAB-02-(5-7)-20210922
				Sample Date	9/17/2021	9/17/2021	9/17/2021	9/22/2021	9/22/2021
				Start Depth	5	15	5	43	5
				End Depth	8	17	8	45	7
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 21.9 U	< 20.7 U	< 21.7 U	< 29.1 U	< 22.6 U
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 21.9 U	< 20.7 U	< 21.7 U	< 29.1 U	< 22.6 U
Acetone	67-64-1	**50**	500000	ug/kg	45.4	< 20.7 U	10 J	19.7 J	10.4 J
Benzene	71-43-2	60	44000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Bromoform	75-25-2	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Bromomethane	74-83-9	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Carbon Disulfide	75-15-0	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
CFC-11	75-69-4	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
CFC-12	75-71-8	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Chloroethane	75-00-3	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Chloroform	67-66-3	370	350000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Chloromethane	74-87-3	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	24.7	7.7	6.7	1.7 J	< 4.5 U
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Cyclohexane	110-82-7	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Dichloromethane	75-09-2	50	500000	ug/kg	< 8.8 U	< 8.3 U	< 8.7 U	< 11.6 U	< 9 U
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Isopropylbenzene	98-82-8	--	--	ug/kg	28.3	< 4.1 U	12.9	< 5.8 U	< 4.5 U
m&p-Xylenes	--	--	--	ug/kg	< 8.8 U	< 8.3 U	< 8.7 U	< 11.6 U	< 9 U
Methyl Acetate	79-20-9	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 21.9 U	< 20.7 U	< 21.7 U	< 29.1 U	< 22.6 U
Methylcyclohexane	108-87-2	--	--	ug/kg	48.7	< 4.1 U	19.5	< 5.8 U	< 4.5 U
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
o-Xylene	95-47-6	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	15.5	< 4.5 U
Toluene	108-88-3	700	500000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 4.4 U	< 4.1 U	< 4.3 U	< 5.8 U	< 4.5 U
Vinyl chloride	75-01-4	**20**	13000	ug/kg	5.1	1.5 J	< 4.3 U	3.8 J	< 4.5 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	SUBSLAB-03	SUBSLAB-03	SUBSLAB-03	SUBSLAB-04	SUBSLAB-04
				Sample ID	SUB-SLAB-03-(33-35)-20210922	SUB-SLAB-03-(8-10)-20210922	SUP-UST-03-(8-10)-20210922	SUB-SLAB-04-(6-2.6)-20210923	SUB-SLAB-04-(6-8)-20210923
				Sample Date	9/22/2021	9/22/2021	9/22/2021	9/23/2021	9/23/2021
				Start Depth	33	8	8	0.5	6
				End Depth	35	10	10	2.6	8
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 32.1 U	< 22.5 U	26.2	< 23.6 U	< 23.4 U
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 32.1 U	< 22.5 U	< 19.4 U	< 23.6 U	< 23.4 U
Acetone	67-64-1	**50**	500000	ug/kg	34.3	< 22.5 U	**99.5**	41.3	11.8 J
Benzene	71-43-2	60	44000	ug/kg	< 6.4 U	< 4.5 U	7.7	< 4.7 U	< 4.7 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Bromoform	75-25-2	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Bromomethane	74-83-9	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Carbon Disulfide	75-15-0	--	--	ug/kg	< 6.4 U	< 4.5 U	0.84 J	< 4.7 U	< 4.7 U
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
CFC-11	75-69-4	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
CFC-12	75-71-8	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Chloroethane	75-00-3	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Chloroform	67-66-3	370	350000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Chloromethane	74-87-3	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Cyclohexane	110-82-7	--	--	ug/kg	< 6.4 U	< 4.5 U	--	< 4.7 U	< 4.7 U
Dichloromethane	75-09-2	50	500000	ug/kg	< 12.8 U	< 9 U	7.2 J	< 9.5 U	< 9.4 U
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Isopropylbenzene	98-82-8	--	--	ug/kg	< 6.4 U	< 4.5 U	76.1	< 4.7 U	< 4.7 U
m&p-Xylenes	--	--	--	ug/kg	< 12.8 U	< 9 U	< 7.7 U	< 9.5 U	< 9.4 U
Methyl Acetate	79-20-9	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 32.1 U	< 22.5 U	< 19.4 U	< 23.6 U	< 23.4 U
Methylcyclohexane	108-87-2	--	--	ug/kg	< 6.4 U	< 4.5 U	--	< 4.7 U	< 4.7 U
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
o-Xylene	95-47-6	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	21.1	< 4.7 U
Toluene	108-88-3	700	500000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 6.4 U	< 4.5 U	< 3.9 U	< 4.7 U	< 4.7 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	SUBSLAB-05	SUBSLAB-05	SUBSLAB-06	SUBSLAB-06	SUBSLAB-07
				Sample ID	SUB-SLAB-05(6-2.6)-20210923	SUB-SLAB-05(6-8)-20210923	SUB-SLAB-06-(6-2.6)-20210923	SUB-SLAB-06-(6-8)-20210923	SUB-SLAB-07(5-7)-20210923
				Sample Date	9/23/2021	9/23/2021	9/23/2021	9/23/2021	9/23/2021
				Start Depth	0.5	6	0.5	6	5
				End Depth	2.6	8	2.6	8	7
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 20.8 U	< 23 U	< 23.2 U	< 24.8 U	< 24.6 U
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 20.8 U	< 23 U	< 23.2 U	< 24.8 U	< 24.6 U
Acetone	67-64-1	**50**	500000	ug/kg	< 20.8 U	< 23 U	**51.6**	25.6	< 24.6 U
Benzene	71-43-2	60	44000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Bromoform	75-25-2	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Bromomethane	74-83-9	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Carbon Disulfide	75-15-0	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
CFC-11	75-69-4	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
CFC-12	75-71-8	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Chloroethane	75-00-3	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Chloroform	67-66-3	370	350000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Chloromethane	74-87-3	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Cyclohexane	110-82-7	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Dichloromethane	75-09-2	50	500000	ug/kg	< 8.3 U	< 9.2 U	< 9.3 U	37.4	< 9.9 U
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Isopropylbenzene	98-82-8	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
m&p-Xylenes	--	--	--	ug/kg	< 8.3 U	< 9.2 U	< 9.3 U	< 9.9 U	< 9.9 U
Methyl Acetate	79-20-9	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 20.8 U	< 23 U	< 23.2 U	< 24.8 U	< 24.6 U
Methylcyclohexane	108-87-2	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
o-Xylene	95-47-6	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Toluene	108-88-3	700	500000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 4.2 U	< 4.6 U	< 4.6 U	< 5 U	< 4.9 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	SUBSLAB-07	SUBSLAB-08	SUBSLAB-08	SUBSLAB-08	SUBSLAB-08
				Sample ID	SUB-SLAB-07(8-10)-20210923	SUB-SLAB-08(12-14)-20210923	SUB-SLAB-08(12-14)ME-20210923	SUB-SLAB-08(20-22)-20210923	SUB-SLAB-08(6-8)-20210923
				Sample Date	9/23/2021	9/23/2021	9/23/2021	9/23/2021	9/23/2021
				Start Depth	8	12	12	20	6
				End Depth	10	14	14	22	8
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 21.7 U	< 23.3 U	< 1300 UD	< 23 U	< 21.3 U
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 21.7 U	< 23.3 U	< 1300 UD	< 23 U	< 21.3 U
Acetone	67-64-1	**50**	500000	ug/kg	< 21.7 U	36.9	< 1300 UD	< 23 U	20.3 J
Benzene	71-43-2	60	44000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Bromoform	75-25-2	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Bromomethane	74-83-9	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Carbon Disulfide	75-15-0	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	1.9 J
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
CFC-11	75-69-4	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
CFC-12	75-71-8	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Chloroethane	75-00-3	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Chloroform	67-66-3	370	350000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Chloromethane	74-87-3	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	< 4.3 U	65.5	< 260 UD	2.1 J	2.2 J
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Cyclohexane	110-82-7	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Dichloromethane	75-09-2	50	500000	ug/kg	< 8.7 U	< 9.3 U	< 520 UD	< 9.2 U	< 8.5 U
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Isopropylbenzene	98-82-8	--	--	ug/kg	< 4.3 U	2.5 J	< 260 UD	< 4.6 U	< 4.3 U
m&p-Xylenes	--	--	--	ug/kg	< 8.7 U	< 9.3 U	< 520 UD	< 9.2 U	< 8.5 U
Methyl Acetate	79-20-9	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 21.7 U	< 23.3 U	< 1300 UD	< 23 U	< 21.3 U
Methylcyclohexane	108-87-2	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
o-Xylene	95-47-6	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	< 4.3 U	--	--	2.2 J	13.3
Toluene	108-88-3	700	500000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 4.3 U	< 4.7 U	< 260 UD	< 4.6 U	< 4.3 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 4.3 U	94.4	< 260 UD	2.6 J	2.9 J
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 4.3 U	1.8 J	< 260 UD	< 4.6 U	< 4.3 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	SUBSLAB-09	SUBSLAB-09	SUBSLAB-09	SUPUST-01	SUPUST-01
				Sample ID	SUB-SLAB-09(20-21)-20210927	SUB-SLAB-09(5-2.5)-20210927	SUB-SLAB-09(8.5-9)-20210927	DUPLICATE-1-20210913	SUP-UST-01-(10-12)-20210913
				Sample Date	9/27/2021	9/27/2021	9/27/2021	9/13/2021	9/13/2021
				Start Depth	20	0.5	8.5	13	10
				End Depth	21	2.5	9	15	12
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 22.7 U	< 22.4 U	< 24.4 U	< 26.1 U	11 J
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 22.7 U	< 22.4 U	< 24.4 U	< 26.1 U	< 19.9 U
Acetone	67-64-1	**50**	500000	ug/kg	10.3 J	< 22.4 U	37.8	30	47.6
Benzene	71-43-2	60	44000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	0.86 J
Bromochloromethane	74-97-5	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
Bromoform	75-25-2	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
Bromomethane	74-83-9	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
Carbon Disulfide	75-15-0	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	3.8 J
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
CFC-11	75-69-4	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
CFC-12	75-71-8	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
Chloroethane	75-00-3	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
Chloroform	67-66-3	370	350000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
Chloromethane	74-87-3	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	2.9 J	< 4.5 U	< 4.9 U	39.5	< 4 U
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
Cyclohexane	110-82-7	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	48.7
Dichloromethane	75-09-2	50	500000	ug/kg	< 9.1 U	< 9 U	< 9.8 U	< 10.4 U	< 8 U
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	96.1
Isopropylbenzene	98-82-8	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	--
m&p-Xylenes	--	--	--	ug/kg	< 9.1 U	< 9 U	< 9.8 U	< 10.4 U	160
Methyl Acetate	79-20-9	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	2 J
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 22.7 U	< 22.4 U	< 24.4 U	< 26.1 U	< 19.9 U
Methylcyclohexane	108-87-2	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	--
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	17.3
o-Xylene	95-47-6	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	33.7
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	1.3 J	4.5	< 4.9 U	25.3	< 4 U
Toluene	108-88-3	700	500000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	< 5.2 U	< 4 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	14.9	< 4 U
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 4.5 U	< 4.5 U	< 4.9 U	4.9 J	< 4 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	SUPUST-01	SUPUST-01	SUPUST-01	SUPUST-01	SUPUST-02
				Sample ID	SUP-UST-01-(10-12)ME-20210913	SUP-UST-01-(5-7)-20210913	SUP-UST-01-(5-7)REME-20210913	SUP-VST-01-(13-15)-20210913	SUP-UST-02-(5-7)-20210913
				Sample Date	9/13/2021	9/13/2021	9/13/2021	9/13/2021	9/13/2021
				Start Depth	10	5	5	13	5
				End Depth	12	7	7	15	7
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 1300 UD	< 20 U	< 1700 UD	< 19.3 U	13.7 J
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 1300 UD	< 20 U	< 1700 UD	< 19.3 U	< 20.5 U
Acetone	67-64-1	**50**	500000	ug/kg	< 1300 UD	21.9	< 1700 UD	17.3 J	**92.2**
Benzene	71-43-2	60	44000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Bromoform	75-25-2	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Bromomethane	74-83-9	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Carbon Disulfide	75-15-0	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	1.9 J	< 4.1 U
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
CFC-11	75-69-4	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
CFC-12	75-71-8	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Chloroethane	75-00-3	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Chloroform	67-66-3	370	350000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Chloromethane	74-87-3	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	4.7
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Cyclohexane	110-82-7	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Dichloromethane	75-09-2	50	500000	ug/kg	--	< 8 U	< 690 UD	< 7.7 U	< 8.2 U
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 270 UD	11.7	< 340 UD	2.9 J	< 4.1 U
Isopropylbenzene	98-82-8	--	--	ug/kg	--	15.1	--	18.7	24.7
m&p-Xylenes	--	--	--	ug/kg	< 540 UD	21.3	--	7.9	< 8.2 U
Methyl Acetate	79-20-9	--	--	ug/kg	< 270 UD	1.3 J	< 340 UD	1.1 J	< 4.1 U
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 1300 UD	< 20 U	< 1700 UD	< 19.3 U	< 20.5 U
Methylcyclohexane	108-87-2	--	--	ug/kg	--	6.8	--	68.1	64.1
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 270 UD	47.7	--	< 3.9 U	< 4.1 U
o-Xylene	95-47-6	--	--	ug/kg	< 270 UD	3.8 J	< 340 UD	< 3.9 U	< 4.1 U
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	3.3 J
Toluene	108-88-3	700	500000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 270 UD	< 4 U	< 340 UD	< 3.9 U	< 4.1 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	SUPUST-02	SUPUST-03	SUPUST-03	SUPUST-03	SUPUST-04
				Sample ID	SUP-UST-02-(7-10)-20210913	SUP-UST-03-(5-7)-20210922	SUP-UST-03-(5-7)ME-20210922	SUP-UST-03-(8-10)ME-20210922	SUP-UST-04-(13-15)-20210922
				Sample Date	9/13/2021	9/22/2021	9/22/2021	9/22/2021	9/22/2021
				Start Depth	7	5	5	8	13
				End Depth	10	7	7	10	15
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	8.7
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 23.6 U	25.5	< 1100 UD	< 1000 UD	< 31.7 U
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 23.6 U	< 22.8 U	< 1100 UD	< 1000 UD	< 31.7 U
Acetone	67-64-1	**50**	500000	ug/kg	**250**	**74.1**	< 1100 UD	< 1000 UD	**91.8**
Benzene	71-43-2	60	44000	ug/kg	< 4.7 U	1.8 J	< 210 UD	< 210 UD	< 6.3 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Bromoform	75-25-2	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Bromomethane	74-83-9	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Carbon Disulfide	75-15-0	--	--	ug/kg	< 4.7 U	2.8 J	< 210 UD	< 210 UD	1.8 J
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
CFC-11	75-69-4	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
CFC-12	75-71-8	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Chloroethane	75-00-3	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Chloroform	67-66-3	370	350000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Chloromethane	74-87-3	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	70.6
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Cyclohexane	110-82-7	--	--	ug/kg	< 4.7 U	84	< 210 UD	230 D	< 6.3 U
Dichloromethane	75-09-2	50	500000	ug/kg	< 9.4 U	< 9.1 U	< 420 UD	< 410 UD	12.3 J
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Isopropylbenzene	98-82-8	--	--	ug/kg	51.6	85.5	220 D	--	< 6.3 U
m&p-Xylenes	--	--	--	ug/kg	< 9.4 U	< 9.1 U	< 420 UD	< 410 UD	< 12.7 U
Methyl Acetate	79-20-9	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 23.6 U	< 22.8 U	< 1100 UD	< 1000 UD	< 31.7 U
Methylcyclohexane	108-87-2	--	--	ug/kg	51.2	--	520 D	670 D	< 6.3 U
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
o-Xylene	95-47-6	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Toluene	108-88-3	700	500000	ug/kg	< 4.7 U	0.97 J	< 210 UD	< 210 UD	< 6.3 U
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	< 6.3 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	25.4
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 4.7 U	< 4.6 U	< 210 UD	< 210 UD	3.1 J

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	SUPUST-04	SUPUST-05	SUPUST-05	SUPUST-05	UST-7-EAST-SIDEWALL
				Sample ID	SUP-UST-04-(6-8)-20210922	DUPLICATE-03-20210923	SUP-UST-05-(23-25)-20210923	SUP-UST-05-(6-8)-20210923	UST-7-EAST-SIDEWALL-20220321
				Sample Date	9/22/2021	9/23/2021	9/23/2021	9/23/2021	3/21/2022
				Start Depth	6	23	23	6	0
				End Depth	8	25	25	8	0
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 21.9 U	< 24.2 U	< 1200 U	< 1200 U	< 20.3 U
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 21.9 U	< 24.2 U	< 1200 U	< 1200 U	< 20.3 U
Acetone	67-64-1	**50**	500000	ug/kg	19.6 J	< 24.2 U	< 1200 U	< 1200 U	**130**
Benzene	71-43-2	60	44000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Bromoform	75-25-2	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Bromomethane	74-83-9	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 UQ	< 230 UQ	< 4.1 U
Carbon Disulfide	75-15-0	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	2.9 J
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
CFC-11	75-69-4	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
CFC-12	75-71-8	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Chloroethane	75-00-3	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Chloroform	67-66-3	370	350000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Chloromethane	74-87-3	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	6.3	< 4.8 U	< 250 U	< 230 U	< 4.1 U
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Cyclohexane	110-82-7	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Dichloromethane	75-09-2	50	500000	ug/kg	6.9 J	< 9.7 U	< 500 U	< 460 U	< 8.1 U
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Isopropylbenzene	98-82-8	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	14.7
m&p-Xylenes	--	--	--	ug/kg	< 8.8 U	< 9.7 U	< 500 U	< 460 U	< 8.1 U
Methyl Acetate	79-20-9	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 21.9 U	< 24.2 U	< 1200 U	< 1200 U	< 20.3 U
Methylcyclohexane	108-87-2	--	--	ug/kg	1.3 J	< 4.8 U	< 250 U	< 230 U	--
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
o-Xylene	95-47-6	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Toluene	108-88-3	700	500000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	1.4 J
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 4.4 U	< 4.8 U	< 250 U	< 230 U	< 4.1 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	UST-7-EAST-SIDEWALL	UST-7-NORTH-SIDEWALL	UST-7-SOUTH-SIDEWALL	UST-7-WEST-SIDEWALL	W-BOILER-ROOM-BOTTOM
				Sample ID	UST-7-EAST-SIDEWALLME-20220321	UST-7-NORTH-SIDEWALL-20220321	UST-7-SOUTH-SIDEWALL-20220321	UST-7-WEST-SIDEWALL-20220321	WEST-BOILER-ROOM-BOTTOM-20220113
				Sample Date	3/21/2022	3/21/2022	3/21/2022	3/21/2022	1/13/2022
				Start Depth	0	0	0	0	0
				End Depth	0	0	0	0	0
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 1100 UD	< 17.6 U	13.2 J	< 1900 U	< 30 U
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 1100 UD	< 17.6 U	< 22 U	< 1900 U	< 30 U
Acetone	67-64-1	**50**	500000	ug/kg	< 1100 UD	17.8	37.8	< 1900 U	13.5 J
Benzene	71-43-2	60	44000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
Bromoform	75-25-2	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
Bromomethane	74-83-9	--	--	ug/kg	< 210 UD	< 3.5 UQ	< 4.4 UQ	< 390 U	< 6 U
Carbon Disulfide	75-15-0	--	--	ug/kg	< 210 UD	< 3.5 UQ	< 4.4 UQ	< 390 U	< 6 U
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
CFC-11	75-69-4	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
CFC-12	75-71-8	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
Chloroethane	75-00-3	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
Chloroform	67-66-3	370	350000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
Chloromethane	74-87-3	--	--	ug/kg	< 210 UD	< 3.5 UQ	< 4.4 UQ	< 390 U	< 6 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
Cyclohexane	110-82-7	--	--	ug/kg	< 210 UD	< 3.5 UQ	< 4.4 UQ	230 J	< 6 U
Dichloromethane	75-09-2	50	500000	ug/kg	< 430 UD	< 7 U	< 8.8 U	< 770 U	< 12 U
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	84.2 J	13.1
Isopropylbenzene	98-82-8	--	--	ug/kg	--	< 3.5 U	< 4.4 U	150 J	42.6
m&p-Xylenes	--	--	--	ug/kg	< 430 UD	< 7 U	< 8.8 U	< 770 U	24.9
Methyl Acetate	79-20-9	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 1100 UD	< 17.6 U	< 22 U	< 1900 U	< 30 U
Methylcyclohexane	108-87-2	--	--	ug/kg	340 D	1.6 J	8.6	1200	4.4 J
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	2.9 J
o-Xylene	95-47-6	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	36.7
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	< 210 UD	53.4	< 4.4 U	< 390 U	< 6 U
Toluene	108-88-3	700	500000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 210 UD	1.2 J	< 4.4 U	< 390 U	< 6 U
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 210 UD	< 3.5 U	< 4.4 U	< 390 U	< 6 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 2
Soil Sample Results - VOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	W-BOILER-ROOM-E	W-BOILER-ROOM-N	W-BOILER-ROOM-S	W-BOILER-ROOM-S	W-BOILER-ROOM-W
				Sample ID	WEST-BOILER-ROOM-EAST-SIDEWALL-20220113	WEST-BOILER-ROOM-NORTH-SIDEWALL-20220113	WEST-BOILER-ROOM-SOUTH-SIDEWALL-20220113	WEST-BOILER-ROOM-SOUTH-SIDEWALLME-202201	WEST-BOILER-ROOM-WEST-SIDEWALL-20220113
				Sample Date	1/13/2022	1/13/2022	1/13/2022	1/13/2022	1/13/2022
				Start Depth	0	0	0	0	0
				End Depth	0	0	0	0	0
				Units					
1,1,1-Trichloroethane	71-55-6	680	500000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
1,1,2,2-Tetrachloroethane	79-34-5	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
1,1,2-Trichloroethane	79-00-5	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
1,1-Dichloroethane	75-34-3	270	240000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
1,1-Dichloroethene	75-35-4	330	500000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
1,2,3-Trichlorobenzene	87-61-6	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
1,2,4-Trichlorobenzene	120-82-1	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
1,2-Dibromo-3-chloropropane	96-12-8	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
1,2-Dibromoethane	106-93-4	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
1,2-Dichlorobenzene	95-50-1	1100	500000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
1,2-Dichloroethane	107-06-2	20	30000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
1,2-Dichloropropane	78-87-5	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
1,3-Dichlorobenzene	541-73-1	2400	280000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
1,4-Dichlorobenzene	106-46-7	1800	130000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
2-Butanone (MEK)	78-93-3	**120**	500000	ug/kg	< 28.9 U	< 28.8 U	9.9 J	--	< 27.4 U
4-Methyl-2-Pentanone	108-10-1	--	--	ug/kg	< 28.9 U	< 28.8 U	< 29.8 U	< 3000 UD	< 27.4 U
Acetone	67-64-1	**50**	500000	ug/kg	23.2 J	37.6	**52.2**	< 3000 UD	30.9
Benzene	71-43-2	60	44000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Bromochloromethane	74-97-5	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Bromodichloromethane	75-27-4	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Bromoform	75-25-2	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Bromomethane	74-83-9	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Carbon Disulfide	75-15-0	--	--	ug/kg	< 5.8 U	1.6 J	< 6 U	< 600 UD	< 5.5 U
Carbon Tetrachloride	56-23-5	760	22000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
CFC-11	75-69-4	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
CFC-12	75-71-8	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Chlorobenzene	108-90-7	1100	500000	ug/kg	< 5.8 U	9.8	< 6 U	< 600 UD	< 5.5 U
Chlorodibromomethane	124-48-1	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Chloroethane	75-00-3	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Chloroform	67-66-3	370	350000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Chloromethane	74-87-3	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
cis-1,2-Dichloroethene	156-59-2	**250**	500000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
cis-1,3-Dichloropropene	10061-01-5	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Cyclohexane	110-82-7	--	--	ug/kg	< 5.8 U	4.5 J	< 6 U	< 600 UD	< 5.5 U
Dichloromethane	75-09-2	50	500000	ug/kg	< 11.6 U	< 11.5 U	< 11.9 U	< 1200 UD	< 11 U
Ethylbenzene	100-41-4	**1000**	390000	ug/kg	< 5.8 U	87.3	43.3	< 600 UD	23.4
Isopropylbenzene	98-82-8	--	--	ug/kg	< 5.8 U	23.9	77.6	--	44.3
m&p-Xylenes	--	--	--	ug/kg	< 11.6 U	7.6 J	260	--	120
Methyl Acetate	79-20-9	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Methyl N-Butyl Ketone (2-Hexanone)	591-78-6	--	--	ug/kg	< 28.9 U	< 28.8 U	< 29.8 U	< 3000 UD	< 27.4 U
Methylcyclohexane	108-87-2	--	--	ug/kg	< 5.8 U	35	14.3	< 600 UD	4.1 J
Methyl-tert-butylether	1634-04-4	930	500000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
o-Xylene	95-47-6	--	--	ug/kg	< 5.8 U	< 5.8 U	--	< 600 UD	27.4
Styrene (Monomer)	100-42-5	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Tetrachloroethene	127-18-4	**1300**	150000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Toluene	108-88-3	700	500000	ug/kg	< 5.8 U	< 5.8 U	4.7 J	< 600 UD	< 5.5 U
trans-1,2-Dichloroethene	156-60-5	**190**	500000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
trans-1,3-Dichloropropene	10061-02-6	--	--	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Trichloroethene	79-01-6	**470**	200000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U
Vinyl chloride	75-01-4	**20**	13000	ug/kg	< 5.8 U	< 5.8 U	< 6 U	< 600 UD	< 5.5 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
VOCs - volatile organic compounds
ug/kg - microgram per kilogram

Table 3
Soil Sample Results - SVOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

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Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	BLUE-GREEN-CLAY	BOILER-PIT-3-5	EAST-AREA-BOTTOM	EAST-AREA-E-SIDEWALL	EAST-SIDEWALL	LAUNDRY ROOM	NAPL-01	NAPL-01
				Sample ID	BLUE-GREEN-CLAY-20211216	BOILER-PIT-3-5-20210924	EAST-AREA-BOTTOM-20220112	EAST-AREA-EAST-SIDEWALL-20220112	EAST-SIDEWALL-20211207	LAUNDRYROOM-PIT-BOTTOM-20211207	NAPL-01-(8-10)-END-POINT-20210913	NAPL-AREA-01-(18-20)-20210913
				Sample Date	12/16/2021	9/24/2021	1/12/2022	1/12/2022	12/7/2021	12/7/2021	9/13/2021	9/13/2021
				Start Depth	0	3	0	0	0	0	8	18
				End Depth	0	5	0	0	0	0	10	20
				Units								
SVOCs												
1,1-Biphenyl	92-52-4	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
1,2,4,5-Tetrachlorobenzene	95-94-3	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
1,4-Dioxane	123-91-1	100	130000	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
2,2-Oxybis(1-Chloropropane)	108-60-1	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
2,4,5-Trichlorophenol	95-95-4	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
2,4,6-Trichlorophenol	88-06-2	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
2,4-Dichlorophenol	120-83-2	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
2,4-Dimethylphenol	105-67-9	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
2,4-Dinitrophenol	51-28-5	--	--	ug/kg	< 3700 U	< 1100 U	< 410 U	< 1900 U	< 18700 U	< 380 U	< 360 U	< 360 U
2,4-Dinitrotoluene	121-14-2	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
2,6-Dinitrotoluene	606-20-2	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
2-Chloronaphthalene	91-58-7	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
2-Chlorophenol	95-57-8	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
2-Methyl-4,6-dinitrophenol	534-52-1	--	--	ug/kg	< 3700 U	< 1100 U	< 410 U	< 1900 U	< 18700 U	< 380 U	< 360 U	< 360 U
2-Methylnaphthalene	91-57-6	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	7100 J	< 190 U	< 190 U	< 190 U
2-Methylphenol	95-48-7	330	500000	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
2-Nitroaniline	88-74-4	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
2-Nitrophenol	88-75-5	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
3,3-Dichlorobenzidine	91-94-1	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 UQ	< 190 UQ
3-Methylphenol, 4-Methylphenol	65794-96-9	--	--	ug/kg	< 3700 U	< 1100 U	< 410 U	< 1900 U	< 18700 U	< 380 U	< 360 U	< 360 U
3-Nitroaniline	99-09-2	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
4-Bromophenyl phenyl ether	101-55-3	--	--	ug/kg	< 1900 U	< 570 U	< 210 UQ	< 990 UQ	< 9600 U	< 190 U	< 190 U	< 190 U
4-Chloro-3-Methylphenol	59-50-7	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
4-Chlorophenyl phenyl ether	7005-72-3	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
4-Nitroaniline	100-01-6	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
4-Nitrophenol	100-02-7	--	--	ug/kg	< 3700 U	< 1100 U	< 410 U	< 1900 U	< 18700 U	< 380 U	< 360 U	< 360 U
Acenaphthene	83-32-9	20000	500000	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Acenaphthylene	208-96-8	100000	500000	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Acetophenone	98-86-2	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Anthracene	120-12-7	100000	500000	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Atrazine	1912-24-9	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 UQ	< 190 UQ	< 190 U	< 190 U
Benz(a)anthracene	56-55-3	1000	5600	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Benzaldehyde	100-52-7	--	--	ug/kg	< 3700 U	< 1100 U	< 410 U	< 1900 U	< 18700 U	< 380 U	< 360 U	< 360 U
Benzo(a)pyrene	50-32-8	1000	1000	ug/kg	< 1900 UQ	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Benzo(b)fluoranthene	205-99-2	1000	5600	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Benzo(g,h,i)perylene	191-24-2	100000	500000	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Benzo(k)fluoranthene	207-08-9	800	56000	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
bis(2-Chloroethoxy)methane	111-91-1	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
bis(2-Chloroethyl)ether	111-44-4	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
bis(2-Ethylhexyl)phthalate	117-81-7	--	--	ug/kg	< 1900 U	670	< 210 U	< 990 U	< 9600 U	240	510	1400
Butyl benzyl phthalate	85-68-7	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Caprolactam	105-60-2	--	--	ug/kg	< 3700 U	< 1100 U	< 410 U	< 1900 U	10300 JQ	< 380 UQ	< 360 UQ	< 360 UQ
Carbazole	86-74-8	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Chrysene	218-01-9	**1000**	56000	ug/kg	< 1900 U	< 570 U	< 210 U	630 J	**5900 J**	< 190 U	< 190 U	< 190 U
Dibenz(a,h)anthracene	53-70-3	330	560	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Dibenzofuran	132-64-9	7000	350000	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Diethyl phthalate	84-66-2	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Dimethyl phthalate	131-11-3	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Di-n-butyl phthalate	84-74-2	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Di-n-octyl phthalate	117-84-0	--	--	ug/kg	< 3700 U	< 1100 U	< 410 U	< 1900 U	< 18700 U	< 380 U	< 360 U	< 360 U
Fluoranthene	206-44-0	100000	500000	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Fluorene	86-73-7	30000	500000	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Hexachloro-1,3-butadiene	87-68-3	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Hexachlorobenzene	118-74-1	330	6000	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Hexachlorocyclopentadiene	77-47-4	--	--	ug/kg	< 3700 U	< 1100 U	< 410 U	< 1900 U	< 18700 U	< 380 U	< 360 U	< 360 U
Hexachloroethane	67-72-1	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Indeno(1,2,3-cd)pyrene	193-39-5	500	5600	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Isophorone	78-59-1	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Naphthalene	91-20-3	12000	500000	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	110 J	< 190 U
Nitrobenzene	98-95-3	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
N-Nitrosodi-n-propylamine	621-64-7	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
N-Nitrosodiphenylamine	86-30-6	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
p-Chloroaniline	106-47-8	--	--	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Pentachlorophenol	87-86-5	800	6700	ug/kg	< 3700 U	< 1100 U	< 410 U	< 1900 U	< 18700 U	< 380 U	< 360 U	< 360 U
Phenanthrene	85-01-8	100000	500000	ug/kg	< 1900 U	< 570 U	< 210 U	590 J	10700	< 190 U	< 190 U	< 190 U
Phenol	108-95-2	330	500000	ug/kg	< 1900 U	< 570 U	< 210 U	< 990 U	< 9600 U	< 190 U	< 190 U	< 190 U
Pyrene	129-00-0	100000	500000	ug/kg	< 1900 U	< 570 U	< 210 UQ	780 JQ	< 9600 U	< 190 U	< 190 U	< 190 U
SVOCs SIM												
1,4-Dioxane	123-91-1	100	130000	ug/kg	--	--	--	--	--	--	< 7.2 U	--

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
SVOCs - semivolatile organic compounds
ug/kg - microgram per kilogram

Table 3
Soil Sample Results - SVOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

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Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	NAPL-01	NAPL-02	NAPL-02	NAPL-02	NAPL-03	NAPL-03	NAPL-03	NAPL-04
				Sample ID	NAPL-AREA-01-(25-27)-20210913	NAPL-02-(8-10)-END-POINT-20210913	NAPL-AREA-02-(25-27)-20210913	NAPL-AREA-02-(5-8)-20210913	NAPL-AREA-03-(10-12)-END-POINT-20210914	NAPL-AREA-03-(25-27)-20210914	NAPL-AREA-03-(8-10)-20210914	NAPL-AREA-04-(25-27)-20210914
				Sample Date	9/13/2021	9/13/2021	9/13/2021	9/13/2021	9/14/2021	9/14/2021	9/14/2021	9/14/2021
				Start Depth	25	8	25	5	10	25	8	25
				End Depth	27	10	27	8	12	27	10	27
				Units								
SVOCs												
1,1-Biphenyl	92-52-4	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
1,2,4,5-Tetrachlorobenzene	95-94-3	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
1,4-Dioxane	123-91-1	100	130000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
2,2-Oxybis(1-Chloropropane)	108-60-1	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
2,4,5-Trichlorophenol	95-95-4	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
2,4,6-Trichlorophenol	88-06-2	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
2,4-Dichlorophenol	120-83-2	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
2,4-Dimethylphenol	105-67-9	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
2,4-Dinitrophenol	51-28-5	--	--	ug/kg	< 410 U	< 360 U	< 430 U	< 380 U	< 370 U	< 410 U	< 380 U	< 440 U
2,4-Dinitrotoluene	121-14-2	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
2,6-Dinitrotoluene	606-20-2	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
2-Chloronaphthalene	91-58-7	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
2-Chlorophenol	95-57-8	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
2-Methyl-4,6-dinitrophenol	534-52-1	--	--	ug/kg	< 410 U	< 360 U	< 430 U	< 380 U	< 370 U	< 410 U	< 380 U	< 440 U
2-Methylnaphthalene	91-57-6	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
2-Methylphenol	95-48-7	330	500000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
2-Nitroaniline	88-74-4	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
2-Nitrophenol	88-75-5	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
3,3-Dichlorobenzidine	91-94-1	--	--	ug/kg	< 210 UQ	< 180 UQ	< 220 UQ	< 190 UQ	< 190 UQ	< 210 UQ	< 200 UQ	< 230 UQ
3-Methylphenol, 4-Methylphenol	65794-96-9	--	--	ug/kg	< 410 U	< 360 U	< 430 U	< 380 U	< 370 U	< 410 U	< 380 U	< 440 U
3-Nitroaniline	99-09-2	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
4-Bromophenyl phenyl ether	101-55-3	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
4-Chloro-3-Methylphenol	59-50-7	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
4-Chlorophenyl phenyl ether	7005-72-3	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
4-Nitroaniline	100-01-6	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
4-Nitrophenol	100-02-7	--	--	ug/kg	< 410 U	< 360 U	< 430 U	< 380 U	< 370 U	< 410 U	< 380 U	< 440 U
Acenaphthene	83-32-9	20000	500000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Acenaphthylene	208-96-8	100000	500000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Acetophenone	98-86-2	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Anthracene	120-12-7	100000	500000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Atrazine	1912-24-9	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Benz(a)anthracene	56-55-3	1000	5600	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Benzaldehyde	100-52-7	--	--	ug/kg	< 410 U	< 360 U	< 430 U	< 380 U	< 370 U	< 410 U	< 380 U	< 440 U
Benzo(a)pyrene	50-32-8	1000	1000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Benzo(b)fluoranthene	205-99-2	1000	5600	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Benzo(g,h,i)perylene	191-24-2	100000	500000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Benzo(k)fluoranthene	207-08-9	800	56000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
bis(2-Chloroethoxy)methane	111-91-1	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
bis(2-Chloroethyl)ether	111-44-4	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
bis(2-Ethylhexyl)phthalate	117-81-7	--	--	ug/kg	< 210 U	890	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Butyl benzyl phthalate	85-68-7	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Caprolactam	105-60-2	--	--	ug/kg	< 410 UQ	< 360 UQ	< 430 UQ	< 380 UQ	< 370 U	< 410 U	< 380 U	< 440 U
Carbazole	86-74-8	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Chrysene	218-01-9	**1000**	56000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Dibenz(a,h)anthracene	53-70-3	330	560	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Dibenzofuran	132-64-9	7000	350000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Diethyl phthalate	84-66-2	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Dimethyl phthalate	131-11-3	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Di-n-butyl phthalate	84-74-2	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Di-n-octyl phthalate	117-84-0	--	--	ug/kg	< 410 U	< 360 U	< 430 U	< 380 U	< 370 U	< 410 U	< 380 U	< 440 U
Fluoranthene	206-44-0	100000	500000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Fluorene	86-73-7	30000	500000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Hexachloro-1,3-butadiene	87-68-3	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Hexachlorobenzene	118-74-1	330	6000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Hexachlorocyclopentadiene	77-47-4	--	--	ug/kg	< 410 U	< 360 U	< 430 U	< 380 U	< 370 U	< 410 U	< 380 U	< 440 U
Hexachloroethane	67-72-1	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Indeno(1,2,3-cd)pyrene	193-39-5	500	5600	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Isophorone	78-59-1	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Naphthalene	91-20-3	12000	500000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Nitrobenzene	98-95-3	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
N-Nitrosodi-n-propylamine	621-64-7	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
N-Nitrosodiphenylamine	86-30-6	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
p-Chloroaniline	106-47-8	--	--	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Pentachlorophenol	87-86-5	800	6700	ug/kg	< 410 U	< 360 U	< 430 U	< 380 U	< 370 U	< 410 U	< 380 U	< 440 U
Phenanthrene	85-01-8	100000	500000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Phenol	108-95-2	330	500000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
Pyrene	129-00-0	100000	500000	ug/kg	< 210 U	< 180 U	< 220 U	< 190 U	< 190 U	< 210 U	< 200 U	< 230 U
SVOCs SIM												
1,4-Dioxane	123-91-1	100	130000	ug/kg	--	< 7.2 U	--	--	< 7.5 UQ	--	--	--

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
SVOCs - semivolatile organic compounds
ug/kg - microgram per kilogram

Table 3
Soil Sample Results - SVOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

DRAFT

ARCADIS

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location Sample ID Sample Date Start Depth End Depth Units	NAPL-04 NAPL-AREA-04-(5-7)-20210914 9/14/2021 5 7	NAPL-04 NAPL-AREA-04-(8-10)-END-POINT-20210914 9/14/2021 8 10	NAPL-05 NAPL-05-(20-22)-20210915 9/15/2021 20 22	NAPL-05 NAPL-05-(29-31)-20210915 9/15/2021 29 31	NAPL-05 NAPL-5-SIDEWALL-END-POINT-(10-12)-202109 9/15/2021 10 12	NAPL-06 NAPL-06-(15-18)-20210916 9/16/2021 15 18	NAPL-06 NAPL-06-(30-32)-20210916 9/16/2021 30 32	NAPL-06 NAPL-06-(8-10)-END-POINT-20210916 9/16/2021 8 10
SVOCs												
1,1-Biphenyl	92-52-4	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
1,2,4,5-Tetrachlorobenzene	95-94-3	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
1,4-Dioxane	123-91-1	100	130000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
2,2-Oxybis(1-Chloropropane)	108-60-1	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
2,4,5-Trichlorophenol	95-95-4	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
2,4,6-Trichlorophenol	88-06-2	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
2,4-Dichlorophenol	120-83-2	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
2,4-Dimethylphenol	105-67-9	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
2,4-Dinitrophenol	51-28-5	--	--	ug/kg	< 380 U	< 390 U	< 360 U	< 410 U	< 390 U	< 370 U	< 400 U	< 360 U
2,4-Dinitrotoluene	121-14-2	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
2,6-Dinitrotoluene	606-20-2	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
2-Chloronaphthalene	91-58-7	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
2-Chlorophenol	95-57-8	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
2-Methyl-4,6-dinitrophenol	534-52-1	--	--	ug/kg	< 380 U	< 390 U	< 360 U	< 410 U	< 390 U	< 370 U	< 400 U	< 360 U
2-Methylnaphthalene	91-57-6	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	220
2-Methylphenol	95-48-7	330	500000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
2-Nitroaniline	88-74-4	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
2-Nitrophenol	88-75-5	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
3,3-Dichlorobenzidine	91-94-1	--	--	ug/kg	< 190 UQ	< 200 UQ	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
3-Methylphenol, 4-Methylphenol	65794-96-9	--	--	ug/kg	< 380 U	< 390 U	< 360 U	< 410 U	< 390 U	< 370 U	< 400 U	< 360 U
3-Nitroaniline	99-09-2	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
4-Bromophenyl phenyl ether	101-55-3	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
4-Chloro-3-Methylphenol	59-50-7	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
4-Chlorophenyl phenyl ether	7005-72-3	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
4-Nitroaniline	100-01-6	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
4-Nitrophenol	100-02-7	--	--	ug/kg	< 380 U	< 390 U	< 360 U	< 410 U	< 390 U	< 370 U	< 400 U	< 360 U
Acenaphthene	83-32-9	20000	500000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Acenaphthylene	208-96-8	100000	500000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Acetophenone	98-86-2	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Anthracene	120-12-7	100000	500000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	89.5 J
Atrazine	1912-24-9	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Benz(a)anthracene	56-55-3	1000	5600	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	170 J
Benzaldehyde	100-52-7	--	--	ug/kg	< 380 U	< 390 U	< 360 U	< 410 U	< 390 U	< 370 U	< 400 U	< 360 U
Benzo(a)pyrene	50-32-8	1000	1000	ug/kg	< 190 U	< 200 U	< 190 UQ	< 210 UQ	< 200 UQ	< 190 U	< 210 U	150 J
Benzo(b)fluoranthene	205-99-2	1000	5600	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	190
Benzo(g,h,i)perylene	191-24-2	100000	500000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Benzo(k)fluoranthene	207-08-9	800	56000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
bis(2-Chloroethoxy)methane	111-91-1	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
bis(2-Chloroethyl)ether	111-44-4	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
bis(2-Ethylhexyl)phthalate	117-81-7	--	--	ug/kg	< 190 U	< 200 U	270	< 210 U	160 J	< 190 U	< 210 U	1500
Butyl benzyl phthalate	85-68-7	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	83.4 J
Caprolactam	105-60-2	--	--	ug/kg	< 380 U	< 390 U	< 360 U	< 410 U	< 390 U	< 370 U	< 400 U	< 360 U
Carbazole	86-74-8	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Chrysene	218-01-9	**1000**	56000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	140 J
Dibenz(a,h)anthracene	53-70-3	330	560	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Dibenzofuran	132-64-9	7000	350000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Diethyl phthalate	84-66-2	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Dimethyl phthalate	131-11-3	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Di-n-butyl phthalate	84-74-2	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Di-n-octyl phthalate	117-84-0	--	--	ug/kg	< 380 U	< 390 U	< 360 U	< 410 U	< 390 U	< 370 U	< 400 U	96.7 J
Fluoranthene	206-44-0	100000	500000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	350
Fluorene	86-73-7	30000	500000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Hexachloro-1,3-butadiene	87-68-3	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Hexachlorobenzene	118-74-1	330	6000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Hexachlorocyclopentadiene	77-47-4	--	--	ug/kg	< 380 U	< 390 U	< 360 U	< 410 U	< 390 U	< 370 U	< 400 U	< 360 U
Hexachloroethane	67-72-1	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Indeno(1,2,3-cd)pyrene	193-39-5	500	5600	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Isophorone	78-59-1	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Naphthalene	91-20-3	12000	500000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	96 J	< 190 U	< 210 U	810
Nitrobenzene	98-95-3	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
N-Nitrosodi-n-propylamine	621-64-7	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
N-Nitrosodiphenylamine	86-30-6	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
p-Chloroaniline	106-47-8	--	--	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Pentachlorophenol	87-86-5	800	6700	ug/kg	< 380 U	< 390 U	< 360 U	< 410 U	< 390 U	< 370 U	< 400 U	< 360 U
Phenanthrene	85-01-8	100000	500000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	330
Phenol	108-95-2	330	500000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	< 180 U
Pyrene	129-00-0	100000	500000	ug/kg	< 190 U	< 200 U	< 190 U	< 210 U	< 200 U	< 190 U	< 210 U	270
SVOCs SIM												
1,4-Dioxane	123-91-1	100	130000	ug/kg	--	< 7.7 UQ	--	--	< 7.8 U	--	--	< 7.1 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
SVOCs - semivolatile organic compounds
ug/kg - microgram per kilogram

Table 3
Soil Sample Results - SVOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

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Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	NAPL-07	NAPL-07	NAPL-07	NE-CORNER-EXC-E	NE-CORNER-EXC-N	NE-CORNER-EXC-S	NE-CORNER-EXC-W	Post-Ex-Bottom
				Sample ID	NAPL-07-(15-18)-20210916	NAPL-07-(22-24)-20210916	NAPL-07-(8-10)-END-POINT-20210916	NORTH-EAST-CORNER-EXCAVATION-EAST-SIDEWA	NORTH-EAST-CORNER-EXCAVATION-NORTH-SIDEW	NORTH-EAST-CORNER-EXCAVATION-SOUTH-SIDEW	NORTH-EAST-CORNER-EXCAVATION-WEST-SIDEWA	POST-EXCAVATION-BOTTOM-1-20211220
				Sample Date	9/16/2021	9/16/2021	9/16/2021	1/12/2022	1/12/2022	1/12/2022	1/12/2022	12/20/2021
				Start Depth	15	22	8	0	0	0	0	0
				End Depth	18	24	10	0	0	0	0	0
				Units								
SVOCs												
1,1-Biphenyl	92-52-4	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
1,2,4,5-Tetrachlorobenzene	95-94-3	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
1,4-Dioxane	123-91-1	100	130000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
2,2-Oxybis(1-Chloropropane)	108-60-1	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
2,4,5-Trichlorophenol	95-95-4	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
2,4,6-Trichlorophenol	88-06-2	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
2,4-Dichlorophenol	120-83-2	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
2,4-Dimethylphenol	105-67-9	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
2,4-Dinitrophenol	51-28-5	--	--	ug/kg	< 380 U	< 420 U	< 360 U	< 390 U	< 390 U	< 400 U	< 440 U	< 390 U
2,4-Dinitrotoluene	121-14-2	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
2,6-Dinitrotoluene	606-20-2	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
2-Chloronaphthalene	91-58-7	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
2-Chlorophenol	95-57-8	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
2-Methyl-4,6-dinitrophenol	534-52-1	--	--	ug/kg	< 380 U	< 420 U	< 360 U	< 390 U	< 390 U	< 400 U	< 440 U	< 390 U
2-Methylnaphthalene	91-57-6	--	--	ug/kg	< 200 U	< 210 U	720	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
2-Methylphenol	95-48-7	330	500000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
2-Nitroaniline	88-74-4	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
2-Nitrophenol	88-75-5	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
3,3-Dichlorobenzidine	91-94-1	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
3-Methylphenol, 4-Methylphenol	65794-96-9	--	--	ug/kg	< 380 U	< 420 U	< 360 U	< 390 U	< 390 U	< 400 U	< 440 U	< 390 U
3-Nitroaniline	99-09-2	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
4-Bromophenyl phenyl ether	101-55-3	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 UQ	< 200 UQ	< 210 UQ	< 230 UQ	< 200 U
4-Chloro-3-Methylphenol	59-50-7	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
4-Chlorophenyl phenyl ether	7005-72-3	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
4-Nitroaniline	100-01-6	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
4-Nitrophenol	100-02-7	--	--	ug/kg	< 380 U	< 420 U	< 360 U	< 390 U	< 390 U	< 400 U	< 440 U	< 390 U
Acenaphthene	83-32-9	20000	500000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Acenaphthylene	208-96-8	100000	500000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Acetophenone	98-86-2	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Anthracene	120-12-7	100000	500000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Atrazine	1912-24-9	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 UQ
Benz(a)anthracene	56-55-3	1000	5600	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Benzaldehyde	100-52-7	--	--	ug/kg	< 380 U	< 420 U	< 360 U	< 390 U	< 390 U	< 400 U	< 440 U	< 390 U
Benzo(a)pyrene	50-32-8	1000	1000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Benzo(b)fluoranthene	205-99-2	1000	5600	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Benzo(g,h,i)perylene	191-24-2	100000	500000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Benzo(k)fluoranthene	207-08-9	800	56000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
bis(2-Chloroethoxy)methane	111-91-1	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
bis(2-Chloroethyl)ether	111-44-4	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
bis(2-Ethylhexyl)phthalate	117-81-7	--	--	ug/kg	< 200 U	< 210 U	2500	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Butyl benzyl phthalate	85-68-7	--	--	ug/kg	< 200 U	< 210 U	110 J	< 200 U	230	< 210 U	< 230 U	< 200 U
Caprolactam	105-60-2	--	--	ug/kg	< 380 U	< 420 U	< 360 U	< 390 U	< 390 U	< 400 U	< 440 U	< 390 UQ
Carbazole	86-74-8	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Chrysene	218-01-9	**1000**	56000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Dibenz(a,h)anthracene	53-70-3	330	560	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Dibenzofuran	132-64-9	7000	350000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Diethyl phthalate	84-66-2	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Dimethyl phthalate	131-11-3	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Di-n-butyl phthalate	84-74-2	--	--	ug/kg	< 200 U	< 210 U	140 J	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Di-n-octyl phthalate	117-84-0	--	--	ug/kg	< 380 U	< 420 U	160 J	< 390 U	< 390 U	< 400 U	< 440 U	< 390 U
Fluoranthene	206-44-0	100000	500000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Fluorene	86-73-7	30000	500000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Hexachloro-1,3-butadiene	87-68-3	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Hexachlorobenzene	118-74-1	330	6000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Hexachlorocyclopentadiene	77-47-4	--	--	ug/kg	< 380 U	< 420 U	< 360 U	< 390 U	< 390 U	< 400 U	< 440 U	< 390 U
Hexachloroethane	67-72-1	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Indeno(1,2,3-cd)pyrene	193-39-5	500	5600	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Isophorone	78-59-1	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Naphthalene	91-20-3	12000	500000	ug/kg	< 200 U	< 210 U	2300	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Nitrobenzene	98-95-3	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
N-Nitrosodi-n-propylamine	621-64-7	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
N-Nitrosodiphenylamine	86-30-6	--	--	ug/kg	< 200 U	< 210 U	89.4 J	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
p-Chloroaniline	106-47-8	--	--	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Pentachlorophenol	87-86-5	800	6700	ug/kg	< 380 U	< 420 U	< 360 U	< 390 U	< 390 U	< 400 U	< 440 U	< 390 U
Phenanthrene	85-01-8	100000	500000	ug/kg	< 200 U	< 210 U	75.7 J	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Phenol	108-95-2	330	500000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 U	< 200 U	< 210 U	< 230 U	< 200 U
Pyrene	129-00-0	100000	500000	ug/kg	< 200 U	< 210 U	< 190 U	< 200 UQ	< 200 UQ	< 210 UQ	< 230 UQ	< 200 U
SVOCs SIM												
1,4-Dioxane	123-91-1	100	130000	ug/kg	--	--	< 7.2 U	--	--	--	--	< 7.8 U

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
SVOCs - semivolatile organic compounds
ug/kg - microgram per kilogram

Table 3
Soil Sample Results - SVOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	Post-Ex-Bottom-East	Post-Ex-Bottom-West	SUBSLAB-01	SUBSLAB-01	SUBSLAB-01	SUBSLAB-02	SUBSLAB-02	SUBSLAB-03
				Sample ID	POST-EXCAVATION-BOTTOM-EAST-20211220	POST-EXCAVATION-BOTTOM-WEST-20211220	DUPLICATE-2-20210917	SUB-SLAB-01-(15-17)-20210917	SUB-SLAB-01-(5-8)-20210917	SUB-SLAB-02-(43-45)-20210922	SUB-SLAB-02-(5-7)-20210922	SUB-SLAB-03-(33-35)-20210922
				Sample Date	12/20/2021	12/20/2021	9/17/2021	9/17/2021	9/17/2021	9/22/2021	9/22/2021	9/22/2021
				Start Depth	0	0	5	15	5	43	5	33
				End Depth	0	0	8	17	8	45	7	35
				Units								
SVOCs												
1,1-Biphenyl	92-52-4	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
1,2,4,5-Tetrachlorobenzene	95-94-3	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
1,4-Dioxane	123-91-1	100	130000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 UM
2,2-Oxybis(1-Chloropropane)	108-60-1	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
2,4,5-Trichlorophenol	95-95-4	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
2,4,6-Trichlorophenol	88-06-2	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
2,4-Dichlorophenol	120-83-2	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
2,4-Dimethylphenol	105-67-9	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
2,4-Dinitrophenol	51-28-5	--	--	ug/kg	< 410 U	< 390 U	< 380 U	< 370 U	< 380 U	< 440 U	< 370 U	< 430 U
2,4-Dinitrotoluene	121-14-2	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
2,6-Dinitrotoluene	606-20-2	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
2-Chloronaphthalene	91-58-7	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
2-Chlorophenol	95-57-8	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
2-Methyl-4,6-dinitrophenol	534-52-1	--	--	ug/kg	< 410 U	< 390 U	< 380 U	< 370 U	< 380 U	< 440 U	< 370 U	< 430 U
2-Methylnaphthalene	91-57-6	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
2-Methylphenol	95-48-7	330	500000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
2-Nitroaniline	88-74-4	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
2-Nitrophenol	88-75-5	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
3,3-Dichlorobenzidine	91-94-1	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
3-Methylphenol, 4-Methylphenol	65794-96-9	--	--	ug/kg	< 410 U	< 390 U	< 380 U	< 370 U	< 380 U	< 440 U	< 370 U	< 430 U
3-Nitroaniline	99-09-2	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
4-Bromophenyl phenyl ether	101-55-3	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
4-Chloro-3-Methylphenol	59-50-7	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
4-Chlorophenyl phenyl ether	7005-72-3	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
4-Nitroaniline	100-01-6	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
4-Nitrophenol	100-02-7	--	--	ug/kg	< 410 U	< 390 U	< 380 U	< 370 U	< 380 U	< 440 U	< 370 U	< 430 U
Acenaphthene	83-32-9	20000	500000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Acenaphthylene	208-96-8	100000	500000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Acetophenone	98-86-2	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Anthracene	120-12-7	100000	500000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Atrazine	1912-24-9	--	--	ug/kg	< 210 UQ	< 200 UQ	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Benz(a)anthracene	56-55-3	1000	5600	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Benzaldehyde	100-52-7	--	--	ug/kg	< 410 U	< 390 U	< 380 U	< 370 U	< 380 U	< 440 U	< 370 U	< 430 U
Benzo(a)pyrene	50-32-8	1000	1000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Benzo(b)fluoranthene	205-99-2	1000	5600	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Benzo(g,h,i)perylene	191-24-2	100000	500000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Benzo(k)fluoranthene	207-08-9	800	56000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
bis(2-Chloroethoxy)methane	111-91-1	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
bis(2-Chloroethyl)ether	111-44-4	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
bis(2-Ethylhexyl)phthalate	117-81-7	--	--	ug/kg	< 210 U	150 J	< 200 U	< 190 U	140 J	< 220 U	< 190 U	< 220 U
Butyl benzyl phthalate	85-68-7	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	250	< 190 U	< 220 U
Caprolactam	105-60-2	--	--	ug/kg	< 410 UQ	< 390 UQ	< 380 U	< 370 U	< 380 U	< 440 U	< 370 U	< 430 U
Carbazole	86-74-8	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Chrysene	218-01-9	**1000**	56000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Dibenz(a,h)anthracene	53-70-3	330	560	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Dibenzofuran	132-64-9	7000	350000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Diethyl phthalate	84-66-2	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Dimethyl phthalate	131-11-3	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Di-n-butyl phthalate	84-74-2	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Di-n-octyl phthalate	117-84-0	--	--	ug/kg	< 410 U	< 390 U	< 380 U	< 370 U	< 380 U	< 440 U	< 370 U	< 430 U
Fluoranthene	206-44-0	100000	500000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Fluorene	86-73-7	30000	500000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Hexachloro-1,3-butadiene	87-68-3	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Hexachlorobenzene	118-74-1	330	6000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Hexachlorocyclopentadiene	77-47-4	--	--	ug/kg	< 410 U	< 390 U	< 380 U	< 370 U	< 380 U	< 440 U	< 370 U	< 430 U
Hexachloroethane	67-72-1	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Indeno(1,2,3-cd)pyrene	193-39-5	500	5600	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Isophorone	78-59-1	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Naphthalene	91-20-3	12000	500000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Nitrobenzene	98-95-3	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
N-Nitrosodi-n-propylamine	621-64-7	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
N-Nitrosodiphenylamine	86-30-6	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
p-Chloroaniline	106-47-8	--	--	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Pentachlorophenol	87-86-5	800	6700	ug/kg	< 410 U	< 390 U	< 380 U	< 370 U	< 380 U	< 440 U	< 370 U	< 430 U
Phenanthrene	85-01-8	100000	500000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Phenol	108-95-2	330	500000	ug/kg	110 J	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
Pyrene	129-00-0	100000	500000	ug/kg	< 210 U	< 200 U	< 200 U	< 190 U	< 190 U	< 220 U	< 190 U	< 220 U
SVOCs SIM												
1,4-Dioxane	123-91-1	100	130000	ug/kg	< 8.1 U	< 7.8 U	--	--	--	--	--	--

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
SVOCs - semivolatile organic compounds
ug/kg - microgram per kilogram

Table 3
Soil Sample Results - SVOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

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Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	SUBSLAB-03	SUBSLAB-03	SUBSLAB-03	SUBSLAB-04	SUBSLAB-04	SUBSLAB-05	SUBSLAB-05	SUBSLAB-06
				Sample ID	SUB-SLAB-03-(8-10)-20210922	SUP-UST-03-(8-10)-20210922	SUP-UST-03-(8-10)-20210922	SUB-SLAB-04-(6-2.6)-20210923	SUB-SLAB-04-(6-8)-20210923	SUB-SLAB-05(6-2.6)-20210923	SUB-SLAB-05(6-8)-20210923	SUB-SLAB-06-(6-2.6)-20210923
				Sample Date	9/22/2021	9/22/2021	9/22/2021	9/23/2021	9/23/2021	9/23/2021	9/23/2021	9/23/2021
				Start Depth	8	8	8	0.5	6	0.5	6	0.5
				End Depth	10	10	10	2.6	8	2.6	8	2.6
				Units								
SVOCs												
1,1-Biphenyl	92-52-4	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
1,2,4,5-Tetrachlorobenzene	95-94-3	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
1,4-Dioxane	123-91-1	100	130000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
2,2-Oxybis(1-Chloropropane)	108-60-1	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
2,4,5-Trichlorophenol	95-95-4	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
2,4,6-Trichlorophenol	88-06-2	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
2,4-Dichlorophenol	120-83-2	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
2,4-Dimethylphenol	105-67-9	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
2,4-Dinitrophenol	51-28-5	--	--	ug/kg	< 380 U	< 1100 U	--	< 410 U	< 390 U	< 370 U	< 370 U	< 390 U
2,4-Dinitrotoluene	121-14-2	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
2,6-Dinitrotoluene	606-20-2	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
2-Chloronaphthalene	91-58-7	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
2-Chlorophenol	95-57-8	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
2-Methyl-4,6-dinitrophenol	534-52-1	--	--	ug/kg	< 380 U	< 1100 U	--	< 410 U	< 390 U	< 370 U	< 370 U	< 390 U
2-Methylnaphthalene	91-57-6	--	--	ug/kg	< 190 U	1100	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
2-Methylphenol	95-48-7	330	500000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
2-Nitroaniline	88-74-4	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
2-Nitrophenol	88-75-5	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
3,3-Dichlorobenzidine	91-94-1	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
3-Methylphenol, 4-Methylphenol	65794-96-9	--	--	ug/kg	< 380 U	< 1100 U	--	< 410 U	< 390 U	< 370 U	< 370 U	< 390 U
3-Nitroaniline	99-09-2	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
4-Bromophenyl phenyl ether	101-55-3	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
4-Chloro-3-Methylphenol	59-50-7	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
4-Chlorophenyl phenyl ether	7005-72-3	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
4-Nitroaniline	100-01-6	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
4-Nitrophenol	100-02-7	--	--	ug/kg	< 380 U	< 1100 U	--	< 410 U	< 390 U	< 370 U	< 370 U	< 390 U
Acenaphthene	83-32-9	20000	500000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Acenaphthylene	208-96-8	100000	500000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Acetophenone	98-86-2	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Anthracene	120-12-7	100000	500000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Atrazine	1912-24-9	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Benz(a)anthracene	56-55-3	1000	5600	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Benzaldehyde	100-52-7	--	--	ug/kg	< 380 U	< 1100 U	--	< 410 U	< 390 U	< 370 U	< 370 U	< 390 U
Benzo(a)pyrene	50-32-8	1000	1000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Benzo(b)fluoranthene	205-99-2	1000	5600	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Benzo(g,h,i)perylene	191-24-2	100000	500000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Benzo(k)fluoranthene	207-08-9	800	56000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
bis(2-Chloroethoxy)methane	111-91-1	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
bis(2-Chloroethyl)ether	111-44-4	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
bis(2-Ethylhexyl)phthalate	117-81-7	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Butyl benzyl phthalate	85-68-7	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Caprolactam	105-60-2	--	--	ug/kg	< 380 U	< 1100 U	--	< 410 U	< 390 U	< 370 U	< 370 U	< 390 U
Carbazole	86-74-8	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Chrysene	218-01-9	**1000**	56000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Dibenz(a,h)anthracene	53-70-3	330	560	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Dibenzofuran	132-64-9	7000	350000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Diethyl phthalate	84-66-2	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Dimethyl phthalate	131-11-3	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Di-n-butyl phthalate	84-74-2	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Di-n-octyl phthalate	117-84-0	--	--	ug/kg	< 380 U	< 1100 U	--	< 410 U	< 390 U	< 370 U	< 370 U	< 390 U
Fluoranthene	206-44-0	100000	500000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Fluorene	86-73-7	30000	500000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Hexachloro-1,3-butadiene	87-68-3	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Hexachlorobenzene	118-74-1	330	6000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Hexachlorocyclopentadiene	77-47-4	--	--	ug/kg	< 380 U	< 1100 U	--	< 410 U	< 390 U	< 370 U	< 370 U	< 390 U
Hexachloroethane	67-72-1	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Indeno(1,2,3-cd)pyrene	193-39-5	500	5600	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Isophorone	78-59-1	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Naphthalene	91-20-3	12000	500000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Nitrobenzene	98-95-3	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
N-Nitrosodi-n-propylamine	621-64-7	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
N-Nitrosodiphenylamine	86-30-6	--	--	ug/kg	< 190 U	450 J	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
p-Chloroaniline	106-47-8	--	--	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Pentachlorophenol	87-86-5	800	6700	ug/kg	< 380 U	< 1100 U	--	< 410 U	< 390 U	< 370 U	< 370 U	< 390 U
Phenanthrene	85-01-8	100000	500000	ug/kg	< 190 U	730	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Phenol	108-95-2	330	500000	ug/kg	< 190 U	< 590 U	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
Pyrene	129-00-0	100000	500000	ug/kg	< 190 U	290 J	--	< 210 U	< 200 U	< 190 U	< 190 U	< 200 U
SVOCs SIM												
1,4-Dioxane	123-91-1	100	130000	ug/kg	--	--	< 210 U	--	--	--	--	--

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
SVOCs - semivolatile organic compounds
ug/kg - microgram per kilogram

Table 3
Soil Sample Results - SVOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

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Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	SUBSLAB-06	SUBSLAB-07	SUBSLAB-07	SUBSLAB-08	SUBSLAB-08	SUBSLAB-08	SUBSLAB-09	SUBSLAB-09
				Sample ID	SUB-SLAB-06-(6-8)-20210923	SUB-SLAB-07(5-7)-20210923	SUB-SLAB-07(8-10)-20210923	SUB-SLAB-08(12-14)-20210923	SUB-SLAB-08(20-22)-20210923	SUB-SLAB-08(6-8)-20210923	SUB-SLAB-09(20-21)-20210927	SUB-SLAB-09(5-2.5)-20210927
				Sample Date	9/23/2021	9/23/2021	9/23/2021	9/23/2021	9/23/2021	9/23/2021	9/27/2021	9/27/2021
				Start Depth	6	5	8	12	20	6	20	0.5
				End Depth	8	7	10	14	22	8	21	2.5
				Units								
SVOCs												
1,1-Biphenyl	92-52-4	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
1,2,4,5-Tetrachlorobenzene	95-94-3	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
1,4-Dioxane	123-91-1	100	130000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
2,2-Oxybis(1-Chloropropane)	108-60-1	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
2,4,5-Trichlorophenol	95-95-4	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
2,4,6-Trichlorophenol	88-06-2	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
2,4-Dichlorophenol	120-83-2	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
2,4-Dimethylphenol	105-67-9	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
2,4-Dinitrophenol	51-28-5	--	--	ug/kg	< 420 U	< 380 U	< 370 U	< 390 U	< 390 U	< 380 U	< 360 U	< 410 U
2,4-Dinitrotoluene	121-14-2	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
2,6-Dinitrotoluene	606-20-2	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
2-Chloronaphthalene	91-58-7	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
2-Chlorophenol	95-57-8	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
2-Methyl-4,6-dinitrophenol	534-52-1	--	--	ug/kg	< 420 U	< 380 U	< 370 U	< 390 U	< 390 U	< 380 U	< 360 U	< 410 U
2-Methylnaphthalene	91-57-6	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
2-Methylphenol	95-48-7	330	500000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
2-Nitroaniline	88-74-4	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
2-Nitrophenol	88-75-5	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
3,3-Dichlorobenzidine	91-94-1	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 UQ	< 210 UQ
3-Methylphenol, 4-Methylphenol	65794-96-9	--	--	ug/kg	< 420 U	< 380 U	< 370 U	< 390 U	< 390 U	< 380 U	< 360 U	< 410 U
3-Nitroaniline	99-09-2	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
4-Bromophenyl phenyl ether	101-55-3	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
4-Chloro-3-Methylphenol	59-50-7	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
4-Chlorophenyl phenyl ether	7005-72-3	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
4-Nitroaniline	100-01-6	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
4-Nitrophenol	100-02-7	--	--	ug/kg	< 420 U	< 380 U	< 370 U	< 390 U	< 390 U	< 380 U	< 360 U	< 410 U
Acenaphthene	83-32-9	20000	500000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Acenaphthylene	208-96-8	100000	500000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Acetophenone	98-86-2	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Anthracene	120-12-7	100000	500000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Atrazine	1912-24-9	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Benz(a)anthracene	56-55-3	1000	5600	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Benzaldehyde	100-52-7	--	--	ug/kg	< 420 U	< 380 U	< 370 U	< 390 U	< 390 U	< 380 U	< 360 U	< 410 U
Benzo(a)pyrene	50-32-8	1000	1000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Benzo(b)fluoranthene	205-99-2	1000	5600	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Benzo(g,h,i)perylene	191-24-2	100000	500000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Benzo(k)fluoranthene	207-08-9	800	56000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
bis(2-Chloroethoxy)methane	111-91-1	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
bis(2-Chloroethyl)ether	111-44-4	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
bis(2-Ethylhexyl)phthalate	117-81-7	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Butyl benzyl phthalate	85-68-7	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Caprolactam	105-60-2	--	--	ug/kg	< 420 U	< 380 U	< 370 U	< 390 U	< 390 U	< 380 U	< 360 U	< 410 U
Carbazole	86-74-8	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Chrysene	218-01-9	**1000**	56000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Dibenz(a,h)anthracene	53-70-3	330	560	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Dibenzofuran	132-64-9	7000	350000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Diethyl phthalate	84-66-2	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Dimethyl phthalate	131-11-3	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Di-n-butyl phthalate	84-74-2	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Di-n-octyl phthalate	117-84-0	--	--	ug/kg	< 420 U	< 380 U	< 370 U	< 390 U	< 390 U	< 380 U	< 360 U	< 410 U
Fluoranthene	206-44-0	100000	500000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Fluorene	86-73-7	30000	500000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Hexachloro-1,3-butadiene	87-68-3	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Hexachlorobenzene	118-74-1	330	6000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Hexachlorocyclopentadiene	77-47-4	--	--	ug/kg	< 420 U	< 380 U	< 370 U	< 390 U	< 390 U	< 380 U	< 360 U	< 410 U
Hexachloroethane	67-72-1	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Indeno(1,2,3-cd)pyrene	193-39-5	500	5600	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Isophorone	78-59-1	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Naphthalene	91-20-3	12000	500000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Nitrobenzene	98-95-3	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
N-Nitrosodi-n-propylamine	621-64-7	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
N-Nitrosodiphenylamine	86-30-6	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
p-Chloroaniline	106-47-8	--	--	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Pentachlorophenol	87-86-5	800	6700	ug/kg	< 420 U	< 380 U	< 370 U	< 390 U	< 390 U	< 380 U	< 360 U	< 410 U
Phenanthrene	85-01-8	100000	500000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Phenol	108-95-2	330	500000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
Pyrene	129-00-0	100000	500000	ug/kg	< 220 U	< 190 U	< 190 U	< 200 U	< 200 U	< 200 U	< 190 U	< 210 U
SVOCs SIM												
1,4-Dioxane	123-91-1	100	130000	ug/kg	--	--	--	--	--	--	--	--

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
SVOCs - semivolatile organic compounds
ug/kg - microgram per kilogram

Table 3
Soil Sample Results - SVOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

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Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	SUBSLAB-09	SUPUST-01	SUPUST-01	SUPUST-01	SUPUST-01	SUPUST-02	SUPUST-02	SUPUST-03
				Sample ID	SUB-SLAB-09(8.5-9)-20210927	DUPLICATE-1-20210913	SUP-UST-01-(10-12)-20210913	SUP-UST-01-(5-7)-20210913	SUP-VST-01-(13-15)-20210913	SUP-UST-02-(5-7)-20210913	SUP-UST-02-(7-10)-20210913	SUP-UST-03-(5-7)-20210922
				Sample Date	9/27/2021	9/13/2021	9/13/2021	9/13/2021	9/13/2021	9/13/2021	9/13/2021	9/22/2021
				Start Depth	8.5	13	10	5	13	5	7	5
				End Depth	9	15	12	7	15	7	10	7
				Units								
SVOCs												
1,1-Biphenyl	92-52-4	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
1,2,4,5-Tetrachlorobenzene	95-94-3	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
1,4-Dioxane	123-91-1	100	130000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
2,2-Oxybis(1-Chloropropane)	108-60-1	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
2,4,5-Trichlorophenol	95-95-4	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
2,4,6-Trichlorophenol	88-06-2	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
2,4-Dichlorophenol	120-83-2	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
2,4-Dimethylphenol	105-67-9	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
2,4-Dinitrophenol	51-28-5	--	--	ug/kg	< 370 U	< 410 U	< 380 U	< 360 U	< 380 U	< 380 U	< 400 U	< 2200 U
2,4-Dinitrotoluene	121-14-2	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
2,6-Dinitrotoluene	606-20-2	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
2-Chloronaphthalene	91-58-7	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
2-Chlorophenol	95-57-8	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
2-Methyl-4,6-dinitrophenol	534-52-1	--	--	ug/kg	< 370 U	< 410 U	< 380 U	< 360 U	< 380 U	< 380 U	< 400 U	< 2200 U
2-Methylnaphthalene	91-57-6	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	1900
2-Methylphenol	95-48-7	330	500000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
2-Nitroaniline	88-74-4	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
2-Nitrophenol	88-75-5	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
3,3-Dichlorobenzidine	91-94-1	--	--	ug/kg	< 190 UQ	< 210 U	< 190 UQ	< 190 UQ	< 200 U	< 200 UQ	< 210 UQ	< 1100 U
3-Methylphenol, 4-Methylphenol	65794-96-9	--	--	ug/kg	< 370 U	< 410 U	< 380 U	< 360 U	< 380 U	< 380 U	< 400 U	< 2200 U
3-Nitroaniline	99-09-2	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
4-Bromophenyl phenyl ether	101-55-3	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
4-Chloro-3-Methylphenol	59-50-7	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
4-Chlorophenyl phenyl ether	7005-72-3	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
4-Nitroaniline	100-01-6	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
4-Nitrophenol	100-02-7	--	--	ug/kg	< 370 U	< 410 U	< 380 U	< 360 U	< 380 U	< 380 U	< 400 U	< 2200 U
Acenaphthene	83-32-9	20000	500000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	460 J
Acenaphthylene	208-96-8	100000	500000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Acetophenone	98-86-2	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Anthracene	120-12-7	100000	500000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	120 J	< 210 U	< 1100 U
Atrazine	1912-24-9	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Benz(a)anthracene	56-55-3	1000	5600	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	200	< 210 U	< 1100 U
Benzaldehyde	100-52-7	--	--	ug/kg	< 370 U	< 410 U	< 380 U	< 360 U	< 380 U	< 380 U	< 400 U	< 2200 U
Benzo(a)pyrene	50-32-8	1000	1000	ug/kg	< 190 U	< 210 UQ	< 190 U	< 190 U	< 200 UQ	180 J	< 210 U	< 1100 U
Benzo(b)fluoranthene	205-99-2	1000	5600	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	210	< 210 U	< 1100 U
Benzo(g,h,i)perylene	191-24-2	100000	500000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	89.4 J	< 210 U	< 1100 U
Benzo(k)fluoranthene	207-08-9	800	56000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
bis(2-Chloroethoxy)methane	111-91-1	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
bis(2-Chloroethyl)ether	111-44-4	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
bis(2-Ethylhexyl)phthalate	117-81-7	--	--	ug/kg	< 190 U	410	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Butyl benzyl phthalate	85-68-7	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Caprolactam	105-60-2	--	--	ug/kg	< 370 U	< 410 U	< 380 UQ	< 360 UQ	< 380 U	< 380 UQ	< 400 UQ	< 2200 U
Carbazole	86-74-8	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Chrysene	218-01-9	**1000**	56000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	170 J	< 210 U	< 1100 U
Dibenz(a,h)anthracene	53-70-3	330	560	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Dibenzofuran	132-64-9	7000	350000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Diethyl phthalate	84-66-2	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Dimethyl phthalate	131-11-3	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Di-n-butyl phthalate	84-74-2	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Di-n-octyl phthalate	117-84-0	--	--	ug/kg	< 370 U	< 410 U	< 380 U	< 360 U	< 380 U	< 380 U	< 400 U	< 2200 U
Fluoranthene	206-44-0	100000	500000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	420	< 210 U	< 1100 U
Fluorene	86-73-7	30000	500000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	1000 J
Hexachloro-1,3-butadiene	87-68-3	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Hexachlorobenzene	118-74-1	330	6000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Hexachlorocyclopentadiene	77-47-4	--	--	ug/kg	< 370 U	< 410 U	< 380 U	< 360 U	< 380 U	< 380 U	< 400 U	< 2200 U
Hexachloroethane	67-72-1	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Indeno(1,2,3-cd)pyrene	193-39-5	500	5600	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Isophorone	78-59-1	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Naphthalene	91-20-3	12000	500000	ug/kg	< 190 U	< 210 U	< 190 U	74.9 J	< 200 U	< 200 U	< 210 U	< 1100 U
Nitrobenzene	98-95-3	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
N-Nitrosodi-n-propylamine	621-64-7	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
N-Nitrosodiphenylamine	86-30-6	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	1900
p-Chloroaniline	106-47-8	--	--	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Pentachlorophenol	87-86-5	800	6700	ug/kg	< 370 U	< 410 U	< 380 U	< 360 U	< 380 U	< 380 U	< 400 U	< 2200 U
Phenanthrene	85-01-8	100000	500000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	430	< 210 U	3600
Phenol	108-95-2	330	500000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	< 200 U	< 210 U	< 1100 U
Pyrene	129-00-0	100000	500000	ug/kg	< 190 U	< 210 U	< 190 U	< 190 U	< 200 U	330	< 210 U	700 J
SVOCs SIM												
1,4-Dioxane	123-91-1	100	130000	ug/kg	--	--	--	< 7.2 U	--	< 7.6 U	--	--

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
SVOCs - semivolatile organic compounds
ug/kg - microgram per kilogram

Table 3
Soil Sample Results - SVOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

DRAFT

ARCADIS

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	SUPUST-04	SUPUST-04	SUPUST-04	SUPUST-05	SUPUST-05	SUPUST-05	UST-7-EAST-SIDEWALL	UST-7-NORTH-SIDEWALL
				Sample ID	SUP-UST-04-(13-15)-20210922	SUP-UST-04-(6-8)-20210922	SUP-UST-04-(6-8)-20210922	DUPLICATE-03-20210923	SUP-UST-05-(23-25)-20210923	SUP-UST-05-(6-8)-20210923	UST-7-EAST-SIDEWALL-20220321	UST-7-NORTH-SIDEWALL-20220321
				Sample Date	9/22/2021	9/22/2021	9/22/2021	9/23/2021	9/23/2021	9/23/2021	3/21/2022	3/21/2022
				Start Depth	13	6	6	23	23	6	0	0
				End Depth	15	8	8	25	25	8	0	0
				Units								
SVOCs												
1,1-Biphenyl	92-52-4	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
1,2,4,5-Tetrachlorobenzene	95-94-3	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
1,4-Dioxane	123-91-1	100	130000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
2,2-Oxybis(1-Chloropropane)	108-60-1	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
2,4,5-Trichlorophenol	95-95-4	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
2,4,6-Trichlorophenol	88-06-2	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
2,4-Dichlorophenol	120-83-2	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
2,4-Dimethylphenol	105-67-9	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
2,4-Dinitrophenol	51-28-5	--	--	ug/kg	< 480 U	< 400 U	--	< 390 U	< 400 U	< 360 U	< 1800 U	< 370 U
2,4-Dinitrotoluene	121-14-2	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
2,6-Dinitrotoluene	606-20-2	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
2-Chloronaphthalene	91-58-7	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
2-Chlorophenol	95-57-8	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
2-Methyl-4,6-dinitrophenol	534-52-1	--	--	ug/kg	< 480 U	< 400 U	--	< 390 U	< 400 U	< 360 U	< 1800 U	< 370 U
2-Methylnaphthalene	91-57-6	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
2-Methylphenol	95-48-7	330	500000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
2-Nitroaniline	88-74-4	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
2-Nitrophenol	88-75-5	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
3,3-Dichlorobenzidine	91-94-1	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
3-Methylphenol, 4-Methylphenol	65794-96-9	--	--	ug/kg	< 480 U	< 400 U	--	< 390 U	< 400 U	< 360 U	< 1800 U	< 370 U
3-Nitroaniline	99-09-2	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
4-Bromophenyl phenyl ether	101-55-3	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
4-Chloro-3-Methylphenol	59-50-7	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
4-Chlorophenyl phenyl ether	7005-72-3	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
4-Nitroaniline	100-01-6	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
4-Nitrophenol	100-02-7	--	--	ug/kg	< 480 U	< 400 U	--	< 390 U	< 400 U	< 360 U	< 1800 U	< 370 U
Acenaphthene	83-32-9	20000	500000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Acenaphthylene	208-96-8	100000	500000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Acetophenone	98-86-2	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Anthracene	120-12-7	100000	500000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Atrazine	1912-24-9	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Benz(a)anthracene	56-55-3	1000	5600	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Benzaldehyde	100-52-7	--	--	ug/kg	< 480 U	< 400 U	--	< 390 U	< 400 U	< 360 U	< 1800 U	< 370 U
Benzo(a)pyrene	50-32-8	1000	1000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Benzo(b)fluoranthene	205-99-2	1000	5600	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Benzo(g,h,i)perylene	191-24-2	100000	500000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Benzo(k)fluoranthene	207-08-9	800	56000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
bis(2-Chloroethoxy)methane	111-91-1	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
bis(2-Chloroethyl)ether	111-44-4	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
bis(2-Ethylhexyl)phthalate	117-81-7	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Butyl benzyl phthalate	85-68-7	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Caprolactam	105-60-2	--	--	ug/kg	< 480 U	< 400 U	--	< 390 U	< 400 U	< 360 U	< 1800 U	< 370 U
Carbazole	86-74-8	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Chrysene	218-01-9	**1000**	56000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	720 J	< 190 U
Dibenz(a,h)anthracene	53-70-3	330	560	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Dibenzofuran	132-64-9	7000	350000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Diethyl phthalate	84-66-2	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Dimethyl phthalate	131-11-3	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Di-n-butyl phthalate	84-74-2	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Di-n-octyl phthalate	117-84-0	--	--	ug/kg	< 480 U	< 400 U	--	< 390 U	< 400 U	< 360 U	< 1800 U	< 370 U
Fluoranthene	206-44-0	100000	500000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Fluorene	86-73-7	30000	500000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	770 J	< 190 U
Hexachloro-1,3-butadiene	87-68-3	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Hexachlorobenzene	118-74-1	330	6000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Hexachlorocyclopentadiene	77-47-4	--	--	ug/kg	< 480 U	< 400 U	--	< 390 U	< 400 U	< 360 U	< 1800 U	< 370 U
Hexachloroethane	67-72-1	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Indeno(1,2,3-cd)pyrene	193-39-5	500	5600	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Isophorone	78-59-1	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Naphthalene	91-20-3	12000	500000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Nitrobenzene	98-95-3	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
N-Nitrosodi-n-propylamine	621-64-7	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
N-Nitrosodiphenylamine	86-30-6	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
p-Chloroaniline	106-47-8	--	--	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Pentachlorophenol	87-86-5	800	6700	ug/kg	< 480 U	< 400 U	--	< 390 U	< 400 U	< 360 U	< 1800 U	< 370 U
Phenanthrene	85-01-8	100000	500000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Phenol	108-95-2	330	500000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	< 950 U	< 190 U
Pyrene	129-00-0	100000	500000	ug/kg	< 250 U	< 200 U	--	< 200 U	< 210 U	< 180 U	460 J	< 190 U
SVOCs SIM												
1,4-Dioxane	123-91-1	100	130000	ug/kg	--	--	< 8.4 U	< 7.7 U	--	< 7.1 U	--	--

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
SVOCs - semivolatile organic compounds
ug/kg - microgram per kilogram

Table 3
Soil Sample Results - SVOCs
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

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ARCADIS

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	UST-7-SOUTH-SIDEWALL	UST-7-WEST-SIDEWALL	W-BOILER-ROOM-BOTTOM	W-BOILER-ROOM-E	W-BOILER-ROOM-N	W-BOILER-ROOM-S	W-BOILER-ROOM-W
				Sample ID	UST-7-SOUTH-SIDEWALL-20220321	UST-7-WEST-SIDEWALL-20220321	WEST-BOILER-ROOM-BOTTOM-20220113	WEST-BOILER-ROOM-EAST-SIDEWALL-20220113	WEST-BOILER-ROOM-NORTH-SIDEWALL-20220113	WEST-BOILER-ROOM-SOUTH-SIDEWALL-20220113	WEST-BOILER-ROOM-WEST-SIDEWALL-20220113
				Sample Date	3/21/2022	3/21/2022	1/13/2022	1/13/2022	1/13/2022	1/13/2022	1/13/2022
				Start Depth	0	0	0	0	0	0	0
				End Depth	0	0	0	0	0	0	0
				Units							
SVOCs											
1,1-Biphenyl	92-52-4	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
1,2,4,5-Tetrachlorobenzene	95-94-3	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
1,4-Dioxane	123-91-1	100	130000	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
2,2-Oxybis(1-Chloropropane)	108-60-1	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
2,4,5-Trichlorophenol	95-95-4	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
2,4,6-Trichlorophenol	88-06-2	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
2,4-Dichlorophenol	120-83-2	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
2,4-Dimethylphenol	105-67-9	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
2,4-Dinitrophenol	51-28-5	--	--	ug/kg	< 3600 U	< 1800 U	< 400 U	< 380 U	< 380 U	< 400 U	< 360 U
2,4-Dinitrotoluene	121-14-2	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
2,6-Dinitrotoluene	606-20-2	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
2-Chloronaphthalene	91-58-7	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
2-Chlorophenol	95-57-8	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
2-Methyl-4,6-dinitrophenol	534-52-1	--	--	ug/kg	< 3600 U	< 1800 U	< 400 U	< 380 U	< 380 U	< 400 U	< 360 U
2-Methylnaphthalene	91-57-6	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	95.4 J
2-Methylphenol	95-48-7	330	500000	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
2-Nitroaniline	88-74-4	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
2-Nitrophenol	88-75-5	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
3,3-Dichlorobenzidine	91-94-1	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
3-Methylphenol, 4-Methylphenol	65794-96-9	--	--	ug/kg	< 3600 U	< 1800 U	< 400 U	< 380 U	< 380 U	< 400 U	< 360 U
3-Nitroaniline	99-09-2	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
4-Bromophenyl phenyl ether	101-55-3	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
4-Chloro-3-Methylphenol	59-50-7	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
4-Chlorophenyl phenyl ether	7005-72-3	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
4-Nitroaniline	100-01-6	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
4-Nitrophenol	100-02-7	--	--	ug/kg	< 3600 U	< 1800 U	< 400 U	< 380 U	< 380 U	< 400 U	< 360 U
Acenaphthene	83-32-9	20000	500000	ug/kg	< 1800 U	370 J	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Acenaphthylene	208-96-8	100000	500000	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Acetophenone	98-86-2	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Anthracene	120-12-7	100000	500000	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Atrazine	1912-24-9	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Benz(a)anthracene	56-55-3	1000	5600	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Benzaldehyde	100-52-7	--	--	ug/kg	< 3600 U	< 1800 U	< 400 UQ	< 380 UQ	< 380 UQ	< 400 UQ	< 360 UQ
Benzo(a)pyrene	50-32-8	1000	1000	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Benzo(b)fluoranthene	205-99-2	1000	5600	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Benzo(g,h,i)perylene	191-24-2	100000	500000	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Benzo(k)fluoranthene	207-08-9	800	56000	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
bis(2-Chloroethoxy)methane	111-91-1	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
bis(2-Chloroethyl)ether	111-44-4	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
bis(2-Ethylhexyl)phthalate	117-81-7	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	1900	140 J	100 J
Butyl benzyl phthalate	85-68-7	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Caprolactam	105-60-2	--	--	ug/kg	< 3600 U	< 1800 U	< 400 U	< 380 U	< 380 U	< 400 U	< 360 U
Carbazole	86-74-8	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Chrysene	218-01-9	**1000**	56000	ug/kg	870 J	650 J	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Dibenz(a,h)anthracene	53-70-3	330	560	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Dibenzofuran	132-64-9	7000	350000	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Diethyl phthalate	84-66-2	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Dimethyl phthalate	131-11-3	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Di-n-butyl phthalate	84-74-2	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Di-n-octyl phthalate	117-84-0	--	--	ug/kg	< 3600 U	< 1800 U	< 400 U	< 380 U	< 380 U	< 400 U	< 360 U
Fluoranthene	206-44-0	100000	500000	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Fluorene	86-73-7	30000	500000	ug/kg	< 1800 U	850 J	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Hexachloro-1,3-butadiene	87-68-3	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Hexachlorobenzene	118-74-1	330	6000	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Hexachlorocyclopentadiene	77-47-4	--	--	ug/kg	< 3600 U	< 1800 U	< 400 U	< 380 U	< 380 U	< 400 U	< 360 U
Hexachloroethane	67-72-1	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Indeno(1,2,3-cd)pyrene	193-39-5	500	5600	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Isophorone	78-59-1	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Naphthalene	91-20-3	12000	500000	ug/kg	< 1800 U	< 940 U	190 J	< 200 U	< 200 U	170 J	340
Nitrobenzene	98-95-3	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
N-Nitrosodi-n-propylamine	621-64-7	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
N-Nitrosodiphenylamine	86-30-6	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
p-Chloroaniline	106-47-8	--	--	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Pentachlorophenol	87-86-5	800	6700	ug/kg	< 3600 U	< 1800 U	< 400 U	< 380 U	< 380 U	< 400 U	< 360 U
Phenanthrene	85-01-8	100000	500000	ug/kg	< 1800 U	820 J	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
Phenol	108-95-2	330	500000	ug/kg	< 1800 U	< 940 U	< 210 U	< 200 U	< 200 U	< 210 U	89.3 J
Pyrene	129-00-0	100000	500000	ug/kg	< 1800 U	530 J	< 210 U	< 200 U	< 200 U	< 210 U	< 190 U
SVOCs SIM											
1,4-Dioxane	123-91-1	100	130000	ug/kg	--	--	--	--	--	--	--

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
SU - standard units
SVOCs - semivolatile organic compounds
ug/kg - microgram per kilogram

DRAFT

Table 4
Soil Sample Results - Metals
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	BOILER-PIT-3-5	EAST-AREA-BOTTOM	EAST-AREA-E-SIDEWALL
				Sample ID	BOILER-PIT-3-5-20210924	EAST-AREA-BOTTOM-20220112	EAST-AREA-EAST-SIDEWALL-20220112
				Sample Date	9/24/2021	1/12/2022	1/12/2022
				Start Depth	3	0	0
				End Depth	5	0	0
				Units			
Metals							
Aluminum	7429-90-5	--	--	mg/kg	4830	7560	3290
Antimony	7440-36-0	--	--	mg/kg	5.14	< 2.83 UN	< 2.6 UN
Arsenic	7440-38-2	**13**	16	mg/kg	**15.4**	1.79	2.04
Barium	7440-39-3	**350**	400	mg/kg	**845**	64.8 N	21.9 N
Beryllium	7440-41-7	7.2	590	mg/kg	< 0.293 U	0.322 J	0.217 J
Cadmium	7440-43-9	**2.5**	9.3	mg/kg	**14.7**	0.95	0.265 J
Calcium	7440-70-2	--	--	mg/kg	8160	14200	2100
Chromium	7440-47-3	--	--	mg/kg	252 D	18.7 N	9.41 N
Cobalt	7440-48-4	--	--	mg/kg	37.1	6.18	3.32
Copper	7440-50-8	**50**	270	mg/kg	**777**	8.63	13.5
Iron	7439-89-6	--	--	mg/kg	129000 D	19300	8860
Lead	7439-92-1	**63**	1000	mg/kg	**557**	9.18	11.7
Magnesium	7439-95-4	--	--	mg/kg	4650	9390	754
Manganese	7439-96-5	**1600**	10000	mg/kg	489	313	251
Mercury	7439-97-6	**0.18**	2.8	mg/kg	**0.854 D**	0.009 J	0.015 J
Nickel	7440-02-0	**30**	310	mg/kg	**2360**	9.58	11.5
Potassium	7440-09-7	--	--	mg/kg	238	1660	318
Selenium	7782-49-2	3.9	1500	mg/kg	< 0.978 U	< 1.13 UN	< 1.04 UN
Silver	7440-22-4	2	1500	mg/kg	--	< 0.566 UN	< 0.521 UN
Sodium	7440-23-5	--	--	mg/kg	1010	151	41.4 J
Thallium	7440-28-0	--	--	mg/kg	< 19.6 UD	1.87 J	< 2.08 U
Vanadium	7440-62-2	--	--	mg/kg	4950 D	23.8	30.4
Zinc	7440-66-6	**109**	10000	mg/kg	**989**	34	37.7

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
N - Indicates the spiked sample recovery is not within control limits.
SU - standard units
ug/kg - microgram per kilogram
BOILER-PIT-3-5 location was excavated as part of site remedial activities.

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Table 4
Soil Sample Results - Metals
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location Sample ID Sample Date Start Depth End Depth Units	E-BOILER-PIT-BOTTOM EAST-BOILER-PIT-BOTTOM-20220112 1/12/2022 0 0	NAPL-01 NAPL-01-(8-10)-END-POINT-20210913 9/13/2021 8 10	NAPL-02 NAPL-02-(8-10)-END-POINT-20210913 9/13/2021 8 10
Metals							
Aluminum	7429-90-5	--	--	mg/kg	19900	5410	2230
Antimony	7440-36-0	--	--	mg/kg	< 3.11 UN	< 2.32 UN	< 2.4 UN
Arsenic	7440-38-2	**13**	16	mg/kg	1.91	2.32	1.2
Barium	7440-39-3	**350**	400	mg/kg	101 N	29.5	12.1
Beryllium	7440-41-7	7.2	590	mg/kg	0.965	0.317	0.191 J
Cadmium	7440-43-9	**2.5**	9.3	mg/kg	2.49	< 0.279 U	< 0.288 U
Calcium	7440-70-2	--	--	mg/kg	1690	721	498
Chromium	7440-47-3	--	--	mg/kg	30 N	12.8	7.31
Cobalt	7440-48-4	--	--	mg/kg	15.4	5.19	1.97
Copper	7440-50-8	**50**	270	mg/kg	20.5	7.49	5.12
Iron	7439-89-6	--	--	mg/kg	24600	7710	5950
Lead	7439-92-1	**63**	1000	mg/kg	10.97	4.95	1.98
Magnesium	7439-95-4	--	--	mg/kg	5570	1640	730
Manganese	7439-96-5	**1600**	10000	mg/kg	1460	167	139
Mercury	7439-97-6	**0.18**	2.8	mg/kg	0.018	0.005 J	0.005 J
Nickel	7440-02-0	**30**	310	mg/kg	25.6	7.39	4.65
Potassium	7440-09-7	--	--	mg/kg	3910	728	293
Selenium	7782-49-2	3.9	1500	mg/kg	< 1.25 UN	< 0.929 U	< 0.96 U
Silver	7440-22-4	2	1500	mg/kg	< 0.623 UN	< 0.465 U	< 0.48 U
Sodium	7440-23-5	--	--	mg/kg	154	77.1 J	72.8 J
Thallium	7440-28-0	--	--	mg/kg	1.19 J	< 1.86 U	< 1.92 U
Vanadium	7440-62-2	--	--	mg/kg	45.9	13.5	7.1
Zinc	7440-66-6	**109**	10000	mg/kg	60.7	21.5	18.7

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
N - Indicates the spiked sample recovery is not within control limits.
SU - standard units
ug/kg - microgram per kilogram
BOILER-PIT-3-5 location was excavated as part of site remedial activities.

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Table 4
Soil Sample Results - Metals
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	NAPL-03	NAPL-04	NAPL-05
				Sample ID	NAPL-AREA-03-(10-12)-END-POINT-20210914	NAPL-AREA-04-(8-10)-END-POINT-20210914	NAPL-5-SIDEWALL-END-POINT-(10-12)-202109
				Sample Date	9/14/2021	9/14/2021	9/15/2021
				Start Depth	10	8	10
				End Depth	12	10	12
				Units			
Metals							
Aluminum	7429-90-5	--	--	mg/kg	4720	4810	5700
Antimony	7440-36-0	--	--	mg/kg	< 2.47 UN	< 2.62 UN	< 2.86 UN
Arsenic	7440-38-2	**13**	16	mg/kg	1.62	2.63	1.53
Barium	7440-39-3	**350**	400	mg/kg	31.5	39.5	51.2 N
Beryllium	7440-41-7	7.2	590	mg/kg	0.209 J	0.353	0.266 J
Cadmium	7440-43-9	**2.5**	9.3	mg/kg	< 0.296 U	< 0.314 U	< 0.343 U
Calcium	7440-70-2	--	--	mg/kg	1680	591	1160
Chromium	7440-47-3	--	--	mg/kg	22	11.2	10.19
Cobalt	7440-48-4	--	--	mg/kg	4.01	5.38	5.82
Copper	7440-50-8	**50**	270	mg/kg	6.73	8.03	7.5
Iron	7439-89-6	--	--	mg/kg	7970	15400	9890
Lead	7439-92-1	**63**	1000	mg/kg	2.39	4.77	3.5
Magnesium	7439-95-4	--	--	mg/kg	2950	1370	2470
Manganese	7439-96-5	**1600**	10000	mg/kg	153	1270	165
Mercury	7439-97-6	**0.18**	2.8	mg/kg	0.004 J	0.004 J	0.007 J
Nickel	7440-02-0	**30**	310	mg/kg	10.47	7.34	8.78
Potassium	7440-09-7	--	--	mg/kg	771	373	1860 N
Selenium	7782-49-2	3.9	1500	mg/kg	< 0.988 U	0.45 J	< 1.14 U
Silver	7440-22-4	2	1500	mg/kg	< 0.494 U	< 0.523 U	< 0.572 UN
Sodium	7440-23-5	--	--	mg/kg	104	81.5 J	108 J
Thallium	7440-28-0	--	--	mg/kg	< 1.98 U	< 2.09 U	< 2.29 U
Vanadium	7440-62-2	--	--	mg/kg	16.3	15.4	22.4
Zinc	7440-66-6	**109**	10000	mg/kg	18.3	18.9	31.7

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
N - Indicates the spiked sample recovery is not within control limits.
SU - standard units
ug/kg - microgram per kilogram
BOILER-PIT-3-5 location was excavated as part of site remedial activities.

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Table 4
Soil Sample Results - Metals
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location Sample ID Sample Date Start Depth End Depth Units	NAPL-06 NAPL-06-(8-10)-END-POINT-20210916 9/16/2021 8 10	NAPL-07 NAPL-07-(8-10)-END-POINT-20210916 9/16/2021 8 10	NE-CORNER-EXC-E NORTH-EAST-CORNER-EXCAVATION-EAST-SIDEWA 1/12/2022 0 0
Metals							
Aluminum	7429-90-5	--	--	mg/kg	3300	2500	5170
Antimony	7440-36-0	--	--	mg/kg	< 2.32 UN	< 2.31 UN	< 2.8 UN
Arsenic	7440-38-2	**13**	16	mg/kg	2.08	1.75	2.91
Barium	7440-39-3	**350**	400	mg/kg	25.5 N	25 N	108 N
Beryllium	7440-41-7	7.2	590	mg/kg	0.247 J	0.241 J	0.287 J
Cadmium	7440-43-9	**2.5**	9.3	mg/kg	< 0.278 U	< 0.277 U	0.461
Calcium	7440-70-2	--	--	mg/kg	1680	357	1300
Chromium	7440-47-3	--	--	mg/kg	7.16	6.22	10.14 N
Cobalt	7440-48-4	--	--	mg/kg	2.3	3.14	4.45
Copper	7440-50-8	**50**	270	mg/kg	4.91	3.46	7.73
Iron	7439-89-6	--	--	mg/kg	7250	9360	11300
Lead	7439-92-1	**63**	1000	mg/kg	3.79	3.17	19
Magnesium	7439-95-4	--	--	mg/kg	728	610	1280
Manganese	7439-96-5	**1600**	10000	mg/kg	503	473	505
Mercury	7439-97-6	**0.18**	2.8	mg/kg	0.01 J	0.008 J	0.033
Nickel	7440-02-0	**30**	310	mg/kg	4.35	3.53	7.76
Potassium	7440-09-7	--	--	mg/kg	274 N	281 N	591
Selenium	7782-49-2	3.9	1500	mg/kg	< 0.928 U	0.527 J	< 1.12 UN
Silver	7440-22-4	2	1500	mg/kg	< 0.464 UN	< 0.462 UN	< 0.561 UN
Sodium	7440-23-5	--	--	mg/kg	73.4 J	61.7 J	112
Thallium	7440-28-0	--	--	mg/kg	< 1.86 U	< 1.85 U	1.01 J
Vanadium	7440-62-2	--	--	mg/kg	10.37	8.3	18.2
Zinc	7440-66-6	**109**	10000	mg/kg	16.6	13.8	49

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
N - Indicates the spiked sample recovery is not within control limits.
SU - standard units
ug/kg - microgram per kilogram
BOILER-PIT-3-5 location was excavated as part of site remedial activities.

Table 4
Soil Sample Results - Metals
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location Sample ID Sample Date Start Depth End Depth Units	NE-CORNER-EXC-N NORTH-EAST-CORNER-EXCAVATION-NORTH-SIDEW 1/12/2022 0 0	NE-CORNER-EXC-S NORTH-EAST-CORNER-EXCAVATION-SOUTH-SIDEW 1/12/2022 0 0	NE-CORNER-EXC-W NORTH-EAST-CORNER-EXCAVATION-WEST-SIDEWA 1/12/2022 0 0
Metals							
Aluminum	7429-90-5	--	--	mg/kg	6570	1970	12900
Antimony	7440-36-0	--	--	mg/kg	0.681 JN	< 2.56 UN	< 3.03 UN
Arsenic	7440-38-2	**13**	16	mg/kg	5.76	0.543 J	2.55
Barium	7440-39-3	**350**	400	mg/kg	51.3 N	10.94 N	59.2 N
Beryllium	7440-41-7	7.2	590	mg/kg	0.399	0.068 J	0.479
Cadmium	7440-43-9	**2.5**	9.3	mg/kg	1.39	< 0.307 U	0.859
Calcium	7440-70-2	--	--	mg/kg	804	431	1100
Chromium	7440-47-3	--	--	mg/kg	14.8 N	4 N	22.7 N
Cobalt	7440-48-4	--	--	mg/kg	7.99	1.1 J	21.6
Copper	7440-50-8	**50**	270	mg/kg	27.4	1.06	15.6
Iron	7439-89-6	--	--	mg/kg	12200	2230	13400
Lead	7439-92-1	**63**	1000	mg/kg	**75.8**	2.5	9.13
Magnesium	7439-95-4	--	--	mg/kg	1470	604	2410
Manganese	7439-96-5	**1600**	10000	mg/kg	135	25.6	118
Mercury	7439-97-6	**0.18**	2.8	mg/kg	0.175	0.002 J	0.027
Nickel	7440-02-0	**30**	310	mg/kg	16.6	2.36	14.2
Potassium	7440-09-7	--	--	mg/kg	839	367	1870
Selenium	7782-49-2	3.9	1500	mg/kg	< 1.14 UN	< 1.02 UN	< 1.21 UN
Silver	7440-22-4	2	1500	mg/kg	1.44 N	< 0.512 UN	< 0.607 UN
Sodium	7440-23-5	--	--	mg/kg	37.2 J	33.7 J	69.3 J
Thallium	7440-28-0	--	--	mg/kg	< 2.29 U	< 2.05 U	0.951 J
Vanadium	7440-62-2	--	--	mg/kg	34.9	3.08	20.5
Zinc	7440-66-6	**109**	10000	mg/kg	95	12.6	37.4

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
N - Indicates the spiked sample recovery is not within control limits.
SU - standard units
ug/kg - microgram per kilogram
BOILER-PIT-3-5 location was excavated as part of site remedial activities.

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Table 4
Soil Sample Results - Metals
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	Post-Ex-Bottom	Post-Ex-Bottom-East	Post-Ex-Bottom-West
				Sample ID	POST-EXCAVATION-BOTTOM-1-20211220	POST-EXCAVATION-BOTTOM-EAST-20211220	POST-EXCAVATION-BOTTOM-WEST-20211220
				Sample Date	12/20/2021	12/20/2021	12/20/2021
				Start Depth	0	0	0
				End Depth	0	0	0
				Units			
Metals							
Aluminum	7429-90-5	--	--	mg/kg	12200	3340	6980
Antimony	7440-36-0	--	--	mg/kg	0.5 JN	< 2.65 UN	< 2.41 UN
Arsenic	7440-38-2	**13**	16	mg/kg	2.11	1.35	1.66
Barium	7440-39-3	**350**	400	mg/kg	65.4	18.1	43.5
Beryllium	7440-41-7	7.2	590	mg/kg	0.409	0.191 J	0.254 J
Cadmium	7440-43-9	**2.5**	9.3	mg/kg	**3.39**	0.533	1.05
Calcium	7440-70-2	--	--	mg/kg	2560	729	10500
Chromium	7440-47-3	--	--	mg/kg	35.4	10.89	10
Cobalt	7440-48-4	--	--	mg/kg	22	3.17	6.29
Copper	7440-50-8	**50**	270	mg/kg	16.5	13	10.78
Iron	7439-89-6	--	--	mg/kg	27700	7940	13100
Lead	7439-92-1	**63**	1000	mg/kg	4.69	3.11	12
Magnesium	7439-95-4	--	--	mg/kg	5700	1270	5930
Manganese	7439-96-5	**1600**	10000	mg/kg	331	103	404
Mercury	7439-97-6	**0.18**	2.8	mg/kg	0.006 J	< 0.015 U	< 0.015 U
Nickel	7440-02-0	**30**	310	mg/kg	**33.2**	8.38	11.1
Potassium	7440-09-7	--	--	mg/kg	1680	482	559
Selenium	7782-49-2	3.9	1500	mg/kg	< 0.953 U	< 1.06 U	< 0.963 U
Silver	7440-22-4	2	1500	mg/kg	0.422 J	0.153 J	0.265 J
Sodium	7440-23-5	--	--	mg/kg	92 J	37.9 J	598
Thallium	7440-28-0	--	--	mg/kg	1.99	0.84 J	1.5 J
Vanadium	7440-62-2	--	--	mg/kg	38.8	11.6	16.2
Zinc	7440-66-6	**109**	10000	mg/kg	52.8	15.6	32.8

Notes:
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U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
N - Indicates the spiked sample recovery is not within control limits.
SU - standard units
ug/kg - microgram per kilogram
BOILER-PIT-3-5 location was excavated as part of site remedial activities.

Table 4
Soil Sample Results - Metals
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	SUBSLAB-01	SUBSLAB-01	SUBSLAB-01
				Sample ID	DUPLICATE-2-20210917	SUB-SLAB-01-(15-17)-20210917	SUB-SLAB-01-(5-8)-20210917
				Sample Date	9/17/2021	9/17/2021	9/17/2021
				Start Depth	5	15	5
				End Depth	8	17	8
				Units			
Metals							
Aluminum	7429-90-5	--	--	mg/kg	2830	2380	3120
Antimony	7440-36-0	--	--	mg/kg	< 2.66 UN	< 2.66 UN	< 2.44 UN
Arsenic	7440-38-2	**13**	16	mg/kg	1.81	5.66	1.83
Barium	7440-39-3	**350**	400	mg/kg	24.4 N	10.38 N	25.4 N
Beryllium	7440-41-7	7.2	590	mg/kg	0.179 J	0.331	0.183 J
Cadmium	7440-43-9	**2.5**	9.3	mg/kg	< 0.319 U	< 0.319 U	< 0.293 U
Calcium	7440-70-2	--	--	mg/kg	294	336	289
Chromium	7440-47-3	--	--	mg/kg	5.88	9.21	6.23
Cobalt	7440-48-4	--	--	mg/kg	2.69	2.31	3.04
Copper	7440-50-8	**50**	270	mg/kg	3.4	8.93	3.42
Iron	7439-89-6	--	--	mg/kg	7230	19000	7160
Lead	7439-92-1	**63**	1000	mg/kg	2.42	3.56	2.58
Magnesium	7439-95-4	--	--	mg/kg	728	334	851
Manganese	7439-96-5	**1600**	10000	mg/kg	614	157	603
Mercury	7439-97-6	**0.18**	2.8	mg/kg	0.008 J	0.08	0.009 J
Nickel	7440-02-0	**30**	310	mg/kg	4.64	5.68	5.15
Potassium	7440-09-7	--	--	mg/kg	315 N	176 N	401 N
Selenium	7782-49-2	3.9	1500	mg/kg	< 1.06 U	< 1.06 U	< 0.977 U
Silver	7440-22-4	2	1500	mg/kg	< 0.532 UN	< 0.531 UN	< 0.488 UN
Sodium	7440-23-5	--	--	mg/kg	75.7 J	120	72.4 J
Thallium	7440-28-0	--	--	mg/kg	< 2.13 U	< 2.12 U	< 1.95 U
Vanadium	7440-62-2	--	--	mg/kg	7.34	9.37	7.97
Zinc	7440-66-6	**109**	10000	mg/kg	12.9	15.9	12.3

Notes:
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U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
N - Indicates the spiked sample recovery is not within control limits.
SU - standard units
ug/kg - microgram per kilogram
BOILER-PIT-3-5 location was excavated as part of site remedial activities.

Table 4
Soil Sample Results - Metals
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	SUBSLAB-09	SUBSLAB-09	SUBSLAB-09
				Sample ID	SUB-SLAB-09(20-21)-20210927	SUB-SLAB-09(5-2.5)-20210927	SUB-SLAB-09(8.5-9)-20210927
				Sample Date	9/27/2021	9/27/2021	9/27/2021
				Start Depth	20	0.5	8.5
				End Depth	21	2.5	9
				Units			
Metals							
Aluminum	7429-90-5	--	--	mg/kg	841	11200	16600
Antimony	7440-36-0	--	--	mg/kg	< 2.48 U	0.528 J	0.584 J
Arsenic	7440-38-2	**13**	16	mg/kg	0.375 J	4.63	2.66
Barium	7440-39-3	**350**	400	mg/kg	4.32 J	135	139
Beryllium	7440-41-7	7.2	590	mg/kg	0.123 J	0.674	0.359
Cadmium	7440-43-9	**2.5**	9.3	mg/kg	< 0.298 U	0.505	0.519
Calcium	7440-70-2	--	--	mg/kg	96.6 J	989	7900
Chromium	7440-47-3	--	--	mg/kg	6.7	19.9	78.5
Cobalt	7440-48-4	--	--	mg/kg	0.855 J	11.1	20.1
Copper	7440-50-8	**50**	270	mg/kg	3.74	8.54	21.3
Iron	7439-89-6	--	--	mg/kg	4560	17400	23600
Lead	7439-92-1	**63**	1000	mg/kg	1.26	26.4	6.61
Magnesium	7439-95-4	--	--	mg/kg	146	2090	13500
Manganese	7439-96-5	**1600**	10000	mg/kg	55.1	**1720**	422
Mercury	7439-97-6	**0.18**	2.8	mg/kg	0.006 J	0.11	0.023
Nickel	7440-02-0	**30**	310	mg/kg	2.47	15.5	**40.2**
Potassium	7440-09-7	--	--	mg/kg	25.5 J	346	3420
Selenium	7782-49-2	3.9	1500	mg/kg	< 0.992 U	< 1.16 U	< 1.06 U
Silver	7440-22-4	2	1500	mg/kg	< 0.496 U	< 0.578 U	< 0.529 U
Sodium	7440-23-5	--	--	mg/kg	38.2 J	186	295
Thallium	7440-28-0	--	--	mg/kg	< 1.98 U	< 2.31 U	< 2.12 U
Vanadium	7440-62-2	--	--	mg/kg	4	24.4	45.9
Zinc	7440-66-6	**109**	10000	mg/kg	8.39 N	43.1 N	53.2 N

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
N - Indicates the spiked sample recovery is not within control limits.
SU - standard units
ug/kg - microgram per kilogram
BOILER-PIT-3-5 location was excavated as part of site remedial activities.

Table 4
Soil Sample Results - Metals
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	W-BOILER-ROOM-BOTTOM	W-BOILER-ROOM-E	W-BOILER-ROOM-N
				Sample ID	WEST-BOILER-ROOM-BOTTOM-20220113	WEST-BOILER-ROOM-EAST-SIDEWALL-20220113	WEST-BOILER-ROOM-NORTH-SIDEWALL-20220113
				Sample Date	1/13/2022	1/13/2022	1/13/2022
				Start Depth	0	0	0
				End Depth	0	0	0
				Units			
Metals							
Aluminum	7429-90-5	--	--	mg/kg	8440	7250	8610
Antimony	7440-36-0	--	--	mg/kg	< 2.64 UN	< 2.6 UN	< 2.45 UN
Arsenic	7440-38-2	**13**	16	mg/kg	3.93	0.822 J	1.14
Barium	7440-39-3	**350**	400	mg/kg	67.1	63.6	32.6
Beryllium	7440-41-7	7.2	590	mg/kg	0.553	0.444	0.358
Cadmium	7440-43-9	**2.5**	9.3	mg/kg	0.625	0.573	0.105 J
Calcium	7440-70-2	--	--	mg/kg	1570	1480	524
Chromium	7440-47-3	--	--	mg/kg	19.7 N	15 N	16.9 N
Cobalt	7440-48-4	--	--	mg/kg	8.13	6.43	5.08
Copper	7440-50-8	**50**	270	mg/kg	11	12.6	4.9
Iron	7439-89-6	--	--	mg/kg	12600	7970	10000
Lead	7439-92-1	**63**	1000	mg/kg	7.79	6.86	5.48
Magnesium	7439-95-4	--	--	mg/kg	3340	2790	2490
Manganese	7439-96-5	**1600**	10000	mg/kg	124	111	217
Mercury	7439-97-6	**0.18**	2.8	mg/kg	0.012 J	0.002 J	0.012 J
Nickel	7440-02-0	**30**	310	mg/kg	16.1	16.6	9.38
Potassium	7440-09-7	--	--	mg/kg	1770 N	947 N	880 N
Selenium	7782-49-2	3.9	1500	mg/kg	0.905 J	0.498 J	0.778 J
Silver	7440-22-4	2	1500	mg/kg	0.592	0.363 J	0.499
Sodium	7440-23-5	--	--	mg/kg	84 JN	88.4 JN	64.2 JN
Thallium	7440-28-0	--	--	mg/kg	1.71 J	1.05 J	1.48 J
Vanadium	7440-62-2	--	--	mg/kg	26.3 N	16.8 N	20.5 N
Zinc	7440-66-6	**109**	10000	mg/kg	45.4	43.9	29.2

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
N - Indicates the spiked sample recovery is not within control limits.
SU - standard units
ug/kg - microgram per kilogram
BOILER-PIT-3-5 location was excavated as part of site remedial activities.

Table 4
Soil Sample Results - Metals
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	W-BOILER-ROOM-S	W-BOILER-ROOM-W
				Sample ID	WEST-BOILER-ROOM-SOUTH-SIDEWALL-20220113	WEST-BOILER-ROOM-WEST-SIDEWALL-20220113
				Sample Date	1/13/2022	1/13/2022
				Start Depth	0	0
				End Depth	0	0
				Units		
Metals						
Aluminum	7429-90-5	--	--	mg/kg	7550	7070
Antimony	7440-36-0	--	--	mg/kg	< 2.77 UN	< 2.34 UN
Arsenic	7440-38-2	**13**	16	mg/kg	2.6	1.34
Barium	7440-39-3	**350**	400	mg/kg	52.6	45.9
Beryllium	7440-41-7	7.2	590	mg/kg	0.493	0.382
Cadmium	7440-43-9	**2.5**	9.3	mg/kg	0.411	0.364
Calcium	7440-70-2	--	--	mg/kg	881	829
Chromium	7440-47-3	--	--	mg/kg	15.6 N	13.9 N
Cobalt	7440-48-4	--	--	mg/kg	10.08	3.27
Copper	7440-50-8	**50**	270	mg/kg	9.75	6.13
Iron	7439-89-6	--	--	mg/kg	9320	7960
Lead	7439-92-1	**63**	1000	mg/kg	6.88	5.58
Magnesium	7439-95-4	--	--	mg/kg	2090	1290
Manganese	7439-96-5	**1600**	10000	mg/kg	146	81.7
Mercury	7439-97-6	**0.18**	2.8	mg/kg	0.008 J	0.016
Nickel	7440-02-0	**30**	310	mg/kg	14	9.01
Potassium	7440-09-7	--	--	mg/kg	1010 N	424 N
Selenium	7782-49-2	3.9	1500	mg/kg	0.568 J	0.587 J
Silver	7440-22-4	2	1500	mg/kg	0.427 J	0.346 J
Sodium	7440-23-5	--	--	mg/kg	38.1 JN	54.3 JN
Thallium	7440-28-0	--	--	mg/kg	1.1 J	1.18 J
Vanadium	7440-62-2	--	--	mg/kg	17 N	11.8 N
Zinc	7440-66-6	**109**	10000	mg/kg	43.7	28.4

Notes:
J - estimated concentation greater than the laboratory's method detection limit, but less than the laboratory's reporting limit.
U - Concentration was not detected in sample. Reporting limit provided.
D - sample diluted for analysis.
N - Indicates the spiked sample recovery is not within control limits.
SU - standard units
ug/kg - microgram per kilogram
BOILER-PIT-3-5 location was excavated as part of site remedial activities.

Table 5
Soil Sample Results - Polychlorinated Biphenyls
Crown Dykman
66 Herb Hill Road
Glen Cove, New York, 11542

Analyte	CAS	NYSDEC TABLE 375-6:UNRESTRICTED USE SCO (bold)	NYSDEC TABLE 375-6:COMMERCIAL USE SCO (gray shading)	Location	EAST-AREA-E-SIDEWALL	NE-CORNER-EXC-E	NE-CORNER-EXC-N	NE-CORNER-EXC-S	NE-CORNER-EXC-W	W-BOILER-ROOM-BOTTOM	W-BOILER-ROOM-E	W-BOILER-ROOM-N	W-BOILER-ROOM-S	W-BOILER-ROOM-W
				Sample ID	EAST-AREA-EAST-SIDEWALL-20220112	NORTH-EAST-CORNER-EXCAVATION-EAST-SIDEWA	NORTH-EAST-CORNER-EXCAVATION-NORTH-SIDEW	NORTH-EAST-CORNER-EXCAVATION-SOUTH-SIDEW	NORTH-EAST-CORNER-EXCAVATION-WEST-SIDEWA	WEST-BOILER-ROOM-BOTTOM-20220113	WEST-BOILER-ROOM-EAST-SIDEWALL-20220113	WEST-BOILER-ROOM-NORTH-SIDEWALL-20220113	WEST-BOILER-ROOM-SOUTH-SIDEWALL-20220113	WEST-BOILER-ROOM-WEST-SIDEWALL-20220113
				Sample Date	1/12/2022	1/12/2022	1/12/2022	1/12/2022	1/12/2022	1/13/2022	1/13/2022	1/13/2022	1/13/2022	1/13/2022
				Start Depth	0	0	0	0	0	0	0	0	0	0
				End Depth	0	0	0	0	0	0	0	0	0	0
				Units										
PCBs														
Aroclor 1016	12674-11-2	--	--	ug/kg	< 19.8 U	< 20.1 U	< 20 U	< 20.7 U	< 22.7 U	< 20.6 U	< 19.8 U	< 19.6 U	< 20.6 U	< 18.6 U
Aroclor 1221	11104-28-2	100	--	ug/kg	< 19.8 U	< 20.1 U	< 20 U	< 20.7 U	< 22.7 U	< 20.6 U	< 19.8 U	< 19.6 U	< 20.6 U	< 18.6 U
Aroclor 1232	11141-16-5	100	--	ug/kg	< 19.8 U	< 20.1 U	< 20 U	< 20.7 U	< 22.7 U	< 20.6 U	< 19.8 U	< 19.6 U	< 20.6 U	< 18.6 U
Aroclor 1242	53469-21-9	100	--	ug/kg	< 19.8 U	< 20.1 U	< 20 U	< 20.7 U	< 22.7 U	< 20.6 U	< 19.8 U	< 19.6 U	< 20.6 U	< 18.6 U
Aroclor 1248	12672-29-6	100	--	ug/kg	< 19.8 U	< 20.1 U	< 20 U	< 20.7 U	< 22.7 U	< 20.6 U	< 19.8 U	< 19.6 U	< 20.6 U	< 18.6 U
Aroclor 1254	11097-69-1	100	--	ug/kg	< 19.8 U	< 20.1 U	< 20 U	< 20.7 U	< 22.7 U	< 20.6 U	< 19.8 U	< 19.6 U	< 20.6 U	< 18.6 U
Aroclor 1260	11096-82-5	100	--	ug/kg	< 19.8 U	< 20.1 U	< 20 U	< 20.7 U	< 22.7 U	< 20.6 U	< 19.8 U	< 19.6 U	< 20.6 U	< 18.6 U
Aroclor 1262	37324-23-5	100	--	ug/kg	< 19.8 U	< 20.1 U	< 20 U	< 20.7 U	< 22.7 U	< 20.6 U	< 19.8 U	< 19.6 U	< 20.6 U	< 18.6 U
Aroclor 1268	11100-14-4	100	--	ug/kg	< 19.8 U	< 20.1 U	< 20 U	< 20.7 U	< 22.7 U	< 20.6 U	< 19.8 U	< 19.6 U	< 20.6 U	< 18.6 U

Notes:
U - Concentration was not detected in sample. Reporting limit provided.
SU - standard units
ug/kg - microgram per kilogram

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Appendix G.
Historical Groundwater Analytical Results

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		Location	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01	MW-01
		Sample Name	MW-1_03092011	MW-1	MW-1_06202011	MW-X	MW-1_09162011	MWX	MW-1_03292012	MW-1_07182012	MW-X	MW-1_11012012	MW-X	MW-1-20130424	MW-X	MW-01	MW-1-101413	MW-1-112113	MW-1 011514	MW-1_071014	MW-1	MW-01
		Parent Sample Name				MW-1_06202011		MW-1_09162011			MW-1_07182012		MW-1_11012012		MW-1-20130424							
		Sample Date	3/8/2011	3/9/2011	6/20/2011	6/20/2011	9/16/2011	9/16/2011	3/29/2012	7/18/2012	7/18/2012	11/1/2012	11/1/2012	4/24/2013	4/24/2013	8/27/2013	10/14/2013	11/21/2013	1/15/2014	7/10/2014	3/24/2017	11/2/2017
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)																						
1,1,1,2-Tetrachloroethane	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.93 U	< 0.93 U	< 0.2 U	< 0.2 U	< 0.1 U	< 0.2 U	< 0.5 U	< 0.2 U	< 0.1 U	--	--	--	--	--	--	--
1,1,1-Trichloroethane (TCA)	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.69 U	< 0.69 U	< 0.12 U	< 0.12 U	< 0.06 U	< 0.12 U	< 0.3 U	< 0.12 U	< 0.06 U	< 16 U	< 8.8 U	< 16 U	< 8.2 U	< 16 U	--	< 0.19 U
1,1,2,2-Tetrachloroethane	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.81 U	< 0.81 U	< 0.32 U	< 0.32 U	< 0.16 U	< 0.32 U	< 0.8 U	< 0.32 U	< 0.16 U	< 4.2 U	< 7.2 U	< 4.2 U	< 2.1 U	< 4.2 U	--	< 0.19 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 6.2 U	< 11 U	< 6.2 U	< 3.1 U	< 6.2 U	--	< 0.15 UT
1,1,2-Trichloroethane	1	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.65 U	< 0.65 U	< 0.38 U	< 0.38 U	< 0.19 U	< 0.38 U	< 0.95 U	< 0.38 U	< 0.19 U	< 4.6 U	< 11 U	< 4.6 U	< 2.3 U	< 4.6 U	--	< 0.19 U
1,1-Dichloroethane	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 1 U	< 1 U	< 0.26 U	< 0.26 U	0.53 J	< 0.26 U	< 0.65 U	0.44 J	0.52 J	< 7.6 U	< 6 U	< 7.6 U	< 3.8 U	< 7.6 U	--	< 0.24 U
1,1-Dichloroethene	5	µg/L	< 100 U	--	< 100 U	**5.6**	0.83 J	< 0.83 U	2.3	3.3	4.8	3.3	3.9 J	1.6 J	1.7	< 5.8 U	< 7.6 U	< 5.8 U	< 2.9 U	< 5.8 U	--	< 0.25 U
1,1-Dichloropropene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.82 U	< 0.82 U	< 0.24 U	< 0.24 U	< 0.12 U	< 0.24 U	< 0.6 U	< 0.24 U	< 0.12 U	--	--	--	--	--	--	--
1,2,3-Trichlorobenzene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.88 U	< 0.88 U	< 1 U	< 1 U	< 0.51 U	< 1 UI	< 2.6 UI	< 1 U	< 0.51 U	--	--	--	--	--	--	--
1,2,3-Trichloropropane	0.04	µg/L	< 100 U	--	< 100 U	< 5 U	< 1.5 U	< 1.5 U	< 0.84 U	< 0.84 U	< 0.42 U	< 0.84 U	< 2.1 U	< 0.84 U	< 0.42 U	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.72 U	< 0.72 U	< 0.68 U	< 0.68 U	< 0.34 U	< 0.68 U	< 1.7 U	< 0.68 U	< 0.34 U	< 8.2 U	< 6 U	< 8.2 U	< 4.1 U	< 8.2 U	--	< 0.2 U
1,2,4-Trimethylbenzene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.64 U	< 0.64 U	< 0.26 U	< 0.26 U	< 0.13 U	< 0.26 U	< 0.65 U	< 0.26 U	< 0.13 U	--	--	--	--	--	--	--
1,2-Dibromo-3-Chloropropane	0.04	µg/L	< 100 U	--	< 100 U	< 5 U	< 1.2 U	< 1.2 U	< 0.8 U	< 0.8 U	< 0.4 U	< 0.8 U	< 2 U	< 0.8 U	< 0.4 U	< 7.8 U	< 27 U	< 7.8 U	< 3.9 U	< 7.8 U	--	< 0.94 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.52 U	< 0.52 U	< 0.56 U	< 0.56 U	< 0.28 U	< 0.56 U	< 1.4 U	< 0.56 U	< 0.28 U	< 15 U	< 9.6 U	< 15 U	< 7.3 U	< 15 U	--	< 0.21 U
1,2-Dichlorobenzene	3	µg/L	< 100 U	--	< 100 U	0.29 J	< 0.22 U	< 0.22 U	< 0.42 U	< 0.42 U	< 0.21 U	< 0.42 U	< 1.1 U	< 0.42 U	< 0.21 U	< 16 U	< 5.2 U	< 16 U	< 7.9 U	< 16 U	--	< 0.19 U
1,2-Dichloroethane	0.6	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.72 U	< 0.72 U	< 0.38 U	< 0.38 U	< 0.19 U	< 0.38 U	< 0.95 U	< 0.38 U	< 0.19 U	< 4.2 U	< 8.8 U	< 4.2 U	< 2.1 U	< 4.2 U	--	< 0.2 U
1,2-Dichloropropane	1	µg/L	< 100 U	--	< 100 U	< 5 U	**1.1 J**	0.92 J	< 0.18 U	< 0.18 U	< 0.09 U	< 0.18 U	< 0.45 U	< 0.18 U	< 0.09 U	< 14 U	< 7.2 U	< 14 U	< 7.2 U	< 14 U	--	< 0.25 U
1,3,5-Trichlorobenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene (Mesitylene)	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.53 U	< 0.53 U	< 0.3 U	< 0.3 U	< 0.15 U	< 0.3 U	< 0.75 U	< 0.3 U	< 0.15 U	--	--	--	--	--	--	--
1,3-Dichlorobenzene	3	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.14 U	< 0.14 U	< 0.28 U	< 0.28 U	< 0.14 U	< 0.28 U	< 0.7 U	< 0.28 U	< 0.14 U	< 16 U	< 5.6 U	< 16 U	< 7.8 U	< 16 U	--	< 0.18 U
1,3-Dichloropropane	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.69 U	< 0.69 U	< 0.38 U	< 0.38 U	< 0.19 U	< 0.38 U	< 0.95 U	< 0.38 U	< 0.19 U	--	--	--	--	--	--	--
1,4-Dichlorobenzene	3	µg/L	< 100 U	--	< 100 U	0.63 J	< 0.59 U	< 0.59 U	< 0.46 U	< 0.46 U	0.35 J	< 0.46 U	< 1.2 U	< 0.46 U	< 0.23 U	< 17 U	< 5.2 U	< 17 U	< 8.4 U	< 17 U	--	< 0.17 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,2-Dichloropropane	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.79 U	< 0.79 U	< 0.32 U	< 0.32 U	< 0.16 U	< 0.32 U	< 0.8 U	< 0.32 U	< 0.16 U	--	--	--	--	--	--	--
2-Chlorotoluene	NSL	µg/L	< 100 U	--	< 100 U	< 5 U	< 1.2 U	< 1.2 U	< 0.28 U	< 0.28 U	< 0.14 U	< 0.28 U	< 0.7 U	< 0.28 U	< 0.14 U	--	--	--	--	--	--	--
2-Hexanone	50	µg/L	< 200 U	--	< 200 U	< 10 U	< 1.1 U	< 1.1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	< 2.5 U	< 1 U	< 0.5 U	< 25 U	< 16 U	< 25 U	< 12 U	< 25 U	--	< 1.3 U
2-Methoxy-2-Methylbutane	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chlorotoluene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.8 U	< 0.8 U	< 0.28 U	< 0.28 U	< 0.14 U	< 0.28 U	< 0.7 U	< 0.28 U	< 0.14 U	--	--	--	--	--	--	--
Acetone	50	µg/L	< 200 U	--	50 U	3.3 J	< 1 U	< 1 U	< 5.4 U	< 5.4 U	< 2.7 U	< 5.4 U	< 13 U	< 5.4 R	< 2.7 R	< 60 U	< 44 U	< 60 U	< 30 U	< 60 U	--	< 2.7 U
Acrylonitrile	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	1	µg/L	< 100 U	--	< 100 U	< 5 U	0.88 J	0.86 J	< 0.16 U	0.37 J	0.44 J	0.21 J	< 0.4 U	0.29 J	0.3 J	< 8.2 U	< 5.2 U	< 8.2 U	< 4.1 U	< 8.2 U	--	< 0.2 U
Bromobenzene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.67 U	< 0.67 U	< 0.26 U	< 0.26 U	< 0.13 U	< 0.26 U	< 0.65 U	< 0.26 U	< 0.13 U	--	--	--	--	--	--	--
Bromochloromethane	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.77 U	< 0.77 U	< 0.54 U	< 0.54 U	< 0.27 U	< 0.54 U	< 1.4 U	< 0.54 U	< 0.27 U	--	--	--	--	--	--	--
Bromodichloromethane	50	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.48 U	< 0.48 U	< 0.24 U	< 0.24 U	< 0.12 U	< 0.24 U	< 0.6 U	< 0.24 U	< 0.12 U	< 7.8 U	< 6 U	< 7.8 U	< 3.9 U	< 7.8 U	--	< 0.17 U
Bromoform	50	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.46 U	< 0.46 U	< 0.38 U	< 0.38 U	< 0.19 U	< 0.38 U	< 0.95 U	< 0.38 U	< 0.19 U	< 5.2 U	< 26 U	< 5.2 U	< 2.6 U	< 5.2 U	--	< 0.29 U
Bromomethane	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 2.1 U	< 2.1 U	< 0.36 U	< 0.36 U	< 0.18 U	< 0.36 U	< 0.9 U	< 0.36 UJ	< 0.18 U	< 14 U	< 16 U	< 14 U	< 6.9 U	< 14 U	--	< 0.35 U
Carbon Disulfide	60	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.9 U	< 0.9 U	< 0.26 U	< 0.26 U	< 0.13 U	< 0.26 U	< 0.65 U	< 0.26 U	< 0.13 U	< 3.8 U	< 5.2 U	< 3.8 U	< 1.9 U	< 3.8 U	--	< 0.22 U
Carbon Tetrachloride	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 1.1 U	< 1.1 U	< 0.12 U	< 0.12 U	< 0.06 U	< 0.12 U	< 0.3 U	< 0.12 U	< 0.06 U	< 5.4 U	< 5.2 U	< 5.4 U	< 2.7 U	< 5.4 U	--	< 0.18 U
Chlorobenzene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.72 U	< 0.72 U	< 0.22 U	< 0.22 U	< 0.11 U	< 0.22 U	< 0.55 U	< 0.22 U	< 0.11 U	< 15 U	< 6 U	< 15 U	< 7.5 U	< 15 U	--	< 0.18 U
Chloroethane	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 1.1 U	< 1.1 U	< 0.34 U	< 0.34 U	< 0.17 U	< 0.34 U	< 0.85 U	< 0.34 U	< 0.17 U	< 6.4 U	< 12 U	< 6.4 U	< 3.2 U	< 6.4 U	--	< 0.36 U
Chloroform	7	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.67 U	< 0.67 U	< 0.16 U	< 0.16 U	< 0.08 U	< 0.16 U	< 0.4 U	< 0.16 U	< 0.08 U	< 6.8 U	< 6.4 U	< 6.8 U	< 3.4 U	< 6.8 U	--	< 0.23 U
Chloromethane (Methyl Chloride)	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 1.1 U	< 1.1 U	< 0.2 U	< 0.2 U	< 0.1 U	< 0.2 U	< 0.5 U	< 0.2 U	< 0.1 U	< 7 U	< 12 U	< 7 U	< 3.5 U	< 7 U	--	< 0.36 U
Cis-1,2-Dichloroethylene	5	µg/L	**3000**	**3000**	**5700**	**5700**	**120**	**120**	**2500**	**4500**	**3800**	**2800**	**3600**	**2200**	**2000 J**	**1400**	**690**	**970**	**630**	**1300**	--	**45**
Cis-1,3-Dichloropropene	0.4	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.28 U	< 0.28 U	< 0.36 U	< 0.36 U	< 0.18 U	< 0.36 U	< 0.9 U	< 0.36 U	< 0.18 U	< 7.2 U	< 5.6 U	< 7.2 U	< 3.6 U	< 7.2 U	--	< 0.17 U
Cyclohexane	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 3.6 U	< 4.8 U	< 3.6 U	< 1.8 U	< 3.6 U	--	< 0.13 U
Cymene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.81 U	< 0.81 U	< 0.28 U	< 0.28 U	< 0.14 U	< 0.28 U	< 0.7 U	< 0.28 U	< 0.14 U	--	--	--	--	--	--	--
Dibromochloromethane	50	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.55 U	< 0.55 U	< 0.4 U	< 0.4 U	< 0.2 U	< 0.4 U	< 1 U	< 0.4 U	< 0.2 U	< 6.4 U	< 7.2 U	< 6.4 U	< 3.2 U	< 6.4 U	--	< 0.25 U
Dibromomethane	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.7 U	< 0.7 U	< 0.58 U	< 0.58 U	< 0.29 U	< 0.58 U	< 1.5 U	< 0.58 U	< 0.29 U	--	--	--	--	--	--	--
Dichlorodifluoromethane	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 1 U	< 1 U	< 0.44 U	< 0.44 U	< 0.22 U	< 0.44 U	< 1.1 U	< 0.44 UJ	< 0.22 U	< 14 U	< 12 U	< 14 U	< 6.8 U	< 14 U	--	< 0.17 U
Diethyl Ether (Ethyl Ether)	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethyl Tert-Butyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.87 U	< 0.87 U	< 0.2 U	< 0.2 U	< 0.1 U	< 0.2 U	< 0.5 U	< 0.2 U	< 0.1 U	< 15 U	< 6.8 U	< 15 U	< 7.4 U	< 15 U	--	< 0.19 U
Hexachlorobutadiene	0.5	µg/L	< 100 U	--	< 100 U	< 5 U	< 1 U	< 1 U	< 0.96 U	< 0.96 U	< 0.48 U	< 0.96 U	< 2.4 U	< 0.96 U	< 0.48 U	--	--	--	--	--	--	--
Iodomethane (Methyl Iodide)	5	µg/L	< 200 U	--	< 200 U	< 10 U	< 0.91 U	< 0.91 U	< 0.26 U	< 0.26 U	< 0.13 U	< 0.26 U	< 0.65 U	< 0.26 UJ	< 0.13 U	--	--	--	--	--	--	--
Isopropyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropylbenzene (Cumene)	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.85 U	< 0.85 U	< 0.16 U	0.31 J	0.36 J	0.21 J	< 0.4 U	< 0.16 U	< 0.08 U	< 16 U	< 5.2 U	< 16 U	< 7.9 U	< 16 U	--	< 0.33 U
M,P-Xylene (Sum Of Isomers)	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl Acetate	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 10 U	< 15 U	< 10 U	< 5 U	< 10 U	--	< 0.58 U
Methyl Ethyl Ketone (2-Butanone)	50	µg/L	< 200 U	--	< 200 U	< 10 U	< 1.1 U	< 1.1 U	< 4.6 U	< 4.6 U	< 2.3 U	< 4.6 U	< 12 U	< 4.6 R	< 2.3 R	< 26 U	< 23 U	< 26 U	< 13 U	< 26 U	--	< 2.6 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NSL	µg/L	< 200 U	--	< 200 U	< 10 U	< 0.38 U	< 0.38 U	< 2 U	< 2 U	< 0.99 U	< 2 U	< 5 U	< 2 U	< 0.99 U	< 42 U	< 13 U	< 42 U	< 21 U	< 42 U	--	< 0.81 U
Methylcyclohexane	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 3.2 U	< 5.2 U	< 3.2 U	< 1.6 U	< 3.2 U	--	< 0.09 U
Methylene Chloride	5	µg/L	**35 JB**	--	**20 U**	< 5 U	< 0.78 U	< 0.78 U	< 0.36 U	< 0.36 U	< 0.18 U	< 0.36 U	< 0.9 U	< 0.36 U	< 0.18 U	**10 J**	< 13 U	< 8.8 U	**7.7 J**	< 8.8 U	--	< 1 U
M-P-Xylene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 1.7 U	< 1.7 U	< 0.5 U	< 0.5 U	< 0.25 U	< 0.5 U	< 1.3 U	< 0.5 U	< 0.25 U	--	--	--	--	--	--	--
Naphthalene	10	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.34 U	< 0.34 U	< 0.58 U	< 0.58 U	0.37 J	< 0.58 UI	< 1.5 UI	< 0.58 U	< 0.29 U	--	--	--	--	--	--	--
N-Butylbenzene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.67 U	< 0.67 U	< 0.28 U	< 0.28 U	< 0.14 U	< 0.28 U	< 0.7 U	< 0.28 U	< 0.14 U	--	--	--	--	--	--	--
N-Propylbenzene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.62 U	< 0.62 U	< 0.2 U	< 0.2 U	< 0.1 U	< 0.2 U	< 0.5 U	< 0.2 U	< 0.1 U	--	--	--	--	--	--	--
O-Xylene (1,2-Dimethylbenzene)	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.66 U	< 0.66 U	< 0.26 U	0.34 J	0.37 J	< 0.26 U	< 0.65 U	< 0.26 U	0.16 J	--	--	--	--	--	--	--
Sec-Butylbenzene	5	µg/L	< 100 U	--	< 100 U	1.8 J	< 0.79 U	< 0.79 U	0.8 J	0.65 J	0.74 J	0.66 J	< 0.9 U	< 0.36 U	0.42 J	--	--	--	--	--	--	--
Styrene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.64 U	< 0.64 U	< 0.24 U	< 0.24 U	< 0.12 U	< 0.24 U	< 0.6 U	< 0.24 U	< 0.12 U	< 15 U	< 4.4 U	< 15 U	< 7.3 U	< 15 U	--	< 0.28 U
T-Butylbenzene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.75 U	< 0.75 U	< 0.24 U	0.4 J	0.48 J	0.25 J	< 0.6 U	0.3 J	0.4 J	--	--	--	--	--	--	--
Tert-Butyl Alcohol	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tert-Butyl Methyl Ether	10	µg/L	< 100 U	--	< 100 U	0.28 J	1.4 J	1.3 J	< 0.28 U	1.2 J	1.3	< 0.28 U	< 0.7 U	0.72 J	0.7 J	< 3.2 U	< 6.8 U	< 3.2 U	2 J	< 3.2 U	--	< 0.17 U
Tetrachloroethylene (PCE)	5	µg/L	**950**	**950**	**3300**	**3300**	**48**	**51**	**880**	**1300**	**1100**	**1200**	**1500**	**600**	**640**	**470**	**240**	**250**	**170**	**530**	--	**11**
Tetrahydrofuran	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.72 U	< 0.72 U	< 0.3 U	< 0.3 U	0.18 J	< 0.3 U	< 0.75 U	< 0.3 U	< 0.15 U	< 10 U	< 5.2 U	< 10 U	< 5.1 U	< 10 U	--	< 0.17 U
Trans-1,2-Dichloroethene	5	µg/L	**19 J**	--	**41 U**	**43**	2.6 J	2.8 J	**15**	**72**	**63**	**24**	**26**	**11**	**14**	< 18 U	< 7.6 U	< 18 U	< 9 U	< 18 U	--	0.3 J
Trans-1,3-Dichloropropene	0.4	µg/L	< 100 U	--	< 100 U	< 5 U	< 0.57 U	< 0.57 U	< 0.48 U	< 0.48 U	< 0.24 U	< 0.48 U	< 1.2 U	< 0.48 U	< 0.24 U	< 7.4 U	< 7.6 U	< 7.4 U	< 3.7 U	< 7.4 U	--	< 0.17 U
Trans-1,4-Dichloro-2-Butene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethylene (TCE)	5	µg/L	**530**	**530**	**1100**	**1200**	**20**	**22**	**300**	**760**	**700**	**660**	**690**	**240**	**290**	**230**	**100**	**140**	**95**	**340**	--	**11**
Trichlorofluoromethane	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 1.1 U	< 1.1 U	< 0.3 U	< 0.3 U	< 0.15 U	< 0.3 U	< 0.75 U	< 0.3 U	< 0.15 U	< 18 U	< 8.4 U	< 18 U	< 8.8 U	< 18 U	--	< 0.21 U
Vinyl Acetate	NSL	µg/L	< 100 U	--	< 100 U	< 5 U	< 1.6 U	< 1.6 U	< 0.76 U	< 0.76 U	< 0.38 U	< 0.76 U	< 1.9 U	< 0.76 U	< 0.38 U	--	--	--	--	--	--	--
Vinyl Chloride	2	µg/L	**77 J**	--	**200**	**230**	**64**	**66**	**87**	**140**	**190**	**130**	**150**	**98**	**130**	**87**	**58**	**65**	**21**	< 18 U	--	**3.1**
Xylenes	5	µg/L	< 100 U	--	< 100 U	< 5 U	< 2.3 U	< 2.3 U	< 0.72 U	< 0.72 U	0.37 J	< 0.72 U	< 1.8 U	< 0.72 U	< 0.36 U	< 13 U	< 5.6 U	< 13 U	< 6.6 U	< 13 U	--	< 0.58 U
Xylenes, Total	NSL	µg/L	< 100 U	--	< 100 U	< 5 U	< 2.3 U	< 2.3 U	< 0.72 U	< 0.72 U	0.37 J	< 0.72 U	< 1.8 U	< 0.72 U	< 0.36 U	< 13 U	< 5.6 U	< 13 U	< 6.6 U	< 13 U	--	< 0.58 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)																						
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3-Perfluoroheptyl propanoic acid (7:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3-Perfluoropropyl propanoic acid (3:3 FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamide (NMeFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluoro-3-methoxypropanoic acid (PFMPA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluoro-4-methoxybutanoic acid (PFMBA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluorobutanesulfonic acid (PFBS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	25.9	19
Perfluorobutanoic Acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17
Perfluorodecanesulfonic acid (PFDS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.27 U
Perfluorodecanoic acid (PFDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13
Perfluorododecanesulfonic acid (PFDoS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluorododecanoic acid (PFDoA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.65 J
Perfluoroheptanesulfonic acid (PFHpS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.7
Perfluoroheptanoic acid (PFHpA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	19.6	30
Perfluorohexanesulfonic acid (PFHxS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8.53	11 B
Perfluorohexanoic acid (PFHxA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	36
Perfluorononanesulfonic Acid (PFNS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluorononanoic acid (PFNA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.76	14
Perfluorooctane Sulfonamide (PFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.7
Perfluorooctanesulfonic acid (PFOS)	2.7	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**101**	**230**
Perfluorooctanoic acid (PFOA)	6.7	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**62.8**	**86**
Perfluoropentanesulfonic Acid (PFPeS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluoropentanoic Acid (PFPeA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35
Perfluorotetradecanoic acid (PFTeDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.24 U
Perfluorotridecanoic Acid (PFTriA/PFTrDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U
Perfluoroundecanoic Acid (PFUnA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.1 J

Notes:

[1]NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)

--' = Not analyzed
µg/L = Mircogram(s) per liter
ng/L - Nanogram(s) per liter
B = Analyte detected in blank, as well as sample
D = Compound in analysis has been diluted
J = Concentration is estimated
NSL = No screening level available
U = Analyte not detected
R = Reported result unusable
VOCs = Volatile organic compounds
PFAS = Per- and polyfluoroalkyl substances
Concentrations exceeding the screening level are bolded and shaded gray

Location		MW-01	MW-01	MW-01D	MW-01D	MW-01D	MW-01D	MW-01D	MW-01D	MW-01D	MW-01D	MW-01D	MW-01D	MW-01D	MW-01D	MW-01D	MW-01D	MW-01D	MW-01D
Sample Name		MW-1-06182022	MW-1-09262022	MW-1D_03052011	MW-1D	MW-1D_06282011	MW-1D_09152011	MW-1D_03292012	MW-1D_07182012	MW-1D_10312012	MW-1D_20130424	MW-01D	MW-01D-101413	MW-01D-112113	MW-01D 011414	MW-01D_071814	MW-01D	MW-01D	MW-01D_040518
Parent Sample Name																			
Sample Date		6/10/2022	9/26/2022	3/8/2011	3/9/2011	6/28/2011	9/15/2011	3/29/2012	7/18/2012	10/31/2012	4/24/2013	8/26/2013	10/14/2013	11/21/2013	1/14/2014	7/10/2014	3/21/2017	11/2/2017	4/5/2018
Analyte	NYSDEC AWQS[1]	Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)																			
1,1,1,2-Tetrachloroethane	5	µg/L	< 0.36 U	< 0.18 U	< 250 U	--	< 5 U	< 0.93 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.5 U	--	--	--	--	--	--	--	< 0.71 U
1,1,1-Trichloroethane (TCA)	5	µg/L	< 0.34 U	< 0.17 U	< 250 U	--	< 5 U	< 0.69 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.3 U	< 66 U	< 11 U	< 41 U	< 21 U	< 16 U	--	< 0.19 U	< 0.68 U
1,1,2,2-Tetrachloroethane	5	µg/L	< 0.25 U	< 0.13 U	< 250 U	--	< 5 U	< 0.81 U	< 0.32 U	< 0.32 U	< 0.32 U	< 0.8 U	< 17 U	< 9 U	< 11 U	< 5.3 U	< 4.2 U	--	< 0.19 U	< 0.51 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	µg/L	< 0.45 U	< 0.23 U	--	--	--	--	--	--	--	--	< 25 U	< 14 U	< 16 U	< 7.8 U	< 6.2 U	--	< 0.15 UT	< 0.91 U
1,1,2-Trichloroethane	1	µg/L	< 0.37 U	< 0.18 U	< 250 U	--	< 5 U	< 0.65 U	< 0.38 U	< 0.38 U	< 0.38 U	< 0.95 U	< 18 U	< 14 U	< 12 U	< 5.8 U	< 4.6 U	--	< 0.19 U	< 0.73 U
1,1-Dichloroethane	5	µg/L	< 0.28 U	< 0.14 U	< 250 U	--	< 5 U	< 1 U	0.53 J	< 0.26 U	0.91 J	< 0.65 U	< 30 U	< 7.5 U	< 19 U	< 9.5 U	< 7.6 U	--	0.33 J	< 0.57 U
1,1-Dichloroethene	5	µg/L	< 0.28 U	< 0.14 U	< 250 U	--	4.6 J	4 J	3.5	2.7	5	4.2 J	< 23 U	< 9.5 U	< 15 U	< 7.3 U	< 5.8 U	--	0.77 J	< 0.57 U
1,1-Dichloropropene	5	µg/L	< 0.3 U	< 0.15 U	< 250 U	--	< 5 U	< 0.82 U	< 0.24 U	< 0.24 U	< 0.24 U	< 0.6 U	--	--	--	--	--	--	--	< 0.6 U
1,2,3-Trichlorobenzene	5	µg/L	< 0.61 U	< 0.3 U	< 250 U	--	< 5 U	< 0.88 U	< 1 U	< 1 U	< 1 U	< 2.6 U	--	--	--	--	--	--	< 1.2 U	< 0.50 U
1,2,3-Trichloropropane	0.04	µg/L	< 0.56 U	< 0.28 U	< 250 U	--	< 5 U	< 1.5 U	< 0.84 U	< 0.84 U	< 0.84 U	< 2.1 U	--	--	--	--	--	--	< 1.1 U	--
1,2,4-Trichlorobenzene	5	µg/L	< 0.5 U	< 0.25 U	< 250 U	--	< 5 U	< 0.72 U	< 0.68 U	< 0.68 U	< 0.68 U	< 1.7 U	< 33 U	< 7.5 U	< 21 U	< 10 U	< 8.2 U	--	< 0.2 U	< 0.99 U
1,2,4-Trimethylbenzene	5	µg/L	< 0.4 U	0.49 J	< 250 U	--	< 5 U	< 0.64 U	< 0.26 U	< 0.26 U	< 0.26 U	< 0.65 U	--	--	--	--	--	--	--	< 0.8 U
1,2-Dibromo-3-Chloropropane	0.04	µg/L	< 1.6 U	< 0.8 U	< 250 U	--	< 5 U	< 1.2 U	< 0.8 U	< 0.8 U	< 0.8 U	< 2 U	< 31 U	< 34 U	< 20 U	< 9.8 U	< 7.8 U	--	< 0.94 U	< 3.2 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	µg/L	< 0.34 U	< 0.17 U	< 250 U	--	< 5 U	< 0.52 U	< 0.56 U	< 0.56 U	< 0.56 U	< 1.4 U	< 58 U	< 12 U	< 37 U	< 18 U	< 15 U	--	< 0.21 U	< 0.68 U
1,2-Dichlorobenzene	3	µg/L	< 0.24 U	< 0.12 U	< 250 U	--	< 5 U	< 0.22 U	< 0.42 U	< 0.42 U	< 0.42 U	< 1.1 U	< 63 U	< 6.5 U	< 40 U	< 20 U	< 16 U	--	< 0.19 U	< 0.49 U
1,2-Dichloroethane	0.6	µg/L	< 0.62 U	< 0.31 U	< 250 U	--	< 5 U	< 0.72 U	< 0.38 U	< 0.38 U	< 0.38 U	< 0.95 U	< 17 U	< 11 U	< 11 U	< 5.3 U	< 4.2 U	--	< 0.2 U	< 0.60 U
1,2-Dichloropropane	1	µg/L	< 0.36 U	< 0.18 U	< 250 U	--	< 5 U	< 0.71 U	< 0.18 U	< 0.18 U	0.37 J	< 0.45 U	< 58 U	< 9 U	< 36 U	< 18 U	< 14 U	--	< 0.25 U	< 0.72 U
1,3,5-Trichlorobenzene	5	µg/L	< 0.42 U	< 0.21 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.84 U
1,3,5-Trimethylbenzene (Mesitylene)	5	µg/L	< 0.23 U	< 0.11 U	< 250 U	--	< 5 U	< 0.53 U	< 0.3 U	< 0.3 U	< 0.3 U	< 0.75 U	--	--	--	--	--	--	--	< 0.45 U
1,3-Dichlorobenzene	3	µg/L	< 0.24 U	0.28 J	< 250 U	--	< 5 U	< 0.14 U	< 0.28 U	< 0.28 U	< 0.28 U	< 0.7 U	< 62 U	< 7 U	< 39 U	< 20 U	< 16 U	--	< 0.18 U	< 0.47 U
1,3-Dichloropropane	5	µg/L	< 0.26 U	< 0.13 U	< 250 U	--	< 5 U	< 0.69 U	< 0.38 U	< 0.38 U	< 0.38 U	< 0.95 U	--	--	--	--	--	--	--	< 0.52 U
1,4-Dichlorobenzene	3	µg/L	< 0.26 U	< 0.13 U	< 250 U	--	< 5 U	< 0.59 U	< 0.46 U	< 0.46 U	< 0.46 U	< 1.2 U	< 67 U	< 6.5 U	< 42 U	< 21 U	< 17 U	--	< 0.17 U	< 0.52 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	< 41 U	< 21 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 82 U
2,2-Dichloropropane	5	µg/L	< 0.65 U	< 0.33 U	< 250 U	--	< 5 U	< 0.79 U	< 0.32 U	< 0.32 U	< 0.32 U	< 0.8 U	--	--	--	--	--	--	--	< 1.3 U
2-Chlorotoluene	NSL	µg/L	< 0.23 U	< 0.11 U	< 250 U	--	< 5 U	< 1.2 U	< 0.28 U	< 0.28 U	< 0.28 U	< 0.7 U	--	--	--	--	--	--	--	< 0.46 U
2-Hexanone	50	µg/L	< 2.2 U	< 1.1 U	< 500 U	--	< 10 U	< 1.1 U	< 1 U	< 1 U	< 1 U	< 2.5 U	< 99 U	< 21 U	< 62 U	< 31 U	< 25 U	--	< 1.3 U	< 4.5 U
2-Methoxy-2-Methylbutane	NSL	µg/L	< 0.29 U	< 0.14 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.57 U
4-Chlorotoluene	5	µg/L	< 0.24 U	< 0.12 U	< 250 U	--	< 5 U	< 0.8 U	< 0.28 U	< 0.28 U	< 0.28 U	< 0.7 U	--	--	--	--	--	--	--	< 0.47 U
Acetone	50	µg/L	< 4.1 U	33 J	< 500 U	--	1.3 J	3.3 J	< 5.4 U	< 5.4 U	< 5.4 U	< 13 R	< 240 U	< 55 U	< 150 U	< 75 U	< 60 U	--	< 2.7 U	< 8.1 U
Acrylonitrile	5	µg/L	< 1.1 U	< 0.55 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.2 U
Benzene	1	µg/L	< 0.4 U	0.28 J	< 250 U	--	< 5 U	0.81 J	0.59 J	< 0.16 U	0.49 J	**1.1 J**	< 33 U	< 6.5 U	< 21 U	< 10 U	< 8.2 U	--	< 0.2 U	< 0.43 U
Bromobenzene	5	µg/L	< 0.3 U	< 0.15 U	< 250 U	--	< 5 U	< 0.67 U	< 0.26 U	< 0.26 U	< 0.26 U	< 0.65 U	--	--	--	--	--	--	--	< 0.6 U
Bromochloromethane	5	µg/L	< 0.61 U	< 0.31 U	< 250 U	--	< 5 U	< 0.77 U	< 0.54 U	< 0.54 U	< 0.54 U	< 1.4 U	--	--	--	--	--	--	--	< 1.2 U
Bromodichloromethane	50	µg/L	< 0.36 U	< 0.18 U	< 250 U	--	< 5 U	< 0.48 U	< 0.24 U	< 0.24 U	< 0.24 U	< 0.6 U	< 31 U	< 7.5 U	< 20 U	< 9.8 U	< 7.8 U	--	< 0.17 U	< 0.72 U
Bromoform	50	µg/L	< 0.77 U	< 0.38 U	< 250 U	--	< 5 U	< 0.46 U	< 0.38 U	< 0.38 U	< 0.38 U	< 0.95 U	< 21 U	< 32 U	< 13 U	< 6.5 U	< 5.2 U	--	< 0.29 U	< 1.5 U
Bromomethane	5	µg/L	< 3.1 U	< 1.5 U	< 250 U	--	< 5 U	< 2.1 U	< 0.36 U	< 0.36 U	< 0.36 U	< 0.9 U	< 55 U	< 21 U	< 35 U	< 17 U	< 14 U	--	< 0.35 U	< 6.2 U
Carbon Disulfide	60	µg/L	< 2.9 U	< 1.4 U	< 250 U	--	< 5 U	< 0.9 U	< 0.26 U	< 0.26 U	< 0.26 U	< 0.65 U	< 15 U	< 6.5 U	< 9.5 U	< 4.8 U	< 3.8 U	--	< 0.22 U	< 5.8 U
Carbon Tetrachloride	5	µg/L	< 0.33 U	< 0.16 U	< 250 U	--	< 5 U	< 1.1 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.3 U	< 22 U	< 6.5 U	< 14 U	< 6.8 U	< 5.4 U	--	< 0.18 U	< 0.66 U
Chlorobenzene	5	µg/L	< 0.21 U	< 0.11 U	< 250 U	--	< 5 U	< 0.72 U	< 0.22 U	< 0.22 U	< 0.22 U	< 0.55 U	< 60 U	< 7.5 U	< 38 U	< 19 U	< 15 U	--	< 0.18 U	< 0.42 U
Chloroethane	5	µg/L	< 0.64 U	< 0.32 U	< 250 U	--	< 5 U	< 1.1 U	< 0.34 U	< 0.34 U	< 0.34 U	< 0.85 U	< 26 U	< 15 U	< 16 U	< 8 U	< 6.4 U	--	< 0.36 U	< 1.3 U
Chloroform	7	µg/L	< 0.34 U	< 0.17 U	< 250 U	--	< 5 U	< 0.67 U	< 0.16 U	< 0.16 U	0.2 J	< 0.4 U	< 27 U	< 8 U	< 17 U	< 8.5 U	< 6.8 U	--	0.27 J	< 0.67 U
Chloromethane (Methyl Chloride)	5	µg/L	< 1 U	< 0.52 U	< 250 U	--	< 5 U	< 1.1 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.5 U	< 28 U	< 15 U	< 18 U	< 8.8 U	< 7 U	--	< 0.36 U	< 2.1 U
Cis -1,2-Dichloroethylene	5	µg/L	**230 D**	**43**	**8500**	**8500**	**4000**	**2100**	**3300**	**2000**	**6500**	**7800**	**6200**	**3800**	**4800**	**1900**	**1300**	--	**350**	**410 D**
Cis -1,3-Dichloropropene	0.4	µg/L	< 0.32 U	< 0.16 U	< 250 U	--	< 5 U	< 0.28 U	< 0.36 U	< 0.36 U	< 0.36 U	< 0.9 U	< 29 U	< 7 U	< 18 U	< 9 U	< 7.2 U	--	< 0.17 U	< 0.63 U
Cyclohexane	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	< 14 U	< 6 U	< 9 U	< 4.5 U	< 3.6 U	--	< 0.13 U	< 0.78 U
Cymene	5	µg/L	< 0.19 U	< 0.097 U	< 250 U	--	< 5 U	< 0.81 U	< 0.28 U	< 0.28 U	< 0.28 U	< 0.7 U	--	--	--	--	--	--	--	< 0.39 U
Dibromochloromethane	50	µg/L	< 0.44 U	< 0.22 U	< 250 U	--	< 5 U	< 0.55 U	< 0.4 U	< 0.4 U	< 0.4 U	< 1 U	< 26 U	< 9 U	< 16 U	< 8 U	< 6.4 U	--	< 0.25 U	< 0.89 U
Dibromomethane	5	µg/L	< 0.71 U	< 0.35 U	< 250 U	--	< 5 U	< 0.7 U	< 0.58 U	< 0.58 U	< 1.5 U	--	--	--	--	--	--	--	--	< 1.4 U
Dichlorodifluoromethane	5	µg/L	< 0.38 U	< 0.19 U	< 250 U	--	< 5 U	< 1 U	< 0.44 U	< 0.44 U	< 0.44 U	< 1.1 U	< 54 U	< 16 U	< 34 U	< 17 U	< 14 U	--	< 0.17 U	< 0.77 U
Diethyl Ether (Ethyl Ether)	NSL	µg/L	< 0.36 U	< 0.18 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.73 U
Ethyl Tert-Butyl Ether	NSL	µg/L	< 0.3 U	< 0.15 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.59 U
Ethylbenzene	5	µg/L	< 0.43 U	0.46 J	< 250 U	--	< 5 U	< 0.87 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.5 U	< 59 U	< 8.5 U	< 37 U	< 19 U	< 15 U	--	< 0.19 U	< 0.86 U
Hexachlorobutadiene	0.5	µg/L	< 0.91 U	< 0.46 U	< 250 U	--	< 5 U	< 1 U	< 0.96 U	< 0.96 U	< 0.96 U	< 2.4 U	--	--	--	--	--	--	--	< 1.8 U
Iodomethane (Methyl Iodide)	5	µg/L	--	--	< 500 U	--	< 10 U	< 0.91 U	< 0.26 U	< 0.26 U	< 0.26 U	< 0.65 U	--	--	--	--	--	--	--	--
Isopropyl Ether	NSL	µg/L	< 0.26 U	< 0.13 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.51 U	--
Isopropylbenzene (Cumene)	5	µg/L	< 0.22 U	< 0.11 U	< 250 U	--	< 5 U	< 0.85 U	< 0.16 U	< 0.16 U	0.48 J	0.42 J	< 63 U	< 6.5 U	< 40 U	< 20 U	< 16 U	--	< 0.33 U	< 0.65 U
M,P-Xylene (Sum Of Isomers)	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.78 U
Methyl Acetate	NSL	µg/L	< 0.91 U	< 0.45 U	--	--	--	--	--	--	--	--	< 40 U	< 19 U	< 25 U	< 13 U	< 10 U	--	< 0.58 U	< 1.8 U
Methyl Ethyl Ketone (2-Butanone)	50	µg/L	< 3.2 U	< 1.6 U	< 500 U	--	< 10 U	< 1.1 U	< 4.6 U	< 4.6 U	< 4.6 U	< 12 R	< 110 U	< 29 U	< 66 U	< 33 U	< 26 U	--	< 2.6 UT	< 6.5 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NSL	µg/L	< 2.6 U	< 1.3 U	< 500 U	--	< 10 U	< 0.38 U	< 2 U	< 2 U	< 2 U	< 5 U	< 170 U	< 16 U	< 110 U	< 53 U	< 42 U	--	< 0.81 U	< 5.1 U
Methylcyclohexane	NSL	µg/L	< 0.49 U	< 0.24 U	--	--	--	--	--	--	--	--	< 13 U	< 6.5 U	< 8 U	< 4 U	< 3.2 U	--	< 0.09 U	< 0.98 U
Methylene Chloride	5	µg/L	< 0.47 U	< 0.23 U	**110 JB**	--	< 5 U	< 0.78 U	< 0.36 U	< 0.36 U	< 0.36 U	< 0.9 U	**58 J**	< 17 U	< 22 U	**25**	< 8.8 U	--	< 1 U	< 0.94 U
M-P-Xylene	5	µg/L	< 0.92 U	1.5 J	< 250 U	--	< 5 U	< 1.7 U	< 0.5 U	< 0.5 U	< 0.5 U	< 1.3 U	--	--	--	--	--	--	--	< 1.8 U
Naphthalene	10	µg/L	< 0.49 U	< 0.24 U	< 250 U	--	< 5 U	< 0.34 U	< 0.58 U	< 0.58 U	< 0.58 U	< 1.5 U	--	--	--	--	--	--	--	< 0.97 U
N-Butylbenzene	5	µg/L	< 0.3 U	< 0.15 U	< 250 U	--	< 5 U	< 0.67 U	< 0.28 U	< 0.28 U	< 0.28 U	< 0.7 U	--	--	--	--	--	--	--	< 0.63 U
N-Propylbenzene	5	µg/L	< 0.17 U	< 0.086 U	< 250 U	--	< 5 U	< 0.62 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.5 U	--	--	--	--	--	--	--	< 0.34 U
O-Xylene (1,2-Dimethylbenzene)	5	µg/L	< 0.46 U	0.83 J	< 250 U	--	< 5 U	< 0.66 U	< 0.26 U	< 0.26 U	< 0.26 U	< 0.65 U	--	--	--	--	--	--	--	< 0.92 U
Sec-Butylbenzene	5	µg/L	< 0.22 U	< 0.11 U	< 250 U	--	< 5 U	< 0.79 U	< 0.36 U	1.1 J	0.57 J	0.96 J	--	--	--	--	--	--	--	< 0.44 U
Styrene	5	µg/L	< 0.21 U	< 0.11 U	< 250 U	--	< 5 U	< 0.64 U	< 0.24 U	< 0.24 U	< 0.24 U	< 0.6 U	< 58 U	< 5.5 U	< 37 U	< 18 U	< 15 U	--	< 0.28 U	< 0.42 U
T-Butylbenzene	5	µg/L	< 0.26 U	< 0.13 U	< 250 U	--	< 5 U	1.1 J	< 0.24 U	0.41 J	0.45 J	1.3 J	--	--	--	--	--	--	--	< 0.52 U
Tert-Butyl Alcohol	NSL	µg/L	< 9.4 U	< 4.7 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 19 U
Tert-Butyl Methyl Ether	10	µg/L	< 0.34 U	< 0.17 U	< 250 U	--	2 J	5.1	1.5 J	< 0.28 U	2.2	4 J	< 13 U	< 8.5 U	< 8 U	< 4 U	< 3.2 U	--	< 0.17 U	< 0.69 U
Tetrachloroethylene (PCE)	5	µg/L	**120 D**	**6**	**4400**	**4400**	**420**	**220**	**150**	**150**	**940**	**1400**	**1100**	**630**	**700**	**300**	**270**	--	**40**	**54 D**
Tetrahydrofuran	NSL	µg/L	< 0.98 U	< 0.49 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2 U
Toluene	5	µg/L	< 0.45 U	2.7	< 250 U	--	< 5 U	< 0.72 U	< 0.3 U	< 0.3 U	< 0.3 U	< 0.75 U	< 41 U	< 6.5 U	< 26 U	< 13 U	< 10 U	--	< 0.17 U	< 0.91 U
Trans -1,2-Dichloroethene	5	µg/L	1.3 JD	< 0.17 U	**76 J**	--	**26**	**27**	**21**	**15**	**140**	**48**	< 72 U	**22 J**	< 45 U	< 23 U	< 18 U	--	3.6	--
Trans -1,3-Dichloropropene	0.4	µg/L	< 0.34 U	< 0.17 U	< 250 U	--	< 5 U	< 0.57 U	< 0.48 U	< 0.48 U	< 0.48 U	< 1.2 U	< 30 U	< 9.5 U	< 19 U	< 9.3 U	< 7.4 U	--	< 0.17 U	< 0.67 U
Trans -1,4-Dichloro-2-Butene	5	µg/L	< 3.2 U	< 1.6 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 6.5 U
Trichloroethylene (TCE)	5	µg/L	**61 D**	**5.7**	**1700**	**1700**	**460**	**190**	**300**	**320**	**880**	**1100**	**1100**	**690**	**840**	**290**	**290**	--	**65**	**58 D**
Trichlorofluoromethane	5	µg/L	< 0.35 U	< 0.18 U	< 250 U	--	< 5 U	< 1.1 U	< 0.3 U	< 0.3 U	< 0.3 U	< 0.75 U	< 70 U	< 11 U	< 44 U	< 22 U	< 18 U	--	< 0.21 U	< 0.7 U
Vinyl Acetate	NSL	µg/L	--	--	< 250 U	--	< 5 U	< 1.6 U	< 0.76 U	< 0.76 U	< 0.76 U	< 1.9 U	--	--	--	--	--	--	--	--
Vinyl Chloride	2	µg/L	**6.2 D**	0.89 J	**400**	**400**	**110 J**	**190**	**71**	**76**	**290**	**450**	**520**	**350**	**410**	**96**	**49**	--	**4.8**	**13 D**
Xylenes	5	µg/L	--	--	< 250 U	--	< 5 U	< 2.3 U	< 0.72 U	< 0.72 U	< 0.72 U	< 1.8 U	< 53 U	< 7 U	< 33 U	< 17 U	< 13 U	--	< 0.58 U	< 0.59 U
Xylenes, Total	NSL	µg/L	--	--	< 250 U	--	< 5 U	< 2.3 U	< 0.72 U	< 0.72 U	< 0.72 U	< 1.8 U	< 53 U	< 7 U	< 33 U	< 17 U	< 13 U	--	< 0.58 U	--
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)																				
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.6 U
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.0 U
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.80 U
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 6.3 U
3-Perfluoroheptyl propanoic acid (7:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 5.4 U
3-Perfluoropropyl propanoic acid (3:3 FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.1 U
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.1 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.6 U
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.47 U
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.3 J
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 3.3 U
N-methyl perfluorooctanesulfonamide (NMeFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.56 U
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.8
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.4 U
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.24 U
Perfluoro-3-methoxypropanoic acid (PFMPA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.26 U
Perfluoro-4-methoxybutanoic acid (PFMBA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.49 U
Perfluorobutanesulfonic acid (PFBS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24.8	16	--	4.2
Perfluorobutanoic Acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15	--	6.7 J
Perfluorodecanesulfonic acid (PFDS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.27 U	--	< 0.96 U
Perfluorodecanoic acid (PFDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.7	--	2
Perfluorododecanesulfonic acid (PFDoS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.35 U
Perfluorododecanoic acid (PFDoA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.46 U	--	< 0.68 U
Perfluoroheptanesulfonic acid (PFHpS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.4 J	--	1.1 J
Perfluoroheptanoic acid (PFHpA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	18.2	17	--	4.6
Perfluorohexanesulfonic acid (PFHxS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9.13	7.7 B	--	3.1
Perfluorohexanoic acid (PFHxA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	--	5.6
Perfluorononanesulfonic Acid (PFNS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U
Perfluorononanoic acid (PFNA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6.29	7	--	2.3
Perfluorooctane Sulfonamide (PFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.99 J	--	1.8
Perfluorooctanesulfonic acid (PFOS)	2.7	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**114**	**100**	--	**91.2**
Perfluorooctanoic acid (PFOA)	6.7	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**57.6**	**52**	--	**16.8**
Perfluoropentanesulfonic Acid (PFPeS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.89 U
Perfluoropentanoic Acid (PFPeA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	25	--	6.8
Perfluorotetradecanoic acid (PFTeDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.24 U	--	< 0.67 U
Perfluorotridecanoic Acid (PFTrDA/PFTrDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	--	< 0.69 U
Perfluoroundecanoic Acid (PFUnA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.93 U	--	< 0.48 U

Notes:
[1]NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)

-- = Not analyzed
µg/L = Microgram(s) per liter
ng/L = Nanogram(s) per liter
B = Analyte detected in blank, as well as sample
D = Compound in analysis has been diluted
J = Concentration is estimated
NSL = No screening level available
U = Analyte not detected
R = Reported result unusable
VOCs = Volatile organic compounds
PFAS = Per- and polyfluoroalkyl substances
Concentrations exceeding the screening level are bolded and shaded gray

		Location	MW-01D	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD	MW-01DD
		Sample Name	130054-MW-01D-20241125	MW-1DD_06202011	MW-1DD_09152011	MW-1DD_03292012	MW-1DD_07182012	MW-1DD_10312012	MW-01DD	MW-1DD-101413	MW-1DD-112113	MW-1DD 011414	MW-1DD_071014	MW-1DD	MW-01DD	MW-1DD-06102022	MW-X-06102022	MW-1DD-09262022	MW-1DD-03192024	130054-MW-1DD-06252024	130054-MW-1DD-09192024	130054-MW-01DD-20241125
		Parent Sample Name															MW-1DD-06102022					
		Sample Date	11/25/2024	6/20/2011	9/15/2011	3/29/2012	7/18/2012	10/31/2012	8/26/2013	10/14/2013	11/21/2013	1/14/2014	7/10/2014	3/21/2017	11/2/2017	6/10/2022	6/10/2022	9/26/2022	3/19/2024	6/25/2024	9/19/2024	11/25/2024
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)																						
1,1,1,2-Tetrachloroethane	5	µg/L	--	< 5 U	< 0.93 U	< 0.1 U	< 0.1 U	< 0.1 U	--	--	--	--	--	--	--	< 0.36 U	< 0.36 U	< 0.18 U	--	--	--	--
1,1,1-Trichloroethane (TCA)	5	µg/L	< 0.54 U	< 5 U	< 0.69 U	< 0.06 U	< 0.06 U	< 0.06 U	< 8.2 U	< 2.8 U	< 3.3 U	< 1.6 U	< 3.3 U	--	< 0.19 U	< 0.34 U	< 0.34 U	< 0.17 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U
1,1,2,2-Tetrachloroethane	5	µg/L	< 0.65 U	< 5 U	< 0.81 U	< 0.16 U	< 0.16 U	< 0.16 U	< 2.1 U	< 2.3 U	< 0.84 U	< 0.42 U	< 0.84 U	--	< 0.19 U	< 0.25 U	< 0.25 U	< 0.13 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	µg/L	< 0.58 U	--	--	--	--	--	< 3.1 U	< 3.5 U	< 1.2 U	< 0.62 U	< 1.2 U	--	< 0.15 UT	< 0.45 U	< 0.45 U	< 0.23 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U
1,1,2-Trichloroethane	1	µg/L	< 0.53 U	< 5 U	< 0.65 U	< 0.19 U	< 0.19 U	< 0.19 U	< 2.3 U	< 3.4 U	< 0.92 U	< 0.46 U	< 0.92 U	--	< 0.19 U	< 0.37 U	< 0.37 U	< 0.18 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U
1,1-Dichloroethane	5	µg/L	< 0.57 U	< 5 U	< 1 U	0.6 J	0.77 J	0.61 J	< 3.8 U	< 1.9 U	< 1.5 U	< 0.76 U	< 1.5 U	--	< 0.24 U	< 0.28 U	< 0.28 U	< 0.14 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U
1,1-Dichloroethene	5	µg/L	0.67 J	< 5 U	< 0.83 U	2.9	**8**	1.2	< 2.9 U	< 2.4 U	< 1.2 U	< 0.58 U	< 1.2 U	--	< 0.25 U	< 0.28 U	< 0.28 U	< 0.14 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U
1,1-Dichloropropene	5	µg/L	--	< 5 U	< 0.82 U	< 0.12 U	< 0.12 U	< 0.12 U	--	--	--	--	--	--	--	< 0.3 U	< 0.3 U	< 0.15 U	--	--	--	--
1,2,3-Trichlorobenzene	5	µg/L	< 0.50 U	< 5 U	< 0.88 U	< 0.51 U	< 0.51 U	< 0.51 U	--	--	--	--	--	--	--	< 0.61 U	< 0.61 U	< 0.3 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2,3-Trichloropropane	0.04	µg/L	--	< 5 U	< 1.5 U	< 0.42 U	< 0.42 U	< 0.42 U	--	--	--	--	--	--	--	< 0.56 U	< 0.56 U	< 0.28 U	--	--	--	--
1,2,4-Trichlorobenzene	5	µg/L	< 0.50 U	< 5 U	< 0.72 U	< 0.34 U	< 0.34 U	< 0.34 U	< 4.1 U	< 1.9 U	< 1.6 U	< 0.82 U	< 1.6 U	--	< 0.2 U	< 0.5 U	< 0.5 U	< 0.25 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2,4-Trimethylbenzene	5	µg/L	--	< 5 U	< 0.64 U	< 0.13 U	< 0.13 U	< 0.13 U	--	--	--	--	--	--	--	< 0.4 U	< 0.4 U	0.25 J	--	--	--	--
1,2-Dibromo-3-Chloropropane	0.04	µg/L	< 0.53 U	< 5 U	< 1.2 U	< 0.4 U	< 0.4 U	< 0.4 U	< 3.9 U	< 8.4 U	< 1.6 U	< 0.78 U	< 1.6 U	--	< 0.94 U	< 1.6 U	< 1.6 U	< 0.8 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	µg/L	< 0.48 U	< 5 U	< 0.52 U	< 0.28 U	< 0.28 U	< 0.28 U	< 7.3 U	< 3 U	< 2.9 U	< 1.5 U	< 2.9 U	--	< 0.21 U	< 0.34 U	< 0.34 U	< 0.17 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U
1,2-Dichlorobenzene	3	µg/L	< 0.53 U	< 5 U	< 0.22 U	< 0.21 U	< 0.21 U	< 0.21 U	< 7.9 U	< 1.6 U	< 3.2 U	< 1.6 U	< 3.2 U	--	< 0.19 U	< 0.24 U	< 0.24 U	< 0.12 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U
1,2-Dichloroethane	0.6	µg/L	< 0.60 U	< 5 U	< 0.72 U	< 0.19 U	< 0.19 U	< 0.19 U	< 2.1 U	< 2.8 U	< 0.84 U	< 0.42 U	< 0.84 U	--	< 0.2 U	< 0.62 U	< 0.62 U	< 0.31 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U
1,2-Dichloropropane	1	µg/L	< 0.51 U	0.76 U	< 0.71 U	0.6 J	0.68 J	0.68 J	< 7.2 U	< 2.3 U	< 2.9 U	< 1.4 U	< 2.9 U	--	< 0.25 U	< 0.36 U	< 0.36 U	< 0.18 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U
1,3,5-Trichlorobenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.42 U	< 0.42 U	< 0.21 U	--	--	--	--
1,3,5-Trimethylbenzene (Mesitylene)	5	µg/L	--	< 5 U	< 0.53 U	< 0.15 U	< 0.15 U	< 0.15 U	--	--	--	--	--	--	--	< 0.23 U	< 0.23 U	0.22 J	--	--	--	--
1,3-Dichlorobenzene	3	µg/L	< 0.54 U	< 5 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 7.8 U	< 1.8 U	< 3.1 U	< 1.6 U	< 3.1 U	--	< 0.18 U	< 0.24 U	< 0.24 U	0.2 J	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U
1,3-Dichloropropane	5	µg/L	--	< 5 U	< 0.69 U	< 0.19 U	< 0.19 U	< 0.19 U	--	--	--	--	--	--	--	< 0.26 U	< 0.26 U	< 0.13 U	--	--	--	--
1,4-Dichlorobenzene	3	µg/L	< 0.51 U	< 5 U	< 0.59 U	< 0.23 U	< 0.23 U	< 0.23 U	< 8.4 U	< 1.6 U	< 3.4 U	< 1.7 U	< 3.4 U	--	< 0.17 U	< 0.26 U	< 0.26 U	< 0.13 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 41 U	< 41 U	< 21 U	--	--	--	--
2,2-Dichloropropane	5	µg/L	--	< 5 U	< 0.79 U	< 0.16 U	< 0.16 U	< 0.16 U	--	--	--	--	--	--	--	< 0.65 U	< 0.65 U	< 0.33 U	--	--	--	--
2-Chlorotoluene	NSL	µg/L	--	< 5 U	< 1.2 U	< 0.14 U	< 0.14 U	< 0.14 U	--	--	--	--	--	--	--	< 0.23 U	< 0.23 U	< 0.11 U	--	--	--	--
2-Hexanone	50	µg/L	< 4.8 U	< 10 U	< 1.1 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 5.1 U	< 5 U	< 2.5 U	< 5 U	--	< 1.3 U	< 2.2 U	< 2.2 U	< 1.1 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U
2-Methoxy-2-Methylbutane	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.29 U	< 0.29 U	< 0.14 U	--	--	--	--
4-Chlorotoluene	5	µg/L	--	< 5 U	< 0.8 U	< 0.14 U	< 0.14 U	< 0.14 U	--	--	--	--	--	--	--	< 0.24 U	< 0.24 U	< 0.12 U	--	--	--	--
Acetone	50	µg/L	< 3.1 U	< 10 U	1.9 J	< 2.7 U	< 2.7 U	< 2.7 U	< 30 U	< 14 U	< 12 U	< 6 U	< 12 U	--	< 2.7 U	< 4.1 U	< 4.1 U	6.3 J	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U
Acrylonitrile	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	< 1.1 U	< 0.55 U	--	--	--	--
Benzene	1	µg/L	< 0.43 U	0.81 U	< 0.74 U	0.64 J	0.71 J	0.7 J	< 4.1 U	< 1.6 U	< 1.6 U	< 0.82 U	< 1.6 U	--	< 0.2 U	< 0.4 U	< 0.4 U	0.3 J	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U
Bromobenzene	5	µg/L	--	< 5 U	< 0.67 U	< 0.13 U	< 0.13 U	< 0.13 U	--	--	--	--	--	--	--	< 0.3 U	< 0.3 U	< 0.15 U	--	--	--	--
Bromochloromethane	5	µg/L	< 0.48 U	< 5 U	< 0.77 U	< 0.27 U	< 0.27 U	< 0.27 U	--	--	--	--	--	--	--	< 0.61 U	< 0.61 U	< 0.31 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U
Bromodichloromethane	50	µg/L	< 0.45 U	< 5 U	< 0.48 U	< 0.12 U	< 0.12 U	< 0.12 U	< 3.9 U	< 1.9 U	< 1.6 U	< 0.78 U	< 1.6 U	--	< 0.17 U	< 0.36 U	< 0.36 U	< 0.18 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U
Bromoform	50	µg/L	< 0.63 U	< 5 U	< 0.46 U	< 0.19 U	< 0.19 U	< 0.19 U	< 2.6 U	< 8 U	< 1 U	< 0.52 U	< 1 U	--	< 0.29 U	< 0.77 U	< 0.77 U	< 0.38 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U
Bromomethane	5	µg/L	< 1.6 U	< 5 U	< 2.1 U	< 0.18 U	< 0.18 U	< 0.18 U	< 6.9 U	< 5.1 U	< 2.8 U	< 1.4 U	< 2.8 U	--	< 0.35 U	< 3.1 U	< 3.1 U	< 1.5 U	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 U
Carbon Disulfide	60	µg/L	< 1.8 U	< 5 U	< 0.9 U	< 0.13 U	< 0.13 U	1.1	< 1.9 U	< 1.6 U	< 0.76 U	< 0.38 U	< 0.76 U	--	< 0.22 U	< 2.9 U	< 2.9 U	< 1.4 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U
Carbon Tetrachloride	5	µg/L	< 0.55 U	< 5 U	< 1.1 U	< 0.06 U	< 0.06 U	< 0.06 U	< 2.7 U	< 1.6 U	< 1.1 U	< 0.54 U	< 1.1 U	--	< 0.18 U	< 0.33 U	< 0.33 U	< 0.16 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U
Chlorobenzene	5	µg/L	< 0.56 U	< 5 U	< 0.72 U	< 0.11 U	0.11 J	< 0.11 U	< 7.5 U	< 1.9 U	< 3 U	< 1.5 U	< 3 U	--	< 0.18 U	< 0.21 U	< 0.21 U	< 0.11 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U
Chloroethane	5	µg/L	< 0.73 U	< 5 U	< 1.1 U	< 0.17 U	< 0.17 U	< 0.17 U	< 3.2 U	< 3.6 U	< 1.3 U	< 0.64 U	< 1.3 U	--	< 0.36 U	< 0.64 U	< 0.64 U	< 0.32 U	< 0.73 U	< 0.73 U	< 0.73 UJ	< 0.73 U
Chloroform	7	µg/L	< 0.50 U	< 5 U	< 0.67 U	< 0.08 U	< 0.08 U	< 0.08 U	< 3.4 U	< 2 U	< 1.4 U	< 0.68 U	< 1.4 U	--	< 0.23 U	< 0.34 U	< 0.34 U	< 0.17 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Chloromethane (Methyl Chloride)	5	µg/L	< 0.76 U	< 5 U	< 1.1 U	< 0.1 U	< 0.1 U	< 0.1 U	< 3.5 U	< 3.8 U	< 1.4 U	< 0.7 U	< 1.4 U	--	< 0.36 U	< 1 U	< 1 U	< 0.52 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U
Cis-1,2-Dichloroethylene	5	µg/L	**269**	**340**	**130**	**1900**	**2000**	**280**	**730**	**490**	**240**	**85**	**170**	--	**140**	**58 D**	**49 D**	**24**	**67.4**	**53**	**24.2**	**22**
Cis-1,3-Dichloropropene	0.4	µg/L	< 0.47 U	< 5 U	< 0.28 U	< 0.18 U	< 0.18 U	< 0.18 U	< 3.6 U	< 1.8 U	< 1.4 U	< 0.72 U	< 1.4 U	--	< 0.17 U	< 0.32 U	< 0.32 U	< 0.16 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U
Cyclohexane	NSL	µg/L	< 0.78 U	--	--	--	--	--	< 1.8 U	< 1.5 U	< 0.72 U	< 0.36 U	< 0.72 U	--	< 0.13 U	--	--	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U
Cymene	5	µg/L	--	< 5 U	< 0.81 U	< 0.14 U	< 0.14 U	< 0.14 U	--	--	--	--	--	--	--	< 0.19 U	< 0.19 U	< 0.097 U	--	--	--	--
Dibromochloromethane	50	µg/L	< 0.56 U	< 5 U	< 0.55 U	< 0.2 U	< 0.2 U	< 0.2 U	< 3.2 U	< 2.3 U	< 1.3 U	< 0.64 U	< 1.3 U	--	< 0.25 U	< 0.44 U	< 0.44 U	< 0.22 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U
Dibromomethane	5	µg/L	--	< 5 U	< 0.7 U	< 0.29 U	< 0.29 U	< 0.29 U	--	--	--	--	--	--	--	< 0.71 U	< 0.71 U	< 0.35 U	--	--	--	--
Dichlorodifluoromethane	5	µg/L	< 0.56 U	< 5 U	< 1 U	< 0.22 U	< 0.22 U	< 0.22 U	< 6.8 U	< 3.9 U	< 2.7 U	< 1.4 U	< 2.7 U	--	< 0.17 U	< 0.38 U	< 0.38 U	< 0.19 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U
Diethyl Ether (Ethyl Ether)	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.36 U	< 0.36 U	< 0.18 U	--	--	--	--
Ethyl Tert-Butyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.3 U	< 0.3 U	< 0.15 U	--	--	--	--
Ethylbenzene	5	µg/L	< 0.60 U	< 5 U	< 0.87 U	< 0.1 U	< 0.1 U	< 0.1 U	< 7.4 U	< 2.1 U	< 3 U	< 1.5 U	< 3 U	--	< 0.19 U	< 0.43 U	< 0.43 U	0.26 J	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U
Hexachlorobutadiene	0.5	µg/L	--	< 5 U	< 1 U	< 0.48 U	< 0.48 U	< 0.48 U	--	--	--	--	--	--	--	< 0.91 U	< 0.91 U	< 0.46 U	--	--	--	--
Iodomethane (Methyl Iodide)	5	µg/L	--	< 10 U	< 0.91 U	< 0.13 U	< 0.13 U	< 0.13 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.26 U	< 0.26 U	< 0.13 U	--	--	--	--
Isopropylbenzene (Cumene)	5	µg/L	< 0.65 U	< 5 U	< 0.85 U	0.13 J	0.38 J	< 0.08 U	< 7.9 U	< 1.6 U	< 3.2 U	< 1.6 U	< 3.2 U	--	< 0.33 U	< 0.22 U	< 0.22 U	< 0.11 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U
M,P-Xylene (Sum Of Isomers)	5	µg/L	< 0.78 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U
Methyl Acetate	NSL	µg/L	< 0.80 U	--	--	--	--	--	< 5 U	< 4.8 U	< 2 U	< 1 U	< 2 U	--	< 0.58 U	< 0.91 U	< 0.91 U	< 0.45 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U
Methyl Ethyl Ketone (2-Butanone)	50	µg/L	< 2.7 U	< 10 U	< 1.1 U	< 2.3 U	< 2.3 U	< 2.3 U	< 13 U	< 7.1 U	< 5.3 U	< 2.6 U	< 5.3 U	--	< 2.6 U	< 3.2 U	< 3.2 U	< 1.6 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NSL	µg/L	< 4.9 U	< 10 U	< 0.38 U	< 0.99 U	< 0.99 U	< 0.99 U	< 21 U	< 4 U	< 8.4 U	< 4.2 U	< 8.4 U	--	< 0.81 U	< 2.6 U	< 2.6 U	< 1.3 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U
Methylcyclohexane	NSL	µg/L	< 0.60 U	--	--	--	--	--	< 1.6 U	< 1.6 U	< 0.64 U	< 0.32 U	< 0.64 U	--	< 0.09 U	< 0.49 U	< 0.49 U	< 0.24 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U
Methylene Chloride	5	µg/L	< 1.0 U	< 5 U	< 0.78 U	< 0.18 U	< 0.18 U	< 0.18 U	**6.2 J**	< 4.1 U	< 1.8 U	1.8 J	< 1.8 U	--	< 1 U	< 0.47 U	< 0.47 U	< 0.23 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
M-P-Xylene	5	µg/L	--	< 5 U	< 1.7 U	< 0.25 U	< 0.25 U	< 0.25 U	--	--	--	--	--	--	--	< 0.92 U	< 0.92 U	0.87 J	--	--	--	--
Naphthalene	10	µg/L	--	< 5 U	< 0.34 U	< 0.29 U	< 0.29 U	< 0.29 U	--	--	--	--	--	--	--	< 0.49 U	< 0.49 U	< 0.24 U	--	--	--	--
N-Butylbenzene	5	µg/L	--	< 5 U	< 0.67 U	< 0.14 U	< 0.14 U	< 0.14 U	--	--	--	--	--	--	--	< 0.3 U	< 0.3 U	< 0.15 U	--	--	--	--
N-Propylbenzene	5	µg/L	--	< 5 U	< 0.62 U	< 0.1 U	< 0.1 U	< 0.1 U	--	--	--	--	--	--	--	< 0.17 U	< 0.17 U	< 0.086 U	--	--	--	--
O-Xylene (1,2-Dimethylbenzene)	5	µg/L	< 0.59 U	< 5 U	< 0.66 U	< 0.13 U	0.16 J	< 0.13 U	--	--	--	--	--	--	--	< 0.46 U	< 0.46 U	0.47 J	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U
Sec-Butylbenzene	5	µg/L	--	< 5 U	< 0.79 U	0.71 J	2.8	< 0.18 U	--	--	--	--	--	--	--	< 0.22 U	< 0.22 U	< 0.11 U	--	--	--	--
Styrene	5	µg/L	< 0.49 U	< 5 U	< 0.64 U	< 0.12 U	< 0.12 U	< 0.12 U	< 7.3 U	< 1.4 U	< 2.9 U	< 1.5 U	< 2.9 U	--	< 0.28 U	< 0.21 U	< 0.21 U	< 0.11 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U
T-Butylbenzene	5	µg/L	--	< 5 U	< 0.75 U	1.1	4.5	0.26 J	--	--	--	--	--	--	--	< 0.26 U	< 0.26 U	< 0.13 U	--	--	--	--
Tert-Butyl Alcohol	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 9.4 U	< 9.4 U	< 4.7 U	--	--	--	--
Tert-Butyl Methyl Ether	10	µg/L	< 0.51 U	2.4 U	1.1 J	4.3	6.7	1.2	2.1 J	< 2.1 U	1 J	0.47 J	0.9 J	--	< 0.17 U	< 0.34 U	< 0.34 U	< 0.17 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U
Tetrachloroethylene (PCE)	5	µg/L	**71.2**	**200**	**48**	**400**	**740**	**63**	**210**	**110**	**74**	**33**	**40**	--	**65**	**21 D**	**17 D**	**10**	**12.8**	**15.5**	**10.2**	**10.7**
Tetrahydrofuran	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.98 U	< 0.98 U	< 0.49 U	--	--	--	--
Toluene	5	µg/L	< 0.49 U	< 5 U	< 0.72 U	< 0.15 U	< 0.15 U	< 0.15 U	< 5.1 U	< 1.6 U	< 2 U	< 1 U	< 2 U	--	< 0.17 U	< 0.45 U	< 0.45 U	1.6	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U
Trans-1,2-Dichloroethene	5	µg/L	1.7	3.8 U	2.7 J	**9.8**	**14**	4.6	< 9 U	2.4 J	< 3.6 U	< 1.8 U	< 3.6 U	--	1.3	< 0.34 U	0.7 JD	0.37 J	0.73 J	0.68 J	0.55	< 0.54 U
Trans-1,3-Dichloropropene	0.4	µg/L	< 0.43 U	< 5 U	< 0.57 U	< 0.24 U	< 0.24 U	< 0.24 U	< 3.7 U	< 2.4 U	< 1.5 U	< 0.74 U	< 1.5 U	--	< 0.17 U	< 0.34 U	< 0.34 U	< 0.17 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U
Trans-1,4-Dichloro-2-Butene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 3.2 U	< 3.2 U	< 1.6 U	--	--	--	--
Trichloroethylene (TCE)	5	µg/L	**27.3**	**71**	**16**	**280**	**350**	**27**	**130**	**76**	**44**	**15**	**28**	--	**38**	**11 D**	**8.6 D**	**6.3**	**6.9**	**7.2**	**5.4**	**5.1**
Trichlorofluoromethane	5	µg/L	< 0.40 U	< 5 U	< 1.1 U	< 0.15 U	< 0.15 U	< 0.15 U	< 8.8 U	< 2.6 U	< 3.5 U	< 1.8 U	< 3.5 U	--	< 0.21 U	< 0.35 U	< 0.35 U	< 0.18 U	< 0.40 U	< 0.40 U	< 0.40 UJ	< 0.40 U
Vinyl Acetate	NSL	µg/L	--	< 5 U	< 1.6 U	< 0.38 U	< 0.38 U	< 0.38 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	2	µg/L	**11.4**	**70**	**46**	**190**	**310**	**51**	**110**	**75**	**38**	**25**	**30**	--	**4.1**	< 0.42 U	< 0.42 U	0.33 J	1	< 0.52 U	< 0.52 U	0.58 J
Xylenes	5	µg/L	< 0.59 U	--	--	--	--	--	< 6.6 U	--	--	--	--	--	< 0.58 U	--	--	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U
Xylenes, Total	NSL	µg/L	--	< 5 U	< 2.3 U	< 0.36 U	< 0.36 U	< 0.36 U	< 6.6 U	< 1.8 U	< 2.6 U	< 1.3 U	< 2.6 U	--	< 0.58 U	--	--	--	--	--	--	--
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)																						
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.7 U	--	--	--
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U	--	--	--
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.1 U	--	--	--
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.84 U	--	--	--
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 6.5 U	--	--	--
3-Perfluoroheptyl propanoic acid (7:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 5.7 U	--	--	--
3-Perfluoropropyl propanoic acid (3:3 FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.2 U	--	--	--
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	--	--	--
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.2 U	--	--	--
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.7 U	--	--	--
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.49 U	--	--	--
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.84 U	--	--	--
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 3.4 U	--	--	--
N-methyl perfluorooctanesulfonamide (NMeFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.59 U	--	--	--
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.47 U	--	--	--
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.6 U	--	--	--
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.2 U	--	--	--
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.25 U	--	--	--
Perfluoro-3-methoxypropanoic acid (PFMPA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.28 U	--	--	--
Perfluoro-4-methoxybutanoic acid (PFMBA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.51 U	--	--	--
Perfluorobutanesulfonic acid (PFBS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	13.6	6.5	--	--	--	2.5	--	--	--
Perfluorobutanoic Acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	8.4	--	--	--	5.4 J	--	--	--
Perfluorodecanesulfonic acid (PFDS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	< 0.27 U	--	--	--	< 1.0 U	--	--	--
Perfluorodecanoic acid (PFDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	1.5 J	--	--	--	1.2 J	--	--	--
Perfluorododecanesulfonic acid (PFDoS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.37 U	--	--	--
Perfluorododecanoic acid (PFDoA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	< 0.46 U	--	--	--	< 0.71 U	--	--	--
Perfluoroheptanesulfonic acid (PFHpS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	1.6 J	--	--	--	< 0.90 U	--	--	--
Perfluoroheptanoic acid (PFHpA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	17.3	12	--	--	--	4.9	--	--	--
Perfluorohexanesulfonic acid (PFHxS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	9.56	7.3 B	--	--	--	2.9	--	--	--
Perfluorohexanoic acid (PFHxA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	12	--	--	--	4	--	--	--
Perfluorononanesulfonic Acid (PFNS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U	--	--	--
Perfluorononanoic acid (PFNA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	3.36	2.7	--	--	--	2.3	--	--	--
Perfluorooctane Sulfonamide (PFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	0.92 J	--	--	--	5.2	--	--	--
Perfluorooctanesulfonic acid (PFOS)	2.7	ng/L	--	--	--	--	--	--	--	--	--	--	--	**109**	**94**	--	--	--	**90.1**	--	--	--
Perfluorooctanoic acid (PFOA)	6.7	ng/L	--	--	--	--	--	--	--	--	--	--	--	**93.6**	**65**	--	--	--	**35.1**	--	--	--
Perfluoropentanesulfonic Acid (PFPeS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.93 U	--	--	--
Perfluoropentanoic Acid (PFPeA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	10	--	--	--	4.6	--	--	--
Perfluorotetradecanoic acid (PFTeDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	< 0.24 U	--	--	--	< 0.70 U	--	--	--
Perfluorotridecanoic Acid (PFTriA/PFTrDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	--	--	--	< 0.73 U	--	--	--
Perfluoroundecanoic Acid (PFUnA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	< 0.92 U	--	--	--	< 0.51 U	--	--	--

Notes:

[1]NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)

--' = Not analyzed
µg/L = Mircogram(s) per liter
ng/L - Nanogram(s) per liter
B = Analyte detected in blank, as well as sample
D = Compound in analysis has been diluted
J = Concentration is estimated
NSL = No screening level available
U = Analyte not detected
R = Reported result unusable
VOCs = Volatile organic compounds
PFAS = Per- and polyfluoroalkyl substances
Concentrations exceeding the screening level are bolded and shaded gray

		Location	MW-02	MW-02	MW-02	MW-02	MW-02	MW-02	MW-02	MW-02	MW-02	MW-02	MW-02	MW-02	MW-02	MW-02	MW-02	MW-03	MW-03	MW-03	MW-03	MW-03
		Sample Name	MW-2_03092011	MW-2_06232011	MW-2_09162011	MW-2_04032012	MW-U	MW-2_11022012	MW-2-20130424	MW-2_071114	MW-2	MW-02	MW-02-040518	130054-MW-2-12042023	130054-MW-2-06242024	130054-MW-2-09192024	130054-MW-02-20241125	MW-3_06232011	MW-3_09192011	MW-3_03302012	MW-3	MW-3-20130426
		Parent Sample Name					MW-2_04032012															
		Sample Date	3/9/2011	6/23/2011	9/16/2011	4/3/2012	4/3/2012	11/2/2012	4/24/2013	7/11/2014	3/22/2017	11/8/2017	4/5/2018	12/4/2023	6/24/2024	9/19/2024	11/25/2024	6/23/2011	9/19/2011	3/30/2012	11/1/2012	4/26/2013
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)																						
1,1,1,2-Tetrachloroethane	5	µg/L	< 5 U	< 5 U	< 0.93 U	< 0.1 U	< 0.1 U	< 0.1 U	< 0.1 U	--	--	--	--	--	--	--	--	< 5 U	< 0.93 U	< 0.1 U	< 0.1 U	< 0.1 U
1,1,1-Trichloroethane (TCA)	5	µg/L	< 5 U	< 5 U	< 0.69 U	0.54 J	0.59 J	0.43 J	1.1	1.9	< 0.28 U	< 0.19 U	--	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 5 U	< 0.69 U	< 0.06 U	< 0.06 U	< 0.06 U
1,1,2,2-Tetrachloroethane	5	µg/L	< 5 U	< 5 U	< 0.81 U	< 0.16 U	< 0.16 U	< 0.16 U	< 0.16 U	< 0.21 U	< 0.19 U	< 0.19 U	--	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 5 U	< 0.81 U	< 0.16 U	< 0.16 U	< 0.16 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	µg/L	--	--	--	--	--	--	--	< 0.31 U	< 0.34 U	< 0.15 U	--	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	--	--	--	--	--
1,1,2-Trichloroethane	1	µg/L	< 5 U	< 5 U	< 0.65 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.23 U	< 0.08 U	< 0.19 U	--	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 5 U	< 0.65 U	< 0.19 U	< 0.19 U	< 0.19 U
1,1-Dichloroethane	5	µg/L	< 5 U	< 5 U	< 1 U	0.2 J	< 0.13 U	< 0.13 U	0.18 J	< 0.38 U	< 0.24 U	< 0.24 U	--	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 5 U	< 1 U	< 0.13 U	< 0.13 U	< 0.13 U
1,1-Dichloroethene	5	µg/L	< 5 U	< 5 U	< 0.83 U	< 0.09 U	< 0.09 U	< 0.09 U	< 0.09 U	< 0.29 U	< 0.34 U	< 0.25 U	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 5 U	< 0.83 U	< 0.09 U	< 0.09 U	< 0.09 U
1,1-Dichloropropene	5	µg/L	< 5 U	< 5 U	< 0.82 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.12 U	--	--	--	--	--	--	--	--	< 5 U	< 0.82 U	< 0.12 U	< 0.12 U	< 0.12 U
1,2,3-Trichlorobenzene	5	µg/L	< 5 U	< 5 U	< 0.88 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	--	< 0.35 U	--	--	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 5 U	< 0.88 U	< 0.51 U	< 0.51 U	< 0.51 U
1,2,3-Trichloropropane	0.04	µg/L	< 5 U	< 5 U	< 1.5 U	< 0.42 U	< 0.42 U	< 0.42 U	< 0.42 U	--	--	--	--	--	--	--	--	< 5 U	< 1.5 U	< 0.42 U	< 0.42 U	< 0.42 U
1,2,4-Trichlorobenzene	5	µg/L	< 5 U	< 5 U	< 0.72 U	< 0.34 U	< 0.34 U	< 0.34 U	< 0.34 U	< 0.41 U	< 0.27 U	< 0.2 U	--	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 5 U	< 0.72 U	< 0.34 U	< 0.34 U	< 0.34 U
1,2,4-Trimethylbenzene	5	µg/L	< 5 U	< 5 U	< 0.64 U	< 0.13 U	< 0.13 U	1.5	< 0.13 U	--	--	--	--	--	--	--	--	< 5 U	< 0.64 U	< 0.13 U	< 0.13 U	< 0.13 U
1,2-Dibromo-3-Chloropropane	0.04	µg/L	< 5 U	< 5 U	< 1.2 U	< 0.4 U	< 0.4 U	< 0.4 U	< 0.4 U	< 0.39 U	< 0.23 U	< 0.94 U	--	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 5 U	< 1.2 U	< 0.4 U	< 0.4 U	< 0.4 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	µg/L	< 5 U	< 5 U	< 0.52 U	< 0.28 U	< 0.28 U	< 0.28 U	< 0.28 U	< 0.73 U	< 0.19 U	< 0.21 U	--	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 5 U	< 0.52 U	< 0.28 U	< 0.28 U	< 0.28 U
1,2-Dichlorobenzene	3	µg/L	< 5 U	< 5 U	< 0.22 U	< 0.21 U	< 0.21 U	< 0.21 U	< 0.21 U	< 0.79 U	< 0.22 U	< 0.19 U	--	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 5 U	< 0.22 U	< 0.21 U	< 0.21 U	< 0.21 U
1,2-Dichloroethane	0.6	µg/L	< 5 U	< 5 U	< 0.72 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.21 U	< 0.25 U	< 0.2 U	--	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 5 U	< 0.72 U	< 0.19 U	< 0.19 U	< 0.19 U
1,2-Dichloropropane	1	µg/L	< 5 U	< 5 U	< 0.71 U	< 0.09 U	< 0.09 U	< 0.09 U	< 0.09 U	< 0.72 U	< 0.18 U	< 0.25 U	--	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 5 U	< 0.71 U	< 0.09 U	< 0.09 U	< 0.09 U
1,3,5-Trichlorobenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene (Mesitylene)	5	µg/L	< 5 U	< 5 U	< 0.53 U	< 0.15 U	< 0.15 U	0.53 J	< 0.15 U	--	--	--	--	--	--	--	--	< 5 U	< 0.53 U	< 0.15 U	< 0.15 U	< 0.15 U
1,3-Dichlorobenzene	3	µg/L	< 5 U	< 5 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.78 U	< 0.33 U	< 0.18 U	--	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 5 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U
1,3-Dichloropropane	5	µg/L	< 5 U	< 5 U	< 0.69 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.19 U	--	--	--	--	--	--	--	--	< 5 U	< 0.69 U	< 0.19 U	< 0.19 U	< 0.19 U
1,4-Dichlorobenzene	3	µg/L	< 5 U	< 5 U	< 0.59 U	< 0.23 U	< 0.23 U	< 0.23 U	< 0.23 U	< 0.84 U	< 0.33 U	< 0.17 U	--	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 5 U	< 0.59 U	< 0.23 U	< 0.23 U	< 0.23 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,2-Dichloropropane	5	µg/L	< 5 U	< 5 U	< 0.79 U	< 0.16 U	< 0.16 U	< 0.16 U	< 0.16 U	--	--	--	--	--	--	--	--	< 5 U	< 0.79 U	< 0.16 U	< 0.16 U	< 0.16 U
2-Chlorotoluene	NSL	µg/L	< 5 U	< 5 U	< 1.2 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	--	--	--	--	--	--	--	--	< 5 U	< 1.2 U	< 0.14 U	< 0.14 U	< 0.14 U
2-Hexanone	50	µg/L	< 10 U	< 10 U	< 1.1 U	< 0.5 U	< 0.5 U	< 0.5 UH	< 0.5 U	< 1.2 U	< 0.72 U	< 1.3 U	--	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 10 U	< 1.1 U	< 0.5 U	< 0.5 U	< 0.5 U
2-Methoxy-2-Methylbutane	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chlorotoluene	5	µg/L	< 5 U	< 5 U	< 0.8 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	--	--	--	--	--	--	--	--	< 5 U	< 0.8 U	< 0.14 U	< 0.14 U	< 0.14 U
Acetone	50	µg/L	< 10 U	< 10 U	1.1 J	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 R	< 3 U	< 1.1 U	< 2.7 U	--	< 3.1 U	3.8 J	< 3.1 U	< 3.1 U	1.8 J	< 1 U	< 2.7 U	< 2.7 U	< 2.7 R
Acrylonitrile	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	1	µg/L	< 5 U	< 5 U	< 0.74 U	< 0.08 U	< 0.08 U	< 0.08 U	< 0.08 U	< 0.41 U	< 0.09 U	< 0.2 U	--	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 5 U	< 0.74 U	< 0.08 U	< 0.08 U	< 0.08 U
Bromobenzene	5	µg/L	< 5 U	< 5 U	< 0.67 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 U	--	--	--	--	--	--	--	--	< 5 U	< 0.67 U	< 0.13 U	< 0.13 U	< 0.13 U
Bromochloromethane	5	µg/L	< 5 U	< 5 U	< 0.77 U	< 0.27 U	< 0.27 U	< 0.27 U	< 0.27 U	--	< 0.3 U	--	--	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 5 U	< 0.77 U	< 0.27 U	< 0.27 U	< 0.27 U
Bromodichloromethane	50	µg/L	< 5 U	< 5 U	< 0.48 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.39 U	< 0.15 U	< 0.17 U	--	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 5 U	< 0.48 U	< 0.12 U	< 0.12 U	< 0.12 U
Bromoform	50	µg/L	< 5 U	< 5 U	< 0.46 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.26 U	< 0.18 U	< 0.29 U	--	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 5 U	< 0.46 U	< 0.19 U	< 0.19 U	< 0.19 U
Bromomethane	5	µg/L	< 5 U	< 5 U	< 2.1 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.18 UJ	< 0.69 U	< 0.18 UT	< 0.35 U	--	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 U	< 5 U	< 2.1 U	< 0.18 U	< 0.18 U	< 0.18 U
Carbon Disulfide	60	µg/L	< 5 U	< 5 U	< 0.9 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.19 U	< 0.22 U	< 0.22 U	--	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 5 U	< 0.9 U	< 0.13 U	< 0.13 U	< 0.13 U
Carbon Tetrachloride	5	µg/L	< 5 U	< 5 U	< 1.1 U	< 0.06 U	< 0.06 U	< 0.06 U	< 0.06 U	< 0.27 U	< 0.33 U	< 0.18 U	--	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 5 U	< 1.1 U	< 0.06 U	< 0.06 U	< 0.06 U
Chlorobenzene	5	µg/L	< 5 U	< 5 U	< 0.72 U	< 0.11 U	< 0.11 U	< 0.11 U	< 0.11 U	< 0.75 U	< 0.24 U	< 0.18 U	--	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 5 U	< 0.72 U	< 0.11 U	< 0.11 U	< 0.11 U
Chloroethane	5	µg/L	< 5 U	< 5 U	< 1.1 U	< 0.17 U	< 0.17 U	< 0.17 U	< 0.17 U	< 0.32 U	< 0.37 U	< 0.36 U	--	< 0.73 U	< 0.73 U	< 0.73 UJ	< 0.73 U	< 5 U	< 1.1 U	< 0.17 U	< 0.17 U	< 0.17 U
Chloroform	7	µg/L	< 5 U	< 5 U	< 0.67 U	0.095 J	0.14 J	< 0.08 U	0.13 J	< 0.34 U	< 0.22 U	< 0.23 U	--	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 5 U	0.71 J	< 0.08 U	< 0.08 U	< 0.08 U
Chloromethane (Methyl Chloride)	5	µg/L	< 5 U	< 5 U	< 1.1 U	< 0.1 U	< 0.1 U	< 0.1 U	< 0.1 U	< 0.35 U	< 0.22 U	< 0.36 U	--	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 5 U	< 1.1 U	< 0.1 U	< 0.1 U	< 0.1 U
Cis-1,2-Dichloroethylene	5	µg/L	1 J	1.3 J	4.3 J	1.2	1.1	2.2	1.1	3.3	0.33 J	1.1	--	< 0.51 U	< 0.51 U	1.1	1.1	< 5 U	< 0.99 U	< 0.18 U	< 0.18 U	< 0.18 U
Cis-1,3-Dichloropropene	0.4	µg/L	< 5 U	< 5 U	< 0.28 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.36 U	< 0.16 U	< 0.17 U	--	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 5 U	< 0.28 U	< 0.18 U	< 0.18 U	< 0.18 U
Cyclohexane	NSL	µg/L	--	--	--	--	--	--	--	< 0.18 U	< 0.26 U	< 0.13 U	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--	--	--	--
Cymene	5	µg/L	< 5 U	< 5 U	< 0.81 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	--	--	--	--	--	--	--	--	< 5 U	< 0.81 U	< 0.14 U	< 0.14 U	< 0.14 U
Dibromochloromethane	50	µg/L	< 5 U	< 5 U	< 0.55 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.32 U	< 0.22 U	< 0.25 U	--	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 5 U	< 0.55 U	< 0.2 U	< 0.2 U	< 0.2 U
Dibromomethane	5	µg/L	< 5 U	< 5 U	< 0.7 U	< 0.29 U	< 0.29 U	< 0.29 U	< 0.29 U	--	--	--	--	--	--	--	--	< 5 U	< 0.7 U	< 0.29 U	< 0.29 U	< 0.29 U
Dichlorodifluoromethane	5	µg/L	< 5 U	< 5 U	< 1 U	< 0.22 U	< 0.22 U	< 0.22 U	< 0.22 UJ	< 0.68 U	< 0.14 U	< 0.17 UT	--	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 5 U	< 1 U	< 0.22 U	< 0.22 U	< 0.22 U
Diethyl Ether (Ethyl Ether)	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethyl Tert-Butyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	5	µg/L	< 5 U	< 5 U	< 0.87 U	< 0.1 U	< 0.1 U	< 0.1 U	< 0.1 U	< 0.74 U	< 0.3 U	< 0.19 U	--	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 5 U	< 0.87 U	< 0.1 U	< 0.1 U	< 0.1 U
Hexachlorobutadiene	0.5	µg/L	< 5 U	< 5 U	< 1 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	--	--	--	--	--	--	--	--	< 5 U	< 1 U	< 0.48 U	< 0.48 U	< 0.48 U
Iodomethane (Methyl Iodide)	5	µg/L	< 10 U	< 10 U	< 0.91 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 UJ	--	--	--	--	--	--	--	--	< 10 U	< 0.91 U	< 0.13 U	< 0.13 U	< 0.13 U
Isopropyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropylbenzene (Cumene)	5	µg/L	< 5 U	< 5 U	< 0.85 U	< 0.08 U	< 0.08 U	< 0.08 U	< 0.08 U	< 0.79 U	< 0.32 U	< 0.33 U	--	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 5 U	< 0.85 U	< 0.08 U	< 0.08 U	< 0.08 U
M,P-Xylene (Sum Of Isomers)	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--	--	--	--
Methyl Acetate	NSL	µg/L	--	--	--	--	--	--	--	< 0.5 U	< 0.58 U	< 0.58 U	--	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	--	--	--	--	--
Methyl Ethyl Ketone (2-Butanone)	50	µg/L	< 10 U	< 10 U	< 1.1 U	< 2.3 U	< 2.3 U	< 2.3 UH	< 2.3 R	< 1.3 U	< 2.2 U	< 2.6 U	--	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 10 U	< 1.1 U	< 2.3 U	< 2.3 U	< 2.3 R
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NSL	µg/L	< 10 U	< 10 U	< 0.38 U	< 0.99 U	< 0.99 U	< 0.99 U	< 0.99 U	< 2.1 U	< 0.63 U	< 0.81 U	--	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 10 U	< 0.38 U	< 0.99 U	< 0.99 U	< 0.99 U
Methylcyclohexane	NSL	µg/L	--	--	--	--	--	--	--	< 0.16 U	< 0.22 U	< 0.09 U	--	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	--	--	--	--	--
Methylene Chloride	5	µg/L	< 5 U	< 5 U	< 0.78 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.44 U	< 0.21 U	< 1 U	--	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5 U	< 0.78 U	< 0.18 U	< 0.18 U	< 0.18 U
M-P-Xylene	5	µg/L	< 5 U	< 5 U	< 1.7 U	< 0.25 U	< 0.25 U	0.29 J	< 0.25 U	--	< 0.28 U	--	--	--	--	--	--	< 5 U	< 1.7 U	< 0.25 U	< 0.25 U	< 0.25 U
Naphthalene	10	µg/L	< 5 U	< 5 U	< 0.34 U	< 0.29 U	< 0.29 U	< 0.29 U	< 0.29 U	--	--	--	--	--	--	--	--	< 5 U	< 0.34 U	< 0.29 U	< 0.29 U	< 0.29 U
N-Butylbenzene	5	µg/L	< 5 U	< 5 U	< 0.67 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	--	--	--	--	--	--	--	--	< 5 U	< 0.67 U	< 0.14 U	< 0.14 U	< 0.14 U
N-Propylbenzene	5	µg/L	< 5 U	< 5 U	< 0.62 U	< 0.1 U	< 0.1 U	0.15 J	< 0.1 U	--	--	--	--	--	--	--	--	< 5 U	< 0.62 U	< 0.1 U	< 0.1 U	< 0.1 U
O-Xylene (1,2-Dimethylbenzene)	5	µg/L	< 5 U	< 5 U	< 0.66 U	< 0.13 U	< 0.13 U	0.21 J	< 0.13 U	--	< 0.32 U	--	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 5 U	< 0.66 U	< 0.13 U	< 0.13 U	< 0.13 U
Sec-Butylbenzene	5	µg/L	< 5 U	< 5 U	< 0.79 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.18 U	--	--	--	--	--	--	--	--	< 5 U	< 0.79 U	< 0.18 U	< 0.18 U	< 0.18 U
Styrene	5	µg/L	< 5 U	< 5 U	< 0.64 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.73 U	< 0.17 U	< 0.28 U	--	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 5 U	< 0.64 U	< 0.12 U	< 0.12 U	< 0.12 U
T-Butylbenzene	5	µg/L	< 5 U	< 5 U	< 0.75 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.12 U	--	--	--	--	--	--	--	--	< 5 U	< 0.75 U	< 0.12 U	< 0.12 U	< 0.12 U
Tert-Butyl Alcohol	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tert-Butyl Methyl Ether	10	µg/L	< 5 U	< 5 U	< 0.17 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.16 U	< 0.13 U	< 0.17 U	--	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 5 U	< 0.17 U	< 0.14 U	< 0.14 U	< 0.14 U
Tetrachloroethylene (PCE)	5	µg/L	**42**	**33**	**37**	**34**	**35**	**43**	**26**	**52**	**7.9**	**17**	--	1.4	1.6	3.3	5.0	< 5 U	< 0.81 U	< 0.1 U	< 0.1 U	< 0.1 U
Tetrahydrofuran	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	5	µg/L	< 5 U	< 5 U	< 0.72 U	< 0.15 U	< 0.15 U	< 0.15 U	< 0.15 U	< 0.51 U	< 0.25 U	< 0.17 U	--	< 0.49 U	< 0.49 U	1.9	< 0.49 U	< 5 U	< 0.72 U	< 0.15 U	< 0.15 U	< 0.15 U
Trans-1,2-Dichloroethene	5	µg/L	< 5 U	< 5 U	< 0.76 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.9 U	< 0.18 U	< 0.23 U	--	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 5 U	< 0.76 U	< 0.13 U	< 0.13 U	< 0.13 U
Trans-1,3-Dichloropropene	0.4	µg/L	< 5 U	< 5 U	< 0.57 U	< 0.24 U	< 0.24 U	< 0.24 U	< 0.24 U	< 0.37 U	< 0.19 U	< 0.17 U	--	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 5 U	< 0.57 U	< 0.24 U	< 0.24 U	< 0.24 U
Trans-1,4-Dichloro-2-Butene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethylene (TCE)	5	µg/L	4.1 J	3.2 J	**5.5**	3.7	3.8	**5.1**	2.9	**8.6**	1.4	3.5	--	< 0.53 U	< 0.53 U	0.77	1.0	< 5 U	< 0.62 U	< 0.09 U	< 0.09 U	< 0.09 U
Trichlorofluoromethane	5	µg/L	< 5 U	< 5 U	< 1.1 U	< 0.15 U	< 0.15 U	< 0.15 U	< 0.15 U	< 0.88 U	< 0.15 U	< 0.21 U	--	< 0.40 U	< 0.40 U	< 0.40 UJ	< 0.40 U	< 5 U	< 1.1 U	< 0.15 U	< 0.15 U	< 0.15 U
Vinyl Acetate	NSL	µg/L	< 5 U	< 5 U	< 1.6 U	< 0.38 U	< 0.38 U	< 0.38 U	< 0.38 U	--	--	--	--	--	--	--	--	< 5 U	< 1.6 U	< 0.38 U	< 0.38 UHI	< 0.38 U
Vinyl Chloride	2	µg/L	< 5 U	< 5 U	< 0.99 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.9 U	< 0.06 U	< 0.18 U	--	< 0.52 U	< 0.52 U	< 0.52 U	< 0.52 U	< 5 U	< 0.99 U	< 0.14 U	< 0.14 U	< 0.14 U
Xylenes	5	µg/L	< 5 U	< 5 U	< 2.3 U	< 0.36 U	< 0.36 U	0.5 J	< 0.36 U	< 0.66 U	--	< 0.58 U	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 5 U	< 2.3 U	< 0.36 U	< 0.36 U	< 0.36 U
Xylenes, Total	NSL	µg/L	< 5 U	< 5 U	< 2.3 U	< 0.36 U	< 0.36 U	0.5 J	< 0.36 U	< 0.66 U	--	< 0.58 U	--	--	--	--	--	< 5 U	< 2.3 U	< 0.36 U	< 0.36 U	< 0.36 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	< 0.2 U	--	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)																						
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 1.7 U	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 1.4 U	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 2.1 U	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 0.85 U	--	--	--	--	--	--	--	--
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 6.7 U	--	--	--	--	--	--	--	--
3-Perfluoroheptyl propanoic acid (7:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 5.8 U	--	--	--	--	--	--	--	--
3-Perfluoropropyl propanoic acid (3:3 FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 2.3 U	--	--	--	--	--	--	--	--
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	--	--	--	--	--	--	--	--
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 2.3 U	--	--	--	--	--	--	--	--
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 1.7 U	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 0.50 U	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 0.85 U	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 3.5 U	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamide (NMeFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 0.60 U	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 0.48 U	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 2.6 U	--	--	--	--	--	--	--	--
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 1.2 U	--	--	--	--	--	--	--	--
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 0.25 U	--	--	--	--	--	--	--	--
Perfluoro-3-methoxypropanoic acid (PFMPA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 0.28 U	--	--	--	--	--	--	--	--
Perfluoro-4-methoxybutanoic acid (PFMBA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 0.52 U	--	--	--	--	--	--	--	--
Perfluorobutanesulfonic acid (PFBS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	1.1 J	--	1.3 J	--	--	--	--	--	--	--	--
Perfluorobutanoic Acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	2.5	--	1.7 J	--	--	--	--	--	--	--	--
Perfluorodecanesulfonic acid (PFDS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	< 0.32 U	--	< 1.0 U	--	--	--	--	--	--	--	--
Perfluorodecanoic acid (PFDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	< 0.31 U	--	< 0.58 U	--	--	--	--	--	--	--	--
Perfluorododecanesulfonic acid (PFDoS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 0.37 U	--	--	--	--	--	--	--	--
Perfluorododecanoic acid (PFDoA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	< 0.54 U	--	< 0.72 U	--	--	--	--	--	--	--	--
Perfluoroheptanesulfonic acid (PFHpS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	< 0.19 U	--	< 0.92 U	--	--	--	--	--	--	--	--
Perfluoroheptanoic acid (PFHpA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	1.9 J	--	< 0.47 U	--	--	--	--	--	--	--	--
Perfluorohexanesulfonic acid (PFHxS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	1.4 BJ	--	< 1.0 U	--	--	--	--	--	--	--	--
Perfluorohexanoic acid (PFHxA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	2.2	--	0.91 J	--	--	--	--	--	--	--	--
Perfluorononanesulfonic Acid (PFNS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U	--	--	--	--	--	--	--	--
Perfluorononanoic acid (PFNA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	1.1 BJ	--	1.1 J	--	--	--	--	--	--	--	--
Perfluorooctane Sulfonamide (PFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	< 0.35 U	--	< 0.64 U	--	--	--	--	--	--	--	--
Perfluorooctanesulfonic acid (PFOS)	2.7	ng/L	--	--	--	--	--	--	--	--	--	**15**	--	**13.4**	--	--	--	--	--	--	--	--
Perfluorooctanoic acid (PFOA)	6.7	ng/L	--	--	--	--	--	--	--	--	--	**6.8**	--	1.4 J	--	--	--	--	--	--	--	--
Perfluoropentanesulfonic Acid (PFPeS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	< 0.94 U	--	--	--	--	--	--	--	--
Perfluoropentanoic Acid (PFPeA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	2.5	--	< 0.68 U	--	--	--	--	--	--	--	--
Perfluorotetradecanoic acid (PFTeDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	0.6 J	--	< 0.71 U	--	--	--	--	--	--	--	--
Perfluorotridecanoic Acid (PFTriA/PFTrDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	< 1.3 U	--	< 0.74 U	--	--	--	--	--	--	--	--
Perfluoroundecanoic Acid (PFUnA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	< 1.1 U	--	< 0.51 U	--	--	--	--	--	--	--	--

Notes:

[1]NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)

--' = Not analyzed
µg/L = Mircogram(s) per liter
ng/L - Nanogram(s) per liter
B = Analyte detected in blank, as well as sample
D = Compound in analysis has been diluted
J = Concentration is estimated
NSL = No screening level available
U = Analyte not detected
R = Reported result unusable
VOCs = Volatile organic compounds
PFAS = Per- and polyfluoroalkyl substances
Concentrations exceeding the screening level are bolded and shaded gray

		Location	MW-03	MW-03	MW-03	MW-03	MW-04R	MW-04R	MW-04R	MW-04R	MW-04R	MW-04R	MW-04R	MW-05R	MW-05R	MW-05R	MW-05R	MW-05R	MW-05R	MW-07D	MW-07D	MW-07D
		Sample Name	MW-3_070914	MW-03	MW-03-040518	MW-3	MW-4R	DUP-1	MW-04R-040518	130054-MW-4R-12042023	130054-MW-4R-06242024	130054-MW-4R-09192024	130054-MW-04R-20241125	MW-05R	130054-MW-5R-12042023	MW-5R-03182024	130054-MW-5R-06242024	130054-MW-5R-09192024	130054-MW-05R-20241125	MW-7RD-06082022	MW-7D-09222022	130054-MW-7D-12042023
		Parent Sample Name						MW-4R-20171102														
		Sample Date	7/9/2014	11/7/2017	4/5/2018	12/4/2019	11/2/2017	11/2/2017	4/5/2018	12/4/2023	6/24/2024	9/19/2024	11/25/2024	11/6/2017	12/4/2023	3/18/2024	6/24/2024	9/19/2024	11/25/2024	6/8/2022	9/22/2022	12/4/2023
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)																						
1,1,1,2-Tetrachloroethane	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.71 U	< 0.71 U	--
1,1,1-Trichloroethane (TCA)	5	µg/L	< 0.82 U	< 0.19 U	--	< 0.24 U	< 0.19 U	< 0.19 U	--	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.19 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.68 U	< 0.68 U	< 0.54 U
1,1,2,2-Tetrachloroethane	5	µg/L	< 0.21 U	< 0.19 U	--	< 0.37 U	< 0.19 U	< 0.19 U	--	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.19 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.51 U	< 0.51 U	< 0.65 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	µg/L	< 0.31 U	< 0.15 U	--	< 0.31 U	< 0.15 UT	< 0.15 UT	--	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.15 UT	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.91 U	< 0.91 U	< 0.58 U
1,1,2-Trichloroethane	1	µg/L	< 0.23 U	< 0.19 U	--	< 0.43 U	< 0.19 U	< 0.19 U	--	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.19 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.73 U	< 0.73 U	< 0.53 U
1,1-Dichloroethane	5	µg/L	< 0.38 U	< 0.24 U	--	< 0.26 U	< 0.24 U	< 0.24 U	--	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	0.31 J	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U
1,1-Dichloroethene	5	µg/L	< 0.29 U	< 0.25 U	--	< 0.26 U	< 0.25 U	< 0.25 U	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	0.38 J	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.57 U	1.3 JD	< 0.59 U
1,1-Dichloropropene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.6 U	< 0.6 U	--
1,2,3-Trichlorobenzene	5	µg/L	--	--	--	--	--	--	--	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	--	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 1.2 U	< 1.2 U	< 0.50 U
1,2,3-Trichloropropane	0.04	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	< 1.1 U	--
1,2,4-Trichlorobenzene	5	µg/L	< 0.41 U	< 0.2 U	--	< 0.37 U	< 0.2 U	< 0.2 U	--	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.2 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.99 U	< 0.99 U	< 0.50 U
1,2,4-Trimethylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.8 U	< 0.8 U	--
1,2-Dibromo-3-Chloropropane	0.04	µg/L	< 0.39 U	< 0.94 U	--	< 0.38 U	< 0.94 U	< 0.94 U	--	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.94 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 3.2 U	< 3.2 U	< 0.53 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	µg/L	< 0.73 U	< 0.21 U	--	< 0.5 U	< 0.21 U	< 0.21 U	--	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.21 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.68 U	< 0.68 U	< 0.48 U
1,2-Dichlorobenzene	3	µg/L	< 0.79 U	< 0.19 U	--	< 0.43 U	< 0.19 U	< 0.19 U	--	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.19 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.49 U	< 0.49 U	< 0.53 U
1,2-Dichloroethane	0.6	µg/L	< 0.21 U	< 0.2 U	--	< 0.43 U	< 0.2 U	< 0.2 U	--	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.2 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 1.2 U	< 1.2 U	< 0.60 U
1,2-Dichloropropane	1	µg/L	< 0.72 U	< 0.25 U	--	< 0.35 U	< 0.25 U	< 0.25 U	--	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.25 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.72 U	< 0.72 U	< 0.51 U
1,3,5-Trichlorobenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.84 U	< 0.84 U	--
1,3,5-Trimethylbenzene (Mesitylene)	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.45 U	< 0.45 U	--
1,3-Dichlorobenzene	3	µg/L	< 0.78 U	< 0.18 U	--	< 0.34 U	< 0.18 U	< 0.18 U	--	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.18 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.47 U	< 0.47 U	< 0.54 U
1,3-Dichloropropane	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.52 U	< 0.52 U	--
1,4-Dichlorobenzene	3	µg/L	< 0.84 U	< 0.17 U	--	< 0.33 U	< 0.17 U	< 0.17 U	--	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.17 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.52 U	< 0.52 U	< 0.51 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 82 U	< 82 U	--
2,2-Dichloropropane	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U	< 1.3 U	--
2-Chlorotoluene	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.46 U	< 0.46 U	--
2-Hexanone	50	µg/L	< 1.2 U	< 1.3 U	--	< 1.1 U	< 1.3 U	< 1.3 U	--	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 1.3 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.5 U	< 4.5 U	< 4.8 U
2-Methoxy-2-Methylbutane	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.57 U	< 0.57 U	--
4-Chlorotoluene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.47 U	< 0.47 U	--
Acetone	50	µg/L	< 3 U	6 J	--	< 4.4 U	< 2.7 U	< 2.7 U	--	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 2.7 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 8.1 U	< 8.1 U	< 3.1 U
Acrylonitrile	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.2 U	< 2.2 U	--
Benzene	1	µg/L	< 0.41 U	< 0.2 U	--	< 0.2 U	< 0.2 U	< 0.2 U	--	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.2 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.8 U	< 0.8 U	< 0.43 U
Bromobenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.6 U	< 0.6 U	--
Bromochloromethane	5	µg/L	--	--	--	--	--	--	--	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	--	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 1.2 U	< 1.2 U	< 0.48 U
Bromodichloromethane	50	µg/L	< 0.39 U	< 0.17 U	--	< 0.34 U	< 0.17 U	< 0.17 U	--	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.17 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.72 U	< 0.72 U	< 0.45 U
Bromoform	50	µg/L	< 0.26 U	< 0.29 U	--	< 0.54 UT	< 0.29 U	< 0.29 U	--	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.29 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 1.5 U	< 1.5 U	< 0.63 U
Bromomethane	5	µg/L	< 0.69 U	< 0.35 U	--	< 0.55 U	< 0.35 U	< 0.35 U	--	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 U	< 0.35 U	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 UJ	< 1.6 U	< 6.2 U	< 6.2 U	< 1.6 U
Carbon Disulfide	60	µg/L	0.49 BJ	< 0.22 U	--	< 0.82 U	< 0.22 U	< 0.22 U	--	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 0.22 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 5.8 U	< 5.8 U	< 1.8 U
Carbon Tetrachloride	5	µg/L	< 0.27 U	< 0.18 U	--	< 0.21 U	< 0.18 U	< 0.18 U	--	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.18 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.66 U	< 0.66 U	< 0.55 U
Chlorobenzene	5	µg/L	< 0.75 U	< 0.18 U	--	< 0.38 U	< 0.18 U	< 0.18 U	--	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.18 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.42 U	< 0.42 U	< 0.56 U
Chloroethane	5	µg/L	< 0.32 U	< 0.36 U	--	< 0.32 U	< 0.36 U	< 0.36 U	--	< 0.73 U	< 0.73 U	< 0.73 UJ	< 0.73 U	< 0.36 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U	< 1.3 U	< 1.3 U	< 0.73 U
Chloroform	7	µg/L	< 0.34 U	< 0.23 U	--	< 0.33 U	< 0.23 U	< 0.23 U	--	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.23 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.67 U	< 0.67 U	< 0.50 U
Chloromethane (Methyl Chloride)	5	µg/L	< 0.35 U	< 0.36 U	--	< 0.4 UT	< 0.36 U	< 0.36 U	--	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.36 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 2.1 U	< 2.1 U	< 0.76 U
Cis-1,2-Dichloroethylene	5	µg/L	< 0.81 U	< 0.21 U	--	< 0.22 U	0.94 J	0.69 J	--	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	1.1	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	**210 D**	**290 D**	**175**
Cis-1,3-Dichloropropene	0.4	µg/L	< 0.36 U	< 0.17 U	--	< 0.22 U	< 0.17 U	< 0.17 U	--	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.17 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.63 U	< 0.63 U	< 0.47 U
Cyclohexane	NSL	µg/L	< 0.18 U	< 0.13 U	--	< 0.32 U	< 0.13 U	< 0.13 U	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.13 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--	< 0.78 U
Cymene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.39 U	< 0.39 U	--
Dibromochloromethane	50	µg/L	< 0.32 U	< 0.25 U	--	< 0.28 U	< 0.25 U	< 0.25 U	--	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.25 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.89 U	< 0.89 U	< 0.56 U
Dibromomethane	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.4 U	< 1.4 U	--
Dichlorodifluoromethane	5	µg/L	< 0.68 U	< 0.17 U	--	< 0.31 U	< 0.17 U	< 0.17 U	--	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.17 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.77 U	< 0.77 U	< 0.56 U
Diethyl Ether (Ethyl Ether)	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.73 U	< 0.73 U	--
Ethyl Tert-Butyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.59 U	< 0.59 U	--
Ethylbenzene	5	µg/L	< 0.74 U	< 0.19 U	--	< 0.3 U	< 0.19 U	< 0.19 U	--	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.19 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.86 U	< 0.86 U	< 0.60 U
Hexachlorobutadiene	0.5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.8 U	< 1.8 U	--
Iodomethane (Methyl Iodide)	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.51 U	< 0.51 U	--
Isopropylbenzene (Cumene)	5	µg/L	< 0.79 U	< 0.33 U	--	< 0.34 U	< 0.33 U	< 0.33 U	--	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.33 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.43 U	< 0.43 U	< 0.65 U
M,P-Xylene (Sum Of Isomers)	5	µg/L	--	--	--	--	--	--	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--	< 0.78 U
Methyl Acetate	NSL	µg/L	< 0.5 U	< 0.58 U	--	< 0.79 U	< 0.58 U	< 0.58 U	--	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.58 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 1.8 U	< 1.8 U	< 0.80 U
Methyl Ethyl Ketone (2-Butanone)	50	µg/L	< 1.3 U	< 2.6 U	--	< 1.9 U	< 2.6 U	< 2.6 U	--	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.6 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 6.5 U	< 6.5 U	< 2.7 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NSL	µg/L	< 2.1 U	< 0.81 U	--	< 1.3 U	< 0.81 U	< 0.81 U	--	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 0.81 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 5.1 U	< 5.1 U	< 4.9 U
Methylcyclohexane	NSL	µg/L	< 0.16 U	< 0.09 U	--	< 0.26 U	< 0.09 U	< 0.09 U	--	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.09 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.98 U	< 0.98 U	< 0.60 U
Methylene Chloride	5	µg/L	< 0.44 U	< 1 U	--	< 0.32 U	< 1 U	< 1 U	--	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 0.94 U	< 0.94 U	< 1.0 U
M-P-Xylene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.8 U	< 1.8 U	--
Naphthalene	10	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.97 U	< 0.97 U	--
N-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.61 U	< 0.61 U	--
N-Propylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.34 U	< 0.34 U	--
O-Xylene (1,2-Dimethylbenzene)	5	µg/L	--	--	--	--	--	--	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.92 U	< 0.92 U	< 0.59 U
Sec-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.44 U	< 0.44 U	--
Styrene	5	µg/L	< 0.73 U	< 0.28 U	--	< 0.42 U	< 0.28 U	< 0.28 U	--	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.28 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.42 U	< 0.42 U	< 0.49 U
T-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.52 U	< 0.52 U	--
Tert-Butyl Alcohol	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 19 U	< 19 U	--
Tert-Butyl Methyl Ether	10	µg/L	< 0.16 U	< 0.17 U	--	< 0.47 U	< 0.17 U	< 0.17 U	--	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.17 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	1.2 JD	1.7 JD	1.4
Tetrachloroethylene (PCE)	5	µg/L	< 0.36 U	< 0.14 U	--	< 0.25 U	< 0.14 U	< 0.14 U	--	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.14 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	**23 D**	**13 D**	1.1
Tetrahydrofuran	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2 U	9.4 JD	--
Toluene	5	µg/L	< 0.51 U	< 0.17 U	--	< 0.38 U	< 0.17 U	< 0.17 U	--	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.17 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.9 U	< 0.9 U	< 0.49 U
Trans-1,2-Dichloroethene	5	µg/L	< 0.9 U	< 0.23 U	--	< 0.24 U	< 0.23 U	< 0.23 U	--	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.23 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.67 U	< 0.67 U	0.77 J
Trans-1,3-Dichloropropene	0.4	µg/L	< 0.37 U	< 0.17 U	--	< 0.49 U	< 0.17 U	< 0.17 U	--	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.17 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.67 U	< 0.67 U	< 0.43 U
Trans-1,4-Dichloro-2-Butene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 6.5 U	< 6.5 U	--
Trichloroethylene (TCE)	5	µg/L	< 0.46 U	< 0.2 U	--	< 0.31 U	< 0.2 U	< 0.2 U	--	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	0.26 J	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	**12 D**	**7.2 D**	4.3
Trichlorofluoromethane	5	µg/L	< 0.88 U	< 0.21 U	--	< 0.32 U	< 0.21 U	< 0.21 U	--	< 0.40 U	< 0.40 U	< 0.40 UJ	< 0.40 U	< 0.21 U	< 0.40 U	< 0.40 U	< 0.40 U	< 0.40 UJ	< 0.40 U	< 0.7 U	< 0.7 U	< 0.40 U
Vinyl Acetate	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	2	µg/L	< 0.9 U	< 0.18 U	--	< 0.17 U	< 0.18 U	< 0.18 U	--	< 0.52 U	< 0.52 U	< 0.52 U	< 0.52 U	< 0.18 U	< 0.52 U	< 0.52 U	< 0.52 U	< 0.52 U	< 0.52 U	**2.2 JD**	**3 JD**	2
Xylenes	5	µg/L	< 0.66 U	< 0.58 U	--	< 0.65 U	< 0.58 U	< 0.58 U	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.58 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	--	--	< 0.59 U
Xylenes, Total	NSL	µg/L	< 0.66 U	< 0.58 U	--	--	< 0.58 U	< 0.58 U	--	--	--	--	--	< 0.58 U	--	--	--	--	--	--	--	--
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)																						
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	NSL	ng/L	--	--	--	--	--	--	--	< 1.7 U	--	--	--	--	< 1.7 U	< 1.9 U	--	--	--	--	--	< 1.7 U
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	< 1.4 U	--	--	--	--	< 1.4 U	< 1.5 U	--	--	--	--	--	< 1.3 U
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	< 2.1 U	--	--	--	--	< 2.1 U	< 2.4 U	--	--	--	--	--	< 2.1 U
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	< 0.86 U	--	--	--	--	< 0.86 U	< 0.95 U	--	--	--	--	--	< 0.84 U
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	< 6.8 U	--	--	--	--	< 6.7 U	< 7.5 U	--	--	--	--	--	< 6.6 U
3-Perfluoroheptyl propanoic acid (7:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	< 5.9 U	--	--	--	--	< 5.8 U	< 6.5 U	--	--	--	--	--	< 5.7 U
3-Perfluoropropyl propanoic acid (3:3 FTCA)	NSL	ng/L	--	--	--	--	--	--	--	< 2.3 U	--	--	--	--	< 2.3 U	< 2.5 U	--	--	--	--	--	< 2.2 U
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NSL	ng/L	--	--	--	--	--	--	--	< 1.2 U	--	--	--	--	< 1.2 U	< 1.3 U	--	--	--	--	--	< 1.1 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	NSL	ng/L	--	--	--	--	--	--	--	< 2.3 U	--	--	--	--	< 2.3 U	< 2.6 U	--	--	--	--	--	< 2.2 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NSL	ng/L	--	--	--	--	--	--	--	< 1.7 U	--	--	--	--	< 1.7 U	< 1.9 U	--	--	--	--	--	< 1.7 U
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	NSL	ng/L	--	--	--	--	--	--	--	< 0.50 U	--	--	--	--	< 0.50 U	< 0.56 U	--	--	--	--	--	< 0.49 U
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	1.2 J	--	--	--	--	< 0.86 U	< 0.95 U	--	--	--	--	--	3.1
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	NSL	ng/L	--	--	--	--	--	--	--	< 3.6 U	--	--	--	--	< 3.5 U	< 3.9 U	--	--	--	--	--	< 3.5 U
N-methyl perfluorooctanesulfonamide (NMeFOSA)	NSL	ng/L	--	--	--	--	--	--	--	< 0.61 U	--	--	--	--	< 0.60 U	< 0.67 U	--	--	--	--	--	< 0.59 U
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	0.53 J	--	--	--	--	< 0.48 U	< 0.53 U	--	--	--	--	--	4.2
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	NSL	ng/L	--	--	--	--	--	--	--	< 2.6 U	--	--	--	--	< 2.6 U	< 2.9 U	--	--	--	--	--	< 2.6 U
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NSL	ng/L	--	--	--	--	--	--	--	< 1.2 U	--	--	--	--	< 1.2 U	< 1.3 U	--	--	--	--	--	< 1.2 U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NSL	ng/L	--	--	--	--	--	--	--	< 0.26 U	--	--	--	--	< 0.26 U	< 0.28 U	--	--	--	--	--	< 0.25 U
Perfluoro-3-methoxypropanoic acid (PFMPA)	NSL	ng/L	--	--	--	--	--	--	--	< 0.28 U	--	--	--	--	< 0.28 U	< 0.31 U	--	--	--	--	--	< 0.28 U
Perfluoro-4-methoxybutanoic acid (PFMBA)	NSL	ng/L	--	--	--	--	--	--	--	< 0.53 U	--	--	--	--	< 0.53 U	< 0.59 U	--	--	--	--	--	< 0.52 U
Perfluorobutanesulfonic acid (PFBS)	NSL	ng/L	--	64	--	--	2.8	2.6	--	2.4	--	--	--	53	27.2	50.4	--	--	--	--	--	10.8
Perfluorobutanoic Acid	NSL	ng/L	--	38	--	--	6.4	6.4	--	5 J	--	--	--	28	9.5	5.7 J	--	--	--	--	--	20.7
Perfluorodecanesulfonic acid (PFDS)	NSL	ng/L	--	< 0.33 U	--	--	< 0.32 U	< 0.32 U	--	< 1.0 U	--	--	--	< 0.33 U	< 1.0 U	< 1.1 U	--	--	--	--	--	< 1.0 U
Perfluorodecanoic acid (PFDA)	NSL	ng/L	--	1.1 J	--	--	0.73 J	0.69 J	--	0.6 J	--	--	--	0.55 J	1.1 J	< 0.65 U	--	--	--	--	--	2.4
Perfluorododecanesulfonic acid (PFDoS)	NSL	ng/L	--	--	--	--	--	--	--	< 0.38 U	--	--	--	--	< 0.38 U	< 0.42 U	--	--	--	--	--	< 0.37 U
Perfluorododecanoic acid (PFDoA)	NSL	ng/L	--	< 0.56 U	--	--	< 0.54 U	< 0.55 U	--	< 0.73 U	--	--	--	< 0.57 U	< 0.73 U	< 0.81 U	--	--	--	--	--	< 0.71 U
Perfluoroheptanesulfonic acid (PFHpS)	NSL	ng/L	--	11	--	--	0.95 J	0.86 J	--	< 0.93 U	--	--	--	2.1	4.7	2 J	--	--	--	--	--	1.3 J
Perfluoroheptanoic acid (PFHpA)	NSL	ng/L	--	51	--	--	5.1	5.1	--	2.5	--	--	--	44	13.4	14	--	--	--	--	--	15.2
Perfluorohexanesulfonic acid (PFHxS)	NSL	ng/L	--	36 B	--	--	5.8 B	5.8 B	--	1.6 J	--	--	--	25 B	9.4	7.9	--	--	--	--	--	8
Perfluorohexanoic acid (PFHxA)	NSL	ng/L	--	43	--	--	6.3	5.9	--	4.2	--	--	--	41	12.8	9.8	--	--	--	--	--	19.1
Perfluorononanesulfonic Acid (PFNS)	NSL	ng/L	--	--	--	--	--	--	--	< 1.4 U	--	--	--	--	< 1.4 U	< 1.5 U	--	--	--	--	--	< 1.3 U
Perfluorononanoic acid (PFNA)	NSL	ng/L	--	8.1	--	--	1.8 J	1.8 J	--	0.59 J	--	--	--	5.8	10.2	4.9	--	--	--	--	--	3.7
Perfluorooctane Sulfonamide (PFOSA)	NSL	ng/L	--	59 B	--	--	0.39 J	0.46 J	--	< 0.65 U	--	--	--	< 0.36 U	< 0.65 U	< 0.72 U	--	--	--	--	--	2.8
Perfluorooctanesulfonic acid (PFOS)	2.7	ng/L	--	**310**	--	--	**56**	**53**	--	**30.6**	--	--	--	**52**	**138**	**59 B**	--	--	--	--	--	**167**
Perfluorooctanoic acid (PFOA)	6.7	ng/L	--	**310**	--	--	**25**	**25**	--	**7.4**	--	--	--	**120**	**68.7**	**66.8**	--	--	--	--	--	**53.8**
Perfluoropentanesulfonic Acid (PFPeS)	NSL	ng/L	--	--	--	--	--	--	--	< 0.96 U	--	--	--	--	1.9	1.7 J	--	--	--	--	--	3.3
Perfluoropentanoic Acid (PFPeA)	NSL	ng/L	--	42	--	--	5	6.2	--	2.6 J	--	--	--	30	11.7	5.8	--	--	--	--	--	21.6
Perfluorotetradecanoic acid (PFTeDA)	NSL	ng/L	--	< 0.3 U	--	--	< 0.29 U	< 0.29 U	--	< 0.72 U	--	--	--	< 0.3 U	< 0.72 U	< 0.80 U	--	--	--	--	--	< 0.70 U
Perfluorotridecanoic Acid (PFTriA/PFTrDA)	NSL	ng/L	--	< 1.3 U	--	--	< 1.3 U	< 1.3 U	--	< 0.75 U	--	--	--	< 1.3 U	< 0.75 U	< 0.83 U	--	--	--	--	--	< 0.73 U
Perfluoroundecanoic Acid (PFUnA)	NSL	ng/L	--	< 1.1 U	--	--	< 1.1 U	< 1.1 U	--	< 0.52 U	--	--	--	1.6 J	< 0.52 U	< 0.58 U	--	--	--	--	--	< 0.51 U

Notes:

[1]NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)

--' = Not analyzed
µg/L = Mircogram(s) per liter
ng/L - Nanogram(s) per liter
B = Analyte detected in blank, as well as sample
D = Compound in analysis has been diluted
J = Concentration is estimated
NSL = No screening level available
U = Analyte not detected
R = Reported result unusable
VOCs = Volatile organic compounds
PFAS = Per- and polyfluoroalkyl substances
Concentrations exceeding the screening level are bolded and shaded gray

		Location	MW-07D	MW-07D	MW-07D	MW-07D	MW-07RS	MW-07RS	MW-07RS	MW-07RS	MW-07RS	MW-07RS	MW-07RS	MW-07RS	MW-07RS	MW-08	MW-08	MW-08	MW-08	MW-08	MW-08	MW-08
		Sample Name	MW-7D-03192024	130054-MW-7D-06242024	130054-MW-7D-09182024	130054-MW-07D-20241126	MW-7RS-06082022	MW-7RS-09222022	130054-MW-7RS-12042023	130054-DUP-01-12042023	MW-7S-03192024	130054-MW-7S-06242024	130054-DUP-01-06242024	130054-MW-7RS-09182024	130054-MW-07RS-20241126	MW-8	MW-8-20130426	MW-8-112213	MW-8	MW-8 011514	MW-08	130054-MW-8-12042023
		Parent Sample Name								130054-MW-7RS-20231204			130054-MW-7S-20240624									
		Sample Date	3/19/2024	6/24/2024	9/18/2024	11/26/2024	6/8/2022	9/22/2022	12/4/2023	12/4/2023	3/19/2024	6/24/2024	6/24/2024	9/18/2024	11/26/2024	11/2/2012	4/26/2013	11/22/2013	11/22/2013	1/15/2014	11/6/2017	12/4/2023
Analyte	NYSDEC AWQS[1]	Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)																						
1,1,1,2-Tetrachloroethane	5	µg/L	--	--	--	--	< 1.8 U	< 1.8 U	--	--	--	--	--	--	--	< 0.5 U	< 0.2 U	--	--	--	--	--
1,1,1-Trichloroethane (TCA)	5	µg/L	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 1.7 U	< 1.7 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.3 U	< 0.12 U	< 0.82 U	--	< 0.82 U	< 1.9 U	< 2.1 U
1,1,2,2-Tetrachloroethane	5	µg/L	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 1.3 U	< 1.3 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.8 U	< 0.32 U	< 0.21 U	--	< 0.21 U	< 1.9 U	< 2.6 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	µg/L	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 2.3 U	< 2.3 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	--	--	< 0.31 U	--	< 0.31 U	< 1.5 UT	< 2.3 U
1,1,2-Trichloroethane	1	µg/L	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 1.8 U	< 1.8 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.95 U	< 0.38 U	< 0.23 U	--	< 0.23 U	< 1.9 U	< 2.1 U
1,1-Dichloroethane	5	µg/L	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 1.4 U	< 1.4 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.65 U	< 0.26 U	< 0.38 U	--	< 0.38 U	< 2.4 U	< 2.3 U
1,1-Dichloroethene	5	µg/L	< 0.59 U	0.88 J	0.76	< 0.59 U	**5.5 JD**	2.9 JD	0.66 J	0.73 J	0.92 J	1.7	1.8	< 0.59 U	0.93 J	< 0.45 U	< 0.18 U	< 0.29 U	--	< 0.29 U	< 2.5 U	< 2.4 U
1,1-Dichloropropene	5	µg/L	--	--	--	--	< 1.5 U	< 1.5 U	--	--	--	--	--	--	--	< 0.6 U	< 0.24 U	--	--	--	--	--
1,2,3-Trichlorobenzene	5	µg/L	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 3 U	< 3 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 2.6 U	< 1 UJ	--	--	--	--	< 2.0 U
1,2,3-Trichloropropane	0.04	µg/L	--	--	--	--	< 2.8 U	< 2.8 U	--	--	--	--	--	--	--	**2.9 J**	< 0.84 U	--	--	--	--	--
1,2,4-Trichlorobenzene	5	µg/L	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 2.5 U	< 2.5 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 1.7 U	< 0.68 U	< 0.41 U	--	< 0.41 U	< 2 U	< 2.0 U
1,2,4-Trimethylbenzene	5	µg/L	--	--	--	--	< 2 U	< 2 U	--	--	--	--	--	--	--	**2900**	**2600**	--	--	--	--	--
1,2-Dibromo-3-Chloropropane	0.04	µg/L	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 8 U	< 8 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 2 U	< 0.8 U	< 0.39 U	--	< 0.39 U	< 9.4 U	< 2.1 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	µg/L	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 1.7 U	< 1.7 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 1.4 U	< 0.56 U	< 0.73 U	--	< 0.73 U	< 2.1 U	< 1.9 U
1,2-Dichlorobenzene	3	µg/L	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 1.2 U	< 1.2 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 1.1 U	< 0.42 U	< 0.79 U	--	< 0.79 U	< 1.9 U	< 2.1 U
1,2-Dichloroethane	0.6	µg/L	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 3.1 U	< 3.1 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.95 U	< 0.38 U	< 0.21 U	--	< 0.21 U	< 2 U	< 2.4 U
1,2-Dichloropropane	1	µg/L	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 1.8 U	< 1.8 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.45 U	< 0.18 U	< 0.72 U	--	< 0.72 U	< 2.5 U	< 2.0 U
1,3,5-Trichlorobenzene	5	µg/L	--	--	--	--	< 2.1 U	< 2.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene (Mesitylene)	5	µg/L	--	--	--	--	< 1.1 U	< 1.1 U	--	--	--	--	--	--	--	**840**	**830 J**	--	--	--	--	--
1,3-Dichlorobenzene	3	µg/L	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 1.2 U	< 1.2 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.7 U	< 0.28 U	< 0.78 U	--	< 0.78 U	< 1.8 U	< 2.2 U
1,3-Dichloropropane	5	µg/L	--	--	--	--	< 1.3 U	< 1.3 U	--	--	--	--	--	--	--	< 0.95 U	< 0.38 U	--	--	--	--	--
1,4-Dichlorobenzene	3	µg/L	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 1.3 U	< 1.3 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 1.2 U	< 0.46 U	< 0.84 U	--	< 0.84 U	< 1.7 U	< 2.0 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	< 210 U	< 210 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,2-Dichloropropane	5	µg/L	--	--	--	--	< 3.3 U	< 3.3 U	--	--	--	--	--	--	--	< 0.8 U	< 0.32 U	--	--	--	--	--
2-Chlorotoluene	NSL	µg/L	--	--	--	--	< 1.1 U	< 1.1 U	--	--	--	--	--	--	--	< 0.7 U	< 0.28 U	--	--	--	--	--
2-Hexanone	50	µg/L	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 11 U	< 11 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 2.5 UH	< 1 U	< 1.2 U	--	< 1.2 U	< 13 U	< 19 U
2-Methoxy-2-Methylbutane	NSL	µg/L	--	--	--	--	< 1.4 U	< 1.4 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chlorotoluene	5	µg/L	--	--	--	--	< 1.2 U	< 1.2 U	--	--	--	--	--	--	--	< 0.7 U	< 0.28 U	--	--	--	--	--
Acetone	50	µg/L	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 20 U	< 20 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 13 U	< 5.4 R	< 3 U	--	5.8 J	< 27 U	< 12 U
Acrylonitrile	5	µg/L	--	--	--	--	< 5.5 U	< 5.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	1	µg/L	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 2 U	< 2 U	< 0.43 U	< 0.43 U	< 0.43 U	0.67	0.69	< 0.43 U	0.57	0.97 J	**1.5 J**	< 0.41 U	--	**1.4**	< 2 U	< 1.7 U
Bromobenzene	5	µg/L	--	--	--	--	< 1.5 U	< 1.5 U	--	--	--	--	--	--	--	< 0.65 U	< 0.26 U	--	--	--	--	--
Bromochloromethane	5	µg/L	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 3.1 U	< 3.1 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 1.4 U	< 0.54 U	--	--	--	--	< 1.9 U
Bromodichloromethane	50	µg/L	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 1.8 U	< 1.8 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.6 U	< 0.24 U	< 0.39 U	--	< 0.39 U	< 1.7 U	< 1.8 U
Bromoform	50	µg/L	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 3.8 U	< 3.8 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.95 U	< 0.38 U	< 0.26 U	--	< 0.26 U	< 2.9 U	< 2.5 U
Bromomethane	5	µg/L	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 U	< 15 U	< 15 U	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 UJ	< 1.6 U	< 0.9 U	< 0.36 U	< 0.69 U	--	< 0.69 U	< 3.5 U	< 6.6 U
Carbon Disulfide	60	µg/L	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 14 U	< 14 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 0.65 U	< 0.26 U	< 0.19 U	--	< 0.19 U	< 2.2 U	< 7.2 U
Carbon Tetrachloride	5	µg/L	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 1.6 U	< 1.6 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.3 U	< 0.12 U	< 0.27 U	--	< 0.27 U	< 1.8 U	< 2.2 U
Chlorobenzene	5	µg/L	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 1.1 U	< 1.1 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.55 U	< 0.22 U	< 0.75 U	--	< 0.75 U	< 1.8 U	< 2.2 U
Chloroethane	5	µg/L	< 0.73 U	< 0.73 U	< 0.73 UJ	< 0.73 U	< 3.2 U	< 3.2 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.85 U	< 0.34 U	< 0.32 U	--	< 0.32 U	< 3.6 U	< 2.9 U
Chloroform	7	µg/L	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 1.7 U	< 1.7 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.4 U	< 0.16 U	< 0.34 U	--	< 0.34 U	< 2.3 U	< 2.0 U
Chloromethane (Methyl Chloride)	5	µg/L	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 5.2 U	< 5.2 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.5 U	< 0.2 U	< 0.35 U	--	< 0.35 U	< 3.6 U	< 3.0 U
Cis-1,2-Dichloroethylene	5	µg/L	**212**	**327**	**214**	**181**	**790 D**	**620 D**	**182**	**189**	**345**	**365**	**354**	**191**	**253**	**420**	**270**	**20**	--	**220**	**86**	**67.7**
Cis-1,3-Dichloropropene	0.4	µg/L	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 1.6 U	< 1.6 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.9 U	< 0.36 U	< 0.36 U	--	< 0.36 U	< 1.7 U	< 1.9 U
Cyclohexane	NSL	µg/L	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--	< 0.18 U	--	2.3	< 1.3 U	< 3.1 U
Cymene	5	µg/L	--	--	--	--	< 0.97 U	< 0.97 U	--	--	--	--	--	--	--	**64**	**67**	--	--	--	--	--
Dibromochloromethane	50	µg/L	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 2.2 U	< 2.2 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 1 U	< 0.4 U	< 0.32 U	--	< 0.32 U	< 2.5 U	< 2.2 U
Dibromomethane	5	µg/L	--	--	--	--	< 3.5 U	< 3.5 U	--	--	--	--	--	--	--	< 1.5 U	< 0.58 U	--	--	--	--	--
Dichlorodifluoromethane	5	µg/L	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 1.9 U	< 1.9 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 1.1 U	< 0.44 U	< 0.68 U	--	< 0.68 U	< 1.7 UT	< 2.2 U
Diethyl Ether (Ethyl Ether)	NSL	µg/L	--	--	--	--	< 1.8 U	< 1.8 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethyl Tert-Butyl Ether	NSL	µg/L	--	--	--	--	< 1.5 U	< 1.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	5	µg/L	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 2.1 U	< 2.1 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	**130**	**130**	**14**	--	**120**	**120**	**70**
Hexachlorobutadiene	0.5	µg/L	--	--	--	--	< 4.6 U	< 4.6 U	--	--	--	--	--	--	--	< 2.4 U	< 0.96 U	--	--	--	--	--
Iodomethane (Methyl Iodide)	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.65 U	< 0.26 U	--	--	--	--	--
Isopropyl Ether	NSL	µg/L	--	--	--	--	< 1.3 U	< 1.3 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropylbenzene (Cumene)	5	µg/L	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 1.1 U	< 1.1 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	**88**	**83**	**8.9**	--	**65**	**66**	**36.8**
M,P-Xylene (Sum Of Isomers)	5	µg/L	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--	--	--	--	--	**472**
Methyl Acetate	NSL	µg/L	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 4.5 U	< 4.5 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	--	--	< 0.5 U	--	< 0.5 U	< 5.8 U	< 3.2 U
Methyl Ethyl Ketone (2-Butanone)	50	µg/L	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 16 U	< 16 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 12 UH	< 4.6 R	< 1.3 U	--	< 1.3 U	< 26 U	< 11 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NSL	µg/L	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 13 U	< 13 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 5 U	< 2 U	< 2.1 U	--	< 2.1 U	< 8.1 U	< 19 U
Methylcyclohexane	NSL	µg/L	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 2.4 U	< 2.4 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	1.8	< 0.60 U	--	--	1.3	--	8.3	9.8 J	8.2 J
Methylene Chloride	5	µg/L	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 2.3 U	< 2.3 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 0.9 U	< 0.36 U	< 0.44 U	--	< 0.44 U	**10 J**	< 4.0 U
M-P-Xylene	5	µg/L	--	--	--	--	< 4.6 U	< 4.6 U	--	--	--	--	--	--	--	**750**	**710**	--	--	--	--	--
Naphthalene	10	µg/L	--	--	--	--	< 2.4 U	< 2.4 U	--	--	--	--	--	--	--	**150**	**76 J**	--	--	--	--	--
N-Butylbenzene	5	µg/L	--	--	--	--	< 1.5 U	< 1.5 U	--	--	--	--	--	--	--	**31**	**48 J**	--	--	--	--	--
N-Propylbenzene	5	µg/L	--	--	--	--	< 0.86 U	< 0.86 U	--	--	--	--	--	--	--	**210**	**200**	--	--	--	--	--
O-Xylene (1,2-Dimethylbenzene)	5	µg/L	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 2.3 U	< 2.3 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	**570**	**520**	--	--	--	--	**343**
Sec-Butylbenzene	5	µg/L	--	--	--	--	< 1.1 U	< 1.1 U	--	--	--	--	--	--	--	**52**	**47**	--	--	--	--	--
Styrene	5	µg/L	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 1.1 U	< 1.1 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.6 U	< 0.24 U	< 0.73 U	--	< 0.73 U	< 2.8 U	< 1.9 U
T-Butylbenzene	5	µg/L	--	--	--	--	3.4 JD	2.1 JD	--	--	--	--	--	--	--	**16**	**16**	--	--	--	--	--
Tert-Butyl Alcohol	NSL	µg/L	--	--	--	--	< 47 U	< 47 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tert-Butyl Methyl Ether	10	µg/L	< 0.51 U	< 0.51 U	1.2	0.89 J	3.4 JD	3.7 JD	1.1	1	< 0.51 U	3.4	2.8	< 0.51 U	4.4	**17**	**19**	1.2	--	5.9	< 1.7 U	4.6
Tetrachloroethylene (PCE)	5	µg/L	**29.9**	**16.9**	2.9	1.9	**74 D**	**21 D**	**28.9**	**30**	**174**	**22.5**	**24.7**	**49.1**	**15.2**	1.1 J	1.3 J	< 0.36 U	--	1.3	< 1.4 U	< 2.2 U
Tetrahydrofuran	NSL	µg/L	--	--	--	--	19 JD	< 4.9 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	5	µg/L	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 2.2 U	< 2.2 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	**95**	**84**	**8.7**	--	**79**	**58**	**29.3**
Trans-1,2-Dichloroethene	5	µg/L	1.7	2.9	1.5	1.1	< 1.7 U	< 1.7 U	1.4	1.5	4.4	3.8	2.2	1.4	1.0	3.5 J	3.5	< 0.9 U	--	2.8	< 2.3 U	< 2.1 U
Trans-1,3-Dichloropropene	0.4	µg/L	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 1.7 U	< 1.7 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 1.2 U	< 0.48 U	< 0.37 U	--	< 0.37 U	< 1.7 U	< 1.7 U
Trans-1,4-Dichloro-2-Butene	5	µg/L	--	--	--	--	< 16 U	< 16 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethylene (TCE)	5	µg/L	**50.8**	**23.5**	**9.0**	**8.1**	**91 D**	**23 D**	**27.3**	**27.3**	**133**	**30.0**	**29.3**	**44.5**	**20.0**	< 0.45 U	< 0.18 U	< 0.46 U	--	0.55 J	< 2 U	< 2.1 U
Trichlorofluoromethane	5	µg/L	< 0.40 U	< 0.40 U	< 0.40 UJ	< 0.40 U	< 1.8 U	< 1.8 U	< 0.40 U	< 0.40 U	< 0.40 U	< 0.40 U	< 0.40 U	< 0.40 UJ	< 0.40 U	< 0.75 U	< 0.3 U	< 0.88 U	--	< 0.88 U	< 2.1 UT	< 1.6 U
Vinyl Acetate	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.9 U	< 0.76 U	--	--	--	--	--
Vinyl Chloride	2	µg/L	1.1	1.3	**2.2**	1.8	**28 D**	**55 D**	**20**	**19.9**	**4.3**	**26.1**	**25.5**	**10.0**	**38.7**	**48**	**38**	**3**	--	**25**	**13**	**9.2**
Xylenes	5	µg/L	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	--	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	**1300**	**1200**	**120**	--	**1200**	**1100**	**815**
Xylenes, Total	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	1300	1200	120	--	1200	1100	--
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)																						
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	NSL	ng/L	< 1.7 U	--	--	--	--	--	< 1.6 U	< 1.7 U	< 1.8 U	--	--	--	--	--	--	--	--	--	--	< 1.7 U
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	NSL	ng/L	< 1.4 U	--	--	--	--	--	< 1.3 U	< 1.3 U	< 1.5 U	--	--	--	--	--	--	--	--	--	--	< 1.4 U
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	NSL	ng/L	< 2.2 U	--	--	--	--	--	< 2.0 U	< 2.1 U	< 2.3 U	--	--	--	--	--	--	--	--	--	--	< 2.1 U
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	NSL	ng/L	< 0.87 U	--	--	--	--	--	< 0.83 U	< 0.85 U	< 0.91 U	--	--	--	--	--	--	--	--	--	--	< 0.85 U
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	NSL	ng/L	< 6.8 U	--	--	--	--	--	< 6.5 U	< 6.6 U	< 7.1 U	--	--	--	--	--	--	--	--	--	--	10.5 J
3-Perfluoroheptyl propanoic acid (7:3FTCA)	NSL	ng/L	< 5.9 U	--	--	--	--	--	< 5.6 U	< 5.7 U	< 6.2 U	--	--	--	--	--	--	--	--	--	--	< 5.8 U
3-Perfluoropropyl propanoic acid (3:3 FTCA)	NSL	ng/L	< 2.3 U	--	--	--	--	--	< 2.2 U	< 2.2 U	< 2.4 U	--	--	--	--	--	--	--	--	--	--	< 2.3 U
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NSL	ng/L	< 1.2 U	--	--	--	--	--	< 1.1 U	< 1.1 U	< 1.2 U	--	--	--	--	--	--	--	--	--	--	< 1.1 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	NSL	ng/L	< 2.3 U	--	--	--	--	--	< 2.2 U	< 2.3 U	< 2.4 U	--	--	--	--	--	--	--	--	--	--	< 2.3 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NSL	ng/L	< 1.7 U	--	--	--	--	--	< 1.6 U	< 1.7 U	< 1.8 U	--	--	--	--	--	--	--	--	--	--	< 1.7 U
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	NSL	ng/L	< 0.51 U	--	--	--	--	--	< 0.48 U	< 0.49 U	< 0.53 U	--	--	--	--	--	--	--	--	--	--	< 0.49 U
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NSL	ng/L	< 0.87 U	--	--	--	--	--	2.5	2	< 0.91 U	--	--	--	--	--	--	--	--	--	--	27.5
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	NSL	ng/L	< 3.6 U	--	--	--	--	--	< 3.4 U	< 3.5 U	< 3.8 U	--	--	--	--	--	--	--	--	--	--	54.5
N-methyl perfluorooctanesulfonamide (NMeFOSA)	NSL	ng/L	< 0.61 U	--	--	--	--	--	< 0.58 U	< 0.59 U	< 0.64 U	--	--	--	--	--	--	--	--	--	--	< 0.60 U
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NSL	ng/L	1.8 J	--	--	--	--	--	3.4	2.6	0.68 J	--	--	--	--	--	--	--	--	--	--	27.2
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	NSL	ng/L	< 2.7 U	--	--	--	--	--	< 2.5 U	< 2.6 U	< 2.8 U	--	--	--	--	--	--	--	--	--	--	45.3
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NSL	ng/L	< 1.2 U	--	--	--	--	--	< 1.2 U	< 1.2 U	< 1.3 U	--	--	--	--	--	--	--	--	--	--	< 1.2 U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NSL	ng/L	< 0.26 U	--	--	--	--	--	< 0.25 U	< 0.25 U	< 0.27 U	--	--	--	--	--	--	--	--	--	--	< 0.25 U
Perfluoro-3-methoxypropanoic acid (PFMPA)	NSL	ng/L	< 0.29 U	--	--	--	--	--	< 0.27 U	< 0.28 U	< 0.30 U	--	--	--	--	--	--	--	--	--	--	< 0.28 U
Perfluoro-4-methoxybutanoic acid (PFMBA)	NSL	ng/L	< 0.54 U	--	--	--	--	--	< 0.51 U	< 0.52 U	< 0.56 U	--	--	--	--	--	--	--	--	--	--	< 0.52 U
Perfluorobutanesulfonic acid (PFBS)	NSL	ng/L	3.9	--	--	--	--	--	7.1	7.3	2.3	--	--	--	--	--	--	--	--	--	13	7
Perfluorobutanoic Acid	NSL	ng/L	7.5 J	--	--	--	--	--	14.3	12.6	5.7 J	--	--	--	--	--	--	--	--	--	190	< 0.87 U
Perfluorodecanesulfonic acid (PFDS)	NSL	ng/L	< 1.0 U	--	--	--	--	--	< 0.99 U	< 1.0 U	< 1.1 U	--	--	--	--	--	--	--	--	--	< 0.33 U	< 1.0 U
Perfluorodecanoic acid (PFDA)	NSL	ng/L	0.89 J	--	--	--	--	--	1.4 J	1.4 J	0.74 J	--	--	--	--	--	--	--	--	--	6.7	6.5
Perfluorododecanesulfonic acid (PFDoS)	NSL	ng/L	< 0.38 U	--	--	--	--	--	< 0.36 U	< 0.37 U	< 0.40 U	--	--	--	--	--	--	--	--	--	--	< 0.37 U
Perfluorododecanoic acid (PFDoA)	NSL	ng/L	< 0.74 U	--	--	--	--	--	< 0.70 U	< 0.72 U	< 0.77 U	--	--	--	--	--	--	--	--	--	< 0.57 U	< 0.72 U
Perfluoroheptanesulfonic acid (PFHpS)	NSL	ng/L	< 0.94 U	--	--	--	--	--	1.6 J	1 J	< 0.98 U	--	--	--	--	--	--	--	--	--	13	11.1
Perfluoroheptanoic acid (PFHpA)	NSL	ng/L	5.1	--	--	--	--	--	8.2	8.9	3.9	--	--	--	--	--	--	--	--	--	13	9.5
Perfluorohexanesulfonic acid (PFHxS)	NSL	ng/L	5	--	--	--	--	--	5.9	6.9	4.9	--	--	--	--	--	--	--	--	--	20 B	17.5
Perfluorohexanoic acid (PFHxA)	NSL	ng/L	6.9	--	--	--	--	--	11.8	12	4.8	--	--	--	--	--	--	--	--	--	13	11.3
Perfluorononanesulfonic Acid (PFNS)	NSL	ng/L	< 1.4 U	--	--	--	--	--	< 1.3 U	< 1.3 U	< 1.4 U	--	--	--	--	--	--	--	--	--	--	< 1.3 U
Perfluorononanoic acid (PFNA)	NSL	ng/L	2.7	--	--	--	--	--	3.8	3.3	1.5 J	--	--	--	--	--	--	--	--	--	16	15
Perfluorooctane Sulfonamide (PFOSA)	NSL	ng/L	1.4 J	--	--	--	--	--	1.3 J	0.98 J	< 0.69 U	--	--	--	--	--	--	--	--	--	3.9	11
Perfluorooctanesulfonic acid (PFOS)	2.7	ng/L	**73.4**	--	--	--	--	--	**111**	**108**	**50.7**	--	--	--	--	--	--	--	--	--	**1700**	**1770**
Perfluorooctanoic acid (PFOA)	6.7	ng/L	**27.7**	--	--	--	--	--	**33.5**	**32.3**	**20.6**	--	--	--	--	--	--	--	--	--	**93**	**84.1**
Perfluoropentanesulfonic Acid (PFPeS)	NSL	ng/L	< 0.97 U	--	--	--	--	--	2	2	< 1.0 U	--	--	--	--	--	--	--	--	--	--	< 0.94 U
Perfluoropentanoic Acid (PFPeA)	NSL	ng/L	6.9	--	--	--	--	--	11.9	14.6	5.4	--	--	--	--	--	--	--	--	--	< 0.51 U	233
Perfluorotetradecanoic acid (PFTeDA)	NSL	ng/L	< 0.73 U	--	--	--	--	--	< 0.69 U	< 0.71 U	< 0.76 U	--	--	--	--	--	--	--	--	--	< 0.3 U	< 0.71 U
Perfluorotridecanoic Acid (PFTriA/PFTrDA)	NSL	ng/L	< 0.76 U	--	--	--	--	--	< 0.72 U	< 0.73 U	< 0.79 U	--	--	--	--	--	--	--	--	--	< 1.3 U	< 0.74 U
Perfluoroundecanoic Acid (PFUnA)	NSL	ng/L	< 0.53 U	--	--	--	--	--	0.63 J	< 0.51 U	< 0.55 U	--	--	--	--	--	--	--	--	--	< 1.1 U	8.6

Notes:

[1]NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)

--' = Not analyzed
µg/L = Mircogram(s) per liter
ng/L - Nanogram(s) per liter
B = Analyte detected in blank, as well as sample
D = Compound in analysis has been diluted
J = Concentration is estimated
NSL = No screening level available
U = Analyte not detected
R = Reported result unusable
VOCs = Volatile organic compounds
PFAS = Per- and polyfluoroalkyl substances
Concentrations exceeding the screening level are bolded and shaded gray

Historical Groundwater Analytical Results (VOCs and PFAS)

Location			MW-08	MW-08	MW-08	MW-08	MW-08	MW-08	MW-11	MW-11	MW-11	MW-11
Sample Name			MW-8-03182024	MW8-FD1-03182024	130054-MW-08-06242024	130054-MW-08-09182024	130054-DUP01-09182024	130054-MW-08-20241126	MW-11	MW-11_03082011	MW-11_06222011	MW-W
Parent Sample Name				MW-8-20240318			130054-MW-08-20240918					MW-11_06222011
Sample Date			3/18/2024	3/18/2024	6/24/2024	9/18/2024	9/18/2024	11/26/2024	3/8/2011	3/8/2011	6/22/2011	6/22/2011
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)												
1,1,1,2-Tetrachloroethane	5	µg/L	--	--	--	--	--	--	--	< 100 U	< 100 U	< 100 U
1,1,1-Trichloroethane (TCA)	5	µg/L	< 2.7 U	< 1.3 U	< 2.1 U	< 2.7 U	< 2.7 U	< 0.54 U	--	< 100 U	< 100 U	< 100 U
1,1,2,2-Tetrachloroethane	5	µg/L	< 3.3 U	< 1.6 U	< 2.6 U	< 3.3 U	< 3.3 U	< 0.65 U	--	< 100 U	< 100 U	< 100 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	µg/L	< 2.9 U	< 1.5 U	< 2.3 U	< 2.9 U	< 2.9 U	< 0.58 U	--	--	--	--
1,1,2-Trichloroethane	1	µg/L	< 2.7 U	< 1.3 U	< 2.1 U	< 2.7 U	< 2.7 U	< 0.53 U	--	< 100 U	< 100 U	< 100 U
1,1-Dichloroethane	5	µg/L	< 2.8 U	< 1.4 U	< 2.3 U	< 2.8 U	< 2.8 U	< 0.57 U	--	< 100 U	< 100 U	< 100 U
1,1-Dichloroethene	5	µg/L	< 3.0 U	< 1.5 U	< 2.4 U	< 3.0 U	< 3.0 U	< 0.59 U	--	< 100 U	< 100 U	< 100 U
1,1-Dichloropropene	5	µg/L	--	--	--	--	--	--	--	< 100 U	< 100 U	< 100 U
1,2,3-Trichlorobenzene	5	µg/L	< 2.5 U	< 1.3 U	< 2.0 U	< 2.5 U	< 2.5 U	< 0.50 U	--	< 100 U	< 100 U	< 100 U
1,2,3-Trichloropropane	0.04	µg/L	--	--	--	--	--	--	--	< 100 U	< 100 U	< 100 U
1,2,4-Trichlorobenzene	5	µg/L	< 2.5 U	< 1.3 U	< 2.0 U	< 2.5 U	< 2.5 U	< 0.50 U	--	< 100 U	< 100 U	< 100 U
1,2,4-Trimethylbenzene	5	µg/L	--	--	--	--	--	--	**1500**	**1500**	**1100**	**1100**
1,2-Dibromo-3-Chloropropane	0.04	µg/L	< 2.6 U	< 1.3 U	< 2.1 U	< 2.6 U	< 2.6 U	< 0.53 U	--	< 100 U	< 100 U	< 100 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	µg/L	< 2.4 U	< 1.2 U	< 1.9 U	< 2.4 U	< 2.4 U	< 0.48 U	--	< 100 U	< 100 U	< 100 U
1,2-Dichlorobenzene	3	µg/L	< 2.7 U	< 1.3 U	< 2.1 U	< 2.7 U	< 2.7 U	< 0.53 U	--	< 100 U	< 100 U	< 100 U
1,2-Dichloroethane	0.6	µg/L	< 3.0 U	< 1.5 U	< 2.4 U	< 3.0 U	< 3.0 U	< 0.60 U	--	< 100 U	< 100 U	< 100 U
1,2-Dichloropropane	1	µg/L	< 2.5 U	< 1.3 U	< 2.0 U	< 2.5 U	< 2.5 U	< 0.51 U	--	< 100 U	< 100 U	< 100 U
1,3,5-Trichlorobenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene (Mesitylene)	5	µg/L	--	--	--	--	--	--	**640**	**640**	**470**	**450**
1,3-Dichlorobenzene	3	µg/L	< 2.7 U	< 1.4 U	< 2.2 U	< 2.7 U	< 2.7 U	< 0.54 U	--	< 100 U	< 100 U	< 100 U
1,3-Dichloropropane	5	µg/L	--	--	--	--	--	--	--	< 100 U	< 100 U	< 100 U
1,4-Dichlorobenzene	3	µg/L	< 2.5 U	< 1.3 U	< 2.0 U	< 2.5 U	< 2.5 U	< 0.51 U	--	< 100 U	< 100 U	< 100 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--
2,2-Dichloropropane	5	µg/L	--	--	--	--	--	--	--	< 100 U	< 100 U	< 100 U
2-Chlorotoluene	NSL	µg/L	--	--	--	--	--	--	--	< 100 U	< 100 U	< 100 U
2-Hexanone	50	µg/L	< 24 U	< 12 U	< 19 U	< 24 U	< 24 U	< 4.8 U	--	< 200 U	< 200 U	< 200 U
2-Methoxy-2-Methylbutane	NSL	µg/L	--	--	--	--	--	--	--	--	--	--
4-Chlorotoluene	5	µg/L	--	--	--	--	--	--	--	< 100 U	< 100 U	< 100 U
Acetone	50	µg/L	< 15 U	< 7.6 U	< 12 U	< 15 U	< 15 U	< 3.1 U	--	< 200 U	< 200 U	< 200 U
Acrylonitrile	5	µg/L	--	--	--	--	--	--	--	--	--	--
Benzene	1	µg/L	< 2.1 U	< 1.1 U	< 1.7 U	< 2.1 U	< 2.1 U	< 0.43 U	--	**19 J**	**26 J**	**29 J**
Bromobenzene	5	µg/L	--	--	--	--	--	--	--	< 100 U	< 100 U	< 100 U
Bromochloromethane	5	µg/L	< 2.4 U	< 1.2 U	< 1.9 U	< 2.4 U	< 2.4 U	< 0.48 U	--	< 100 U	< 100 U	< 100 U
Bromodichloromethane	50	µg/L	< 2.3 U	< 1.1 U	< 1.8 U	< 2.3 U	< 2.3 U	< 0.45 U	--	< 100 U	< 100 U	< 100 U
Bromoform	50	µg/L	< 3.2 U	< 1.6 U	< 2.5 U	< 3.2 U	< 3.2 U	< 0.63 U	--	< 100 U	< 100 U	< 100 U
Bromomethane	5	µg/L	< 8.2 U	< 4.1 U	< 6.6 U	< 8.2 U	< 8.2 U	< 1.6 U	--	< 100 U	< 100 U	< 100 U
Carbon Disulfide	60	µg/L	< 9.0 U	< 4.5 U	< 7.2 U	< 9.0 U	< 9.0 U	< 1.8 U	--	< 100 U	< 100 U	< 100 U
Carbon Tetrachloride	5	µg/L	< 2.8 U	< 1.4 U	< 2.2 U	< 2.8 U	< 2.8 U	< 0.55 U	--	< 100 U	< 100 U	< 100 U
Chlorobenzene	5	µg/L	< 2.8 U	< 1.4 U	< 2.2 U	< 2.8 U	< 2.8 U	< 0.56 U	--	< 100 U	< 100 U	< 100 U
Chloroethane	5	µg/L	< 3.6 U	< 1.8 U	< 2.9 U	< 3.6 UJ	< 3.6 UJ	< 0.73 U	--	< 100 U	< 100 U	< 100 U
Chloroform	7	µg/L	< 2.5 U	< 1.3 U	< 2.0 U	< 2.5 U	< 2.5 U	< 0.50 U	--	< 100 U	< 100 U	< 100 U
Chloromethane (Methyl Chloride)	5	µg/L	< 3.8 U	< 1.9 U	< 3.0 U	< 3.8 U	< 3.8 U	< 0.76 U	--	< 100 U	< 100 U	< 100 U
Cis -1,2-Dichloroethylene	5	µg/L	**76.6**	**72.1**	**63.8**	**68.8**	**68.1**	2.1	**2300**	**2300**	**1900 B**	**1900 B**
Cis -1,3-Dichloropropene	0.4	µg/L	< 2.4 U	< 1.2 U	< 1.9 U	< 2.4 U	< 2.4 U	< 0.47 U	--	< 100 U	< 100 U	< 100 U
Cyclohexane	NSL	µg/L	< 3.9 U	< 2.0 U	< 3.1 U	< 3.9 U	< 3.9 U	< 0.78 U	--	--	--	--
Cymene	5	µg/L	--	--	--	--	--	--	--	**82 J**	**48 J**	--
Dibromochloromethane	50	µg/L	< 2.8 U	< 1.4 U	< 2.2 U	< 2.8 U	< 2.8 U	< 0.56 U	--	< 100 U	< 100 U	< 100 U
Dibromomethane	5	µg/L	--	--	--	--	--	--	--	< 100 U	< 100 U	< 100 U
Dichlorodifluoromethane	5	µg/L	< 2.8 U	< 1.4 U	< 2.2 U	< 2.8 U	< 2.8 U	< 0.56 U	--	< 100 U	< 100 U	< 100 U
Diethyl Ether (Ethyl Ether)	NSL	µg/L	--	--	--	--	--	--	--	--	--	--
Ethyl Tert-Butyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	5	µg/L	**69.1**	**64.2**	**79.2**	**70.7**	**61.0**	2.1	--	**76 J**	**63 J**	**67 J**
Hexachlorobutadiene	0.5	µg/L	--	--	--	--	--	--	--	< 100 U	< 100 U	< 100 U
Iodomethane (Methyl Iodide)	5	µg/L	--	--	--	--	--	--	--	< 200 U	< 200 U	< 200 U
Isopropyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--
Isopropylbenzene (Cumene)	5	µg/L	**39.2**	**38.8**	**45.2**	**41.1**	**35.7**	1.6	--	**45 J**	**33 J**	**32 J**
M,P-Xylene (Sum Of Isomers)	5	µg/L	**535**	**529**	**537**	**547**	**523**	**15.9**	--	--	--	--
Methyl Acetate	NSL	µg/L	< 4.0 U	< 2.0 U	< 3.2 U	< 4.0 U	< 4.0 U	< 0.80 U	--	--	--	--
Methyl Ethyl Ketone (2-Butanone)	50	µg/L	< 14 U	< 6.8 U	< 11 U	< 14 U	< 14 U	< 2.7 U	--	< 200 U	< 200 U	< 200 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NSL	µg/L	< 24 U	< 12 U	< 19 U	< 24 U	< 24 U	< 4.9 U	--	< 200 U	< 200 U	< 200 U
Methylcyclohexane	NSL	µg/L	9.3 J	8.3 J	10.3 J	9.8	10.4	< 0.60 U	--	--	--	--
Methylene Chloride	5	µg/L	< 5.0 U	< 2.5 U	< 4.0 U	< 5.0 U	< 5.0 U	< 1.0 U	--	**37 JB**	**40 JB**	**43 JB**
M-P-Xylene	5	µg/L	--	--	--	--	--	--	**190**	**190**	**150**	**150**
Naphthalene	10	µg/L	--	--	--	--	--	--	**100**	**100**	**98 J**	**120**
N-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	**26 J**	**17 J**	**14 J**
N-Propylbenzene	5	µg/L	--	--	--	--	--	--	**100**	**100**	**70 J**	**68 J**
O-Xylene (1,2-Dimethylbenzene)	5	µg/L	**397**	**399**	**377**	**415**	**385**	**12.3**	**200**	**200**	**180**	**180**
Sec-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	**54 J**	**31 J**	**29 J**
Styrene	5	µg/L	< 2.4 U	< 1.2 U	< 1.9 U	< 2.4 U	< 2.4 U	< 0.49 U	--	< 100 U	< 100 U	< 100 U
T-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	**60 J**	**33 J**	**36 J**
Tert-Butyl Alcohol	NSL	µg/L	--	--	--	--	--	--	--	--	--	--
Tert-Butyl Methyl Ether	10	µg/L	4.4 J	4.4	2.6 J	3.9	3.9	< 0.51 U	**410**	**410**	**390**	**390**
Tetrachloroethylene (PCE)	5	µg/L	< 2.8 U	< 1.4 U	< 2.2 U	< 2.8 U	< 2.8 U	< 0.56 U	--	< 100 U	**23 JB**	**19 JB**
Tetrahydrofuran	NSL	µg/L	--	--	--	--	--	--	--	--	--	--
Toluene	5	µg/L	**29.6**	**28**	**30.5**	**30.1**	**29.5**	0.63 J	--	**60 J**	**47 J**	**47 J**
Trans -1,2-Dichloroethene	5	µg/L	< 2.7 U	1.9 J	2.3 J	< 2.7 U	< 2.7 U	< 0.54 U	--	**23 J**	**15 J**	**17 J**
Trans -1,3-Dichloropropene	0.4	µg/L	< 2.2 U	< 1.1 U	< 1.7 U	< 2.2 U	< 2.2 U	< 0.43 U	--	< 100 U	< 100 U	< 100 U
Trans -1,4-Dichloro-2-Butene	5	µg/L	--	--	--	--	--	--	--	--	--	--
Trichloroethylene (TCE)	5	µg/L	< 2.6 U	< 1.3 U	< 2.1 U	< 2.6 U	< 2.6 U	< 0.53 U	--	< 100 U	< 100 U	< 100 U
Trichlorofluoromethane	5	µg/L	< 2.0 U	< 1.0 U	< 1.6 U	< 2.0 U	< 2.0 UJ	< 0.40 U	--	< 100 U	< 100 U	< 100 U
Vinyl Acetate	NSL	µg/L	--	--	--	--	--	--	--	< 100 U	< 100 U	< 100 U
Vinyl Chloride	2	µg/L	**11.4**	**11.1**	**6.1**	**9.7**	**8.6**	< 0.52 U	**1300**	**1300**	**640**	**670**
Xylenes	5	µg/L	**932**	**928**	**914**	**962**	**908**	**28.2**	**390**	**390**	**330**	**330**
Xylenes, Total	NSL	µg/L	--	--	--	--	--	--	390	390	330	330
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)												
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	NSL	ng/L	< 1.9 U	< 1.6 U	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	NSL	ng/L	< 1.6 U	< 1.3 U	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	NSL	ng/L	< 2.4 U	< 2.0 U	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	NSL	ng/L	< 0.98 U	< 0.81 U	--	--	--	--	--	--	--	--
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	NSL	ng/L	8.8 J	8.1 J	--	--	--	--	--	--	--	--
3-Perfluoroheptyl propanoic acid (7:3FTCA)	NSL	ng/L	< 6.7 U	< 5.5 U	--	--	--	--	--	--	--	--
3-Perfluoropropyl propanoic acid (3:3 FTCA)	NSL	ng/L	< 2.6 U	< 2.2 U	--	--	--	--	--	--	--	--
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NSL	ng/L	< 1.3 U	< 1.1 U	--	--	--	--	--	--	--	--
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	NSL	ng/L	< 2.6 U	< 2.2 U	--	--	--	--	--	--	--	--
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NSL	ng/L	< 1.9 U	< 1.6 U	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	NSL	ng/L	< 0.57 U	< 0.47 U	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NSL	ng/L	28	26.4	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	NSL	ng/L	23.1	20.7	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamide (NMeFOSA)	NSL	ng/L	< 0.69 U	< 0.57 U	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NSL	ng/L	27.3	26.8	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	NSL	ng/L	26	22.7	--	--	--	--	--	--	--	--
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NSL	ng/L	< 1.4 U	< 1.1 U	--	--	--	--	--	--	--	--
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NSL	ng/L	< 0.29 U	< 0.24 U	--	--	--	--	--	--	--	--
Perfluoro-3-methoxypropanoic acid (PFMPA)	NSL	ng/L	< 0.32 U	< 0.27 U	--	--	--	--	--	--	--	--
Perfluoro-4-methoxybutanoic acid (PFMBA)	NSL	ng/L	< 0.61 U	< 0.50 U	--	--	--	--	--	--	--	--
Perfluorobutanesulfonic acid (PFBS)	NSL	ng/L	6.8	5.8	--	--	--	--	--	--	--	--
Perfluorobutanoic Acid	NSL	ng/L	50.8	< 0.83 U	--	--	--	--	--	--	--	--
Perfluorodecanesulfonic acid (PFDS)	NSL	ng/L	< 1.2 U	< 0.97 U	--	--	--	--	--	--	--	--
Perfluorodecanoic acid (PFDA)	NSL	ng/L	4.9	4.4	--	--	--	--	--	--	--	--
Perfluorododecanesulfonic acid (PFDoS)	NSL	ng/L	< 0.43 U	< 0.36 U	--	--	--	--	--	--	--	--
Perfluorododecanoic acid (PFDoA)	NSL	ng/L	< 0.83 U	< 0.69 U	--	--	--	--	--	--	--	--
Perfluoroheptanesulfonic acid (PFHpS)	NSL	ng/L	15.1	13.1	--	--	--	--	--	--	--	--
Perfluoroheptanoic acid (PFHpA)	NSL	ng/L	9.7	9.1	--	--	--	--	--	--	--	--
Perfluorohexanesulfonic acid (PFHxS)	NSL	ng/L	26	19	--	--	--	--	--	--	--	--
Perfluorohexanoic acid (PFHxA)	NSL	ng/L	11.9	11.7	--	--	--	--	--	--	--	--
Perfluorononanesulfonic Acid (PFNS)	NSL	ng/L	< 1.6 U	2.5	--	--	--	--	--	--	--	--
Perfluorononanoic acid (PFNA)	NSL	ng/L	16.9	16.2	--	--	--	--	--	--	--	--
Perfluorooctane Sulfonamide (PFOSA)	NSL	ng/L	11.5	10.3	--	--	--	--	--	--	--	--
Perfluorooctanesulfonic acid (PFOS)	2.7	ng/L	**1650**	**1260**	--	--	--	--	--	--	--	--
Perfluorooctanoic acid (PFOA)	6.7	ng/L	**84.6**	**81.2**	--	--	--	--	--	--	--	--
Perfluoropentanesulfonic Acid (PFPeS)	NSL	ng/L	< 1.1 U	< 0.90 U	--	--	--	--	--	--	--	--
Perfluoropentanoic Acid (PFPeA)	NSL	ng/L	< 0.79 U	< 0.65 U	--	--	--	--	--	--	--	--
Perfluorotetradecanoic acid (PFTeDA)	NSL	ng/L	< 0.82 U	< 0.68 U	--	--	--	--	--	--	--	--
Perfluorotridecanoic Acid (PFTriA/PFTrDA)	NSL	ng/L	< 0.85 U	< 0.71 U	--	--	--	--	--	--	--	--
Perfluoroundecanoic Acid (PFUnA)	NSL	ng/L	< 0.60 U	7.5	--	--	--	--	--	--	--	--

Location	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11
Sample Name	MW-11_09162011	MW-11_04022012	MW-11	MW-11-20130425	MW-W	MW-11	MW-11-040518	130054-MW-11-12052023	MW-11-20240320	130054-MW-11-06242024
Parent Sample Name					MW-11-20130425					
Sample Date	9/16/2011	4/2/2012	11/2/2012	4/25/2013	4/25/2013	11/6/2017	4/5/2018	12/5/2023	3/20/2024	6/24/2024
Analyte	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)										
1,1,1,2-Tetrachloroethane	< 0.93 U	< 0.1 U	< 0.1 U	< 0.1 U	< 0.1 U	--	--	--	--	--
1,1,1-Trichloroethane (TCA)	< 0.69 U	< 0.06 U	< 0.06 U	< 0.06 U	< 0.06 U	< 0.95 U	--	< 0.54 U	< 0.54 U	< 0.54 U
1,1,2,2-Tetrachloroethane	< 0.81 U	< 0.16 U	< 0.16 U	< 0.16 U	< 0.16 U	< 0.95 U	--	< 0.65 U	< 0.65 U	< 0.65 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	--	--	--	--	--	< 0.75 UT	--	< 0.58 U	< 0.58 U	< 0.58 U
1,1,2-Trichloroethane	< 0.65 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.95 U	--	< 0.53 U	< 0.53 U	< 0.53 U
1,1-Dichloroethane	< 1 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 U	< 1.2 U	--	< 0.57 U	< 0.57 U	< 0.57 U
1,1-Dichloroethene	< 0.83 U	1	0.75 J	1.3	1.3	< 1.3 U	--	< 0.59 U	< 0.59 U	< 0.59 U
1,1-Dichloropropene	< 0.82 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.12 U	--	--	--	--	--
1,2,3-Trichlorobenzene	< 0.88 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	--	--	< 0.50 U	< 0.50 U	< 0.50 U
1,2,3-Trichloropropane	< 1.5 U	< 0.42 U	**0.83 J**	< 0.42 U	< 0.42 U	--	--	--	--	--
1,2,4-Trichlorobenzene	< 0.72 U	< 0.34 U	< 0.34 U	< 0.34 U	< 0.34 U	< 1 U	--	< 0.50 U	< 0.50 U	< 0.50 U
1,2,4-Trimethylbenzene	**790**	**980**	**740**	**850**	**950**	--	--	--	--	--
1,2-Dibromo-3-Chloropropane	< 1.2 U	< 0.4 U	< 0.4 U	< 0.4 U	< 0.4 U	< 4.7 U	--	< 0.53 U	< 0.53 U	< 0.53 U
1,2-Dibromoethane (Ethylene Dibromide)	< 0.52 U	< 0.28 U	< 0.28 U	< 0.28 U	< 0.28 U	< 1.1 U	--	< 0.48 U	< 0.48 U	< 0.48 U
1,2-Dichlorobenzene	< 0.22 U	< 0.21 U	< 0.21 U	< 0.21 U	0.28 J	< 0.95 U	--	< 0.53 U	< 0.53 U	< 0.53 U
1,2-Dichloroethane	< 0.72 U	< 0.19 U	< 0.19 U	< 0.19 UJ	< 0.19 UJ	< 1 U	--	< 0.60 U	< 0.60 U	< 0.60 U
1,2-Dichloropropane	< 0.71 U	< 0.09 U	< 0.09 U	< 0.09 U	< 0.09 U	< 1.3 U	--	< 0.51 U	< 0.51 U	< 0.51 U
1,3,5-Trichlorobenzene	--	--	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene (Mesitylene)	--	**460**	**220**	**490**	**490**	--	--	--	--	--
1,3-Dichlorobenzene	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.9 U	--	< 0.54 U	< 0.54 U	< 0.54 U
1,3-Dichloropropane	< 0.69 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.19 U	--	--	--	--	--
1,4-Dichlorobenzene	< 0.59 U	< 0.23 U	< 0.23 U	0.3 J	0.34 J	< 0.85 U	--	< 0.51 U	< 0.51 U	< 0.51 U
1,4-Dioxane (P-Dioxane)	--	--	--	--	--	--	--	--	--	--
2,2-Dichloropropane	< 0.79 U	< 0.16 U	< 0.16 U	< 0.16 U	< 0.16 U	--	--	--	--	--
2-Chlorotoluene	< 1.2 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	--	--	--	--	--
2-Hexanone	< 1.1 U	< 0.5 U	< 0.5 UH	< 0.5 U	< 0.5 U	< 6.4 U	--	< 4.8 U	< 4.8 U	< 4.8 U
2-Methoxy-2-Methylbutane	--	--	--	--	--	--	--	--	--	--
4-Chlorotoluene	< 0.8 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	--	--	--	--	--
Acetone	16	17	19	--	--	< 13 U	--	4.6 J	8 J	6.1 J
Acrylonitrile	--	--	--	--	--	--	--	--	--	--
Benzene	**29**	**29**	**36**	**37**	**36**	**21**	--	**9.7**	**3.6**	**8.2**
Bromobenzene	< 0.67 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 U	--	--	--	--	--
Bromochloromethane	< 0.77 U	< 0.27 U	< 0.27 U	< 0.27 U	< 0.27 U	--	--	< 0.48 U	< 0.48 U	< 0.48 U
Bromodichloromethane	< 0.48 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.85 U	--	< 0.45 U	< 0.45 U	< 0.45 U
Bromoform	< 0.46 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.19 U	< 1.5 U	--	< 0.63 U	< 0.63 U	< 0.63 U
Bromomethane	< 2.1 U	< 0.18 U	< 0.18 U	< 0.18 UJ	< 0.18 UJ	< 1.8 U	--	< 1.6 U	< 1.6 U	< 1.6 U
Carbon Disulfide	< 0.9 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 U	< 1.1 U	--	< 1.8 U	< 1.8 U	< 1.8 U
Carbon Tetrachloride	< 1.1 U	< 0.06 U	< 0.06 U	< 0.06 U	< 0.06 U	< 0.9 U	--	< 0.55 U	< 0.55 U	< 0.55 U
Chlorobenzene	< 0.72 U	< 0.11 U	< 0.11 U	0.12 J	0.17 J	< 0.9 U	--	< 0.56 U	< 0.56 U	< 0.56 U
Chloroethane	< 1.1 U	< 0.17 U	< 0.17 U	< 0.17 U	< 0.17 U	< 1.8 U	--	< 0.73 U	< 0.73 U	< 0.73 U
Chloroform	< 0.67 U	< 0.08 U	< 0.08 U	< 0.08 U	< 0.08 U	< 1.2 U	--	< 0.50 U	< 0.50 U	< 0.50 U
Chloromethane (Methyl Chloride)	< 1.1 U	< 0.1 U	< 0.1 U	< 0.1 U	< 0.1 U	< 1.8 U	--	< 0.76 U	< 0.76 U	< 0.76 U
Cis -1,2-Dichloroethylene	**1500**	**1900**	**1700**	**2100**	**2100**	**650**	--	**74.7**	**91**	**163**
Cis -1,3-Dichloropropene	< 0.28 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.85 U	--	< 0.47 U	< 0.47 U	< 0.47 U
Cyclohexane	--	--	--	--	--	< 0.65 U	--	< 0.78 U	< 0.78 U	< 0.78 U
Cymene	--	**41**	**13**	**52**	**51**	--	--	--	--	--
Dibromochloromethane	< 0.55 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 1.3 U	--	< 0.56 U	< 0.56 U	< 0.56 U
Dibromomethane	< 0.7 U	< 0.29 U	< 0.29 U	< 0.29 U	< 0.29 U	--	--	--	--	--
Dichlorodifluoromethane	< 1 U	< 0.22 U	< 0.22 U	< 0.22 U	< 0.22 U	< 0.85 U	--	< 0.56 U	< 0.56 U	< 0.56 U
Diethyl Ether (Ethyl Ether)	--	--	--	--	--	--	--	--	--	--
Ethyl Tert-Butyl Ether	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	**50**	**73**	**50**	**89**	**90**	**47**	--	**30.7**	**13.7**	**12.9**
Hexachlorobutadiene	< 1 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	--	--	--	--	--
Iodomethane (Methyl Iodide)	< 0.91 U	< 0.13 U	< 0.13 U	< 0.13 UJ	< 0.13 UJ	--	--	--	--	--
Isopropyl Ether	--	--	--	--	--	--	--	--	--	--
Isopropylbenzene (Cumene)	**29**	**32**	**18**	**41**	**42**	**15**	--	**13.1**	**6.2**	**5.9**
M,P-Xylene (Sum Of Isomers)	--	--	--	--	--	--	--	**59.2**	**30.7**	**26.9**
Methyl Acetate	--	--	--	--	--	< 2.9 U	--	< 0.80 U	< 0.80 U	< 0.80 U
Methyl Ethyl Ketone (2-Butanone)	< 1.1 U	< 2.3 U	< 2.3 UH	--	--	< 13 U	--	< 2.7 U	< 2.7 U	< 2.7 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	0.71 J	< 0.99 U	< 0.99 U	< 0.99 U	< 0.99 U	< 4.1 U	--	< 4.9 U	< 4.9 U	< 4.9 U
Methylcyclohexane	--	--	--	--	--	< 0.45 U	--	1 J	< 0.60 U	< 0.60 U
Methylene Chloride	< 0.78 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.18 U	< 5 U	--	< 1.0 U	< 1.0 U	< 1.0 U
M-P-Xylene	**120**	**160**	**110**	**200**	**210**	--	--	--	--	--
Naphthalene	**70**	**100**	**51**	**110**	**110**	--	--	--	--	--
N-Butylbenzene	**27**	**23**	< 0.14 U	**55**	**55**	--	--	--	--	--
N-Propylbenzene	**58**	**74**	**32**	**79**	**79**	--	--	--	--	--
O-Xylene (1,2-Dimethylbenzene)	**110 J**	**180**	**140**	**230**	**230**	--	--	**68.3**	**36.5**	**33.5**
Sec-Butylbenzene	**22**	**26**	< 0.18 U	**31**	**30**	--	--	--	--	--
Styrene	< 0.64 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.12 U	< 1.4 U	--	< 0.49 U	< 0.49 U	< 0.49 U
T-Butylbenzene	**22**	**38**	**15**	**43**	**42**	--	--	--	--	--
Tert-Butyl Alcohol	--	--	--	--	--	--	--	--	--	--
Tert-Butyl Methyl Ether	**410**	**320**	< 0.14 U	**200**	**200**	**63**	--	8.8	**17.1**	**28.5**
Tetrachloroethylene (PCE)	**14**	0.92 J	0.23 J	0.67 J	0.73 J	3.2 J	--	< 0.56 U	< 0.56 U	< 0.56 U
Tetrahydrofuran	--	--	--	--	--	--	--	--	--	--
Toluene	**36**	**47**	**41**	**65**	**65**	**36**	--	**15.4**	**6.3**	**7.8**
Trans -1,2-Dichloroethene	**14**	**20**	**14**	**23**	**24**	**9.6**	--	1.8	1.9	3.3
Trans -1,3-Dichloropropene	< 0.57 U	< 0.24 U	< 0.24 U	< 0.24 U	< 0.24 U	< 0.85 U	--	< 0.43 U	< 0.43 U	< 0.43 U
Trans -1,4-Dichloro-2-Butene	--	--	--	--	--	--	--	--	--	--
Trichloroethylene (TCE)	**7.3**	0.45 J	< 0.09 U	0.53 J	0.53 J	< 1 U	--	< 0.53 U	< 0.53 U	< 0.53 U
Trichlorofluoromethane	< 1.1 U	< 0.15 U	< 0.15 U	< 0.15 U	< 0.15 U	< 1.1 U	--	< 0.40 U	< 0.40 U	< 0.40 U
Vinyl Acetate	< 1.6 U	< 0.38 U	< 0.38 U	< 0.38 UJ	< 0.38 UJ	--	--	--	--	--
Vinyl Chloride	**250**	**600**	**460**	**640**	**690**	**370**	--	**41.4**	**47**	**55.2**
Xylenes	**270**	**350**	**250**	**430**	**440**	**210**	--	**128**	**67.2**	**60.4**
Xylenes, Total	270	350	250	430	440	210	--	--	--	--
1,4-Dioxane (P-Dioxane)	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)										
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	--	--	--	--	--	--	--	< 1.7 U	< 1.8 U	--
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	--	--	--	--	--	--	--	< 1.4 U	< 1.5 U	--
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	--	--	--	--	--	--	--	< 2.1 U	< 2.3 U	--
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	--	--	--	--	--	--	--	< 0.86 U	< 0.91 U	--
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	--	--	--	--	--	--	--	< 6.7 U	11.7 J	--
3-Perfluoroheptyl propanoic acid (7:3FTCA)	--	--	--	--	--	--	--	< 5.8 U	< 6.2 U	--
3-Perfluoropropyl propanoic acid (3:3 FTCA)	--	--	--	--	--	--	--	< 2.3 U	< 2.4 U	--
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	--	--	--	--	--	--	--	< 1.2 U	< 1.2 U	--
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	--	--	--	--	--	--	--	< 2.3 U	< 2.4 U	--
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	--	--	--	--	--	--	< 1.7 U	< 1.8 U	--
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	--	--	--	--	--	--	--	< 0.50 U	< 0.53 U	--
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	--	--	--	--	--	--	--	4.1	1.5 J	--
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	--	--	--	--	--	--	--	< 3.5 U	< 3.8 U	--
N-methyl perfluorooctanesulfonamide (NMeFOSA)	--	--	--	--	--	--	--	< 0.60 U	< 0.64 U	--
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	--	--	--	--	--	--	--	12.2	3.8	--
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	--	--	--	--	--	--	--	< 2.6 U	< 2.8 U	--
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	--	--	--	--	--	--	--	< 1.2 U	< 1.3 U	--
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	--	--	--	--	--	--	--	< 0.26 U	< 0.27 U	--
Perfluoro-3-methoxypropanoic acid (PFMPA)	--	--	--	--	--	--	--	< 0.28 U	< 0.30 U	--
Perfluoro-4-methoxybutanoic acid (PFMBA)	--	--	--	--	--	--	--	< 0.53 U	< 0.56 U	--
Perfluorobutanesulfonic acid (PFBS)	--	--	--	--	--	14	--	2.1	4.6	--
Perfluorobutanoic Acid	--	--	--	--	--	450	--	< 0.88 U	< 0.93 U	--
Perfluorodecanesulfonic acid (PFDS)	--	--	--	--	--	< 0.32 U	--	< 1.0 U	< 1.1 U	--
Perfluorodecanoic acid (PFDA)	--	--	--	--	--	6.9	--	1.2 J	1.4 J	--
Perfluorododecanesulfonic acid (PFDoS)	--	--	--	--	--	--	--	< 0.38 U	< 0.40 U	--
Perfluorododecanoic acid (PFDoA)	--	--	--	--	--	< 0.55 U	--	< 0.73 U	< 0.77 U	--
Perfluoroheptanesulfonic acid (PFHpS)	--	--	--	--	--	13	--	2.5	11.3	--
Perfluoroheptanoic acid (PFHpA)	--	--	--	--	--	16	--	3.7	7.6	--
Perfluorohexanesulfonic acid (PFHxS)	--	--	--	--	--	28 B	--	5.8	35.3	--
Perfluorohexanoic acid (PFHxA)	--	--	--	--	--	18	--	4.8	9.7	--
Perfluorononanesulfonic Acid (PFNS)	--	--	--	--	--	--	--	< 1.4 U	< 1.4 U	--
Perfluorononanoic acid (PFNA)	--	--	--	--	--	26	--	3	11.2	--
Perfluorooctane Sulfonamide (PFOSA)	--	--	--	--	--	1.2 J	--	4.3	1.5 J	--
Perfluorooctanesulfonic acid (PFOS)	--	--	--	--	--	**1800**	--	**280**	**776**	--
Perfluorooctanoic acid (PFOA)	--	--	--	--	--	**120**	--	**16.3**	**97.3**	--
Perfluoropentanesulfonic Acid (PFPeS)	--	--	--	--	--	--	--	2.4	5.2	--
Perfluoropentanoic Acid (PFPeA)	--	--	--	--	--	< 0.49 U	--	48.1	< 0.73 U	--
Perfluorotetradecanoic acid (PFTeDA)	--	--	--	--	--	< 0.29 U	--	< 0.72 U	< 0.76 U	--
Perfluorotridecanoic Acid (PFTriA/PFTrDA)	--	--	--	--	--	< 1.3 U	--	< 0.75 U	< 0.79 U	--
Perfluoroundecanoic Acid (PFUnA)	--	--	--	--	--	< 1.1 U	--	1 J	< 0.55 U	--

Notes:

[1]NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)

--' = Not analyzed
µg/L = Mircogram(s) per liter
ng/L - Nanogram(s) per liter
B = Analyte detected in blank, as well as sample
D = Compound in analysis has been diluted
J = Concentration is estimated
NSL = No screening level available
U = Analyte not detected
R = Reported result unusable
VOCs = Volatile organic compounds
PFAS = Per- and polyfluoroalkyl substances
Concentrations exceeding the screening level are bolded and shaded gray

Location			MW-11	MW-11	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D
Sample Name			130054-MW-11-09182024	130054-MW-11-20241126	MW-21D_06212011	MW-Y	MW-21D_09162011	MW-Y	MW-21D_04022012	MW-Y	MW-21D	MW-Y	MW-21D	MW-21D-20130423	MW-Y	MW-21D	MW-21D-101413	MW-21D-112113	MW-21D 011414	MW-21D	MW-21D	MW-21D-06082022
Parent Sample Name						MW-21D_06212011		MW-21D_09162011		MW-21D_04022012		MW-21D_07162012			MW-21D-20130423							
Sample Date			9/18/2024	11/26/2024	6/21/2011	6/21/2011	9/16/2011	9/16/2011	4/2/2012	4/2/2012	7/16/2012	7/16/2012	11/1/2012	4/23/2013	4/23/2013	8/27/2013	10/14/2013	11/21/2013	1/14/2014	11/7/2017	12/4/2019	6/8/2022
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)																						
1,1,1,2-Tetrachloroethane	5	µg/L	--	--	< 50 U	< 50 U	< 0.93 U	< 0.93 U	< 0.1 U	< 0.1 U	< 0.1 U	< 0.1 U	< 0.1 U	< 1 U	< 0.5 U	--	--	--	--	--	--	< 1.8 U
1,1,1-Trichloroethane (TCA)	5	µg/L	< 0.54 U	< 0.54 U	< 50 U	< 50 U	< 0.69 U	< 0.69 U	< 0.06 U	< 0.06 U	< 0.06 U	< 0.06 U	< 0.06 U	< 0.6 U	< 0.3 U	< 41 U	< 28 U	< 41 U	< 41 U	< 1.9 U	< 0.24 U	< 1.7 U
1,1,2,2-Tetrachloroethane	5	µg/L	< 0.65 U	< 0.65 U	< 50 U	< 50 U	< 0.81 U	< 0.81 U	< 0.16 U	< 0.16 U	< 0.16 U	< 0.16 U	< 0.16 U	< 1.6 U	< 0.8 U	< 11 U	< 23 U	< 11 U	< 11 U	< 1.9 U	< 0.37 U	< 1.3 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	µg/L	< 0.58 U	< 0.58 U	--	--	--	--	--	--	--	--	--	--	--	< 16 U	< 35 U	< 16 U	< 16 U	< 1.5 U	< 0.31 U	< 2.3 U
1,1,2-Trichloroethane	1	µg/L	< 0.53 U	< 0.53 U	< 50 U	< 50 U	< 0.65 U	< 0.65 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.19 U	< 1.9 U	< 0.95 U	< 12 U	< 34 U	< 12 U	< 12 U	< 1.9 U	< 0.43 U	< 1.8 U
1,1-Dichloroethane	5	µg/L	< 0.57 U	< 0.57 U	< 50 U	< 50 U	< 1 U	< 1 U	0.38 J	0.45 J	0.26 J	0.25 J	0.42 J	< 1.3 U	< 0.65 U	< 19 U	< 19 U	< 19 U	< 19 U	< 2.4 U	< 0.26 U	< 1.4 U
1,1-Dichloroethene	5	µg/L	< 0.59 U	< 0.59 U	< 50 U	< 50 U	**7.4**	**8.2**	4.1	4	2.3	2.4	3	1.3 J	1.7 J	< 15 U	< 24 U	< 15 U	< 15 U	2.7 J	< 0.26 U	< 1.4 U
1,1-Dichloropropene	5	µg/L	--	--	< 50 U	< 50 U	< 0.82 U	< 0.82 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.12 U	< 1.2 U	< 0.6 U	--	--	--	--	--	--	< 1.5 U
1,2,3-Trichlorobenzene	5	µg/L	< 0.50 U	< 0.50 U	< 50 U	< 50 U	< 0.88 U	< 0.88 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 5.1 U	< 2.6 U	--	--	--	--	--	--	< 3 U
1,2,3-Trichloropropane	0.04	µg/L	--	--	< 50 U	< 50 U	< 1.5 U	< 1.5 U	< 0.42 U	< 0.42 U	< 0.42 U	< 0.42 U	< 0.42 U	< 4.2 U	< 2.1 U	--	--	--	--	--	--	< 2.8 U
1,2,4-Trichlorobenzene	5	µg/L	< 0.50 U	< 0.50 U	< 50 U	< 50 U	< 0.72 U	< 0.72 U	< 0.34 U	< 0.34 U	< 0.34 U	< 0.34 U	< 0.34 U	< 3.4 U	< 1.7 U	< 21 U	< 19 U	< 21 U	< 21 U	< 2 U	< 0.37 U	< 2.5 U
1,2,4-Trimethylbenzene	5	µg/L	--	--	< 50 U	< 50 U	< 0.64 U	< 0.64 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 U	< 1.3 U	< 0.65 U	--	--	--	--	--	--	< 2 U
1,2-Dibromo-3-Chloropropane	0.04	µg/L	< 0.53 U	< 0.53 U	< 50 U	< 50 U	< 1.2 U	< 1.2 U	< 0.4 U	< 0.4 U	< 0.4 U	< 0.4 U	< 0.4 U	< 4 U	< 2 U	< 20 U	< 84 U	< 20 U	< 20 U	< 9.4 U	< 0.38 U	< 8 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	µg/L	< 0.48 U	< 0.48 U	< 50 U	< 50 U	< 0.52 U	< 0.52 U	< 0.28 U	< 0.28 U	< 0.28 U	< 0.28 U	< 0.28 U	< 2.8 U	< 1.4 U	< 37 U	< 30 U	< 37 U	< 37 U	< 2.1 U	< 0.5 U	< 1.7 U
1,2-Dichlorobenzene	3	µg/L	< 0.53 U	< 0.53 U	< 50 U	< 50 U	< 0.22 U	< 0.22 U	< 0.21 U	< 0.21 U	< 0.21 U	< 0.21 U	< 0.21 U	< 2.1 U	< 1.1 U	< 40 U	< 16 U	< 40 U	< 40 U	< 1.9 U	< 0.43 U	< 1.2 U
1,2-Dichloroethane	0.6	µg/L	< 0.60 U	< 0.60 U	< 50 U	< 50 U	< 0.72 U	< 0.72 U	< 0.19 U	0.51 J	0.21 J	0.23 J	**0.87 J**	< 1.9 U	< 0.95 U	< 11 U	< 28 U	< 11 U	< 11 U	< 2 U	< 0.43 U	< 3.1 U
1,2-Dichloropropane	1	µg/L	< 0.51 U	< 0.51 U	< 50 U	< 50 U	< 0.71 U	< 0.71 U	< 0.09 U	< 0.09 U	< 0.09 U	< 0.09 U	< 0.09 U	< 0.9 U	< 0.45 U	< 36 U	< 23 U	< 36 U	< 36 U	< 2.5 U	< 0.35 U	< 1.8 U
1,3,5-Trichlorobenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.1 U
1,3,5-Trimethylbenzene (Mesitylene)	5	µg/L	--	--	< 50 U	< 50 U	< 0.53 U	< 0.53 U	< 0.15 U	< 0.15 U	< 0.15 U	< 0.15 U	< 0.15 U	< 1.5 U	< 0.75 U	--	--	--	--	--	--	< 1.1 U
1,3-Dichlorobenzene	3	µg/L	< 0.54 U	< 0.54 U	< 50 U	< 50 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 1.4 U	< 0.7 U	< 39 U	< 18 U	< 39 U	< 39 U	< 1.8 U	< 0.34 U	< 1.2 U
1,3-Dichloropropane	5	µg/L	--	--	< 50 U	< 50 U	< 0.69 U	< 0.69 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.19 U	< 1.9 U	< 0.95 U	--	--	--	--	--	--	< 1.3 U
1,4-Dichlorobenzene	3	µg/L	< 0.51 U	< 0.51 U	< 50 U	< 50 U	< 0.59 U	< 0.59 U	< 0.23 U	< 0.23 U	< 0.23 U	< 0.23 U	< 0.23 U	< 2.3 U	< 1.2 U	< 42 U	< 16 U	< 42 U	< 42 U	< 1.7 U	< 0.33 U	< 1.3 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 210 U
2,2-Dichloropropane	5	µg/L	--	--	< 50 U	< 50 U	< 0.79 U	< 0.79 U	< 0.16 U	< 0.16 U	< 0.16 U	< 0.16 U	< 0.16 U	< 1.6 U	< 0.8 U	--	--	--	--	--	--	< 3.3 U
2-Chlorotoluene	NSL	µg/L	--	--	< 50 U	< 50 U	< 1.2 U	< 1.2 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 1.4 U	< 0.7 U	--	--	--	--	--	--	< 1.1 U
2-Hexanone	50	µg/L	< 4.8 U	< 4.8 U	< 100 U	< 100 U	< 1.1 U	< 1.1 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5 U	< 2.5 U	< 62 U	< 51 U	< 62 U	< 62 U	< 13 U	< 1.1 U	< 11 U
2-Methoxy-2-Methylbutane	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.4 U
4-Chlorotoluene	5	µg/L	--	--	< 50 U	< 50 U	< 0.8 U	< 0.8 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 1.4 U	< 0.7 U	--	--	--	--	--	--	< 1.2 U
Acetone	50	µg/L	4.5	< 3.1 U	< 100 U	< 100 U	< 1 U	< 1 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	**100 JR**	**51 JR**	< 150 U	< 140 U	< 150 U	< 150 U	< 27 U	< 4.4 U	25 JD
Acrylonitrile	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 5.5 U
Benzene	1	µg/L	**13.7**	**2.1**	< 50 U	< 50 U	**1.7 J**	**1.8 J**	**1.2**	**1.1**	0.66 J	0.66 J	**2.4**	**2.2 J**	**2 J**	< 21 U	< 16 U	< 21 U	< 21 U	< 2 U	0.23 J	< 2 U
Bromobenzene	5	µg/L	--	--	< 50 U	< 50 U	< 0.67 U	< 0.67 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 U	< 1.3 U	< 0.65 U	--	--	--	--	--	--	< 1.5 U
Bromochloromethane	5	µg/L	< 0.48 U	< 0.48 U	< 50 U	< 50 U	< 0.77 U	< 0.77 U	< 0.27 U	< 0.27 U	< 0.27 U	< 0.27 U	< 0.27 U	< 2.7 U	< 1.4 U	--	--	--	--	--	--	< 3.1 U
Bromodichloromethane	50	µg/L	< 0.45 U	< 0.45 U	< 50 U	< 50 U	< 0.48 U	< 0.48 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.12 U	< 1.2 U	< 0.6 U	< 20 U	< 19 U	< 20 U	< 20 U	< 1.7 U	< 0.34 U	< 1.8 U
Bromoform	50	µg/L	< 0.63 U	< 0.63 U	< 50 U	< 50 U	< 0.46 U	< 0.46 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.19 U	< 0.19 U	< 1.9 U	< 0.95 U	< 13 U	< 80 U	< 13 U	< 13 U	< 2.9 U	< 0.54 UT	< 3.8 U
Bromomethane	5	µg/L	< 1.6 U	< 1.6 U	< 50 U	< 50 U	< 2.1 U	< 2.1 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.18 U	< 1.8 UJ	< 0.9 UJ	< 35 U	< 51 U	< 35 U	< 35 U	< 3.5 U	< 0.55 U	< 15 U
Carbon Disulfide	60	µg/L	< 1.8 U	< 1.8 U	< 50 U	< 50 U	< 0.9 U	< 0.9 U	< 0.13 U	< 0.13 U	0.29 J	0.29 J	< 0.13 U	< 1.3 U	< 0.65 U	< 9.5 U	< 16 U	< 9.5 U	< 9.5 U	< 2.2 U	< 0.82 U	< 14 U
Carbon Tetrachloride	5	µg/L	< 0.55 U	< 0.55 U	< 50 U	< 50 U	< 1.1 U	< 1.1 U	< 0.06 U	< 0.06 U	< 0.06 U	< 0.06 U	< 0.06 U	< 0.6 U	< 0.3 U	< 14 U	< 16 U	< 14 U	< 14 U	< 1.8 U	< 0.21 U	< 1.6 U
Chlorobenzene	5	µg/L	< 0.56 U	< 0.56 U	< 50 U	< 50 U	< 0.72 U	< 0.72 U	< 0.11 U	< 0.11 U	< 0.11 U	< 0.11 U	< 0.11 U	< 1.1 U	< 0.55 U	< 38 U	< 19 U	< 38 U	< 38 U	< 1.8 U	< 0.38 U	< 1.1 U
Chloroethane	5	µg/L	< 0.73 UJ	< 0.73 U	< 50 U	< 50 U	< 1.1 U	< 1.1 U	< 0.17 U	< 0.17 U	< 0.17 U	< 0.17 U	< 0.17 U	< 1.7 U	< 0.85 U	< 16 U	< 36 U	< 16 U	< 16 U	< 3.6 U	< 0.32 U	< 3.2 U
Chloroform	7	µg/L	< 0.50 U	< 0.50 U	< 50 U	< 50 U	< 0.67 U	< 0.67 U	< 0.08 U	< 0.08 U	< 0.08 U	< 0.08 U	< 0.08 U	< 0.8 U	< 0.4 U	< 17 U	< 20 U	< 17 U	< 17 U	< 2.3 U	< 0.33 U	< 1.7 U
Chloromethane (Methyl Chloride)	5	µg/L	< 0.76 U	< 0.76 U	< 50 U	< 50 U	< 1.1 U	< 1.1 U	< 0.1 U	< 0.1 U	< 0.1 U	< 0.1 U	< 0.1 U	< 1 U	< 0.5 U	< 18 U	< 38 U	< 18 U	< 18 U	< 3.6 U	< 0.4 UT	< 5.2 U
Cis-1,2-Dichloroethylene	5	µg/L	**144**	**17.5**	**1100 B**	**1000 B**	**2700**	**2700**	**1900**	**1700**	**1500 DI**	**1500 DI**	**1900**	**2400**	**2400**	**3400**	**2200**	**3500**	**3700**	**1800**	**47**	**1200 D**
Cis-1,3-Dichloropropene	0.4	µg/L	< 0.47 U	< 0.47 U	< 50 U	< 50 U	< 0.28 U	< 0.28 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.18 U	< 1.8 U	< 0.9 U	< 18 U	< 18 U	< 18 U	< 18 U	< 1.7 U	< 0.22 U	< 1.6 U
Cyclohexane	NSL	µg/L	< 0.78 U	< 0.78 U	--	--	--	--	--	--	--	--	--	--	--	42 J	< 15 U	< 9 U	< 9 U	< 1.3 U	< 0.32 U	--
Cymene	5	µg/L	--	--	< 50 U	< 50 U	< 0.81 U	< 0.81 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 1.4 U	< 0.7 U	--	--	--	--	--	--	< 0.97 U
Dibromochloromethane	50	µg/L	< 0.56 U	< 0.56 U	< 50 U	< 50 U	< 0.55 U	< 0.55 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 2 U	< 1 U	< 16 U	< 23 U	< 16 U	< 16 U	< 2.5 U	< 0.28 U	< 2.2 U
Dibromomethane	5	µg/L	--	--	< 50 U	< 50 U	< 0.7 U	< 0.7 U	< 0.29 U	< 0.29 U	< 0.29 U	< 0.29 U	< 0.29 U	< 2.9 U	< 1.5 U	--	--	--	--	--	--	< 3.5 U
Dichlorodifluoromethane	5	µg/L	< 0.56 U	< 0.56 U	< 50 U	< 50 U	< 1 U	< 1 U	< 0.22 U	< 0.22 U	< 0.22 U	< 0.22 U	< 0.22 U	< 2.2 UJ	< 1.1 UJ	< 34 U	< 39 U	< 34 U	< 34 U	< 1.7 U	< 0.31 U	< 1.9 U
Diethyl Ether (Ethyl Ether)	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.8 U
Ethyl Tert-Butyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.5 U
Ethylbenzene	5	µg/L	**15.5**	**7.2**	< 50 U	< 50 U	< 0.87 U	< 0.87 U	0.22 J	0.23 J	0.11 J	< 0.1 U	0.18 J	< 1 U	< 0.5 U	< 37 U	< 21 U	< 37 U	< 37 U	< 1.9 U	< 0.3 U	< 2.1 U
Hexachlorobutadiene	0.5	µg/L	--	--	< 50 U	< 50 U	< 1 U	< 1 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 4.8 U	< 2.4 U	--	--	--	--	--	--	< 4.6 U
Iodomethane (Methyl Iodide)	5	µg/L	--	--	< 100 U	< 100 U	< 0.91 U	< 0.91 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 U	< 1.3 UJ	< 0.65 UJ	--	--	--	--	--	--	--
Isopropyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U
Isopropylbenzene (Cumene)	5	µg/L	**6.3**	3.9	< 50 U	< 50 U	< 0.85 U	< 0.85 U	< 0.08 U	0.22 J	0.15 J	0.15 J	0.12 J	< 0.8 U	< 0.4 U	< 40 U	< 16 U	< 40 U	< 40 U	< 3.3 U	< 0.34 U	< 1.1 U
M,P-Xylene (Sum Of Isomers)	5	µg/L	**32.1**	**16.7**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl Acetate	NSL	µg/L	< 0.80 U	< 0.80 U	--	--	--	--	--	--	--	--	--	--	--	< 25 U	< 48 U	< 25 U	< 25 U	< 5.8 U	< 0.79 U	< 4.5 U
Methyl Ethyl Ketone (2-Butanone)	50	µg/L	< 2.7 U	< 2.7 U	< 100 U	< 100 U	< 1.1 U	< 1.1 U	< 2.3 U	< 2.3 U	< 2.3 U	3.5 J	< 2.3 U	< 23 R	< 12 R	< 66 U	< 71 U	< 66 U	< 66 U	< 26 U	< 1.9 U	17 JD
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NSL	µg/L	< 4.9 U	< 4.9 U	< 100 U	< 100 U	< 0.38 U	< 0.38 U	< 0.99 U	< 0.99 U	< 0.99 U	< 0.99 U	< 0.99 U	< 9.9 U	< 5 U	< 110 U	< 40 U	< 110 U	< 110 U	< 8.1 U	< 1.3 U	< 13 U
Methylcyclohexane	NSL	µg/L	< 0.60 U	< 0.60 U	--	--	--	--	--	--	--	--	--	--	--	< 8 U	< 16 U	< 8 U	< 8 U	< 0.9 U	< 0.26 U	< 2.4 U
Methylene Chloride	5	µg/L	< 1.0 U	< 1.0 U	**19 JB**	**20 JB**	< 0.78 U	< 0.78 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.18 U	< 0.18 U	< 1.8 U	< 0.9 U	**43 J**	< 41 U	< 22 U	< 22 U	< 10 U	< 0.32 U	< 2.3 U
M-P-Xylene	5	µg/L	--	--	< 50 U	< 50 U	< 1.7 U	< 1.7 U	< 0.25 U	< 0.25 U	< 0.25 U	< 0.25 U	< 0.25 U	< 2.5 U	< 1.3 U	--	--	--	--	--	--	< 4.6 U
Naphthalene	10	µg/L	--	--	< 50 U	< 50 U	< 0.34 U	< 0.34 U	< 0.29 U	< 0.29 U	< 0.29 U	< 0.29 U	< 0.29 U	< 2.9 U	< 1.5 U	--	--	--	--	--	--	< 2.4 U
N-Butylbenzene	5	µg/L	--	--	< 50 U	< 50 U	< 0.67 U	< 0.67 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U	< 1.4 U	< 0.7 U	--	--	--	--	--	--	< 1.5 U
N-Propylbenzene	5	µg/L	--	--	< 50 U	< 50 U	< 0.62 U	< 0.62 U	< 0.1 U	< 0.1 U	< 0.1 U	0.1 J	< 0.1 U	< 1 U	< 0.5 U	--	--	--	--	--	--	< 0.86 U
O-Xylene (1,2-Dimethylbenzene)	5	µg/L	**41.5**	**22.8**	< 50 U	< 50 U	< 0.66 U	< 0.66 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 U	< 0.13 U	< 1.3 U	< 0.65 U	--	--	--	--	--	--	< 2.3 U
Sec-Butylbenzene	5	µg/L	--	--	< 50 U	< 50 U	< 0.79 U	< 0.79 U	0.42 J	0.45 J	0.26 J	0.28 J	0.4 J	< 1.8 U	< 0.9 U	--	--	--	--	--	--	< 1.1 U
Styrene	5	µg/L	< 0.49 U	< 0.49 U	< 50 U	< 50 U	< 0.64 U	< 0.64 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.12 U	< 0.12 U	< 1.2 U	< 0.6 U	< 37 U	< 14 U	< 37 U	< 37 U	< 2.8 U	< 0.42 U	< 1.1 U
T-Butylbenzene	5	µg/L	--	--	< 50 U	< 50 U	< 0.75 U	< 0.75 U	0.19 J	0.2 J	0.18 J	0.18 J	0.21 J	< 1.2 U	< 0.6 U	--	--	--	--	--	--	< 1.3 U
Tert-Butyl Alcohol	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 47 U
Tert-Butyl Methyl Ether	10	µg/L	**33.9**	3.7	< 50 U	< 50 U	0.7 J	0.79 J	0.43 J	0.46 J	0.34 J	0.35 J	1.1	< 1.4 U	1.1 J	< 8 U	< 21 U	< 8 U	< 8 U	< 1.7 U	< 0.47 U	< 1.7 U
Tetrachloroethylene (PCE)	5	µg/L	< 0.56 U	< 0.56 U	**9.2 JB**	**9.9 JB**	**6.7**	**13**	2.7	2.7	**8**	**8.4**	3	< 1 U	2.6 J	< 18 U	< 36 U	< 18 U	< 18 U	< 1.4 U	0.54 J	< 1.9 U
Tetrahydrofuran	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 4.9 U
Toluene	5	µg/L	**10.5**	3.4	< 50 U	< 50 U	< 0.72 U	< 0.72 U	< 0.15 U	0.16 J	< 0.15 U	< 0.15 U	< 0.15 U	< 1.5 U	< 0.75 U	< 26 U	< 16 U	< 26 U	< 26 U	< 1.7 U	< 0.38 U	< 2.2 U
Trans-1,2-Dichloroethene	5	µg/L	3.0	< 0.54 U	< 50 U	< 50 U	**21**	**22**	**24**	**25**	**27**	**25**	**17**	**19**	**24**	**81**	**35 J**	< 45 U	< 45 U	**28**	1.2	**13 D**
Trans-1,3-Dichloropropene	0.4	µg/L	< 0.43 U	< 0.43 U	< 50 U	< 50 U	< 0.57 U	< 0.57 U	< 0.24 U	< 0.24 U	< 0.24 U	< 0.24 U	< 0.24 U	< 2.4 U	< 1.2 U	< 19 U	< 24 U	< 19 U	< 19 U	< 1.7 U	< 0.49 U	< 1.7 U
Trans-1,4-Dichloro-2-Butene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 16 U
Trichloroethylene (TCE)	5	µg/L	< 0.53 U	< 0.53 U	< 50 U	< 50 U	**11**	**15**	4.2	4.3	**5.9**	**6.4**	2.4	< 0.9 U	1.9 J	< 23 U	< 21 U	< 23 U	< 23 U	< 2 U	< 0.31 U	< 1.9 U
Trichlorofluoromethane	5	µg/L	< 0.40 UJ	< 0.40 U	< 50 U	< 50 U	< 1.1 U	< 1.1 U	< 0.15 U	< 0.15 U	< 0.15 U	< 0.15 U	< 0.15 U	< 1.5 U	< 0.75 U	< 44 U	< 26 U	< 44 U	< 44 U	< 2.1 UT	< 0.32 U	< 1.8 U
Vinyl Acetate	NSL	µg/L	--	--	< 50 U	< 50 U	< 1.6 U	< 1.6 U	< 0.38 U	< 0.38 U	< 0.38 U	< 0.38 U	< 0.38 UHI	< 3.8 U	< 1.9 U	--	--	--	--	--	--	--
Vinyl Chloride	2	µg/L	**83.3**	**5.8**	**70**	**55**	**74**	**71**	**24**	**24**	**17**	**18**	**22**	**27**	**28**	**98**	**57 J**	**130**	**52**	**50**	**6.7**	**47 D**
Xylenes	5	µg/L	**73.6**	**39.5**	< 50 U	< 50 U	< 2.3 U	< 2.3 U	< 0.36 U	< 0.36 U	< 0.36 U	< 0.36 U	< 0.36 U	< 3.6 U	< 1.8 U	< 33 U	< 18 U	< 33 U	< 33 U	< 5.8 U	< 0.65 U	--
Xylenes, Total	NSL	µg/L	--	--	< 50 U	< 50 U	< 2.3 U	< 2.3 U	< 0.36 U	< 0.36 U	< 0.36 U	< 0.36 U	< 0.36 U	< 3.6 U	< 1.8 U	< 33 U	< 18 U	< 33 U	< 33 U	< 5.8 U	--	--
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)																						
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3-Perfluoroheptyl propanoic acid (7:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3-Perfluoropropyl propanoic acid (3:3 FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamide (NMeFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluoro-3-methoxypropanoic acid (PFMPA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluoro-4-methoxybutanoic acid (PFMBA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluorobutanesulfonic acid (PFBS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.8	--	--
Perfluorobutanoic Acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	29	--	--
Perfluorodecanesulfonic acid (PFDS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.31 U	--	--
Perfluorodecanoic acid (PFDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.9 J	--	--
Perfluorododecanesulfonic acid (PFDoS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluorododecanoic acid (PFDoA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.54 U	--	--
Perfluoroheptanesulfonic acid (PFHpS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.6 J	--	--
Perfluoroheptanoic acid (PFHpA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	18	--	--
Perfluorohexanesulfonic acid (PFHxS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8 B	--	--
Perfluorohexanoic acid (PFHxA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	--	--
Perfluorononanesulfonic Acid (PFNS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluorononanoic acid (PFNA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.9	--	--
Perfluorooctane Sulfonamide (PFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.8 BJ	--	--
Perfluorooctanesulfonic acid (PFOS)	2.7	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**110**	--	--
Perfluorooctanoic acid (PFOA)	6.7	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**59**	--	--
Perfluoropentanesulfonic Acid (PFPeS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluoropentanoic Acid (PFPeA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17	--	--
Perfluorotetradecanoic acid (PFTeDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.28 U	--	--
Perfluorotridecanoic Acid (PFTriA/PFTrDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U	--	--
Perfluoroundecanoic Acid (PFUnA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	--	--

Notes:

[1]NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)

--' = Not analyzed
µg/L = Mircogram(s) per liter
ng/L - Nanogram(s) per liter
B = Analyte detected in blank, as well as sample
D = Compound in analysis has been diluted
J = Concentration is estimated
NSL = No screening level available
U = Analyte not detected
R = Reported result unusable
VOCs = Volatile organic compounds
PFAS = Per- and polyfluoroalkyl substances
Concentrations exceeding the screening level are bolded and shaded gray

		Location	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S
		Sample Name	MW-21D-09232022	130054-MW-21D-12052023	MW-21D-03182024	MW-21D-03192024	130054-MW-21D-06252024	130054-MW-21D-09182024	130054-MW-21D-20241125	MW-21S_06212011	MW-21S_09162011	MW-21S_04022012	MW-21S_07182012	MW-21S_11022012	MW-21S-20130423	MW-21S	MW-21S-101413	MW-21S-112113	MW-21S 011414	MW-21S	MW-21S06072022	MW-21S-09232022
		Parent Sample Name																				
		Sample Date	9/23/2022	12/5/2023	3/18/2024	3/19/2024	6/25/2024	9/18/2024	11/25/2024	6/21/2011	9/16/2011	4/2/2012	7/18/2012	11/2/2012	4/23/2013	8/27/2013	10/14/2013	11/21/2013	1/14/2014	11/3/2017	6/7/2022	9/23/2022
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)																						
1,1,1,2-Tetrachloroethane	5	µg/L	< 0.18 U	--	--	--	--	--	--	< 200 U	< 0.93 U	< 0.5 U	< 0.1 U	< 0.1 U	< 0.2 U	--	--	--	--	--	< 0.18 U	< 0.18 U
1,1,1-Trichloroethane (TCA)	5	µg/L	< 0.17 U	< 5.4 U	< 11 U	--	< 11 U	< 5.4 U	< 0.54 U	< 200 U	< 0.69 U	< 0.3 U	< 0.06 U	< 0.06 U	< 0.12 U	< 0.82 U	< 11 U	< 16 U	< 16 U	< 0.19 U	< 0.17 U	< 0.17 U
1,1,2,2-Tetrachloroethane	5	µg/L	< 0.13 U	< 6.5 U	< 13 U	--	< 13 U	< 6.5 U	< 0.65 U	< 200 U	< 0.81 U	< 0.8 U	< 0.16 U	< 0.16 U	< 0.32 U	< 0.21 U	< 9 U	< 4.2 U	< 4.2 U	< 0.19 U	< 0.13 U	< 0.13 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	µg/L	< 0.23 U	< 5.8 U	< 12 U	--	< 12 U	< 5.8 U	< 0.58 U	--	--	--	--	--	--	< 0.31 U	< 14 U	< 6.2 U	< 6.2 U	< 0.15 U	< 0.23 U	< 0.23 U
1,1,2-Trichloroethane	1	µg/L	< 0.18 U	< 5.3 U	< 11 U	--	< 11 U	< 5.3 U	< 0.53 U	< 200 U	< 0.65 U	< 0.95 U	< 0.19 U	< 0.19 U	**1.6 J**	< 0.23 U	< 14 U	< 4.6 U	< 4.6 U	< 0.19 U	< 0.18 U	< 0.18 U
1,1-Dichloroethane	5	µg/L	< 0.14 U	< 5.7 U	< 11 U	--	< 11 U	< 5.7 U	< 0.57 U	< 200 U	< 1 U	< 0.65 U	0.31 J	0.27 J	0.35 J	0.65 J	< 7.5 U	< 7.6 U	< 7.6 U	< 0.24 U	< 0.14 U	< 0.14 U
1,1-Dichloroethene	5	µg/L	< 0.14 U	**6.9 J**	< 12 U	--	< 12 U	**8.0**	< 0.59 U	< 200 U	**19**	2.9 J	2.1	5	< 0.18 U	< 0.29 U	< 9.5 U	< 5.8 U	< 5.8 U	< 0.25 U	< 0.14 U	< 0.14 U
1,1-Dichloropropene	5	µg/L	< 0.15 U	--	--	--	--	--	--	< 200 U	< 0.82 U	< 0.6 U	< 0.12 U	< 0.12 U	< 0.24 U	--	--	--	--	--	< 0.15 U	< 0.15 U
1,2,3-Trichlorobenzene	5	µg/L	< 0.3 U	< 5.0 U	< 10 U	--	< 10 U	< 5.0 U	< 0.50 U	< 200 U	< 0.88 U	< 2.6 U	< 0.51 U	< 0.51 U	< 1 U	--	--	--	--	--	< 0.3 U	< 0.3 U
1,2,3-Trichloropropane	0.04	µg/L	< 0.28 U	--	--	--	--	--	--	< 200 U	< 1.5 U	< 2.1 U	< 0.42 U	< 0.42 U	< 0.84 U	--	--	--	--	--	< 0.28 U	< 0.28 U
1,2,4-Trichlorobenzene	5	µg/L	< 0.25 U	< 5.0 U	< 10 U	--	< 10 U	< 5.0 U	< 0.50 U	< 200 U	< 0.72 U	< 1.7 U	< 0.34 U	< 0.34 U	< 0.68 U	< 0.41 U	< 7.5 U	< 8.2 U	< 8.2 U	< 0.2 U	< 0.25 U	< 0.25 U
1,2,4-Trimethylbenzene	5	µg/L	0.24 J	--	--	--	--	--	--	**36 J**	< 0.64 U	< 0.65 U	0.88 J	< 0.13 U	< 0.26 U	--	--	--	--	--	< 0.2 U	< 0.2 U
1,2-Dibromo-3-Chloropropane	0.04	µg/L	< 0.8 U	< 5.3 U	< 11 U	--	< 11 U	< 5.3 U	< 0.53 U	< 200 U	< 1.2 U	< 2 U	< 0.4 U	< 0.4 U	< 0.8 U	< 0.39 U	< 34 U	< 7.8 U	< 7.8 U	< 0.94 U	< 0.8 U	< 0.8 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	µg/L	< 0.17 U	< 4.8 U	< 9.5 U	--	< 9.5 U	< 4.8 U	< 0.48 U	< 200 U	< 0.52 U	< 1.4 U	< 0.28 U	< 0.28 U	< 0.56 U	< 0.73 U	< 12 U	< 15 U	< 15 U	< 0.21 U	< 0.17 U	< 0.17 U
1,2-Dichlorobenzene	3	µg/L	< 0.12 U	< 5.3 U	< 11 U	--	< 11 U	< 5.3 U	< 0.53 U	< 200 U	0.6 J	< 1.1 U	< 0.21 U	< 0.21 U	< 0.42 U	< 0.79 U	< 6.5 U	< 16 U	< 16 U	< 0.19 U	< 0.12 U	< 0.12 U
1,2-Dichloroethane	0.6	µg/L	< 0.31 U	< 6.0 U	< 12 U	--	< 12 U	< 6.0 U	< 0.60 U	< 200 U	< 0.72 U	< 0.95 U	< 0.19 U	< 0.19 U	< 0.38 U	< 0.21 U	< 11 U	< 4.2 U	< 4.2 U	< 0.2 U	< 0.31 U	< 0.31 U
1,2-Dichloropropane	1	µg/L	< 0.18 U	< 5.1 U	< 10 U	--	< 10 U	< 5.1 U	< 0.51 U	< 200 U	< 0.71 U	< 0.45 U	< 0.09 U	< 0.09 U	< 0.18 U	< 0.72 U	< 9 U	< 14 U	< 14 U	< 0.25 U	< 0.18 U	< 0.18 U
1,3,5-Trichlorobenzene	5	µg/L	< 0.21 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.21 U	< 0.21 U
1,3,5-Trimethylbenzene (Mesitylene)	5	µg/L	< 0.11 U	--	--	--	--	--	--	< 200 U	< 0.53 U	< 0.75 U	0.29 J	< 0.15 U	< 0.3 U	--	--	--	--	--	< 0.11 U	< 0.11 U
1,3-Dichlorobenzene	3	µg/L	0.16 J	< 5.4 U	< 11 U	--	< 11 U	< 5.4 U	< 0.54 U	< 200 U	< 0.14 U	< 0.7 U	< 0.14 U	< 0.14 U	< 0.28 U	< 0.78 U	< 7 U	< 16 U	< 16 U	< 0.18 U	< 0.12 U	< 0.12 U
1,3-Dichloropropane	5	µg/L	< 0.13 U	--	--	--	--	--	--	< 200 U	< 0.69 U	< 0.95 U	< 0.19 U	< 0.19 U	< 0.38 U	--	--	--	--	--	< 0.13 U	< 0.13 U
1,4-Dichlorobenzene	3	µg/L	< 0.13 U	< 5.1 U	< 10 U	--	< 10 U	< 5.1 U	< 0.51 U	< 200 U	0.88 J	< 1.2 U	< 0.23 U	< 0.23 U	< 0.46 U	< 0.84 U	< 6.5 U	< 17 U	< 17 U	< 0.17 U	< 0.13 U	< 0.13 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	< 21 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 21 U	< 21 U
2,2-Dichloropropane	5	µg/L	< 0.33 U	--	--	--	--	--	--	< 200 U	< 0.79 U	< 0.8 U	< 0.16 U	< 0.16 U	< 0.32 U	--	--	--	--	--	< 0.33 U	< 0.33 U
2-Chlorotoluene	NSL	µg/L	< 0.11 U	--	--	--	--	--	--	< 200 U	< 1.2 U	< 0.7 U	< 0.14 U	< 0.14 U	< 0.28 U	--	--	--	--	--	< 0.11 U	< 0.11 U
2-Hexanone	50	µg/L	< 1.1 U	< 48 U	< 96 U	--	< 96 U	< 48 U	< 4.8 U	< 400 U	< 1.1 U	< 2.5 U	< 0.5 U	< 0.5 U	< 1 U	< 1.2 U	< 21 U	< 25 U	< 25 U	< 1.3 U	< 1.1 U	< 1.1 U
2-Methoxy-2-Methylbutane	NSL	µg/L	< 0.14 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.14 U	< 0.14 U
4-Chlorotoluene	5	µg/L	< 0.12 U	--	--	--	--	--	--	< 200 U	< 0.8 U	< 0.7 U	< 0.14 U	< 0.14 U	< 0.28 U	--	--	--	--	--	< 0.12 U	< 0.12 U
Acetone	50	µg/L	4.2 J	< 31 U	< 61 U	--	< 61 U	< 31 U	< 3.1 U	< 400 U	1.2 J	< 13 U	< 2.7 U	< 2.7 U	25 JR	20	< 55 U	< 60 U	< 60 U	< 2.7 U	< 2 U	< 2 U
Acrylonitrile	5	µg/L	< 0.55 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.55 U	< 0.55 U
Benzene	1	µg/L	< 0.2 U	< 4.3 U	< 8.5 U	--	< 8.5 U	< 4.3 U	< 0.43 U	< 200 U	< 0.74 U	< 0.4 U	< 0.08 U	< 0.08 U	< 0.16 U	< 0.41 U	< 6.5 U	< 8.2 U	< 8.2 U	< 0.2 U	< 0.2 U	< 0.2 U
Bromobenzene	5	µg/L	< 0.15 U	--	--	--	--	--	--	< 200 U	< 0.67 U	< 0.65 U	< 0.13 U	< 0.13 U	< 0.26 U	--	--	--	--	--	< 0.15 U	< 0.15 U
Bromochloromethane	5	µg/L	< 0.31 U	< 4.8 U	< 9.6 U	--	< 9.6 U	< 4.8 U	< 0.48 U	< 200 U	< 0.77 U	< 1.4 U	< 0.27 U	< 0.27 U	< 0.54 U	--	--	--	--	--	< 0.31 U	< 0.31 U
Bromodichloromethane	50	µg/L	< 0.18 U	< 4.5 U	< 9.0 U	--	< 9.0 U	< 4.5 U	< 0.45 U	< 200 U	< 0.48 U	< 0.6 U	< 0.12 U	< 0.12 U	< 0.24 U	< 0.39 U	< 7.5 U	< 7.8 U	< 7.8 U	< 0.17 U	< 0.18 U	< 0.18 U
Bromoform	50	µg/L	< 0.38 U	< 6.3 U	< 13 U	--	< 13 U	< 6.3 U	< 0.63 U	< 200 U	< 0.46 U	< 0.95 U	< 0.19 U	< 0.19 U	< 0.38 U	3.9	< 32 U	< 5.2 U	< 5.2 U	< 0.29 U	< 0.38 U	< 0.38 U
Bromomethane	5	µg/L	< 1.5 U	< 16 U	< 33 U	--	< 33 U	< 16 U	< 1.6 U	< 200 U	< 2.1 U	< 0.9 U	< 0.18 U	< 0.18 U	< 0.36 UJ	< 0.69 U	< 21 U	< 14 U	< 14 U	< 0.35 U	< 1.5 U	< 1.5 U
Carbon Disulfide	60	µg/L	< 1.4 U	< 18 U	< 36 U	--	< 36 U	< 18 U	< 1.8 U	< 200 U	< 0.9 U	< 0.65 U	< 0.13 U	< 0.13 U	< 0.26 U	< 0.19 U	< 6.5 U	< 3.8 U	< 3.8 U	< 0.22 U	< 1.4 U	< 1.4 U
Carbon Tetrachloride	5	µg/L	< 0.16 U	< 5.5 U	< 11 U	--	< 11 U	< 5.5 U	< 0.55 U	< 200 U	< 1.1 U	< 0.3 U	< 0.06 U	< 0.06 U	< 0.12 U	< 0.27 U	< 6.5 U	< 5.4 U	< 5.4 U	< 0.18 U	< 0.16 U	< 0.16 U
Chlorobenzene	5	µg/L	< 0.11 U	< 5.6 U	< 11 U	--	< 11 U	< 5.6 U	< 0.56 U	< 200 U	< 0.72 U	< 0.55 U	< 0.11 U	< 0.11 U	< 0.22 U	< 0.75 U	< 7.5 U	< 15 U	< 15 U	< 0.18 U	< 0.11 U	< 0.11 U
Chloroethane	5	µg/L	< 0.32 U	< 7.3 U	< 15 U	--	< 15 U	< 7.3 U	< 0.73 U	< 200 U	< 1.1 U	< 0.85 U	< 0.17 U	< 0.17 U	< 0.34 U	< 0.32 U	< 15 U	< 6.4 U	< 6.4 U	< 0.36 U	< 0.32 U	< 0.32 U
Chloroform	7	µg/L	< 0.17 U	< 5.0 U	< 10 U	--	< 10 U	< 5.0 U	< 0.50 U	< 200 U	< 0.67 U	< 0.4 U	< 0.08 U	< 0.08 U	0.94 J	0.89 J	< 8 U	< 6.8 U	< 6.8 U	0.39 J	< 0.17 U	< 0.17 U
Chloromethane (Methyl Chloride)	5	µg/L	< 0.52 U	< 7.6 U	< 15 U	--	< 15 U	< 7.6 U	< 0.76 U	< 200 U	< 1.1 U	< 0.5 U	< 0.1 U	< 0.1 U	< 0.2 U	< 0.35 U	< 15 U	< 7 U	< 7 U	< 0.36 U	< 0.52 U	< 0.52 U
Cis-1,2-Dichloroethylene	5	µg/L	**9.1**	**4420**	**4770**	--	**5990**	**5970**	**208**	**4100 B**	**14000**	**4500**	**510**	**2400**	**32**	< 0.81 U	**1100**	**1400**	**3500**	**57**	**5.2**	**41**
Cis-1,3-Dichloropropene	0.4	µg/L	< 0.16 U	< 4.7 U	< 9.4 U	--	< 9.4 U	< 4.7 U	< 0.47 U	< 200 U	< 0.28 U	< 0.9 U	< 0.18 U	< 0.18 U	< 0.36 U	< 0.36 U	< 7 U	< 7.2 U	< 7.2 U	< 0.17 U	< 0.16 U	< 0.16 U
Cyclohexane	NSL	µg/L	--	< 7.8 U	< 16 U	--	< 16 U	< 7.8 U	< 0.78 U	--	--	--	--	--	--	1.1	< 6 U	< 3.6 U	< 3.6 U	< 0.13 U	--	--
Cymene	5	µg/L	< 0.097 U	--	--	--	--	--	--	< 200 U	< 0.81 U	< 0.7 U	< 0.14 U	< 0.14 U	< 0.28 U	--	--	--	--	--	< 0.097 U	< 0.097 U
Dibromochloromethane	50	µg/L	< 0.22 U	< 5.6 U	< 11 U	--	< 11 U	< 5.6 U	< 0.56 U	< 200 U	< 0.55 U	< 1 U	< 0.2 U	< 0.2 U	< 0.4 U	< 0.32 U	< 9 U	< 6.4 U	< 6.4 U	< 0.25 U	< 0.22 U	< 0.22 U
Dibromomethane	5	µg/L	< 0.35 U	--	--	--	--	--	--	< 200 U	< 0.7 U	< 1.5 U	< 0.29 U	< 0.29 U	< 0.58 U	--	--	--	--	--	< 0.35 U	< 0.35 U
Dichlorodifluoromethane	5	µg/L	< 0.19 U	< 5.6 U	< 11 U	--	< 11 U	< 5.6 U	< 0.56 U	< 200 U	< 1 U	< 1.1 U	< 0.22 U	< 0.22 U	< 0.44 UJ	< 0.68 U	< 16 U	< 14 U	< 14 U	< 0.17 U	< 0.19 U	< 0.19 U
Diethyl Ether (Ethyl Ether)	NSL	µg/L	< 0.18 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.18 U	< 0.18 U
Ethyl Tert-Butyl Ether	NSL	µg/L	< 0.15 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.15 U	< 0.15 U
Ethylbenzene	5	µg/L	< 0.21 U	< 6.0 U	< 12 U	--	< 12 U	< 6.0 U	< 0.60 U	< 200 U	< 0.87 U	< 0.5 U	< 0.1 U	< 0.1 U	< 0.2 U	< 0.74 U	< 8.5 U	< 15 U	< 15 U	< 0.19 U	< 0.21 U	< 0.21 U
Hexachlorobutadiene	0.5	µg/L	< 0.46 U	--	--	--	--	--	--	< 200 U	< 1 U	< 2.4 U	< 0.48 U	< 0.48 U	< 0.96 U	--	--	--	--	--	< 0.46 U	< 0.46 U
Iodomethane (Methyl Iodide)	5	µg/L	--	--	--	--	--	--	--	< 400 U	< 0.91 U	< 0.65 U	< 0.13 U	< 0.13 U	< 0.26 UJ	--	--	--	--	--	--	--
Isopropyl Ether	NSL	µg/L	< 0.13 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.13 U	< 0.13 U
Isopropylbenzene (Cumene)	5	µg/L	< 0.11 U	< 6.5 U	< 13 U	--	< 13 U	< 6.5 U	< 0.65 U	< 200 U	1.8 J	0.76 J	0.19 J	0.099 J	< 0.16 U	< 0.79 U	< 6.5 U	< 16 U	< 16 U	< 0.33 U	< 0.11 U	< 0.11 U
M,P-Xylene (Sum Of Isomers)	5	µg/L	--	< 7.8 U	< 16 U	--	< 16 U	< 7.8 U	< 0.78 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl Acetate	NSL	µg/L	< 0.45 U	< 8.0 U	< 16 U	--	< 16 U	< 8.0 U	< 0.80 U	--	--	--	--	--	--	< 0.5 U	< 19 U	< 10 U	< 10 U	< 0.58 U	< 0.45 U	< 0.45 U
Methyl Ethyl Ketone (2-Butanone)	50	µg/L	< 1.6 U	< 27 U	< 55 U	--	< 55 U	< 27 U	< 2.7 U	< 400 U	< 1.1 U	< 12 U	< 2.3 U	< 2.3 U	< 4.6 R	2 J	< 29 U	< 26 U	< 26 U	< 2.6 U	< 1.6 U	< 1.6 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NSL	µg/L	< 1.3 U	< 49 U	< 97 U	--	< 97 U	< 49 U	< 4.9 U	< 400 U	< 0.38 U	< 5 U	< 0.99 U	< 0.99 U	< 2 U	< 2.1 U	< 16 U	< 42 U	< 42 U	< 0.81 U	< 1.3 U	< 1.3 U
Methylcyclohexane	NSL	µg/L	< 0.24 U	< 6.0 U	< 12 U	--	< 12 U	< 6.0 U	< 0.60 U	--	--	--	--	--	--	< 0.16 U	< 6.5 U	< 3.2 U	< 3.2 U	< 0.09 U	< 0.24 U	< 0.24 U
Methylene Chloride	5	µg/L	< 0.23 U	< 10 U	< 20 U	--	< 20 U	< 10 U	< 1.0 U	**88 JB**	< 0.78 U	< 0.9 U	< 0.18 U	< 0.18 U	< 0.36 U	< 0.44 U	< 17 U	< 8.8 U	< 8.8 U	< 1 U	< 0.23 U	< 0.23 U
M-P-Xylene	5	µg/L	< 0.46 U	--	--	--	--	--	--	< 200 U	< 1.7 U	< 1.3 U	< 0.25 U	< 0.25 U	< 0.5 U	--	--	--	--	--	< 0.46 U	< 0.46 U
Naphthalene	10	µg/L	< 0.24 U	--	--	--	--	--	--	**34 J**	< 0.34 U	< 1.5 U	< 0.29 U	< 0.29 U	< 0.58 U	--	--	--	--	--	< 0.24 U	< 0.24 U
N-Butylbenzene	5	µg/L	< 0.15 U	--	--	--	--	--	--	< 200 U	< 0.67 U	< 0.7 U	< 0.14 U	< 0.14 U	< 0.28 U	--	--	--	--	--	< 0.15 U	< 0.15 U
N-Propylbenzene	5	µg/L	< 0.086 U	--	--	--	--	--	--	< 200 U	< 0.62 U	< 0.5 U	< 0.1 U	< 0.1 U	< 0.2 U	--	--	--	--	--	< 0.086 U	< 0.086 U
O-Xylene (1,2-Dimethylbenzene)	5	µg/L	< 0.23 U	< 5.9 U	< 12 U	--	< 12 U	< 5.9 U	< 0.59 U	< 200 U	2.9 J	< 0.65 U	< 0.13 U	< 0.13 U	< 0.26 U	--	--	--	--	--	< 0.23 U	< 0.23 U
Sec-Butylbenzene	5	µg/L	< 0.11 U	--	--	--	--	--	--	< 200 U	1.8 J	0.96 J	0.63 J	0.28 J	< 0.36 U	--	--	--	--	--	< 0.11 U	< 0.11 U
Styrene	5	µg/L	< 0.11 U	< 4.9 U	< 9.7 U	--	< 9.7 U	< 4.9 U	< 0.49 U	< 200 U	< 0.64 U	< 0.6 U	< 0.12 U	< 0.12 U	< 0.24 U	< 0.73 U	< 5.5 U	< 15 U	< 15 U	< 0.28 U	< 0.11 U	< 0.11 U
T-Butylbenzene	5	µg/L	< 0.13 U	--	--	--	--	--	--	< 200 U	0.89 J	1.3 J	1.4	0.76 J	0.62 J	--	--	--	--	--	< 0.13 U	< 0.13 U
Tert-Butyl Alcohol	NSL	µg/L	< 4.7 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 4.7 U	< 4.7 U
Tert-Butyl Methyl Ether	10	µg/L	< 0.17 U	< 5.1 U	< 10 U	--	< 10 U	< 5.1 U	< 0.51 U	< 200 U	< 0.17 U	< 0.7 U	< 0.14 U	< 0.14 U	< 0.28 U	< 0.16 U	< 8.5 U	< 3.2 U	< 3.2 U	< 0.17 U	< 0.17 U	< 0.17 U
Tetrachloroethylene (PCE)	5	µg/L	1.8	< 5.6 U	< 11 U	--	< 11 U	< 5.6 U	< 0.56 U	**970 B**	**7800**	**870**	**150**	**400**	**510**	**11**	**380**	**290**	**630**	**58**	4.9	**36**
Tetrahydrofuran	NSL	µg/L	< 0.49 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.49 U	< 0.49 U
Toluene	5	µg/L	0.29 J	< 4.9 U	< 9.8 U	--	< 9.8 U	< 4.9 U	< 0.49 U	< 200 U	1.5 J	< 0.75 U	< 0.15 U	< 0.15 U	< 0.3 U	< 0.51 U	< 6.5 U	< 10 U	< 10 U	< 0.17 U	< 0.22 U	< 0.22 U
Trans-1,2-Dichloroethene	5	µg/L	1	**71.2**	**178**	--	**129**	**92.5**	**6.0**	< 200 U	< 190 U	**35**	4.6	**14**	0.39 J	< 0.9 U	**28 J**	< 18 U	**27**	0.32 J	< 0.17 U	0.3 J
Trans-1,3-Dichloropropene	0.4	µg/L	< 0.17 U	< 4.3 U	< 8.6 U	--	< 8.6 U	< 4.3 U	< 0.43 U	< 200 U	< 0.57 U	< 1.2 U	< 0.24 U	< 0.24 U	< 0.48 U	< 0.37 U	< 9.5 U	< 7.4 U	< 7.4 U	< 0.17 U	< 0.17 U	< 0.17 U
Trans-1,4-Dichloro-2-Butene	5	µg/L	< 1.6 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.6 U	< 1.6 U
Trichloroethylene (TCE)	5	µg/L	0.67 J	< 5.3 U	< 11 U	--	< 11 U	< 5.3 U	< 0.53 U	**1200**	**4400**	**910**	**65**	**190**	**19**	< 0.46 U	**210**	**150**	**460**	**22**	1.6	**5.5**
Trichlorofluoromethane	5	µg/L	< 0.18 U	< 4.0 U	< 8.0 U	--	< 8.0 U	< 4.0 U	< 0.40 U	< 200 U	< 1.1 U	< 0.75 U	< 0.15 U	< 0.15 U	< 0.3 U	< 0.88 U	< 11 U	< 18 U	< 18 U	< 0.21 UT	< 0.18 U	< 0.18 U
Vinyl Acetate	NSL	µg/L	--	--	--	--	--	--	--	< 200 U	< 1.6 U	< 1.9 U	< 0.38 U	< 0.38 UH	< 0.76 U	--	--	--	--	--	--	--
Vinyl Chloride	2	µg/L	1.5 J	**279**	**235**	--	**162**	**499**	**16.8**	**210**	**460 J**	**310**	**21**	**21**	< 0.28 U	< 0.9 U	< 11 U	**32**	**82**	**8.3**	< 0.21 U	**2.2**
Xylenes	5	µg/L	--	< 5.9 U	< 12 U	--	< 12 U	< 5.9 U	< 0.59 U	< 200 U	2.9 J	< 1.8 U	< 0.36 U	< 0.36 U	< 0.72 U	< 0.66 U	< 7 U	< 13 U	< 13 U	< 0.58 U	--	--
Xylenes, Total	NSL	µg/L	--	--	--	--	--	--	--	< 200 U	2.9 J	< 1.8 U	< 0.36 U	< 0.36 U	< 0.72 U	< 0.66 U	< 7 U	< 13 U	< 13 U	< 0.58 U	--	--
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)																						
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	NSL	ng/L	--	< 1.7 U	< 1.9 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	NSL	ng/L	--	< 1.4 U	< 1.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	NSL	ng/L	--	< 2.1 U	< 2.4 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	NSL	ng/L	--	< 0.85 U	< 0.96 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	NSL	ng/L	--	< 6.7 U	< 7.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3-Perfluoroheptyl propanoic acid (7:3FTCA)	NSL	ng/L	--	< 5.8 U	< 6.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3-Perfluoropropyl propanoic acid (3:3 FTCA)	NSL	ng/L	--	< 2.3 U	< 2.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NSL	ng/L	--	< 1.1 U	< 1.3 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	NSL	ng/L	--	< 2.3 U	< 2.6 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NSL	ng/L	--	< 1.7 U	< 1.9 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	NSL	ng/L	--	< 0.50 U	< 0.56 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NSL	ng/L	--	< 0.85 U	< 0.96 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	NSL	ng/L	--	< 3.5 U	< 3.9 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamide (NMeFOSA)	NSL	ng/L	--	< 0.60 U	< 0.67 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NSL	ng/L	--	1.1 J	< 0.54 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	NSL	ng/L	--	< 2.6 U	< 2.9 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NSL	ng/L	--	< 1.2 U	< 1.3 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NSL	ng/L	--	< 0.25 U	< 0.28 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluoro-3-methoxypropanoic acid (PFMPA)	NSL	ng/L	--	< 0.28 U	< 0.32 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluoro-4-methoxybutanoic acid (PFMBA)	NSL	ng/L	--	< 0.52 U	< 0.59 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluorobutanesulfonic acid (PFBS)	NSL	ng/L	--	4.9	3.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	--	--
Perfluorobutanoic Acid	NSL	ng/L	--	7.9	5.1 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	26	--	--
Perfluorodecanesulfonic acid (PFDS)	NSL	ng/L	--	< 1.0 U	< 1.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.35 U	--	--
Perfluorodecanoic acid (PFDA)	NSL	ng/L	--	1.2 J	< 0.65 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	87	--	--
Perfluorododecanesulfonic acid (PFDoS)	NSL	ng/L	--	< 0.37 U	< 0.42 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluorododecanoic acid (PFDoA)	NSL	ng/L	--	< 0.72 U	< 0.81 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.4	--	--
Perfluoroheptanesulfonic acid (PFHpS)	NSL	ng/L	--	< 0.92 U	< 1.0 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.7	--	--
Perfluoroheptanoic acid (PFHpA)	NSL	ng/L	--	6.6	4.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	48	--	--
Perfluorohexanesulfonic acid (PFHxS)	NSL	ng/L	--	4	3.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8.8 B	--	--
Perfluorohexanoic acid (PFHxA)	NSL	ng/L	--	8.5	6.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	66	--	--
Perfluorononanesulfonic Acid (PFNS)	NSL	ng/L	--	< 1.3 U	< 1.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluorononanoic acid (PFNA)	NSL	ng/L	--	2.8	2.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	29	--	--
Perfluorooctane Sulfonamide (PFOSA)	NSL	ng/L	--	0.94 J	< 0.73 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.5 B	--	--
Perfluorooctanesulfonic acid (PFOS)	2.7	ng/L	--	**68.4**	**48.1**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**480**	--	--
Perfluorooctanoic acid (PFOA)	6.7	ng/L	--	**26.1**	**19.7**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**110**	--	--
Perfluoropentanesulfonic Acid (PFPeS)	NSL	ng/L	--	1.3 J	< 1.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perfluoropentanoic Acid (PFPeA)	NSL	ng/L	--	7.8	5.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	74	--	--
Perfluorotetradecanoic acid (PFTeDA)	NSL	ng/L	--	< 0.71 U	< 0.80 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.32 U	--	--
Perfluorotridecanoic Acid (PFTriA/PFTrDA)	NSL	ng/L	--	< 0.74 U	< 0.83 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.4 U	--	--
Perfluoroundecanoic Acid (PFUnA)	NSL	ng/L	--	< 0.51 U	< 0.58 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7.6	--	--

Notes:

[1]NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)

--' = Not analyzed
µg/L = Mircogram(s) per liter
ng/L - Nanogram(s) per liter
B = Analyte detected in blank, as well as sample
D = Compound in analysis has been diluted
J = Concentration is estimated
NSL = No screening level available
U = Analyte not detected
R = Reported result unusable
VOCs = Volatile organic compounds
PFAS = Per- and polyfluoroalkyl substances
Concentrations exceeding the screening level are bolded and shaded gray

Location ID		MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-22RD	MW-22RD	MW-22RD	MW-22RD	MW-22RD	MW-22RD	MW-22RD	MW-22RD	MW-22RD	MW-22RD	MW-22RD	MW-22RD	MW-22RD
Sample Name		130054-MW-21S-12052023	MW-21S-031820224	MW-21S-03192024	130054-MW-21S-06252024	130054-MW-21S-091820241	130054-MW-21S-20241125	MW-22RD	MW-22RD-101413	MW-22RD-112113	MW-22RD-20170321	MW-22RD-011414	MW-22RD-070914	MW-22RD	MW-X MW-22RD-20170321	MW-22RD	MW-22(R)D	MW-22RD-060822	MW-22RD-09262022	MW-22RD-MW-Y-09262022 MW-22RD-09262022
Parent Sample Name																				
Sample Date		12/5/2023	3/18/2024	3/19/2024	6/25/2024	9/18/2024	11/25/2024	8/27/2013	10/14/2013	11/21/2013	1/14/2014	1/14/2014	7/9/2014	3/21/2017	3/21/2017	11/3/2017	12/5/2019	6/8/2022	9/26/2022	9/26/2022
Analyte	NYSDEC AWQS[1]	Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)																				
1,1,1,2-Tetrachloroethane	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.8 U	< 1.8 U	< 1.8 U
1,1,1-Trichloroethane (TCA)	5	µg/L	< 0.54 U	< 0.54 U	--	< 0.54 U	< 0.54 U	< 0.54 U	< 41 U	< 28 U	< 41 U	< 41 U	< 41 U	< 41 U	--	--	< 3.8 U	< 1.2 U	< 1.7 U	< 1.7 U
1,1,2,2-Tetrachloroethane	5	µg/L	< 0.65 U	< 0.65 U	--	< 0.65 U	< 0.65 U	< 0.65 U	< 11 U	< 23 U	< 11 U	< 11 U	< 11 U	< 11 U	--	--	< 3.8 U	< 1.8 U	< 1.3 U	< 1.3 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	µg/L	< 0.58 U	< 0.58 U	--	< 0.58 U	< 0.58 U	< 0.58 U	< 16 U	< 35 U	< 16 U	< 16 U	< 16 U	< 16 U	--	--	< 3 U	< 1.6 U	< 2.3 U	< 2.3 U
1,1,2-Trichloroethane	1	µg/L	< 0.53 U	< 0.53 U	--	< 0.53 U	< 0.53 U	< 0.53 U	< 12 U	< 34 U	< 12 U	< 12 U	< 12 U	< 12 U	--	--	< 3.8 U	< 2.2 U	< 1.8 U	< 1.8 U
1,1-Dichloroethane	5	µg/L	< 0.57 U	< 0.57 U	--	< 0.57 U	< 0.57 U	< 0.57 U	< 19 U	< 19 U	< 19 U	< 19 U	< 19 U	< 19 U	--	--	< 4.8 U	< 1.3 U	< 1.4 U	< 1.4 U
1,1-Dichloroethene	5	µg/L	< 0.59 U	< 0.59 U	--	< 0.59 U	< 0.59 U	1.1	< 15 U	< 24 U	< 15 U	< 15 U	< 15 U	< 15 U	--	--	< 5 U	< 1.3 U	< 1.4 U	1.8 JD
1,1-Dichloropropene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.5 U	< 1.5 U
1,2,3-Trichlorobenzene	5	µg/L	< 0.50 U	< 0.50 U	--	< 0.50 U	< 0.50 U	< 0.50 U	--	--	--	--	--	--	--	--	--	--	< 3 U	< 3 U
1,2,3-Trichloropropane	0.04	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.8 U	< 2.8 U
1,2,4-Trichlorobenzene	5	µg/L	< 0.50 U	< 0.50 U	--	< 0.50 U	< 0.50 U	< 0.50 U	< 21 U	< 19 U	< 21 U	< 21 U	< 21 U	< 21 U	--	--	< 4 U	< 1.8 U	< 2.5 U	< 2.5 U
1,2,4-Trimethylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2 U	< 2 U
1,2-Dibromo-3-Chloropropane	0.04	µg/L	< 0.53 U	< 0.53 U	--	< 0.53 U	< 0.53 U	< 0.53 U	< 20 U	< 84 U	< 20 U	< 20 U	< 20 U	< 20 U	--	--	< 19 U	< 1.9 U	< 8 U	< 8 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	µg/L	< 0.48 U	< 0.48 U	--	< 0.48 U	< 0.48 U	< 0.48 U	< 37 U	< 30 U	< 37 U	< 37 U	< 37 U	< 37 U	--	--	< 4.2 U	< 2.5 U	< 1.7 U	< 1.7 U
1,2-Dichlorobenzene	3	µg/L	< 0.53 U	< 0.53 U	--	< 0.53 U	< 0.53 U	< 0.53 U	< 40 U	< 16 U	< 40 U	< 40 U	< 40 U	< 40 U	--	--	< 3.8 U	< 2.2 U	< 1.2 U	< 1.2 U
1,2-Dichloroethane	0.6	µg/L	< 0.60 U	< 0.60 U	--	< 0.60 U	< 0.60 U	< 0.60 U	< 11 U	< 28 U	< 11 U	< 11 U	< 11 U	< 11 U	--	--	< 4 U	< 2.2 U	< 3.1 U	< 3.1 U
1,2-Dichloropropane	1	µg/L	< 0.51 U	< 0.51 U	--	< 0.51 U	< 0.51 U	< 0.51 U	< 36 U	< 23 U	< 36 U	< 36 U	< 36 U	< 36 U	--	--	< 5 U	< 1.8 U	< 1.8 U	< 1.8 U
1,3,5-Trichlorobenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.1 U	< 2.1 U
1,3,5-Trimethylbenzene (Mesitylene)	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	< 1.1 U
1,3-Dichlorobenzene	3	µg/L	< 0.54 U	< 0.54 U	--	< 0.54 U	< 0.54 U	< 0.54 U	< 39 U	< 18 U	< 39 U	< 39 U	< 39 U	< 39 U	--	--	< 3.6 U	< 1.7 U	< 1.2 U	< 1.2 U
1,3-Dichloropropane	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U	< 1.3 U
1,4-Dichlorobenzene	3	µg/L	< 0.51 U	< 0.51 U	--	< 0.51 U	< 0.51 U	< 0.51 U	< 42 U	< 16 U	< 42 U	< 42 U	< 42 U	< 42 U	--	--	< 3.4 U	< 1.7 U	< 1.3 U	< 1.3 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 210 U	< 210 U
2,2-Dichloropropane	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 3.3 U	< 3.3 U
2-Chlorotoluene	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	< 1.1 U
2-Hexanone	50	µg/L	< 4.8 U	< 4.8 U	--	< 4.8 U	< 4.8 U	< 4.8 U	< 62 U	< 51 U	< 62 U	< 62 U	< 62 U	< 62 U	--	--	< 26 U	< 5.7 U	< 11 U	< 11 U
2-Methoxy-2-Methylbutane	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.4 U	< 1.4 U
4-Chlorotoluene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.2 U	< 1.2 U
Acetone	50	µg/L	< 3.1 U	< 3.1 U	--	< 3.1 U	< 3.1 U	< 3.1 U	< 150 U	< 140 U	< 150 U	< 150 U	< 150 U	< 150 U	--	--	< 53 U	< 22 U	< 20 U	< 20 U
Acrylonitrile	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 5.5 U	< 5.5 U
Benzene	1	µg/L	< 0.43 U	< 0.43 U	--	< 0.43 U	< 0.43 U	< 0.43 U	< 21 U	< 16 U	< 21 U	< 21 U	< 21 U	< 21 U	--	--	< 4 U	< 1 U	< 2 U	< 2 U
Bromobenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.5 U	< 1.5 U
Bromochloromethane	5	µg/L	< 0.48 U	< 0.48 U	--	< 0.48 U	< 0.48 U	< 0.48 U	--	--	--	--	--	--	--	--	--	--	< 3.1 U	< 3.1 U
Bromodichloromethane	50	µg/L	< 0.45 U	< 0.45 U	--	< 0.45 U	< 0.45 U	< 0.45 U	< 20 U	< 19 U	< 20 U	< 20 U	< 20 U	< 20 U	--	--	< 3.4 U	< 1.7 U	< 1.8 U	< 1.8 U
Bromoform	50	µg/L	< 0.63 U	< 0.63 U	--	< 0.63 U	< 0.63 U	< 0.63 U	< 13 U	< 80 U	< 13 U	< 13 U	< 13 U	< 13 U	--	--	< 5.8 U	< 2.7 UT	< 3.8 U	< 3.8 U
Bromomethane	5	µg/L	< 1.6 U	< 1.6 U	--	< 1.6 U	< 1.6 U	< 1.6 U	< 35 U	< 51 U	< 35 U	< 35 U	< 35 U	< 35 U	--	--	< 7 U	< 2.8 U	< 15 U	< 15 U
Carbon Disulfide	60	µg/L	< 1.8 U	< 1.8 U	--	< 1.8 U	< 1.8 U	< 1.8 U	< 9.5 U	< 16 U	< 9.5 U	< 9.5 U	< 9.5 U	< 9.5 U	--	--	< 4.4 U	< 4.1 U	< 14 U	< 14 U
Carbon Tetrachloride	5	µg/L	< 0.55 U	< 0.55 U	--	< 0.55 U	< 0.55 U	< 0.55 U	< 14 U	< 16 U	< 14 U	< 14 U	< 14 U	< 14 U	--	--	< 3.6 U	< 1 U	< 1.6 U	< 1.6 U
Chlorobenzene	5	µg/L	< 0.56 U	< 0.56 U	--	< 0.56 U	< 0.56 U	< 0.56 U	< 38 U	< 19 U	< 38 U	< 38 U	< 38 U	< 38 U	--	--	< 3.6 U	< 1.9 U	< 1.1 U	< 1.1 U
Chloroethane	5	µg/L	< 0.73 U	< 0.73 U	--	< 0.73 U	< 0.73 U	< 0.73 U	< 16 U	< 36 U	< 16 U	< 16 U	< 16 U	< 16 U	--	--	< 7.2 U	< 1.6 U	< 3.2 U	< 3.2 U
Chloroform	7	µg/L	< 0.50 U	< 0.50 U	--	< 0.50 U	< 0.50 U	< 0.50 U	< 17 U	< 20 U	< 17 U	< 17 U	< 17 U	< 17 U	--	--	< 4.6 U	< 1.6 U	< 1.7 U	< 1.7 U
Chloromethane (Methyl Chloride)	5	µg/L	< 0.76 U	< 0.76 U	--	< 0.76 U	< 0.76 U	< 0.76 U	< 18 U	< 38 U	< 18 U	< 18 U	< 18 U	< 18 U	--	--	< 7.2 U	< 2 UT	< 5.2 U	< 5.2 U
Cis-1,2-Dichloroethylene	5	µg/L	**8.2**	4.2	--	4.8	3.6	**1400**	**4800**	**2800**	**3200**	**3600**	**3200**	< 18 U	--	--	**2200**	**1300**	**1300 D**	**1200 D**
Cis-1,3-Dichloropropene	0.4	µg/L	< 0.47 U	< 0.47 U	--	< 0.47 U	< 0.47 U	< 18 U	< 18 U	< 18 U	< 18 U	< 18 U	< 18 U	< 18 U	--	--	< 3.4 U	< 1.1 U	< 1.6 U	< 1.6 U
Cyclohexane	NSL	µg/L	< 0.78 U	< 0.78 U	--	< 0.78 U	< 0.78 U	< 0.78 U	< 9 U	< 15 U	< 9 U	< 9 U	< 9 U	< 9 U	--	--	4.7 J	< 1.6 U	--	--
Cymene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.97 U	< 0.97 U
Dibromochloromethane	50	µg/L	< 0.56 U	< 0.56 U	--	< 0.56 U	< 0.56 U	< 0.56 U	< 16 U	< 23 U	< 16 U	< 16 U	< 16 U	< 16 U	--	--	< 5 U	< 1.4 U	< 2.2 U	< 2.2 U
Dibromomethane	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 3.5 U	< 3.5 U
Dichlorodifluoromethane	5	µg/L	< 0.56 U	< 0.56 U	--	< 0.56 U	< 0.56 U	< 0.56 U	< 34 U	< 39 U	< 34 U	< 34 U	< 34 U	< 34 U	--	--	< 3.4 UT	< 1.6 U	< 1.9 U	< 1.9 U
Diethyl Ether (Ethyl Ether)	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.8 U	< 1.8 U
Ethyl Tert-Butyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.5 U	< 1.5 U
Ethylbenzene	5	µg/L	< 0.60 U	< 0.60 U	--	< 0.60 U	< 0.60 U	< 0.60 U	< 37 U	< 21 U	< 37 U	< 37 U	< 37 U	< 37 U	--	--	< 3.8 U	< 1.5 U	< 2.1 U	< 2.1 U
Hexachlorobutadiene	0.5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 4.6 U	< 4.6 U
Iodomethane (Methyl Iodide)	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U	< 1.3 U
Isopropylbenzene (Cumene)	5	µg/L	< 0.65 U	< 0.65 U	--	< 0.65 U	< 0.65 U	< 0.65 U	< 40 U	< 16 U	< 40 U	< 40 U	< 40 U	< 40 U	--	--	< 6.6 U	< 1.7 U	< 1.1 U	< 1.1 U
M,P-Xylene (Sum Of Isomers)	5	µg/L	< 0.78 U	< 0.78 U	--	< 0.78 U	< 0.78 U	< 0.78 U	--	--	--	--	--	--	--	--	--	--	--	--
Methyl Acetate	NSL	µg/L	< 0.80 U	< 0.80 U	--	< 0.80 U	< 0.80 U	< 0.80 U	< 25 U	< 48 U	< 25 U	< 25 U	< 25 U	< 25 U	--	--	< 12 U	< 3.9 U	< 4.5 U	< 4.5 U
Methyl Ethyl Ketone (2-Butanone)	50	µg/L	< 2.7 U	< 2.7 U	--	< 2.7 U	< 2.7 U	< 2.7 U	< 66 U	< 71 U	< 66 U	< 66 U	< 66 U	< 66 U	--	--	< 53 U	< 9.3 U	< 16 U	< 16 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NSL	µg/L	< 4.9 U	< 4.9 U	--	< 4.9 U	< 4.9 U	< 4.9 U	< 110 U	< 40 U	< 110 U	< 110 U	< 110 U	< 110 U	--	--	< 16 U	< 6.5 U	< 13 U	< 13 U
Methylcyclohexane	NSL	µg/L	< 0.60 U	< 0.60 U	--	< 0.60 U	< 0.60 U	2.2 J	< 8 U	< 16 U	< 8 U	< 8 U	< 8 U	< 8 U	--	--	< 1.8 U	< 1.3 U	< 2.4 U	< 2.4 U
Methylene Chloride	5	µg/L	< 1.0 U	< 1.0 U	--	< 1.0 U	< 1.0 U	< 1.0 U	< 22 U	< 41 U	< 22 U	< 22 U	< 22 U	< 22 U	--	--	**33 BJ**	< 1.6 U	< 2.3 U	< 2.3 U
M-P-Xylene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 4.6 U	< 4.6 U
Naphthalene	10	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.4 U	< 2.4 U
N-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.5 U	< 1.5 U
N-Propylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.86 U	< 0.86 U
O-Xylene (1,2-Dimethylbenzene)	5	µg/L	< 0.59 U	< 0.59 U	--	< 0.59 U	< 0.59 U	< 0.59 U	--	--	--	--	--	--	--	--	--	--	< 2.3 U	< 2.3 U
Sec-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	< 1.1 U
Styrene	5	µg/L	< 0.49 U	< 0.49 U	--	< 0.49 U	< 0.49 U	< 0.49 U	< 37 U	< 14 U	< 37 U	< 37 U	< 37 U	< 37 U	--	--	< 5.6 U	< 2.1 U	< 1.1 U	< 1.1 U
T-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U	< 1.3 U
Tert-Butyl Alcohol	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 47 U	< 47 U
Tert-Butyl Methyl Ether	10	µg/L	< 0.51 U	< 0.51 U	--	< 0.51 U	< 0.51 U	< 0.51 U	< 8 U	< 21 U	< 8 U	< 8 U	< 8 U	< 8 U	--	--	< 3.4 U	< 2.3 U	< 1.7 U	< 1.7 U
Tetrachloroethylene (PCE)	5	µg/L	**6.2**	**44**	--	2.3	2.0	**49.5**	< 18 U	< 36 U	< 18 U	< 18 U	< 18 U	< 18 U	--	--	< 2.8 U	**39**	< 1.9 U	< 1.9 U
Tetrahydrofuran	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 4.9 U	< 4.9 U	< 4.9 U
Toluene	5	µg/L	< 0.49 U	< 0.49 U	--	< 0.49 U	< 0.49 U	< 0.49 U	< 26 U	< 16 U	< 26 U	< 26 U	< 26 U	< 26 U	--	--	< 3.4 U	< 1.9 U	< 2.2 U	< 2.2 U
Trans-1,2-Dichloroethene	5	µg/L	< 0.54 U	< 0.54 U	--	< 0.54 U	< 0.54 U	**5.6**	< 45 U	< 24 U	< 45 U	< 45 U	< 45 U	< 45 U	--	--	**33**	**7**	**8.4 JD**	**9.7 JD**
Trans-1,3-Dichloropropene	0.4	µg/L	< 0.43 U	< 0.43 U	--	< 0.43 U	< 0.43 U	< 0.43 U	< 19 U	< 24 U	< 19 U	< 19 U	< 19 U	< 19 U	--	--	< 3.4 U	< 2.4 U	< 1.7 U	< 1.7 U
Trans-1,4-Dichloro-2-Butene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 16 U	< 16 U
Trichloroethylene (TCE)	5	µg/L	1.6	1.2	--	0.89 J	0.65	**53.7**	< 23 U	< 21 U	< 23 U	< 23 U	< 23 U	< 23 U	--	--	< 4 U	**65**	< 1.9 U	< 1.9 U
Trichlorofluoromethane	5	µg/L	< 0.40 U	< 0.40 U	--	< 0.40 U	< 0.40 UJ	< 0.40 U	< 44 U	< 26 U	< 44 U	< 44 U	< 44 U	< 44 U	--	--	< 4.2 U	< 1.6 U	< 1.8 U	< 1.8 U
Vinyl Acetate	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	2	µg/L	< 0.52 U	< 0.52 U	--	< 0.52 U	< 0.52 U	**62.2**	< 45 U	**56 J**	**52**	< 45 U	**68**	--	--	--	**66**	--	**92 D**	**210 D**
Xylenes	5	µg/L	< 0.59 U	< 0.59 U	--	< 0.59 U	< 0.59 U	< 0.59 U	< 33 U	< 18 U	< 33 U	< 33 U	< 33 U	< 33 U	--	--	< 12 U	< 3.3 U	--	--
Xylenes, Total	NSL	µg/L	--	--	--	--	--	--	< 33 U	< 18 U	< 33 U	< 33 U	< 33 U	< 33 U	--	--	< 12 U	--	--	--
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)																				
11-Chloroicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	NSL	ng/L	< 1.7 U	< 1.9 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.7 U
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	NSL	ng/L	< 1.4 U	< 1.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.4 U
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	NSL	ng/L	< 2.1 U	< 2.4 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.1 U
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	NSL	ng/L	< 0.85 U	< 0.95 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.86 U
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	NSL	ng/L	< 6.7 U	< 7.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 6.7 U
3-Perfluoroheptyl propanoic acid (7:3FTCA)	NSL	ng/L	< 5.8 U	< 6.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 5.8 U
3-Perfluoropropyl propanoic acid (3:3 FTCA)	NSL	ng/L	< 2.3 U	< 2.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.3 U
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NSL	ng/L	< 1.2 U	< 1.3 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.2 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	NSL	ng/L	< 2.3 U	< 2.6 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.3 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NSL	ng/L	< 1.7 U	< 1.9 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.7 U
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	NSL	ng/L	< 0.50 U	< 0.56 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.50 U
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NSL	ng/L	< 0.85 U	< 0.95 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.86 U
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	NSL	ng/L	< 3.5 U	< 3.9 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 3.5 U
N-methyl perfluorooctanesulfonamide (NMeFOSA)	NSL	ng/L	< 0.60 U	< 0.67 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.60 U
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NSL	ng/L	0.72 J	1 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.1 J
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	NSL	ng/L	< 2.6 U	< 2.9 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.6 U
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NSL	ng/L	< 1.2 U	< 1.3 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.2 U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NSL	ng/L	< 0.25 U	< 0.28 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.25 U
Perfluoro-3-methoxypropanoic acid (PFMPA)	NSL	ng/L	< 0.28 U	< 0.31 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.28 U
Perfluoro-4-methoxybutanoic acid (PFMBA)	NSL	ng/L	< 0.52 U	< 0.59 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.53 U
Perfluorobutanesulfonic acid (PFBS)	NSL	ng/L	4.9	1.4 J	--	--	--	--	--	--	--	--	--	5.8	5.66	7.4	--	--	4.9	2.3
Perfluorobutanoic Acid	NSL	ng/L	10.3	6.1 J	--	--	--	--	--	--	--	--	--	--	--	20	--	--	9.1	4.8 J
Perfluorodecanesulfonic acid (PFDS)	NSL	ng/L	< 1.0 U	< 1.1 U	--	--	--	--	--	--	--	--	--	--	--	< 0.31 U	--	--	< 1.0 U	< 1.2 U
Perfluorodecanoic acid (PFDA)	NSL	ng/L	0.9 J	1.2 J	--	--	--	--	--	--	--	--	--	--	--	1.2 J	--	--	1.5 J	0.98 J
Perfluorododecanesulfonic acid (PFDoS)	NSL	ng/L	< 0.37 U	< 0.42 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.38 U	< 0.44 U
Perfluorododecanoic acid (PFDoA)	NSL	ng/L	< 0.72 U	< 0.81 U	--	--	--	--	--	--	--	--	--	--	--	< 0.53 U	--	--	< 0.73 U	< 0.84 U
Perfluoroheptanesulfonic acid (PFHpS)	NSL	ng/L	< 0.92 U	< 1.0 U	--	--	--	--	--	--	--	--	--	--	--	1 J	--	--	< 0.92 U	< 1.1 U
Perfluoroheptanoic acid (PFHpA)	NSL	ng/L	10	2.6	--	--	--	--	--	--	--	--	--	7.49	7.46	8.2	--	--	5.1	3.3
Perfluorohexanesulfonic acid (PFHxS)	NSL	ng/L	5	2.1	--	--	--	--	--	--	--	--	--	6.49	6.35	6.1 B	--	--	3.5	1.9 J
Perfluorohexanoic acid (PFHxA)	NSL	ng/L	12.5	3.3	--	--	--	--	--	--	--	--	--	--	--	10	--	--	7.6	3.9
Perfluorononanesulfonic Acid (PFNS)	NSL	ng/L	< 1.3 U	< 1.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.4 U	< 1.6 U
Perfluorononanoic acid (PFNA)	NSL	ng/L	3.9	1.2 J	--	--	--	--	--	--	--	--	--	3.31	3.34	3	--	--	2.5	1.3 J
Perfluorooctane Sulfonamide (PFOSA)	NSL	ng/L	< 0.65 U	< 0.72 U	--	--	--	--	--	--	--	--	--	--	--	1.1 BJ	--	--	< 0.65 U	< 0.76 U
Perfluorooctanesulfonic acid (PFOS)	2.7	ng/L	**47.4**	**43.9**	--	--	--	--	--	--	--	--	--	**88.8**	**89.2**	**86**	--	--	**62.8**	**49.1**
Perfluorooctanoic acid (PFOA)	6.7	ng/L	**32.1**	**8**	--	--	--	--	--	--	--	--	--	**35.7**	**35.3**	**42**	--	--	**19.4**	**13.2**
Perfluoropentanesulfonic Acid (PFPeS)	NSL	ng/L	1.5 J	< 1.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.6 J	< 1.1 U
Perfluoropentanoic Acid (PFPeA)	NSL	ng/L	13.5	4.1 J	--	--	--	--	--	--	--	--	--	--	--	17	--	--	7.3	5.6
Perfluorotetradecanoic acid (PFTeDA)	NSL	ng/L	< 0.71 U	< 0.80 U	--	--	--	--	--	--	--	--	--	--	--	< 0.28 U	--	--	< 0.72 U	< 0.83 U
Perfluorotridecanoic Acid (PFTrDA/PFTriDA)	NSL	ng/L	< 0.74 U	< 0.83 U	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U	--	--	< 0.75 U	< 0.87 U
Perfluoroundecanoic Acid (PFUnA)	NSL	ng/L	< 0.51 U	< 0.58 U	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	--	--	< 0.52 U	< 0.60 U

Notes:

[1]NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)

--' = Not analyzed
µg/L = Microgram(s) per liter
ng/L - Nanogram(s) per liter
B = Analyte detected in blank, as well as sample
D = Compound in analysis has been diluted
J = Concentration is estimated
NSL = No screening level available
U = Analyte not detected
R = Reported result unusable
VOCs = Volatile organic compounds
PFAS = Per- and polyfluoroalkyl substances
Concentrations exceeding the screening level are bolded and shaded gray

		Location	MW-22RD	MW-22RD	MW-22RD	MW-22RD	MW-22RD	MW-22RS	MW-22RS	MW-22RS	MW-22RS	MW-22RS	MW-22RS	MW-22RS	MW-22RS	MW-22RS	MW-22RS	MW-22RS	MW-22RS	MW-22RS	MW-23D	MW-23D
		Sample Name	130054-MW-22RD-06252024	130054-MW-22RD-09182024	130054-DUP02-09182024	130054-MW-22RD-20241125	130054-DUP-20241125	MW-22RS	MW-22RS-101413	MW-22RS-112113	MW-22(R)S 011614	MW-22RS_070914	MW-22RS	MW-22RS-06082022	MW-22RS-09232022	130054-MW-22RS-12052023	MW-22RS-03182024	130054-MW-22RS-06252024	130054-MW-22RS-09182024	130054-MW-22RS-20241125	MW-23D_06202011	MW-23D_09162011
		Parent Sample Name			130054-MW-22RD-20240918		130054-MW-22RD-20241125															
		Sample Date	6/25/2024	9/18/2024	9/18/2024	11/25/2024	11/25/2024	8/27/2013	10/14/2013	11/21/2013	1/16/2014	7/9/2014	11/2/2017	6/8/2022	9/23/2022	12/5/2023	3/18/2024	6/25/2024	9/18/2024	11/25/2024	6/20/2011	9/16/2011
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)																						
1,1,1,2-Tetrachloroethane	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 1.8 U	< 1.8 U	--	--	--	--	--	< 100 U	< 0.93 U
1,1,1-Trichloroethane (TCA)	5	µg/L	< 0.54 U	< 2.7 U	< 2.1 U	< 2.1 U	< 0.54 U	< 33 U	< 18 U	< 33 U	< 8.2 U	< 8.2 U	< 0.19 U	< 1.7 U	< 1.7 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 100 U	< 0.69 U
1,1,2,2-Tetrachloroethane	5	µg/L	< 0.65 U	< 3.3 U	< 2.6 U	< 2.6 U	< 0.65 U	< 8.4 U	< 15 U	< 8.4 U	< 2.1 U	< 2.1 U	< 0.19 U	< 1.3 U	< 1.3 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 100 U	< 0.81 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	µg/L	< 0.58 U	< 2.9 U	< 2.3 U	< 2.3 U	< 0.58 U	< 12 U	< 23 U	< 12 U	< 3.1 U	< 3.1 U	< 0.15 UT	< 2.3 U	< 2.3 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	--	--
1,1,2-Trichloroethane	1	µg/L	< 0.53 U	< 2.7 U	< 2.1 U	< 2.1 U	< 0.53 U	< 9.2 U	< 22 U	< 9.2 U	< 2.3 U	< 2.3 U	< 0.19 U	< 1.8 U	< 1.8 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 100 U	< 0.65 U
1,1-Dichloroethane	5	µg/L	< 0.57 U	< 2.8 U	< 2.3 U	< 2.3 U	< 0.57 U	< 15 U	< 12 U	< 15 U	< 3.8 U	< 3.8 U	0.36 J	< 1.4 U	< 1.4 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 100 U	< 1 U
1,1-Dichloroethene	5	µg/L	1.3	< 3.0 U	< 2.4 U	< 2.4 U	0.87 J	< 12 U	< 16 U	< 12 U	< 2.9 U	< 2.9 U	0.32 J	< 1.4 U	< 1.4 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 100 U	**7.6**
1,1-Dichloropropene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 1.5 U	< 1.5 U	--	--	--	--	--	< 100 U	< 0.82 U
1,2,3-Trichlorobenzene	5	µg/L	< 0.50 U	< 2.5 U	< 2.0 U	< 2.0 U	< 0.50 U	--	--	--	--	--	--	< 3 U	< 3 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 100 U	< 0.88 U
1,2,3-Trichloropropane	0.04	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 2.8 U	< 2.8 U	--	--	--	--	--	< 100 U	< 1.5 U
1,2,4-Trichlorobenzene	5	µg/L	< 0.50 U	< 2.5 U	< 2.0 U	< 2.0 U	< 0.50 U	< 16 U	< 12 U	< 16 U	< 4.1 U	< 4.1 U	< 0.2 U	< 2.5 U	< 2.5 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 100 U	< 0.72 U
1,2,4-Trimethylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 2 U	< 2 U	--	--	--	--	--	< 100 U	< 0.64 U
1,2-Dibromo-3-Chloropropane	0.04	µg/L	< 0.53 U	< 2.6 U	< 2.1 U	< 2.1 U	< 0.53 U	< 16 U	< 56 U	< 16 U	< 3.9 U	< 3.9 U	< 0.94 U	< 8 U	< 8 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 100 U	< 1.2 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	µg/L	< 0.48 U	< 2.4 U	< 1.9 U	< 1.9 U	< 0.48 U	< 29 U	< 20 U	< 29 U	< 7.3 U	< 7.3 U	< 0.21 U	< 1.7 U	< 1.7 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 100 U	< 0.52 U
1,2-Dichlorobenzene	3	µg/L	< 0.53 U	< 2.7 U	< 2.1 U	< 2.1 U	< 0.53 U	< 32 U	< 11 U	< 32 U	< 7.9 U	< 7.9 U	< 0.19 U	< 1.2 U	< 1.2 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 100 U	< 0.22 U
1,2-Dichloroethane	0.6	µg/L	< 0.60 U	< 3.0 U	< 2.4 U	< 2.4 U	< 0.60 U	< 8.4 U	< 18 U	< 8.4 U	< 2.1 U	< 2.1 U	0.25 J	< 3.1 U	< 3.1 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 100 U	< 0.72 U
1,2-Dichloropropane	1	µg/L	< 0.51 U	< 2.5 U	< 2.0 U	< 2.0 U	< 0.51 U	< 29 U	< 15 U	< 29 U	< 7.2 U	< 7.2 U	< 0.25 U	< 1.8 U	< 1.8 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 100 U	**1.9 J**
1,3,5-Trichlorobenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 2.1 U	< 2.1 U	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene (Mesitylene)	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	< 1.1 U	--	--	--	--	--	< 100 U	< 0.53 U
1,3-Dichlorobenzene	3	µg/L	< 0.54 U	< 2.7 U	< 2.2 U	< 2.2 U	< 0.54 U	< 31 U	< 12 U	< 31 U	< 7.8 U	< 7.8 U	< 0.18 U	< 1.2 U	< 1.2 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 100 U	< 0.14 U
1,3-Dichloropropane	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U	< 1.3 U	--	--	--	--	--	< 100 U	< 0.69 U
1,4-Dichlorobenzene	3	µg/L	< 0.51 U	< 2.5 U	< 2.0 U	< 2.0 U	< 0.51 U	< 34 U	< 11 U	< 34 U	< 8.4 U	< 8.4 U	< 0.17 U	< 1.3 U	< 1.3 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 100 U	< 0.59 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 210 U	< 210 U	--	--	--	--	--	--	--
2,2-Dichloropropane	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 3.3 U	< 3.3 U	--	--	--	--	--	< 100 U	< 0.79 U
2-Chlorotoluene	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	< 1.1 U	--	--	--	--	--	< 100 U	< 1.2 U
2-Hexanone	50	µg/L	< 4.8 U	< 24 U	< 19 U	< 19 U	< 4.8 U	< 50 U	< 34 U	< 50 U	< 12 U	< 12 U	< 1.3 U	< 11 U	< 11 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 200 U	< 1.1 U
2-Methoxy-2-Methylbutane	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 1.4 U	< 1.4 U	--	--	--	--	--	--	--
4-Chlorotoluene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 1.2 U	< 1.2 U	--	--	--	--	--	< 100 U	< 0.8 U
Acetone	50	µg/L	< 3.1 U	< 15 U	< 12 U	< 12 U	< 3.1 U	< 120 U	< 92 U	< 120 U	< 30 U	< 30 U	< 2.7 U	< 20 U	< 20 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	39 J	< 1 U
Acrylonitrile	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 5.5 U	< 5.5 U	--	--	--	--	--	--	--
Benzene	1	µg/L	0.68	< 2.1 U	< 1.7 U	< 1.7 U	0.68	< 16 U	< 11 U	< 16 U	< 4.1 U	< 4.1 U	0.47 J	< 2 U	< 2 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 100 U	**1.6 J**
Bromobenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 1.5 U	< 1.5 U	--	--	--	--	--	< 100 U	< 0.67 U
Bromochloromethane	5	µg/L	< 0.48 U	< 2.4 U	< 1.9 U	< 1.9 U	< 0.48 U	--	--	--	--	--	--	< 3.1 U	< 3.1 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 100 U	< 0.77 U
Bromodichloromethane	50	µg/L	< 0.45 U	< 2.3 U	< 1.8 U	< 1.8 U	< 0.45 U	< 16 U	< 12 U	< 16 U	< 3.9 U	< 3.9 U	< 0.17 U	< 1.8 U	< 1.8 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 100 U	< 0.48 U
Bromoform	50	µg/L	< 0.63 U	< 3.2 U	< 2.5 U	< 2.5 U	< 0.63 U	< 10 U	< 53 U	< 10 U	< 2.6 U	< 2.6 U	< 0.29 U	< 3.8 U	< 3.8 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 100 U	< 0.46 U
Bromomethane	5	µg/L	< 1.6 U	< 8.2 U	< 6.6 UJ	< 6.6 U	< 1.6 U	< 28 U	< 34 U	< 28 U	< 6.9 U	< 6.9 U	< 0.35 U	< 15 U	< 15 U	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 U	< 100 U	< 2.1 U
Carbon Disulfide	60	µg/L	< 1.8 U	< 9.0 U	< 7.2 U	< 7.2 U	< 1.8 U	< 7.6 U	< 11 U	< 7.6 U	< 1.9 U	< 1.9 U	< 0.22 U	< 14 U	< 14 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 100 U	< 0.9 U
Carbon Tetrachloride	5	µg/L	< 0.55 U	< 2.8 U	< 2.2 U	< 2.2 U	< 0.55 U	< 11 U	< 11 U	< 11 U	< 2.7 U	< 2.7 U	< 0.18 U	< 1.6 U	< 1.6 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 100 U	< 1.1 U
Chlorobenzene	5	µg/L	< 0.56 U	< 2.8 U	< 2.2 U	< 2.2 U	< 0.56 U	< 30 U	< 12 U	< 30 U	< 7.5 U	< 7.5 U	< 0.18 U	< 1.1 U	< 1.1 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 100 U	< 0.72 U
Chloroethane	5	µg/L	< 0.73 U	< 3.6 UJ	< 2.9 U	< 2.9 U	< 0.73 U	< 13 U	< 24 U	< 13 U	< 3.2 U	< 3.2 U	< 0.36 U	< 3.2 U	< 3.2 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 UJ	< 0.73 U	< 100 U	< 1.1 U
Chloroform	7	µg/L	< 0.50 U	< 2.5 U	< 2.0 U	< 2.0 U	< 0.50 U	< 14 U	< 13 U	< 14 U	< 3.4 U	< 3.4 U	< 0.23 U	< 1.7 U	< 1.7 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 100 U	< 0.67 U
Chloromethane (Methyl Chloride)	5	µg/L	< 0.76 U	< 3.8 U	< 3.0 U	< 3.0 U	< 0.76 U	< 14 U	< 25 U	< 14 U	< 3.5 U	< 3.5 U	< 0.36 U	< 5.2 U	< 5.2 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 100 U	< 1.1 U
Cis-1,2-Dichloroethylene	5	µg/L	**653**	**623**	**558**	**518**	**520**	**2400**	**1800**	**2100**	**740**	**1900**	**260**	**1000 D**	**800 D**	**60.4**	**239**	**183**	**166**	**197**	**3600**	**2300**
Cis-1,3-Dichloropropene	0.4	µg/L	< 0.47 U	< 2.4 U	< 1.9 U	< 1.9 U	< 0.47 U	< 14 U	< 12 U	< 14 U	< 3.6 U	< 3.6 U	< 0.17 U	< 1.6 U	< 1.6 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 100 U	< 0.28 U
Cyclohexane	NSL	µg/L	1.3 J	< 3.9 U	< 3.1 U	< 3.1 U	1.3 J	< 7.2 U	< 10 U	< 7.2 U	< 1.8 U	< 1.8 U	< 0.13 U	--	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--
Cymene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 0.97 U	< 0.97 U	--	--	--	--	--	< 100 U	< 0.81 U
Dibromochloromethane	50	µg/L	< 0.56 U	< 2.8 U	< 2.2 U	< 2.2 U	< 0.56 U	< 13 U	< 15 U	< 13 U	< 3.2 U	< 3.2 U	< 0.25 U	< 2.2 U	< 2.2 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 100 U	< 0.55 U
Dibromomethane	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 3.5 U	< 3.5 U	--	--	--	--	--	< 100 U	< 0.7 U
Dichlorodifluoromethane	5	µg/L	< 0.56 U	< 2.8 U	< 2.2 U	< 2.2 U	< 0.56 U	< 27 U	< 26 U	< 27 U	< 6.8 U	< 6.8 U	< 0.17 U	< 1.9 U	< 1.9 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 100 U	< 1 U
Diethyl Ether (Ethyl Ether)	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 1.8 U	< 1.8 U	--	--	--	--	--	--	--
Ethyl Tert-Butyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 1.5 U	< 1.5 U	--	--	--	--	--	--	--
Ethylbenzene	5	µg/L	< 0.60 U	< 3.0 U	< 2.4 U	< 2.4 U	< 0.60 U	< 30 U	< 14 U	< 30 U	< 7.4 U	< 7.4 U	< 0.19 U	< 2.1 U	< 2.1 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 100 U	< 0.87 U
Hexachlorobutadiene	0.5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 4.6 U	< 4.6 U	--	--	--	--	--	< 100 U	< 1 U
Iodomethane (Methyl Iodide)	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 200 U	< 0.91 U
Isopropyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U	< 1.3 U	--	--	--	--	--	--	--
Isopropylbenzene (Cumene)	5	µg/L	< 0.65 U	< 3.2 U	< 2.6 U	< 2.6 U	< 0.65 U	< 32 U	< 11 U	< 32 U	< 7.9 U	< 7.9 U	< 0.33 U	< 1.1 U	< 1.1 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 100 U	< 0.85 U
M,P-Xylene (Sum Of Isomers)	5	µg/L	< 0.78 U	< 3.9 U	< 3.1 U	< 3.1 U	< 0.78 U	--	--	--	--	--	--	--	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--
Methyl Acetate	NSL	µg/L	< 0.80 U	< 4.0 U	< 3.2 U	< 3.2 U	< 0.80 U	< 20 U	< 32 U	< 20 U	< 5 U	< 5 U	< 0.58 U	< 4.5 U	< 4.5 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	--	--
Methyl Ethyl Ketone (2-Butanone)	50	µg/L	< 2.7 U	< 14 U	< 11 U	< 11 U	< 2.7 U	< 53 U	< 47 U	< 53 U	< 13 U	< 13 U	< 2.6 U	< 16 U	< 16 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 200 U	< 1.1 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NSL	µg/L	< 4.9 U	< 24 U	< 19 U	< 19 U	< 4.9 U	< 84 U	< 27 U	< 84 U	< 21 U	< 21 U	< 0.81 U	< 13 U	< 13 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 200 U	< 0.38 U
Methylcyclohexane	NSL	µg/L	< 0.60 U	< 3.0 U	< 2.4 U	3.2 J	0.90 J	< 6.4 U	< 11 U	< 6.4 U	< 1.6 U	< 1.6 U	0.29 J	< 2.4 U	< 2.4 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	--	--
Methylene Chloride	5	µg/L	< 1.0 U	< 5.0 U	< 4.0 U	< 4.0 U	< 1.0 U	**21 J**	< 27 U	< 18 U	4.8 J	< 4.4 U	< 1 U	< 2.3 U	< 2.3 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**24 U**	< 0.78 U
M-P-Xylene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 4.6 U	< 4.6 U	--	--	--	--	--	< 100 U	< 1.7 U
Naphthalene	10	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 2.4 U	< 2.4 U	--	--	--	--	--	< 100 U	< 0.34 U
N-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 1.5 U	< 1.5 U	--	--	--	--	--	< 100 U	< 0.67 U
N-Propylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 0.86 U	< 0.86 U	--	--	--	--	--	< 100 U	< 0.62 U
O-Xylene (1,2-Dimethylbenzene)	5	µg/L	< 0.59 U	< 3.0 U	< 2.4 U	< 2.4 U	< 0.59 U	--	--	--	--	--	--	< 2.3 U	< 2.3 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 100 U	< 0.66 U
Sec-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	< 1.1 U	--	--	--	--	--	< 100 U	2.3 J
Styrene	5	µg/L	< 0.49 U	< 2.4 U	< 1.9 U	< 1.9 U	< 0.49 U	< 29 U	< 9.2 U	< 29 U	< 7.3 U	< 7.3 U	< 0.28 U	< 1.1 U	< 1.1 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 100 U	< 0.64 U
T-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U	< 1.3 U	--	--	--	--	--	< 100 U	3.2 J
Tert-Butyl Alcohol	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 47 U	< 47 U	--	--	--	--	--	--	--
Tert-Butyl Methyl Ether	10	µg/L	< 0.51 U	< 2.5 U	< 2.0 U	< 2.0 U	< 0.51 U	< 6.4 U	< 14 U	< 6.4 U	< 1.6 U	< 1.6 U	< 0.17 U	< 1.7 U	< 1.7 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	6.3 J	6.4
Tetrachloroethylene (PCE)	5	µg/L	< 0.56 U	< 2.8 U	< 2.2 U	< 2.2 U	< 0.56 U	**74**	< 24 U	< 14 U	**14**	< 3.6 U	**17**	< 1.9 U	< 1.9 U	3.9	1.4	< 0.56 U	< 0.56 U	< 0.56 U	**1000**	**460**
Tetrahydrofuran	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 4.9 U	< 4.9 U	--	--	--	--	--	--	--
Toluene	5	µg/L	< 0.49 U	< 2.5 U	< 2.0 U	< 2.0 U	< 0.49 U	< 20 U	< 11 U	< 20 U	< 5.1 U	< 5.1 U	< 0.17 U	< 2.2 U	< 2.2 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 100 U	< 0.72 U
Trans-1,2-Dichloroethene	5	µg/L	**6.5**	**6.1**	**5.2**	4.6	4.7	**36 J**	< 16 U	< 36 U	< 9 U	**16**	**5.5**	**18 D**	**15 D**	3.2	**8**	**6.7**	**5.3**	**6.2**	**20 J**	**14**
Trans-1,3-Dichloropropene	0.4	µg/L	< 0.43 U	< 2.2 U	< 1.7 U	< 1.7 U	< 0.43 U	< 15 U	< 16 U	< 15 U	< 3.7 U	< 3.7 U	< 0.17 U	< 1.7 U	< 1.7 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 100 U	< 0.57 U
Trans-1,4-Dichloro-2-Butene	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	< 16 U	< 16 U	--	--	--	--	--	--	--
Trichloroethylene (TCE)	5	µg/L	< 0.53 U	< 2.6 U	< 2.1 U	< 2.1 U	< 0.53 U	**38 J**	< 14 U	< 18 U	**8.9 J**	< 4.6 U	**23**	< 1.9 U	< 1.9 U	1.5	0.66 J	< 0.53 U	< 0.53 U	< 0.53 U	**700**	**270**
Trichlorofluoromethane	5	µg/L	< 0.40 U	< 2.0 UJ	< 1.6 UJ	< 1.6 U	< 0.40 U	< 35 U	< 17 U	< 35 U	< 8.8 U	< 8.8 U	< 0.21 U	< 1.8 U	< 1.8 U	< 0.40 U	< 0.40 U	< 0.40 U	< 0.40 UJ	< 0.40 U	< 100 U	< 1.1 U
Vinyl Acetate	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 100 U	< 1.6 U
Vinyl Chloride	2	µg/L	**147**	**211**	**166**	**170**	**193**	< 36 U	**20 J**	< 36 U	< 9 U	**24**	**61**	**400 D**	**400 D**	**29.3**	**128**	**108**	**103**	**109**	**530**	**510**
Xylenes	5	µg/L	< 0.59 U	< 3.0 U	< 2.4 U	< 2.4 U	< 0.59 U	< 26 U	< 12 U	< 26 U	< 6.6 U	< 6.6 U	< 0.58 U	--	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 100 U	< 2.3 U
Xylenes, Total	NSL	µg/L	--	--	--	--	--	< 26 U	< 12 U	< 26 U	< 6.6 U	< 6.6 U	< 0.58 U	--	--	--	--	--	--	--	< 100 U	< 2.3 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)																						
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.6 U	< 1.9 U	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U	< 1.5 U	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.1 U	< 2.4 U	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.83 U	< 0.97 U	--	--	--	--	--
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 6.5 U	< 7.6 U	--	--	--	--	--
3-Perfluoroheptyl propanoic acid (7:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 5.7 U	< 6.6 U	--	--	--	--	--
3-Perfluoropropyl propanoic acid (3:3 FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.2 U	< 2.6 U	--	--	--	--	--
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.1 U	< 1.3 U	--	--	--	--	--
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.2 U	< 2.6 U	--	--	--	--	--
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.6 U	< 1.9 U	--	--	--	--	--
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.49 U	< 0.57 U	--	--	--	--	--
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.83 U	< 0.97 U	--	--	--	--	--
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 3.4 U	< 4.0 U	--	--	--	--	--
N-methyl perfluorooctanesulfonamide (NMeFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.59 U	< 0.68 U	--	--	--	--	--
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	0.64 J	1.2 J	--	--	--	--	--
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 2.5 U	< 3.0 U	--	--	--	--	--
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.2 U	< 1.4 U	--	--	--	--	--
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.25 U	< 0.29 U	--	--	--	--	--
Perfluoro-3-methoxypropanoic acid (PFMPA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.27 U	< 0.32 U	--	--	--	--	--
Perfluoro-4-methoxybutanoic acid (PFMBA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.51 U	< 0.60 U	--	--	--	--	--
Perfluorobutanesulfonic acid (PFBS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	5.7	--	--	3.7	5.5	--	--	--	--	--
Perfluorobutanoic Acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	18	--	--	5.8 J	6.7 J	--	--	--	--	--
Perfluorodecanesulfonic acid (PFDS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 0.31 U	--	--	< 1.0 U	< 1.2 U	--	--	--	--	--
Perfluorodecanoic acid (PFDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	2.7	--	--	1.4 J	0.91 J	--	--	--	--	--
Perfluorododecanesulfonic acid (PFDoS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.37 U	< 0.43 U	--	--	--	--	--
Perfluorododecanoic acid (PFDoA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 0.53 U	--	--	< 0.71 U	< 0.82 U	--	--	--	--	--
Perfluoroheptanesulfonic acid (PFHpS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	1.9	--	--	0.97 J	< 1.0 U	--	--	--	--	--
Perfluoroheptanoic acid (PFHpA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	9.5	--	--	3.5	6.2	--	--	--	--	--
Perfluorohexanesulfonic acid (PFHxS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	6.8 B	--	--	2.9	3.7	--	--	--	--	--
Perfluorohexanoic acid (PFHxA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	14	--	--	5.3	7.4	--	--	--	--	--
Perfluorononanesulfonic Acid (PFNS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.3 U	< 1.5 U	--	--	--	--	--
Perfluorononanoic acid (PFNA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	5.6	--	--	2	2.1	--	--	--	--	--
Perfluorooctane Sulfonamide (PFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	0.83 J	--	--	1.1 J	1.1 J	--	--	--	--	--
Perfluorooctanesulfonic acid (PFOS)	2.7	ng/L	--	--	--	--	--	--	--	--	--	--	**140**	--	--	**51**	**44.9 B**	--	--	--	--	--
Perfluorooctanoic acid (PFOA)	6.7	ng/L	--	--	--	--	--	--	--	--	--	--	**36**	--	--	**14.9**	**20.3**	--	--	--	--	--
Perfluoropentanesulfonic Acid (PFPeS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.92 U	1.4 J	--	--	--	--	--
Perfluoropentanoic Acid (PFPeA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	16	--	--	5.4	8.7	--	--	--	--	--
Perfluorotetradecanoic acid (PFTeDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 0.28 U	--	--	< 0.70 U	< 0.81 U	--	--	--	--	--
Perfluorotridecanoic Acid (PFTriA/PFTrDA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 1.3 U	--	--	< 0.72 U	< 0.84 U	--	--	--	--	--
Perfluoroundecanoic Acid (PFUnA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 1.1 U	--	--	< 0.50 U	< 0.59 U	--	--	--	--	--

Notes:

[1]NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)

--' = Not analyzed
µg/L = Mircogram(s) per liter
ng/L - Nanogram(s) per liter
B = Analyte detected in blank, as well as sample
D = Compound in analysis has been diluted
J = Concentration is estimated
NSL = No screening level available
U = Analyte not detected
R = Reported result unusable
VOCs = Volatile organic compounds
PFAS = Per- and polyfluoroalkyl substances
Concentrations exceeding the screening level are bolded and shaded gray

		Location	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23S	MW-23S	MW-23S	MW-23S	MW-23S
		Sample Name	MW-23D_03292012	MW-23D_10312012	MW-23D-20130425	MW-23D-101413	MW-23D-112113	MW-23D 011514	MW-23D_071014	MW-23D	MW-23D	MW-23D-06102022	130054-MW-1D-12052023	130054-MW-23D-06252024	130054-MW-23D-09192024	130054-MW-23D-20241125	130054-DUP2-20241125	MW-23S_06202011	MW-23S_09162011	MW-23S_03292012	MW-23S_10312012	MW-23S-20130425
		Parent Sample Name															130054-MW-23D-20241125					
		Sample Date	3/29/2012	10/31/2012	4/25/2013	10/14/2013	11/21/2013	1/15/2014	7/10/2014	3/22/2017	10/31/2017	6/10/2022	12/5/2023	6/25/2024	9/19/2024	11/25/2024	11/25/2024	6/20/2011	9/16/2011	3/29/2012	10/31/2012	4/25/2013
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)																						
1,1,1,2-Tetrachloroethane	5	µg/L	< 0.1 U	< 0.1 U	< 0.1 U	--	--	--	--	--	--	< 0.89 U	--	--	--	--	--	< 100 U	< 0.93 U	< 0.1 U	< 0.1 U	< 0.1 U
1,1,1-Trichloroethane (TCA)	5	µg/L	< 0.06 U	< 0.06 U	3.5	< 8.8 U	**8.4**	< 6.6 U	< 6.6 U	< 0.56 U	< 1.9 U	< 0.84 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 100 U	< 0.69 U	< 0.06 U	< 0.06 U	< 0.06 U
1,1,2,2-Tetrachloroethane	5	µg/L	< 0.16 U	< 0.16 U	< 0.16 U	< 7.2 U	< 1.7 U	< 1.7 U	< 1.7 U	< 0.38 U	< 1.9 U	< 0.63 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 100 U	< 0.81 U	< 0.16 U	< 0.16 U	< 0.16 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	µg/L	--	--	--	< 11 U	< 2.5 U	< 2.5 U	< 2.5 U	< 0.68 U	< 1.5 U	< 1.1 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	--	--	--	--	--
1,1,2-Trichloroethane	1	µg/L	< 0.19 U	< 0.19 U	< 0.19 U	< 11 U	< 1.8 U	< 1.8 U	< 1.8 U	< 0.16 U	< 1.9 U	< 0.91 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 100 U	< 0.65 U	< 0.19 U	< 0.19 U	< 0.19 U
1,1-Dichloroethane	5	µg/L	0.53 J	0.54 J	1.2	**9.2 J**	4.1 J	3.7 J	< 3 U	< 0.48 U	< 2.4 U	< 0.71 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 100 U	< 1 U	0.44 J	0.61 J	< 0.13 U
1,1-Dichloroethene	5	µg/L	0.55 J	4.7	0.94 J	< 7.6 U	< 2.3 U	< 2.3 U	< 2.3 U	< 0.68 U	< 2.5 U	2.9 JD	2.8	< 0.59 U	0.91	0.61 J	< 0.59 U	< 100 U	5	1.7	0.76 J	3.5
1,1-Dichloropropene	5	µg/L	< 0.12 U	< 0.12 U	< 0.12 U	--	--	--	--	--	--	< 0.75 U	--	--	--	--	--	< 100 U	< 0.82 U	< 0.12 U	< 0.12 U	< 0.12 U
1,2,3-Trichlorobenzene	5	µg/L	< 0.51 U	< 0.51 U	< 0.51 U	--	--	--	--	< 0.7 U	--	< 1.5 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 100 U	< 0.88 U	< 0.51 U	< 0.51 U	< 0.51 U
1,2,3-Trichloropropane	0.04	µg/L	< 0.42 U	< 0.42 U	< 0.42 U	--	--	--	--	--	--	< 1.4 U	--	--	--	--	--	< 100 U	< 1.5 U	< 0.42 U	< 0.42 U	< 0.42 U
1,2,4-Trichlorobenzene	5	µg/L	< 0.34 U	< 0.34 U	< 0.34 U	< 6 U	< 3.3 U	< 3.3 U	< 3.3 U	< 0.54 U	< 2 U	< 1.2 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 100 U	< 0.72 U	< 0.34 U	< 0.34 U	< 0.34 U
1,2,4-Trimethylbenzene	5	µg/L	< 0.13 U	< 0.13 U	< 0.13 U	--	--	--	--	--	--	< 0.99 U	--	--	--	--	--	< 100 U	< 0.64 U	< 0.13 U	< 0.13 U	0.16 J
1,2-Dibromo-3-Chloropropane	0.04	µg/L	< 0.4 U	< 0.4 U	< 0.4 U	< 27 U	< 3.1 U	< 3.1 U	< 3.1 U	< 0.46 U	< 9.4 U	< 4 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 100 U	< 1.2 U	< 0.4 U	< 0.4 U	< 0.4 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	µg/L	< 0.28 U	< 0.28 U	< 0.28 U	< 9.6 U	< 5.8 U	< 5.8 U	< 5.8 U	< 0.38 U	< 2.1 U	< 0.85 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 100 U	< 0.52 U	< 0.28 U	< 0.28 U	< 0.28 U
1,2-Dichlorobenzene	3	µg/L	< 0.21 U	< 0.21 U	< 0.21 U	< 5.2 U	< 6.3 U	< 6.3 U	< 6.3 U	< 0.44 U	< 1.9 U	< 0.61 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 100 U	< 0.22 U	< 0.21 U	< 0.21 U	< 0.21 U
1,2-Dichloroethane	0.6	µg/L	< 0.19 U	< 0.19 U	< 0.19 UJ	< 8.8 U	< 1.7 U	< 1.7 U	< 1.7 U	< 0.5 U	< 2 U	< 1.5 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 100 U	< 0.72 U	< 0.19 U	< 0.19 U	< 0.19 UJ
1,2-Dichloropropane	1	µg/L	0.59 J	0.7 J	< 0.09 U	< 7.2 U	< 5.8 U	< 5.8 U	< 5.8 U	0.78 J	< 2.5 U	< 0.91 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 100 U	< 0.71 U	< 0.09 U	< 0.09 U	< 0.09 U
1,3,5-Trichlorobenzene	5	µg/L	--	--	--	--	--	--	--	--	--	< 1.1 U	--	--	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene (Mesitylene)	5	µg/L	< 0.15 U	< 0.15 U	< 0.15 U	--	--	--	--	--	--	< 0.57 U	--	--	--	--	--	< 100 U	< 0.53 U	< 0.15 U	< 0.15 U	< 0.15 U
1,3-Dichlorobenzene	3	µg/L	< 0.14 U	< 0.14 U	< 0.14 U	< 5.6 U	< 6.2 U	< 6.2 U	< 6.2 U	< 0.66 U	< 1.8 U	< 0.59 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 100 U	< 0.14 U	< 0.14 U	< 0.14 U	< 0.14 U
1,3-Dichloropropane	5	µg/L	< 0.19 U	< 0.19 U	< 0.19 U	--	--	--	--	--	--	< 0.65 U	--	--	--	--	--	< 100 U	< 0.69 U	< 0.19 U	< 0.19 U	< 0.19 U
1,4-Dichlorobenzene	3	µg/L	< 0.23 U	< 0.23 U	< 0.23 U	< 5.2 U	< 6.7 U	< 6.7 U	< 6.7 U	< 0.66 U	< 1.7 U	< 0.65 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 100 U	< 0.59 U	< 0.23 U	< 0.23 U	< 0.23 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	< 100 U	--	--	--	--	--	--	--	--	--	--
2,2-Dichloropropane	5	µg/L	< 0.16 U	< 0.16 U	< 0.16 U	--	--	--	--	--	--	< 1.6 U	--	--	--	--	--	< 100 U	< 0.79 U	< 0.16 U	< 0.16 U	< 0.16 U
2-Chlorotoluene	NSL	µg/L	< 0.14 U	< 0.14 U	< 0.14 U	--	--	--	--	--	--	< 0.57 U	--	--	--	--	--	< 100 U	< 1.2 U	< 0.14 U	< 0.14 U	< 0.14 U
2-Hexanone	50	µg/L	< 0.5 U	< 0.5 U	< 0.5 U	< 16 U	< 9.9 U	< 9.9 U	< 9.9 U	< 1.4 U	< 13 U	< 5.6 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 200 U	< 1.1 U	< 0.5 U	< 0.5 U	< 0.5 U
2-Methoxy-2-Methylbutane	NSL	µg/L	--	--	--	--	--	--	--	--	--	< 0.71 U	--	--	--	--	--	--	--	--	--	--
4-Chlorotoluene	5	µg/L	< 0.14 U	< 0.14 U	< 0.14 U	--	--	--	--	--	--	< 0.59 U	--	--	--	--	--	< 100 U	< 0.8 U	< 0.14 U	< 0.14 U	< 0.14 U
Acetone	50	µg/L	< 2.7 U	< 2.7 U	--	< 44 U	< 24 U	< 24 U	< 24 U	< 2.1 U	< 27 U	< 10 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	33 J	2.8 J	< 2.7 U	< 2.7 U	--
Acrylonitrile	5	µg/L	--	--	--	--	--	--	--	--	--	< 2.7 U	--	--	--	--	--	--	--	--	--	--
Benzene	1	µg/L	0.65 J	0.76 J	0.36 J	< 5.2 U	< 3.3 U	< 3.3 U	< 3.3 U	0.25 J	< 2 U	< 1 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 100 U	< 0.74 U	0.11 J	0.14 J	0.64 J
Bromobenzene	5	µg/L	< 0.13 U	< 0.13 U	< 0.13 U	--	--	--	--	--	--	< 0.75 U	--	--	--	--	--	< 100 U	< 0.67 U	< 0.13 U	< 0.13 U	< 0.13 U
Bromochloromethane	5	µg/L	< 0.27 U	< 0.27 U	< 0.27 U	--	--	--	--	< 0.6 U	--	< 1.5 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 100 U	< 0.77 U	< 0.27 U	< 0.27 U	< 0.27 U
Bromodichloromethane	50	µg/L	< 0.12 U	< 0.12 U	< 0.12 U	< 6 U	< 3.1 U	< 3.1 U	< 3.1 U	< 0.3 U	< 1.7 U	< 0.9 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 100 U	< 0.48 U	< 0.12 U	< 0.12 U	< 0.12 U
Bromoform	50	µg/L	< 0.19 U	< 0.19 U	< 0.19 U	< 26 U	< 2.1 U	< 2.1 U	< 2.1 U	< 0.36 U	< 2.9 U	< 1.9 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 100 U	< 0.46 U	< 0.19 U	< 0.19 U	< 0.19 U
Bromomethane	5	µg/L	< 0.18 U	< 0.18 U	< 0.18 UJ	< 16 U	< 5.5 U	< 5.5 U	< 5.5 U	< 0.36 U	< 3.5 U	< 7.7 U	< 1.6 U	< 1.6 U	< 1.6 UJ	< 1.6 U	< 1.6 U	< 100 U	< 2.1 U	< 0.18 U	< 0.18 U	< 0.18 UJ
Carbon Disulfide	60	µg/L	< 0.13 U	< 0.13 U	< 0.13 U	< 5.2 U	< 1.5 U	< 1.5 U	< 1.5 U	< 0.44 U	< 2.2 U	< 7.2 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 100 U	< 0.9 U	< 0.13 U	< 0.13 U	< 0.13 U
Carbon Tetrachloride	5	µg/L	< 0.06 U	< 0.06 U	< 0.06 U	< 5.2 U	< 2.2 U	< 2.2 U	< 2.2 U	< 0.66 U	< 1.8 U	< 0.82 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 100 U	< 1.1 U	< 0.06 U	< 0.06 U	< 0.06 U
Chlorobenzene	5	µg/L	< 0.11 U	< 0.11 U	< 0.11 U	< 6 U	< 6 U	< 6 U	< 6 U	< 0.48 U	< 1.8 U	< 0.53 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 100 U	< 0.72 U	< 0.11 U	< 0.11 U	< 0.11 U
Chloroethane	5	µg/L	< 0.17 U	**5.3**	< 0.17 U	< 12 U	< 2.6 U	< 2.6 U	< 2.6 U	< 0.74 U	< 3.6 U	< 1.6 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U	< 100 U	< 1.1 U	< 0.17 U	< 0.17 U	5
Chloroform	7	µg/L	< 0.08 U	0.54 J	0.44 J	< 6.4 U	< 2.7 U	< 2.7 U	< 2.7 U	< 0.44 U	< 2.3 U	< 0.84 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 100 U	< 0.67 U	< 0.08 U	0.19 J	0.31 J
Chloromethane (Methyl Chloride)	5	µg/L	< 0.1 U	< 0.1 U	< 0.1 U	< 12 U	< 2.8 U	< 2.8 U	< 2.8 U	< 0.44 U	< 3.6 U	< 2.6 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 100 U	< 1.1 U	< 0.1 U	< 0.1 U	< 0.1 U
Cis-1,2-Dichloroethylene	5	µg/L	**200**	**2800**	**1400**	**1100**	**380**	**790**	**560**	**430**	**910**	**580 D**	**659**	**42.9**	**224**	**154**	**182**	**3000**	**2900**	**3100**	**1800**	**3400**
Cis-1,3-Dichloropropene	0.4	µg/L	< 0.18 U	< 0.18 U	< 0.18 U	< 5.6 U	< 2.9 U	< 2.9 U	< 2.9 U	< 0.32 U	< 1.7 U	< 0.79 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 100 U	< 0.28 U	< 0.18 U	< 0.18 U	< 0.18 U
Cyclohexane	NSL	µg/L	--	--	--	< 4.8 U	< 1.4 U	< 1.4 U	< 1.4 U	< 0.52 U	< 1.3 U	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--	--	--	--
Cymene	5	µg/L	< 0.14 U	< 0.14 U	< 0.14 U	--	--	--	--	--	--	< 0.49 U	--	--	--	--	--	< 100 U	< 0.81 U	< 0.14 U	< 0.14 U	< 0.14 U
Dibromochloromethane	50	µg/L	< 0.2 U	< 0.2 U	< 0.2 U	< 7.2 U	< 2.6 U	< 2.6 U	< 2.6 U	< 0.44 U	< 2.5 U	< 1.1 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 100 U	< 0.55 U	< 0.2 U	< 0.2 U	< 0.2 U
Dibromomethane	5	µg/L	< 0.29 U	< 0.29 U	< 0.29 U	--	--	--	--	--	--	< 1.8 U	--	--	--	--	--	< 100 U	< 0.7 U	< 0.29 U	< 0.29 U	< 0.29 U
Dichlorodifluoromethane	5	µg/L	< 0.22 U	< 0.22 U	< 0.22 U	< 12 U	< 5.4 U	< 5.4 U	< 5.4 U	< 0.28 U	< 1.7 U	< 0.96 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 100 U	< 1 U	< 0.22 U	< 0.22 U	< 0.22 U
Diethyl Ether (Ethyl Ether)	NSL	µg/L	--	--	--	--	--	--	--	--	--	< 0.91 U	--	--	--	--	--	--	--	--	--	--
Ethyl Tert-Butyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	< 0.74 U	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	5	µg/L	< 0.1 U	< 0.1 U	< 0.1 U	< 6.8 U	< 5.9 U	< 5.9 U	< 5.9 U	< 0.6 U	< 1.9 U	< 1.1 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 100 U	< 0.87 U	< 0.1 U	< 0.1 U	< 0.1 U
Hexachlorobutadiene	0.5	µg/L	< 0.48 U	< 0.48 U	< 0.48 U	--	--	--	--	--	--	< 2.3 U	--	--	--	--	--	< 100 U	< 1 U	< 0.48 U	< 0.48 U	< 0.48 U
Iodomethane (Methyl Iodide)	5	µg/L	< 0.13 U	< 0.13 U	< 0.13 UJ	--	--	--	--	--	--	--	--	--	--	--	--	< 200 U	< 0.91 U	< 0.13 U	0.58 J	< 0.13 UJ
Isopropyl Ether	NSL	µg/L	--	--	--	--	--	--	--	--	--	< 0.64 U	--	--	--	--	--	--	--	--	--	--
Isopropylbenzene (Cumene)	5	µg/L	< 0.08 U	0.36 J	< 0.08 U	< 5.2 U	< 6.3 U	< 6.3 U	< 6.3 U	< 0.64 U	< 3.3 U	< 0.54 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 100 U	< 0.85 U	< 0.08 U	< 0.08 U	0.12 J
M,P-Xylene (Sum Of Isomers)	5	µg/L	--	--	--	--	--	--	--	--	--	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--	--	--	--
Methyl Acetate	NSL	µg/L	--	--	--	< 15 U	< 4 U	< 4 U	< 4 U	< 1.2 U	< 5.8 U	< 2.3 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	--	--	--	--	--
Methyl Ethyl Ketone (2-Butanone)	50	µg/L	< 2.3 U	< 2.3 U	--	< 23 U	< 11 U	< 11 U	< 11 U	< 4.4 U	< 26 U	< 8.1 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 200 U	< 1.1 U	< 2.3 U	< 2.3 U	--
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NSL	µg/L	< 0.99 U	< 0.99 U	< 0.99 U	< 13 U	< 17 U	< 17 U	< 17 U	< 1.3 U	< 8.1 U	< 6.4 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 200 U	< 0.38 U	< 0.99 U	< 0.99 U	< 0.99 U
Methylcyclohexane	NSL	µg/L	--	--	--	< 5.2 U	< 1.3 U	< 1.3 U	< 1.3 U	< 0.44 U	< 0.9 U	< 1.2 U	< 0.60 U	< 0.60 U	0.92 J	< 0.60 U	< 0.60 U	--	--	--	--	--
Methylene Chloride	5	µg/L	< 0.18 U	< 0.18 U	< 0.18 U	< 13 U	< 3.5 U	< 3.5 U	< 3.5 U	< 0.42 U	**11 BJ**	< 1.2 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**21 U**	< 0.78 U	< 0.18 U	< 0.18 U	< 0.18 U
M-P-Xylene	5	µg/L	< 0.25 U	< 0.25 U	< 0.25 U	--	--	--	--	< 0.56 U	--	< 2.3 U	--	--	--	--	--	< 100 U	< 1.7 U	< 0.25 U	< 0.25 U	< 0.25 U
Naphthalene	10	µg/L	< 0.29 U	< 0.29 U	< 0.29 U	--	--	--	--	--	--	< 1.2 U	--	--	--	--	--	< 100 U	< 0.34 U	< 0.29 U	< 0.29 U	< 0.29 U
N-Butylbenzene	5	µg/L	< 0.14 U	< 0.14 U	< 0.14 U	--	--	--	--	--	--	< 0.76 U	--	--	--	--	--	< 100 U	< 0.67 U	< 0.14 U	< 0.14 U	< 0.14 U
N-Propylbenzene	5	µg/L	< 0.1 U	< 0.1 U	< 0.1 U	--	--	--	--	--	--	< 0.43 U	--	--	--	--	--	< 100 U	< 0.62 U	< 0.1 U	< 0.1 U	< 0.1 U
O-Xylene (1,2-Dimethylbenzene)	5	µg/L	< 0.13 U	0.21 J	< 0.13 U	--	--	--	--	< 0.64 U	--	< 1.1 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 100 U	< 0.66 U	< 0.13 U	< 0.13 U	< 0.13 U
Sec-Butylbenzene	5	µg/L	0.22 J	1.4	< 0.18 U	--	--	--	--	--	--	< 0.55 U	--	--	--	--	--	< 100 U	< 0.79 U	< 0.18 U	< 0.18 U	0.46 J
Styrene	5	µg/L	< 0.12 U	< 0.12 U	< 0.12 U	< 4.4 U	< 5.8 U	< 5.8 U	< 5.8 U	< 0.34 U	< 2.8 U	< 0.53 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 100 U	< 0.64 U	< 0.12 U	< 0.12 U	< 0.12 U
T-Butylbenzene	5	µg/L	0.28 J	1.5	< 0.12 U	--	--	--	--	--	--	< 0.64 U	--	--	--	--	--	< 100 U	< 0.75 U	< 0.12 U	< 0.12 U	0.75 J
Tert-Butyl Alcohol	NSL	µg/L	--	--	--	--	--	--	--	--	--	< 23 U	--	--	--	--	--	--	--	--	--	--
Tert-Butyl Methyl Ether	10	µg/L	0.94 J	4.3	1.3	< 6.8 U	3.6 J	3 J	1.6 J	0.46 J	3.3 J	< 0.86 U	4.3	< 0.51 U	0.97	0.66 J	0.90 J	< 100 U	0.37 J	0.18 J	0.18 J	2.1
Tetrachloroethylene (PCE)	5	µg/L	**62**	**620**	**420**	**270**	**140**	**170**	**160**	**200**	**480**	**130 D**	**289**	4.2	**35.8**	**19.8**	**20.7**	**1600**	**850**	**1300**	**840**	**880**
Tetrahydrofuran	NSL	µg/L	--	--	--	--	--	--	--	--	--	< 2.5 U	--	--	--	--	--	--	--	--	--	--
Toluene	5	µg/L	< 0.15 U	< 0.15 U	< 0.15 U	< 5.2 U	< 4.1 U	< 4.1 U	< 4.1 U	< 0.5 U	< 1.7 U	< 1.1 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 100 U	< 0.72 U	< 0.15 U	< 0.15 U	< 0.15 U
Trans-1,2-Dichloroethene	5	µg/L	1.7	**20**	**14**	< 7.6 U	< 7.2 U	< 7.2 U	< 7.2 U	**7.5**	**5.1 J**	4 JD	3.5	0.63 J	1.5	0.79 J	0.99 J	**22 J**	**29**	**18**	**30**	**35**
Trans-1,3-Dichloropropene	0.4	µg/L	< 0.24 U	< 0.24 U	< 0.24 U	< 7.6 U	< 3 U	< 3 U	< 3 U	< 0.38 U	< 1.7 U	< 0.84 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 100 U	< 0.57 U	< 0.24 U	< 0.24 U	< 0.24 U
Trans-1,4-Dichloro-2-Butene	5	µg/L	--	--	--	--	--	--	--	--	--	< 8.1 U	--	--	--	--	--	--	--	--	--	--
Trichloroethylene (TCE)	5	µg/L	**29**	**430**	**350**	**120**	**61**	**120**	**150**	**88**	**230**	**110 D**	**86.2**	3.8	**23.6**	**16.3**	**17.9**	**600**	**400**	**600**	**440**	**580**
Trichlorofluoromethane	5	µg/L	< 0.15 U	< 0.15 U	< 0.15 U	< 8.4 U	< 7 U	< 7 U	< 7 U	< 0.3 U	< 2.1 U	< 0.88 U	< 0.40 U	< 0.40 U	< 0.40 UJ	< 0.40 U	< 0.40 U	< 100 U	< 1.1 U	< 0.15 U	< 0.15 U	< 0.15 U
Vinyl Acetate	NSL	µg/L	< 0.38 U	< 0.38 U	< 0.38 UJ	--	--	--	--	--	--	--	--	--	--	--	--	< 100 U	< 1.6 U	< 0.38 U	< 0.38 U	< 0.38 UJ
Vinyl Chloride	2	µg/L	**56**	**370**	**18**	**22 J**	**47**	**110**	**11**	**2.4**	**11**	**12 D**	**12.9**	**6.7**	**13.9**	**3.1**	**3.4**	**26 J**	**140 J**	**21**	**6.9**	**150**
Xylenes	5	µg/L	< 0.36 U	< 0.36 U	< 0.36 U	< 5.6 U	< 5.3 U	< 5.3 U	< 5.3 U	--	< 5.8 U	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 100 U	< 2.3 U	< 0.36 U	< 0.36 U	< 0.36 U
Xylenes, Total	NSL	µg/L	< 0.36 U	< 0.36 U	< 0.36 U	< 5.6 U	< 5.3 U	< 5.3 U	< 5.3 U	--	< 5.8 U	--	--	--	--	--	--	< 100 U	< 2.3 U	< 0.36 U	< 0.36 U	< 0.36 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	**1.5**	--	--	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)																						
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 1.7 U	--	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 1.4 U	--	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 2.1 U	--	--	--	--	--	--	--	--	--
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 0.85 U	--	--	--	--	--	--	--	--	--
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 6.6 U	--	--	--	--	--	--	--	--	--
3-Perfluoroheptyl propanoic acid (7:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 5.8 U	--	--	--	--	--	--	--	--	--
3-Perfluoropropyl propanoic acid (3:3 FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 2.3 U	--	--	--	--	--	--	--	--	--
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 1.1 U	--	--	--	--	--	--	--	--	--
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 2.3 U	--	--	--	--	--	--	--	--	--
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 1.7 U	--	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 0.49 U	--	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 0.85 U	--	--	--	--	--	--	--	--	--
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 3.5 U	--	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamide (NMeFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 0.60 U	--	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	0.76 J	--	--	--	--	--	--	--	--	--
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 2.6 U	--	--	--	--	--	--	--	--	--
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 1.2 U	--	--	--	--	--	--	--	--	--
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 0.25 U	--	--	--	--	--	--	--	--	--
Perfluoro-3-methoxypropanoic acid (PFMPA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 0.28 U	--	--	--	--	--	--	--	--	--
Perfluoro-4-methoxybutanoic acid (PFMBA)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 0.52 U	--	--	--	--	--	--	--	--	--
Perfluorobutanesulfonic acid (PFBS)	NSL	ng/L	--	--	--	--	--	--	--	--	19	--	28.7	--	--	--	--	--	--	--	--	--
Perfluorobutanoic Acid	NSL	ng/L	--	--	--	--	--	--	--	--	20 B	--	23.5	--	--	--	--	--	--	--	--	--
Perfluorodecanesulfonic acid (PFDS)	NSL	ng/L	--	--	--	--	--	--	--	--	< 0.3 U	--	< 1.0 U	--	--	--	--	--	--	--	--	--
Perfluorodecanoic acid (PFDA)	NSL	ng/L	--	--	--	--	--	--	--	--	7.7	--	1.3 J	--	--	--	--	--	--	--	--	--
Perfluorododecanesulfonic acid (PFDoS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 0.37 U	--	--	--	--	--	--	--	--	--
Perfluorododecanoic acid (PFDoA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 0.52 U	--	< 0.72 U	--	--	--	--	--	--	--	--	--
Perfluoroheptanesulfonic acid (PFHpS)	NSL	ng/L	--	--	--	--	--	--	--	--	2	--	3.3	--	--	--	--	--	--	--	--	--
Perfluoroheptanoic acid (PFHpA)	NSL	ng/L	--	--	--	--	--	--	--	--	17	--	18.5	--	--	--	--	--	--	--	--	--
Perfluorohexanesulfonic acid (PFHxS)	NSL	ng/L	--	--	--	--	--	--	--	--	8.4 B	--	10.9	--	--	--	--	--	--	--	--	--
Perfluorohexanoic acid (PFHxA)	NSL	ng/L	--	--	--	--	--	--	--	--	19	--	19.8	--	--	--	--	--	--	--	--	--
Perfluorononanesulfonic Acid (PFNS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	< 1.3 U	--	--	--	--	--	--	--	--	--
Perfluorononanoic acid (PFNA)	NSL	ng/L	--	--	--	--	--	--	--	--	8.8	--	6.3	--	--	--	--	--	--	--	--	--
Perfluorooctane Sulfonamide (PFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	1.2 BJ	--	2.5	--	--	--	--	--	--	--	--	--
Perfluorooctanesulfonic acid (PFOS)	2.7	ng/L	--	--	--	--	--	--	--	--	**130 B**	--	**221**	--	--	--	--	--	--	--	--	--
Perfluorooctanoic acid (PFOA)	6.7	ng/L	--	--	--	--	--	--	--	--	**65**	--	**63.4**	--	--	--	--	--	--	--	--	--
Perfluoropentanesulfonic Acid (PFPeS)	NSL	ng/L	--	--	--	--	--	--	--	--	--	--	2.6	--	--	--	--	--	--	--	--	--
Perfluoropentanoic Acid (PFPeA)	NSL	ng/L	--	--	--	--	--	--	--	--	20	--	20	--	--	--	--	--	--	--	--	--
Perfluorotetradecanoic acid (PFTeDA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 0.27 U	--	< 0.71 U	--	--	--	--	--	--	--	--	--
Perfluorotridecanoic Acid (PFTriA/PFTrDA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 1.2 U	--	< 0.74 U	--	--	--	--	--	--	--	--	--
Perfluoroundecanoic Acid (PFUnA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 1 U	--	< 0.51 U	--	--	--	--	--	--	--	--	--

Notes:

[1]NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)

--' = Not analyzed
µg/L = Mircogram(s) per liter
ng/L - Nanogram(s) per liter
B = Analyte detected in blank, as well as sample
D = Compound in analysis has been diluted
J = Concentration is estimated
NSL = No screening level available
U = Analyte not detected
R = Reported result unusable
VOCs = Volatile organic compounds
PFAS = Per- and polyfluoroalkyl substances
Concentrations exceeding the screening level are bolded and shaded gray

		Location	MW-23S	MW-23S	MW-23S	MW-23S	MW-23S	MW-23S	MW-23S	MW-23S	MW-23S	MW-23S	MW-23S	MW-23S	MW-25RD	MW-25RD	MW-25RD	MW-25RD	MW-25RD	MW-25RD	MW-25RD	MW-25RS
		Sample Name	MW-23S-101413	MW-23S-112113	MW-23S 011514	MW-23S_071014	MW-23S	MW-23S	MW-23S	MW-23S-06102022	130054-MW-1-12052023	130054-MW-23S-06252024	130054-MW-23S-09192024	130054-MW-23S-20241125	MW-25RD06072022	MW-25RD-09232022	130054-MW-25RD-12052023	MW-25RD-03192024	130054-MW-25RD-06242024	130054-MW-25RD-09182024	130054-MW-25RD-20241126	MW-25RS06072022
		Parent Sample Name																				
		Sample Date	10/14/2013	11/21/2013	1/15/2014	7/10/2014	3/22/2017	7/6/2017	10/31/2017	6/10/2022	12/5/2023	6/25/2024	9/19/2024	11/25/2024	6/7/2022	9/23/2022	12/5/2023	3/19/2024	6/24/2024	9/18/2024	11/26/2024	6/7/2022
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)																						
1,1,1,2-Tetrachloroethane	5	µg/L	--	--	--	--	--	--	--	< 0.36 U	--	--	--	--	< 0.71 U	< 0.89 U	--	--	--	--	--	< 0.36 U
1,1,1-Trichloroethane (TCA)	5	µg/L	< 28 U	< 66 U	< 33 U	< 8.2 U	< 0.56 U	--	< 0.19 U	< 0.34 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.68 U	< 0.84 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.34 U
1,1,2,2-Tetrachloroethane	5	µg/L	< 23 U	< 17 U	< 8.4 U	< 2.1 U	< 0.38 U	--	< 0.19 U	< 0.25 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.51 U	< 0.63 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.25 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	µg/L	< 35 U	< 25 U	< 12 U	< 3.1 U	< 0.68 U	--	< 0.15 UT	< 0.45 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.91 U	< 1.1 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.45 U
1,1,2-Trichloroethane	1	µg/L	< 34 U	< 18 U	< 9.2 U	< 2.3 U	< 0.16 U	--	< 0.19 U	< 0.37 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.73 U	< 0.91 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.37 U
1,1-Dichloroethane	5	µg/L	< 19 U	< 30 U	< 15 U	< 3.8 U	< 0.48 U	--	< 0.24 U	< 0.28 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.71 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.28 U
1,1-Dichloroethene	5	µg/L	< 24 U	< 23 U	< 12 U	< 2.9 U	< 0.68 U	--	0.79 J	< 0.28 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.57 U	0.8 JD	< 0.59 U	0.66 J	< 0.59 U	< 0.59 U	< 0.59 U	< 0.28 U
1,1-Dichloropropene	5	µg/L	--	--	--	--	--	--	--	< 0.3 U	--	--	--	--	< 0.6 U	< 0.75 U	--	--	--	--	--	< 0.3 U
1,2,3-Trichlorobenzene	5	µg/L	--	--	--	--	< 0.7 U	--	--	< 0.61 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 1.2 U	< 1.5 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.61 U
1,2,3-Trichloropropane	0.04	µg/L	--	--	--	--	--	--	--	< 0.56 U	--	--	--	--	< 1.1 U	< 1.4 U	--	--	--	--	--	< 0.56 U
1,2,4-Trichlorobenzene	5	µg/L	< 19 U	< 33 U	< 16 U	< 4.1 U	< 0.54 U	--	< 0.2 U	< 0.5 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.99 U	< 1.2 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.5 U
1,2,4-Trimethylbenzene	5	µg/L	--	--	--	--	--	--	--	< 0.4 U	--	--	--	--	< 0.8 U	< 0.99 U	--	--	--	--	--	< 0.4 U
1,2-Dibromo-3-Chloropropane	0.04	µg/L	< 84 U	< 31 U	< 16 U	< 3.9 U	< 0.46 U	--	< 0.94 U	< 1.6 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 3.2 U	< 4 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 1.6 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	µg/L	< 30 U	< 58 U	< 29 U	< 7.3 U	< 0.38 U	--	< 0.21 U	< 0.34 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.68 U	< 0.85 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.34 U
1,2-Dichlorobenzene	3	µg/L	< 16 U	< 63 U	< 32 U	< 7.9 U	< 0.44 U	--	< 0.19 U	< 0.24 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.49 U	< 0.61 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.24 U
1,2-Dichloroethane	0.6	µg/L	< 28 U	< 17 U	< 8.4 U	< 2.1 U	< 0.5 U	--	< 0.2 U	< 0.62 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 1.2 U	< 1.5 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.62 U
1,2-Dichloropropane	1	µg/L	< 23 U	< 58 U	< 29 U	< 7.2 U	< 0.36 U	--	< 0.25 U	< 0.36 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.72 U	< 0.91 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.36 U
1,3,5-Trichlorobenzene	5	µg/L	--	--	--	--	--	--	--	< 0.42 U	--	--	--	--	< 0.84 U	< 1.1 U	--	--	--	--	--	< 0.42 U
1,3,5-Trimethylbenzene (Mesitylene)	5	µg/L	--	--	--	--	--	--	--	< 0.23 U	--	--	--	--	< 0.45 U	< 0.57 U	--	--	--	--	--	< 0.23 U
1,3-Dichlorobenzene	3	µg/L	< 18 U	< 62 U	< 31 U	< 7.8 U	< 0.66 U	--	< 0.18 U	< 0.24 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.47 U	< 0.59 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.24 U
1,3-Dichloropropane	5	µg/L	--	--	--	--	--	--	--	< 0.26 U	--	--	--	--	< 0.52 U	< 0.65 U	--	--	--	--	--	< 0.26 U
1,4-Dichlorobenzene	3	µg/L	< 16 U	< 67 U	< 34 U	< 8.4 U	< 0.66 U	--	< 0.17 U	< 0.26 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.52 U	< 0.65 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.26 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	< 41 U	--	--	--	--	< 82 U	< 100 U	--	--	--	--	--	< 41 U
2,2-Dichloropropane	5	µg/L	--	--	--	--	--	--	--	< 0.65 U	--	--	--	--	< 1.3 U	< 1.6 U	--	--	--	--	--	< 0.65 U
2-Chlorotoluene	NSL	µg/L	--	--	--	--	--	--	--	< 0.23 U	--	--	--	--	< 0.46 U	< 0.57 U	--	--	--	--	--	< 0.23 U
2-Hexanone	50	µg/L	< 51 U	< 99 U	< 50 U	< 12 U	< 1.4 U	--	< 1.3 U	< 2.2 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.5 U	< 5.6 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 2.2 U
2-Methoxy-2-Methylbutane	NSL	µg/L	--	--	--	--	--	--	--	< 0.29 U	--	--	--	--	< 0.57 U	< 0.71 U	--	--	--	--	--	< 0.29 U
4-Chlorotoluene	5	µg/L	--	--	--	--	--	--	--	< 0.24 U	--	--	--	--	< 0.47 U	< 0.59 U	--	--	--	--	--	< 0.24 U
Acetone	50	µg/L	< 140 U	< 240 U	< 120 U	< 30 U	< 2.1 U	--	< 2.7 U	< 4.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	9.1 JD	< 10 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	9.6 JD
Acrylonitrile	5	µg/L	--	--	--	--	--	--	--	< 1.1 U	--	--	--	--	< 2.2 U	< 2.7 U	--	--	--	--	--	< 1.1 U
Benzene	1	µg/L	< 16 U	< 33 U	< 16 U	< 4.1 U	< 0.18 U	--	< 0.2 U	< 0.4 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.8 U	< 1 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.4 U
Bromobenzene	5	µg/L	--	--	--	--	--	--	--	< 0.3 U	--	--	--	--	< 0.6 U	< 0.75 U	--	--	--	--	--	< 0.3 U
Bromochloromethane	5	µg/L	--	--	--	--	< 0.6 U	--	--	< 0.61 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 1.2 U	< 1.5 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.61 U
Bromodichloromethane	50	µg/L	< 19 U	< 31 U	< 16 U	< 3.9 U	< 0.3 U	--	< 0.17 U	< 0.36 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.72 U	< 0.9 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.36 U
Bromoform	50	µg/L	< 80 U	< 21 U	< 10 U	< 2.6 U	< 0.36 U	--	< 0.29 U	< 0.77 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 1.5 U	< 1.9 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.77 U
Bromomethane	5	µg/L	< 51 U	< 55 U	< 28 U	< 6.9 U	< 0.36 U	--	< 0.35 U	< 3.1 U	< 1.6 U	< 1.6 U	< 1.6 UJ	< 1.6 U	< 6.2 U	< 7.7 U	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 U	< 3.1 U
Carbon Disulfide	60	µg/L	< 16 U	< 15 U	< 7.6 U	< 1.9 U	< 0.44 U	--	< 0.22 U	< 2.9 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 5.8 U	< 7.2 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 2.9 U
Carbon Tetrachloride	5	µg/L	< 16 U	< 22 U	< 11 U	< 2.7 U	< 0.66 U	--	< 0.18 U	< 0.33 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.66 U	< 0.82 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.33 U
Chlorobenzene	5	µg/L	< 19 U	< 60 U	< 30 U	< 7.5 U	< 0.48 U	--	< 0.18 U	< 0.21 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.42 U	< 0.53 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.21 U
Chloroethane	5	µg/L	< 36 U	< 26 U	< 13 U	< 3.2 U	< 0.74 U	--	< 0.36 U	< 0.64 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U	< 1.3 U	< 1.6 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 UJ	< 0.73 U	< 0.64 U
Chloroform	7	µg/L	< 20 U	< 27 U	< 14 U	< 3.4 U	< 0.44 U	--	< 0.23 U	< 0.34 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.67 U	< 0.84 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.34 U
Chloromethane (Methyl Chloride)	5	µg/L	< 38 U	< 28 U	< 14 U	< 3.5 U	< 0.44 U	--	< 0.36 U	< 1 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 2.1 U	< 2.6 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 1 U
Cis-1,2-Dichloroethylene	5	µg/L	**2800**	**4800**	**1900**	**610**	**520**	--	**380**	**310 D**	**152**	**175**	**156**	**150**	**490 D**	**530 D**	**257**	**351**	**243**	**259**	**248**	**88 D**
Cis-1,3-Dichloropropene	0.4	µg/L	< 18 U	< 29 U	< 14 U	< 3.6 U	< 0.32 U	--	< 0.17 U	< 0.32 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.63 U	< 0.79 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.32 U
Cyclohexane	NSL	µg/L	< 15 U	< 14 U	< 7.2 U	< 1.8 U	< 0.52 U	--	< 0.13 U	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--
Cymene	5	µg/L	--	--	--	--	--	--	--	< 0.19 U	--	--	--	--	< 0.39 U	< 0.49 U	--	--	--	--	--	< 0.19 U
Dibromochloromethane	50	µg/L	< 23 U	< 26 U	< 13 U	< 3.2 U	< 0.44 U	--	< 0.25 U	< 0.44 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.89 U	< 1.1 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.44 U
Dibromomethane	5	µg/L	--	--	--	--	--	--	--	< 0.71 U	--	--	--	--	< 1.4 U	< 1.8 U	--	--	--	--	--	< 0.71 U
Dichlorodifluoromethane	5	µg/L	< 39 U	< 54 U	< 27 U	< 6.8 U	< 0.28 U	--	< 0.17 U	< 0.38 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.77 U	< 0.96 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.38 U
Diethyl Ether (Ethyl Ether)	NSL	µg/L	--	--	--	--	--	--	--	< 0.36 U	--	--	--	--	< 0.73 U	< 0.91 U	--	--	--	--	--	< 0.36 U
Ethyl Tert-Butyl Ether	NSL	µg/L	--	--	--	--	--	--	--	< 0.3 U	--	--	--	--	< 0.59 U	< 0.74 U	--	--	--	--	--	< 0.3 U
Ethylbenzene	5	µg/L	< 21 U	< 59 U	< 30 U	< 7.4 U	< 0.6 U	--	< 0.19 U	< 0.43 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.86 U	< 1.1 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.43 U
Hexachlorobutadiene	0.5	µg/L	--	--	--	--	--	--	--	< 0.91 U	--	--	--	--	< 1.8 U	< 2.3 U	--	--	--	--	--	< 0.91 U
Iodomethane (Methyl Iodide)	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropyl Ether	NSL	µg/L	--	--	--	--	--	--	--	< 0.26 U	--	--	--	--	< 0.51 U	< 0.64 U	--	--	--	--	--	< 0.26 U
Isopropylbenzene (Cumene)	5	µg/L	< 16 U	< 63 U	< 32 U	< 7.9 U	< 0.64 U	--	< 0.33 U	< 0.22 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.43 U	< 0.54 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.22 U
M,P-Xylene (Sum Of Isomers)	5	µg/L	--	--	--	--	--	--	--	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--
Methyl Acetate	NSL	µg/L	< 48 U	< 40 U	< 20 U	< 5 U	< 1.2 U	--	< 0.58 U	< 0.91 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 1.8 U	< 2.3 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.91 U
Methyl Ethyl Ketone (2-Butanone)	50	µg/L	< 71 U	< 110 U	< 53 U	< 13 U	< 4.4 U	--	< 2.6 U	< 3.2 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 6.5 U	14 JD	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 3.2 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NSL	µg/L	< 40 U	< 170 U	< 84 U	< 21 U	< 1.3 U	--	< 0.81 U	< 2.6 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 5.1 U	< 6.4 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 2.6 U
Methylcyclohexane	NSL	µg/L	< 16 U	< 13 U	< 6.4 U	< 1.6 U	< 0.44 U	--	< 0.09 U	< 0.49 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.98 U	< 1.2 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.49 U
Methylene Chloride	5	µg/L	< 41 U	< 35 U	< 18 U	< 4.4 U	< 0.42 U	--	< 1 U	< 0.47 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 0.94 U	< 1.2 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 0.47 U
M-P-Xylene	5	µg/L	--	--	--	--	< 0.56 U	--	--	< 0.92 U	--	--	--	--	< 1.8 U	< 2.3 U	--	--	--	--	--	< 0.92 U
Naphthalene	10	µg/L	--	--	--	--	--	--	--	< 0.49 U	--	--	--	--	< 0.97 U	< 1.2 U	--	--	--	--	--	< 0.49 U
N-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	< 0.3 U	--	--	--	--	< 0.61 U	< 0.76 U	--	--	--	--	--	< 0.3 U
N-Propylbenzene	5	µg/L	--	--	--	--	--	--	--	< 0.17 U	--	--	--	--	< 0.34 U	< 0.43 U	--	--	--	--	--	< 0.17 U
O-Xylene (1,2-Dimethylbenzene)	5	µg/L	--	--	--	--	< 0.64 U	--	--	< 0.46 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.92 U	< 1.1 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.46 U
Sec-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	< 0.22 U	--	--	--	--	< 0.44 U	< 0.55 U	--	--	--	--	--	< 0.22 U
Styrene	5	µg/L	< 14 U	< 58 U	< 29 U	< 7.3 U	< 0.34 U	--	< 0.28 U	< 0.21 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.42 U	< 0.53 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.21 U
T-Butylbenzene	5	µg/L	--	--	--	--	--	--	--	< 0.26 U	--	--	--	--	< 0.52 U	< 0.64 U	--	--	--	--	--	< 0.26 U
Tert-Butyl Alcohol	NSL	µg/L	--	--	--	--	--	--	--	< 9.4 U	--	--	--	--	< 19 U	< 23 U	--	--	--	--	--	< 9.4 U
Tert-Butyl Methyl Ether	10	µg/L	< 21 U	< 13 U	< 6.4 U	< 1.6 U	< 0.26 U	--	< 0.17 U	< 0.34 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.69 U	< 0.86 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.34 U
Tetrachloroethylene (PCE)	5	µg/L	**700**	**1000**	**590**	**320**	**310**	--	**320**	**170 D**	**13**	**10.7**	2.7	**19.0**	**11 D**	3 JD	**8.7**	**13.4**	1.6	0.97	0.73 J	**230 D**
Tetrahydrofuran	NSL	µg/L	--	--	--	--	--	--	--	5.8 JD	--	--	--	--	< 2 U	< 2.5 U	--	--	--	--	--	< 0.98 U
Toluene	5	µg/L	< 16 U	< 41 U	< 20 U	< 5.1 U	< 0.5 U	--	< 0.17 U	< 0.45 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.9 U	< 1.1 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.45 U
Trans-1,2-Dichloroethene	5	µg/L	< 24 U	< 72 U	< 36 U	< 9 U	**6.4**	--	2.5	1.9 JD	0.79 J	1.2	0.71	< 0.54 U	3.1 JD	< 0.84 U	2.2	3.4	2.8	2.2	2.0	1.2 JD
Trans-1,3-Dichloropropene	0.4	µg/L	< 24 U	< 30 U	< 15 U	< 3.7 U	< 0.38 U	--	< 0.17 U	< 0.34 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.67 U	< 0.84 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.34 U
Trans-1,4-Dichloro-2-Butene	5	µg/L	--	--	--	--	--	--	--	< 3.2 U	--	--	--	--	< 6.5 U	< 8.1 U	--	--	--	--	--	< 3.2 U
Trichloroethylene (TCE)	5	µg/L	**550**	**820**	**420**	**190**	**130**	--	**140**	**100 D**	**8.7**	**7.8**	3.7	**7.2**	**17 D**	2 JD	**6.3**	**11.1**	1.6	1.1	0.78 J	**21 D**
Trichlorofluoromethane	5	µg/L	< 26 U	< 70 U	< 35 U	< 8.8 U	< 0.3 U	--	< 0.21 U	< 0.35 U	< 0.40 U	< 0.40 U	< 0.40 UJ	< 0.40 U	< 0.7 U	< 0.88 U	< 0.40 U	< 0.40 U	< 0.40 U	< 0.40 UJ	< 0.40 U	< 0.35 U
Vinyl Acetate	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	2	µg/L	**140**	**210**	< 36 U	< 9 U	< 0.12 U	--	**3.6**	**2.7 JD**	**2.1**	1.2	1.9	1.1	**16 D**	**15 D**	**51.1**	**44.1**	**54.8**	**53.1**	**59.8**	1.9 JD
Xylenes	5	µg/L	< 18 U	< 53 U	< 26 U	< 6.6 U	--	--	< 0.58 U	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	--	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	--
Xylenes, Total	NSL	µg/L	< 18 U	< 53 U	< 26 U	< 6.6 U	--	--	< 0.58 U	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	**0.39 J**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)																						
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	NSL	ng/L	--	--	--	--	--	--	--	--	< 1.7 U	--	--	--	--	--	< 1.6 U	< 1.6 U	--	--	--	--
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	< 1.4 U	--	--	--	--	--	< 1.3 U	< 1.3 U	--	--	--	--
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	< 2.1 U	--	--	--	--	--	< 2.0 U	< 2.0 U	--	--	--	--
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	NSL	ng/L	--	--	--	--	--	--	--	--	< 0.87 U	--	--	--	--	--	< 0.83 U	< 0.80 U	--	--	--	--
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 6.8 U	--	--	--	--	--	< 6.5 U	< 6.2 U	--	--	--	--
3-Perfluoroheptyl propanoic acid (7:3FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 5.9 U	--	--	--	--	--	< 5.6 U	< 5.4 U	--	--	--	--
3-Perfluoropropyl propanoic acid (3:3 FTCA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 2.3 U	--	--	--	--	--	< 2.2 U	< 2.1 U	--	--	--	--
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 1.2 U	--	--	--	--	--	< 1.1 U	< 1.1 U	--	--	--	--
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	NSL	ng/L	--	--	--	--	--	--	--	--	< 2.3 U	--	--	--	--	--	< 2.2 U	< 2.1 U	--	--	--	--
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 1.7 U	--	--	--	--	--	< 1.6 U	< 1.6 U	--	--	--	--
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 0.50 U	--	--	--	--	--	< 0.48 U	< 0.46 U	--	--	--	--
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 0.87 U	--	--	--	--	--	0.96 J	< 0.80 U	--	--	--	--
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	< 3.6 U	--	--	--	--	--	< 3.4 U	< 3.3 U	--	--	--	--
N-methyl perfluorooctanesulfonamide (NMeFOSA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 0.61 U	--	--	--	--	--	< 0.58 U	< 0.56 U	--	--	--	--
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NSL	ng/L	--	--	--	--	--	--	--	--	0.97 J	--	--	--	--	--	2.5	1.3 J	--	--	--	--
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	NSL	ng/L	--	--	--	--	--	--	--	--	< 2.6 U	--	--	--	--	--	< 2.5 U	< 2.4 U	--	--	--	--
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 1.2 U	--	--	--	--	--	< 1.2 U	< 1.1 U	--	--	--	--
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 0.26 U	--	--	--	--	--	< 0.25 U	< 0.24 U	--	--	--	--
Perfluoro-3-methoxypropanoic acid (PFMPA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 0.29 U	--	--	--	--	--	< 0.27 U	< 0.26 U	--	--	--	--
Perfluoro-4-methoxybutanoic acid (PFMBA)	NSL	ng/L	--	--	--	--	--	--	--	--	< 0.53 U	--	--	--	--	--	< 0.51 U	< 0.49 U	--	--	--	--
Perfluorobutanesulfonic acid (PFBS)	NSL	ng/L	--	--	--	--	--	2.9	22	--	6	--	--	--	--	--	4.4	2.3	--	--	--	--
Perfluorobutanoic Acid	NSL	ng/L	--	--	--	--	--	3.9	14	--	14	--	--	--	--	--	7 J	5.2 J	--	--	--	--
Perfluorodecanesulfonic acid (PFDS)	NSL	ng/L	--	--	--	--	--	< 1.2 U	< 0.31 U	--	< 1.0 U	--	--	--	--	--	< 0.99 U	< 0.95 U	--	--	--	--
Perfluorodecanoic acid (PFDA)	NSL	ng/L	--	--	--	--	--	1.5 J	4.7	--	1.4 J	--	--	--	--	--	1.4 J	0.84 J	--	--	--	--
Perfluorododecanesulfonic acid (PFDoS)	NSL	ng/L	--	--	--	--	--	--	--	--	< 0.38 U	--	--	--	--	--	< 0.36 U	< 0.35 U	--	--	--	--
Perfluorododecanoic acid (PFDoA)	NSL	ng/L	--	--	--	--	--	< 0.57 U	< 0.54 U	--	< 0.73 U	--	--	--	--	--	< 0.70 U	< 0.67 U	--	--	--	--
Perfluoroheptanesulfonic acid (PFHpS)	NSL	ng/L	--	--	--	--	--	< 0.69 U	1.6 J	--	0.94 J	--	--	--	--	--	< 0.89 U	< 0.86 U	--	--	--	--
Perfluoroheptanoic acid (PFHpA)	NSL	ng/L	--	--	--	--	--	2.9	16	--	7.3	--	--	--	--	--	5	2.8	--	--	--	--
Perfluorohexanesulfonic acid (PFHxS)	NSL	ng/L	--	--	--	--	--	1.6 J	11 B	--	2.4	--	--	--	--	--	2.4	2.1	--	--	--	--
Perfluorohexanoic acid (PFHxA)	NSL	ng/L	--	--	--	--	--	0.92 J	24	--	8.5	--	--	--	--	--	5.7	3.2	--	--	--	--
Perfluorononanesulfonic Acid (PFNS)	NSL	ng/L	--	--	--	--	--	--	--	--	< 1.4 U	--	--	--	--	--	< 1.3 U	< 1.3 U	--	--	--	--
Perfluorononanoic acid (PFNA)	NSL	ng/L	--	--	--	--	--	3.2	5.5	--	1.9	--	--	--	--	--	2.4	1.3 J	--	--	--	--
Perfluorooctane Sulfonamide (PFOSA)	NSL	ng/L	--	--	--	--	--	< 0.62 U	1.1 BJ	--	0.81 J	--	--	--	--	--	1.5 J	1.3 J	--	--	--	--
Perfluorooctanesulfonic acid (PFOS)	2.7	ng/L	--	--	--	--	--	**63**	**94**	--	**76.6**	--	--	--	--	--	**56.9**	**35.9**	--	--	--	--
Perfluorooctanoic acid (PFOA)	6.7	ng/L	--	--	--	--	--	**8.5**	**51**	--	**18.2**	--	--	--	--	--	**16.3**	**9.1**	--	--	--	--
Perfluoropentanesulfonic Acid (PFPeS)	NSL	ng/L	--	--	--	--	--	--	--	--	1.2 J	--	--	--	--	--	1.2 J	< 0.88 U	--	--	--	--
Perfluoropentanoic Acid (PFPeA)	NSL	ng/L	--	--	--	--	--	1.4 J	26	--	10.2	--	--	--	--	--	6.6	3.1 J	--	--	--	--
Perfluorotetradecanoic acid (PFTeDA)	NSL	ng/L	--	--	--	--	--	< 0.19 U	< 0.29 U	--	< 0.72 U	--	--	--	--	--	< 0.69 U	< 0.67 U	--	--	--	--
Perfluorotridecanoic Acid (PFTriA/PFTrDA)	NSL	ng/L	--	--	--	--	--	< 0.54 U	1.6 J	--	< 0.75 U	--	--	--	--	--	< 0.72 U	< 0.69 U	--	--	--	--
Perfluoroundecanoic Acid (PFUnA)	NSL	ng/L	--	--	--	--	--	< 0.73 U	1.1 J	--	< 0.52 U	--	--	--	--	--	< 0.50 U	< 0.48 U	--	--	--	--

Notes:

[1]NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)

--' = Not analyzed
µg/L = Mircogram(s) per liter
ng/L - Nanogram(s) per liter
B = Analyte detected in blank, as well as sample
D = Compound in analysis has been diluted
J = Concentration is estimated
NSL = No screening level available
U = Analyte not detected
R = Reported result unusable
VOCs = Volatile organic compounds
PFAS = Per- and polyfluoroalkyl substances
Concentrations exceeding the screening level are bolded and shaded gray

		Location	MW-25RS	MW-25RS	MW-25RS	MW-25RS	MW-25RS	MW-25RS	MW-30D	MW-30D	MW-30D	MW-30D	MW-30D	MW-30D	MW-30D	MW-30S	MW-30S	MW-30S	MW-30S	MW-30S	MW-30S
		Sample Name	MW-25RS-09232022	130054-MW-25RS-12052023	MW-25RS-03192024	130054-MW-25RS-06242024	130054-MW-25RS-09182024	130054-MW-25RS-20241126	MW-30D06072022	MW-30D-09222022	130054-MW-30D-12052023	MW-30D-03192024	130054-MW-30D-06252024	130054-MW-30D-09182024	130054-MW-30D-20241126	MW-30S06072022	130054-MW-30S-12052023	MW-30S-03202024	130054-MW-30S-06252024	130054-MW-30S-09182024	130054-MW-30S-20241126
		Parent Sample Name																			
		Sample Date	9/23/2022	12/5/2023	3/19/2024	6/24/2024	9/18/2024	11/26/2024	6/7/2022	9/22/2022	12/5/2023	3/19/2024	6/25/2024	9/18/2024	11/26/2024	6/7/2022	12/5/2023	3/20/2024	6/25/2024	9/18/2024	11/26/2024
Analyte	**NYSDEC AWQS[1]**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (SW8260, SW8260B, SW8260C, SW8260C-SIM)																					
1,1,1,2-Tetrachloroethane	5	µg/L	< 0.18 U	--	--	--	--	--	< 1.8 U	< 0.89 U	--	--	--	--	--	< 0.71 U	--	--	--	--	--
1,1,1-Trichloroethane (TCA)	5	µg/L	< 0.17 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 1.7 U	< 0.84 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.68 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U
1,1,2,2-Tetrachloroethane	5	µg/L	< 0.13 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 1.3 U	< 0.63 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.51 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	µg/L	< 0.23 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 2.3 U	< 1.1 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.91 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U	< 0.58 U
1,1,2-Trichloroethane	1	µg/L	< 0.18 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 1.8 U	< 0.91 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.73 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U
1,1-Dichloroethane	5	µg/L	< 0.14 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 1.4 U	< 0.71 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U
1,1-Dichloroethene	5	µg/L	< 0.14 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 1.4 U	< 0.71 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.57 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U
1,1-Dichloropropene	5	µg/L	< 0.15 U	--	--	--	--	--	< 1.5 U	< 0.75 U	--	--	--	--	--	< 0.6 U	--	--	--	--	--
1,2,3-Trichlorobenzene	5	µg/L	< 0.3 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 3 U	< 1.5 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 1.2 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2,3-Trichloropropane	0.04	µg/L	< 0.28 U	--	--	--	--	--	< 2.8 U	< 1.4 U	--	--	--	--	--	< 1.1 U	--	--	--	--	--
1,2,4-Trichlorobenzene	5	µg/L	< 0.25 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 2.5 U	< 1.2 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.99 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2,4-Trimethylbenzene	5	µg/L	< 0.2 U	--	--	--	--	--	< 2 U	< 0.99 U	--	--	--	--	--	< 0.8 U	--	--	--	--	--
1,2-Dibromo-3-Chloropropane	0.04	µg/L	< 0.8 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 8 U	< 4 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 3.2 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	µg/L	< 0.17 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 1.7 U	< 0.85 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.68 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U
1,2-Dichlorobenzene	3	µg/L	< 0.12 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 1.2 U	< 0.61 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.49 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U
1,2-Dichloroethane	0.6	µg/L	< 0.31 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 3.1 U	< 1.5 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 1.2 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U
1,2-Dichloropropane	1	µg/L	< 0.18 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 1.8 U	< 0.91 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.72 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U
1,3,5-Trichlorobenzene	5	µg/L	< 0.21 U	--	--	--	--	--	< 2.1 U	< 1.1 U	--	--	--	--	--	< 0.84 U	--	--	--	--	--
1,3,5-Trimethylbenzene (Mesitylene)	5	µg/L	< 0.11 U	--	--	--	--	--	< 1.1 U	< 0.57 U	--	--	--	--	--	< 0.45 U	--	--	--	--	--
1,3-Dichlorobenzene	3	µg/L	< 0.12 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 1.2 U	< 0.59 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.47 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U
1,3-Dichloropropane	5	µg/L	< 0.13 U	--	--	--	--	--	< 1.3 U	< 0.65 U	--	--	--	--	--	< 0.52 U	--	--	--	--	--
1,4-Dichlorobenzene	3	µg/L	< 0.13 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 1.3 U	< 0.65 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.52 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U
1,4-Dioxane (P-Dioxane)	0.35	µg/L	< 21 U	--	--	--	--	--	< 210 U	< 100 U	--	--	--	--	--	< 82 U	--	--	--	--	--
2,2-Dichloropropane	5	µg/L	< 0.33 U	--	--	--	--	--	< 3.3 U	< 1.6 U	--	--	--	--	--	< 1.3 U	--	--	--	--	--
2-Chlorotoluene	NSL	µg/L	< 0.11 U	--	--	--	--	--	< 1.1 U	< 0.57 U	--	--	--	--	--	< 0.46 U	--	--	--	--	--
2-Hexanone	50	µg/L	< 1.1 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 11 U	< 5.6 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.5 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U	< 4.8 U
2-Methoxy-2-Methylbutane	NSL	µg/L	< 0.14 U	--	--	--	--	--	< 1.4 U	< 0.71 U	--	--	--	--	--	< 0.57 U	--	--	--	--	--
4-Chlorotoluene	5	µg/L	< 0.12 U	--	--	--	--	--	< 1.2 U	< 0.59 U	--	--	--	--	--	< 0.47 U	--	--	--	--	--
Acetone	50	µg/L	< 2 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 20 U	< 10 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 8.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U	< 3.1 U
Acrylonitrile	5	µg/L	< 0.55 U	--	--	--	--	--	< 5.5 U	< 2.7 U	--	--	--	--	--	< 2.2 U	--	--	--	--	--
Benzene	1	µg/L	< 0.2 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 2 U	< 1 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.8 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U
Bromobenzene	5	µg/L	< 0.15 U	--	--	--	--	--	< 1.5 U	< 0.75 U	--	--	--	--	--	< 0.6 U	--	--	--	--	--
Bromochloromethane	5	µg/L	< 0.31 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 3.1 U	< 1.5 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 1.2 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U
Bromodichloromethane	50	µg/L	< 0.18 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 1.8 U	< 0.9 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.72 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U	< 0.45 U
Bromoform	50	µg/L	< 0.38 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 3.8 U	< 1.9 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 1.5 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U
Bromomethane	5	µg/L	< 1.5 U	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 UJ	< 1.6 U	< 15 U	< 7.7 U	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 UJ	< 1.6 U	< 6.2 U	< 1.6 U	< 1.6 U	< 1.6 U	< 1.6 UJ	< 1.6 U
Carbon Disulfide	60	µg/L	< 1.4 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 14 U	< 7.2 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 5.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U	< 1.8 U
Carbon Tetrachloride	5	µg/L	< 0.16 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 1.6 U	< 0.82 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.66 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U
Chlorobenzene	5	µg/L	< 0.11 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 1.1 U	< 0.53 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.42 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U
Chloroethane	5	µg/L	< 0.32 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U	< 3.2 U	< 1.6 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U	< 1.3 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U
Chloroform	7	µg/L	< 0.17 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 1.7 U	< 0.84 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.67 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Chloromethane (Methyl Chloride)	5	µg/L	< 0.52 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 5.2 U	< 2.6 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 2.1 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U	< 0.76 U
Cis-1,2-Dichloroethylene	5	µg/L	**34**	**26.4**	**12**	**12.4**	**46.1**	**9.5**	**800 D**	**490 D**	**171**	**146**	**159**	**200**	**261**	**400 D**	**108**	**160**	**109**	**123**	**150**
Cis-1,3-Dichloropropene	0.4	µg/L	< 0.16 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 1.6 U	< 0.79 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.63 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U
Cyclohexane	NSL	µg/L	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U
Cymene	5	µg/L	< 0.097 U	--	--	--	--	--	< 0.97 U	< 0.49 U	--	--	--	--	--	< 0.39 U	--	--	--	--	--
Dibromochloromethane	50	µg/L	< 0.22 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 2.2 U	< 1.1 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.89 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U
Dibromomethane	5	µg/L	< 0.35 U	--	--	--	--	--	< 3.5 U	< 1.8 U	--	--	--	--	--	< 1.4 U	--	--	--	--	--
Dichlorodifluoromethane	5	µg/L	< 0.19 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 1.9 U	< 0.96 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.77 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U
Diethyl Ether (Ethyl Ether)	NSL	µg/L	< 0.18 U	--	--	--	--	--	< 1.8 U	< 0.91 U	--	--	--	--	--	< 0.73 U	--	--	--	--	--
Ethyl Tert-Butyl Ether	NSL	µg/L	< 0.15 U	--	--	--	--	--	< 1.5 U	< 0.74 U	--	--	--	--	--	< 0.59 U	--	--	--	--	--
Ethylbenzene	5	µg/L	< 0.21 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 2.1 U	< 1.1 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	0.81 J	< 0.86 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	1.6
Hexachlorobutadiene	0.5	µg/L	< 0.46 U	--	--	--	--	--	< 4.6 U	< 2.3 U	--	--	--	--	--	< 1.8 U	--	--	--	--	--
Iodomethane (Methyl Iodide)	5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropyl Ether	NSL	µg/L	< 0.13 U	--	--	--	--	--	< 1.3 U	< 0.64 U	--	--	--	--	--	< 0.51 U	--	--	--	--	--
Isopropylbenzene (Cumene)	5	µg/L	< 0.11 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	< 1.1 U	< 0.54 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	1.3	< 0.43 U	< 0.65 U	< 0.65 U	< 0.65 U	< 0.65 U	2.3
M,P-Xylene (Sum Of Isomers)	5	µg/L	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	--	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	**6.9**	--	< 0.78 U	< 0.78 U	< 0.78 U	< 0.78 U	**15.2**
Methyl Acetate	NSL	µg/L	< 0.45 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 4.5 U	< 2.3 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 1.8 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U	< 0.80 U
Methyl Ethyl Ketone (2-Butanone)	50	µg/L	< 1.6 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 16 U	< 8.1 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 6.5 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U	< 2.7 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NSL	µg/L	< 1.3 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 13 U	< 6.4 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 5.1 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U	< 4.9 U
Methylcyclohexane	NSL	µg/L	< 0.24 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 2.4 U	< 1.2 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.98 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U
Methylene Chloride	5	µg/L	< 0.23 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 2.3 U	< 1.2 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 0.94 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
M-P-Xylene	5	µg/L	< 0.46 U	--	--	--	--	--	< 4.6 U	< 2.3 U	--	--	--	--	--	< 1.8 U	--	--	--	--	--
Naphthalene	10	µg/L	< 0.24 U	--	--	--	--	--	< 2.4 U	< 1.2 U	--	--	--	--	--	< 0.97 U	--	--	--	--	--
N-Butylbenzene	5	µg/L	< 0.15 U	--	--	--	--	--	< 1.5 U	< 0.76 U	--	--	--	--	--	< 0.61 U	--	--	--	--	--
N-Propylbenzene	5	µg/L	< 0.086 U	--	--	--	--	--	< 0.86 U	< 0.43 U	--	--	--	--	--	< 0.34 U	--	--	--	--	--
O-Xylene (1,2-Dimethylbenzene)	5	µg/L	< 0.23 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 2.3 U	< 1.1 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	4.6	< 0.92 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	**11.1**
Sec-Butylbenzene	5	µg/L	< 0.11 U	--	--	--	--	--	< 1.1 U	< 0.55 U	--	--	--	--	--	< 0.44 U	--	--	--	--	--
Styrene	5	µg/L	< 0.11 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 1.1 U	< 0.53 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.42 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U
T-Butylbenzene	5	µg/L	< 0.13 U	--	--	--	--	--	< 1.3 U	< 0.64 U	--	--	--	--	--	< 0.52 U	--	--	--	--	--
Tert-Butyl Alcohol	NSL	µg/L	< 4.7 U	--	--	--	--	--	< 47 U	< 23 U	--	--	--	--	--	< 19 U	--	--	--	--	--
Tert-Butyl Methyl Ether	10	µg/L	< 0.17 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 1.7 U	< 0.86 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.69 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U
Tetrachloroethylene (PCE)	5	µg/L	**24**	**5.7**	**14**	2.1	3.9	1.3	**30 D**	**10 D**	**6.2**	4.5	2.0	1.9	4.0	< 0.75 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U
Tetrahydrofuran	NSL	µg/L	< 0.49 U	--	--	--	--	--	< 4.9 U	8.4 JD	--	--	--	--	--	6.9 JD	--	--	--	--	--
Toluene	5	µg/L	< 0.22 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 2.2 U	1.4 JD	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.9 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U
Trans-1,2-Dichloroethene	5	µg/L	< 0.17 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U	**5.8 JD**	**5.4 D**	1	0.94 J	1.3	1.1	1.2	2.2 JD	0.6 J	0.93 J	0.80 J	< 0.54 U	< 0.54 U
Trans-1,3-Dichloropropene	0.4	µg/L	< 0.17 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 1.7 U	< 0.84 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.67 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U
Trans-1,4-Dichloro-2-Butene	5	µg/L	< 1.6 U	--	--	--	--	--	< 16 U	< 8.1 U	--	--	--	--	--	< 6.5 U	--	--	--	--	--
Trichloroethylene (TCE)	5	µg/L	**10**	**7.4**	4.8	3.1	4.9	1.1	**68 D**	**13 D**	4.8	3.7	2.5	3.2	**5.6**	< 0.76 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U
Trichlorofluoromethane	5	µg/L	< 0.18 U	< 0.40 U	< 0.40 U	< 0.40 U	< 0.40 UJ	< 0.40 U	< 1.8 U	< 0.88 U	< 0.40 U	< 0.40 U	< 0.40 U	< 0.40 UJ	< 0.40 U	< 0.7 U	< 0.40 U	< 0.40 U	< 0.40 U	< 0.40 UJ	< 0.40 U
Vinyl Acetate	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	2	µg/L	0.64 J	0.71 J	< 0.52 U	< 0.52 U	**3.1**	< 0.52 U	**9 JD**	**8.2 JD**	**13.1**	**8.8**	**5.9**	**7.4**	**8.7**	< 0.83 U	**2.5**	< 0.52 U	< 0.52 U	1.3	1.4
Xylenes	5	µg/L	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	--	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	**11.5**	--	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U	**26.3**
Xylenes, Total	NSL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dioxane (P-Dioxane)	0.35	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PFAS (E1633 & EPA Method 537)																					
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	NSL	ng/L	--	< 1.6 U	< 1.6 U	--	--	--	--	--	< 1.7 U	< 1.8 U	--	--	--	--	< 1.6 U	< 1.8 U	--	--	--
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	NSL	ng/L	--	< 1.3 U	< 1.3 U	--	--	--	--	--	< 1.3 U	< 1.4 U	--	--	--	--	< 1.3 U	< 1.4 U	--	--	--
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	NSL	ng/L	--	< 2.0 U	< 1.9 U	--	--	--	--	--	< 2.1 U	< 2.2 U	--	--	--	--	< 2.0 U	< 2.2 U	--	--	--
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	NSL	ng/L	--	< 0.83 U	< 0.79 U	--	--	--	--	--	< 0.85 U	< 0.90 U	--	--	--	--	< 0.83 U	< 0.90 U	--	--	--
2H,2H,3H,3H-Perfluorooctanoic acid (5:3FTCA)	NSL	ng/L	--	< 6.5 U	< 6.2 U	--	--	--	--	--	< 6.6 U	< 7.0 U	--	--	--	--	< 6.5 U	< 7.0 U	--	--	--
3-Perfluoroheptyl propanoic acid (7:3FTCA)	NSL	ng/L	--	< 5.6 U	< 5.4 U	--	--	--	--	--	< 5.7 U	< 6.1 U	--	--	--	--	< 5.6 U	< 6.1 U	--	--	--
3-Perfluoropropyl propanoic acid (3:3 FTCA)	NSL	ng/L	--	< 2.2 U	< 2.1 U	--	--	--	--	--	< 2.2 U	< 2.4 U	--	--	--	--	< 2.2 U	< 2.4 U	--	--	--
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NSL	ng/L	--	< 1.1 U	< 1.1 U	--	--	--	--	--	< 1.1 U	< 1.2 U	--	--	--	--	< 1.1 U	< 1.2 U	--	--	--
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	NSL	ng/L	--	< 2.2 U	< 2.1 U	--	--	--	--	--	< 2.3 U	< 2.4 U	--	--	--	--	< 2.2 U	< 2.4 U	--	--	--
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NSL	ng/L	--	< 1.6 U	< 1.6 U	--	--	--	--	--	< 1.7 U	< 1.8 U	--	--	--	--	< 1.6 U	< 1.8 U	--	--	--
N-ethyl perfluorooctanesulfonamide (NEtFOSA)	NSL	ng/L	--	< 0.48 U	< 0.46 U	--	--	--	--	--	< 0.49 U	< 0.52 U	--	--	--	--	< 0.48 U	< 0.52 U	--	--	--
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NSL	ng/L	--	< 0.83 U	< 0.79 U	--	--	--	--	--	< 0.85 U	< 0.90 U	--	--	--	--	< 0.83 U	< 0.90 U	--	--	--
N-ethyl perfluorooctanesulfonamidoethanol (NEtFOSE)	NSL	ng/L	--	< 3.4 U	< 3.2 U	--	--	--	--	--	< 3.5 U	< 3.7 U	--	--	--	--	< 3.4 U	< 3.7 U	--	--	--
N-methyl perfluorooctanesulfonamide (NMeFOSA)	NSL	ng/L	--	< 0.58 U	< 0.55 U	--	--	--	--	--	< 0.59 U	< 0.63 U	--	--	--	--	< 0.58 U	< 0.63 U	--	--	--
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NSL	ng/L	--	1.7 J	0.94 J	--	--	--	--	--	1.1 J	0.87 J	--	--	--	--	0.61 J	< 0.50 U	--	--	--
N-methyl perfluorooctanesulfonamidoethanol (NMeFOSE)	NSL	ng/L	--	< 2.5 U	< 2.4 U	--	--	--	--	--	< 2.6 U	< 2.7 U	--	--	--	--	< 2.5 U	< 2.7 U	--	--	--
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NSL	ng/L	--	< 1.2 U	< 1.1 U	--	--	--	--	--	< 1.2 U	< 1.3 U	--	--	--	--	< 1.2 U	< 1.3 U	--	--	--
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NSL	ng/L	--	< 0.25 U	< 0.23 U	--	--	--	--	--	< 0.25 U	< 0.27 U	--	--	--	--	< 0.25 U	< 0.27 U	--	--	--
Perfluoro-3-methoxypropanoic acid (PFMPA)	NSL	ng/L	--	< 0.27 U	< 0.26 U	--	--	--	--	--	< 0.28 U	< 0.30 U	--	--	--	--	< 0.27 U	< 0.30 U	--	--	--
Perfluoro-4-methoxybutanoic acid (PFMBA)	NSL	ng/L	--	< 0.51 U	< 0.49 U	--	--	--	--	--	< 0.52 U	< 0.55 U	--	--	--	--	< 0.51 U	< 0.55 U	--	--	--
Perfluorobutanesulfonic acid (PFBS)	NSL	ng/L	--	6.6	2.9	--	--	--	--	--	2.1	2.2	--	--	--	--	2.7	1.7 J	--	--	--
Perfluorobutanoic Acid	NSL	ng/L	--	8	6.3 J	--	--	--	--	--	6.5 J	6.2 J	--	--	--	--	8.2	6.6 J	--	--	--
Perfluorodecanesulfonic acid (PFDS)	NSL	ng/L	--	< 0.99 U	< 0.94 U	--	--	--	--	--	< 1.0 U	< 1.1 U	--	--	--	--	< 0.99 U	< 1.1 U	--	--	--
Perfluorodecanoic acid (PFDA)	NSL	ng/L	--	1.5 J	1.1 J	--	--	--	--	--	0.7 J	0.87 J	--	--	--	--	0.67 J	< 0.61 U	--	--	--
Perfluorododecanesulfonic acid (PFDoS)	NSL	ng/L	--	< 0.36 U	< 0.35 U	--	--	--	--	--	< 0.37 U	< 0.39 U	--	--	--	--	< 0.36 U	< 0.40 U	--	--	--
Perfluorododecanoic acid (PFDoA)	NSL	ng/L	--	0.93 J	0.68 J	--	--	--	--	--	< 0.72 U	< 0.76 U	--	--	--	--	< 0.70 U	< 0.76 U	--	--	--
Perfluoroheptanesulfonic acid (PFHpS)	NSL	ng/L	--	1.2 J	< 0.85 U	--	--	--	--	--	< 0.91 U	< 0.96 U	--	--	--	--	< 0.89 U	< 0.97 U	--	--	--
Perfluoroheptanoic acid (PFHpA)	NSL	ng/L	--	7.8	2.8	--	--	--	--	--	2.6	2.6	--	--	--	--	3.1	2.4	--	--	--
Perfluorohexanesulfonic acid (PFHxS)	NSL	ng/L	--	4.6	1.8	--	--	--	--	--	< 1.0 U	1.6 J	--	--	--	--	2.3	< 1.1 U	--	--	--
Perfluorohexanoic acid (PFHxA)	NSL	ng/L	--	7.8	2.7	--	--	--	--	--	3.5	3.1	--	--	--	--	4.6	2.8	--	--	--
Perfluorononanesulfonic Acid (PFNS)	NSL	ng/L	--	< 1.3 U	< 1.2 U	--	--	--	--	--	< 1.3 U	< 1.4 U	--	--	--	--	< 1.3 U	< 1.4 U	--	--	--
Perfluorononanoic acid (PFNA)	NSL	ng/L	--	3	1.1 J	--	--	--	--	--	0.68 J	0.55 J	--	--	--	--	0.89 J	< 0.40 U	--	--	--
Perfluorooctane Sulfonamide (PFOSA)	NSL	ng/L	--	0.64 J	< 0.60 U	--	--	--	--	--	< 0.64 U	< 0.68 U	--	--	--	--	< 0.63 U	< 0.68 U	--	--	--
Perfluorooctanesulfonic acid (PFOS)	2.7	ng/L	--	**62.2**	**36.9**	--	--	--	--	--	**15.6**	**19.4**	--	--	--	--	**24.7**	2.2	--	--	--
Perfluorooctanoic acid (PFOA)	6.7	ng/L	--	**24.4**	**10**	--	--	--	--	--	5.4	**8.5**	--	--	--	--	**9.5**	4.4	--	--	--
Perfluoropentanesulfonic Acid (PFPeS)	NSL	ng/L	--	1.3 J	< 0.88 U	--	--	--	--	--	< 0.94 U	< 0.99 U	--	--	--	--	< 0.92 U	< 1.0 U	--	--	--
Perfluoropentanoic Acid (PFPeA)	NSL	ng/L	--	8	3.8	--	--	--	--	--	5	3.8 J	--	--	--	--	5.4	3.4 J	--	--	--
Perfluorotetradecanoic acid (PFTeDA)	NSL	ng/L	--	< 0.69 U	< 0.66 U	--	--	--	--	--	< 0.71 U	< 0.75 U	--	--	--	--	< 0.69 U	< 0.75 U	--	--	--
Perfluorotridecanoic Acid (PFTriA/PFTrDA)	NSL	ng/L	--	< 0.72 U	< 0.68 U	--	--	--	--	--	< 0.73 U	< 0.78 U	--	--	--	--	< 0.72 U	< 0.78 U	--	--	--
Perfluoroundecanoic Acid (PFUnA)	NSL	ng/L	--	< 0.50 U	< 0.48 U	--	--	--	--	--	< 0.51 U	< 0.54 U	--	--	--	--	< 0.50 U	< 0.54 U	--	--	--

Notes:

[1]NYSDEC Ambient Water Quality Standard Class GA (Standard/guidance values) (Technical and Operational Guidance Series [TOGS] 1.1.1)

--' = Not analyzed
µg/L = Mircogram(s) per liter
ng/L - Nanogram(s) per liter
B = Analyte detected in blank, as well as sample
D = Compound in analysis has been diluted
J = Concentration is estimated
NSL = No screening level available
U = Analyte not detected
R = Reported result unusable
VOCs = Volatile organic compounds
PFAS = Per- and polyfluoroalkyl substances
Concentrations exceeding the screening level are bolded and shaded gray

Appendix H.
Excavation Work Plan

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Crown Dykman
(NYSDEC Site No. 130054)
Glen Cove, Nassau County, New York
Excavation Work Plan

NYSDEC State Superfund Standby Contract
Work Assignment No. D009806-34

Prepared for

New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12207

Prepared by

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May 2025

Revisions to Final Approved Excavation Work Plan

Revision Number	Date Submitted	Summary of Revision	New York State Department of Environmental Conservation Approval Date

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MAY 2025

CERTIFICATION STATEMENT

I, Donald Conan, certify that I am currently a New York State Registered Professional Engineer (PE) and that this Excavation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10).

May 27, 2025

Donald Conan, P.E., P.G. Date
New York State Professional Engineer No. 75666

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Table 1. Notifications

Table 2. Air Monitoring Action Levels

LIST OF ACRONYMS/ABBREVIATIONS

CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulations
DER	Division of Environmental Remediation
EWP	Excavation Work Plan
HASP	Health and Safety Plan
No.	Number
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules, and Regulations
PE	Professional Engineer
PFAS	Per- and polyfluoroalkyl substances
PRR	Periodic Review Report
QEP	Qualified Environmental Professional
SMP	Site Management Plan

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1. INTRODUCTION

This Excavation Work Plan (EWP) is an Appendix to the Crown Dykman Site Management Plan (SMP).

1.1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the site's cover system, the site owner or their representative will notify the New York State Department of Environmental Conservation (NYSDEC) contacts listed in **Table 1** and includes contact information for the above notification. The information in **Table 1** will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B of the SMP.

Table 1. Notifications

Company/ Organization	Contact Person	Title	Primary Phone Number	Secondary Phone Number/Mailing Address	Email Address
NYSDEC	Jeffrey Dyber	Chief, Remedial Section D	518-402-9621	625 Broadway, Albany, New York 12233-7017	jeffrey.dyber@dec.ny.gov
NYSDEC	Jasmine Stefansky	NYSDEC Project Manager	518-402-9575	625 Broadway Albany, New York 12233-7017	jasmine.stefansky@dec.ny.gov
NYSDOH	Kristin Kulow	Project Manager	607-353-4335	28 Hill Street, Ste 201, Oneonta, New York 13820	kristin.kulow@health.ny.gov
NYSDOH	Arunesh Ghosh	Public Health Specialist	518-402-7860	Empire State Plaza Corning Tower, Room 1787 Albany, New York 12237	arunesh.ghosh@health.ny.gov
EA	Adam Etringer	Project Manager	315-565-6564	333 West Washington Street, Suite 300 Syracuse, New York 13202	aetringer@eaest.com
BNC Realty	Lisa Colletti	Property Owner	516-250-0914	Not available	lcornide@mac.com

Notes:
DER = Division of Environmental Remediation
NYSDOH = New York State Department of Health

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements, or utilities to be installed below ground surface, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control.

- A summary of environmental conditions anticipated in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any preconstruction sampling.

- A schedule for the work, detailing the start and completion of all intrusive work and submittals (e.g., reports) to the NYSDEC documenting the completed intrusive work.

- A summary of the applicable components of this EWP.

- A statement that the work will be performed in compliance with this EWP and 29 Code of Federal Regulations (CFR) 1910.120 and 29 CFR 1926 Subpart P.

- A copy of the contractor's site-specific health and safety plan (HASP), in electronic format if it differs from the HASP provided in Appendix J of the SMP.

- Identification of disposal facilities for potential waste streams.

- Identification of sources of any anticipated backfill, along with along with the required request to import form and all supporting documentation including, but not limited to, chemical testing results.

The NYSDEC Project Manager will review the notification and may impose additional requirements for the excavation that are not listed in this EWP. The alteration, restoration, and modification of engineering controls must conform with Article 145, Section 7209 of the Education Law regarding the application of professional seals and alterations.

1.2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g., photoionization detector) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination) or a breach of the cover system. A qualified environmental professional as defined in 6 NYCRR New York Codes, Rules, and Regulations (NYCRR) Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will perform the screening. Soil screening will be performed when invasive work is done and will include excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the Certificate of Completion.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in **Section 1.6**.

1.3 STOCKPILE METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Appropriate erosion and sediment controls will be used as needed near catch basins, surface waters, and other discharge points. Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected, and damaged tarp covers will be promptly replaced. Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC.

1.4 MATERIALS EXCAVATION AND LOAD OUT

A Qualified Environmental Professional (QEP) as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will oversee all invasive work and the excavation and load-out of excavated material.

The Property Owner and remedial party and its contractors are solely responsible for safe execution of all invasive and other work performed under this EWP.

The presence of utilities and easements on the site will be investigated by the QEP. It will be determined whether a risk or impediment to the planned work under the SMP is posed by utilities or easements on the site. A site utility stakeout will be completed for all utilities prior to any ground intrusive activities at the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate federal, state, local, and New York State Department of Transportation requirements (and all other applicable transportation requirements). Trucks transporting contaminated soils must have either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides.

A truck wash will be operated on-site, as appropriate. The QEP will be responsible for ensuring that outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The QEP will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean

condition with respect to site-derived materials. Material accumulated from the street cleaning and egress cleaning activities will be disposed of off-site at a permitted landfill facility in accordance with all applicable local, state, and federal regulations.

1.5 MATERIALS TRANSPORT OFF-SITE

Transport of materials will be performed by licensed haulers in accordance with appropriate local, state, and federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used. Truck transport routes shall be proposed as part of the notice required in **Section 1.1**. All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes.

The route selected should be the most appropriate route and consider:

- Limiting transport through residential areas and past sensitive sites
- Using city mapped truck routes
- Prohibiting off-site queuing of trucks entering the facility
- Limiting total distance to major highways
- Promoting safety in access to highways
- Ensuring overall safety in transport

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site. Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development. Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

1.6 MATERIALS DISPOSAL OFF-SITE

Material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed off-site in a permitted facility in accordance with local, state and federal regulations. If disposal of soil/fill from this site is proposed for unregulated off-site disposal (i.e., clean soil removed for development purposes), a formal request with an associated plan and characterization results will be made to the NYSDEC Project Manager. Unregulated off-site management of materials from this site will not occur without formal NYSDEC Project Manager approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, (e.g., hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, construction and demolition recycling facility, etc.). Actual disposal quantities and associated

documentation will be reported to the NYSDEC in the Periodic Review Report (PRR). This documentation will include, but not be limited to, waste profiles, test results, facility acceptance letters, manifests, bills of lading, and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled consistent with 6 NYCRR Parts 360, 361, 362, 363, 364, and 365. Material that does not meet Unrestricted Soil Cleanup Objectives is prohibited from being taken to a New York State construction and demolition debris recovery facility (6 NYCRR Subpart 360-15 registered or permitted facility).

1.7 MATERIALS REUSE ON-SITE

The QEP as defined in 6 NYCRR Part 375 will ensure that procedures defined for materials reuse in the SMP are followed and that unacceptable material (i.e., contaminated) does not remain on-site. Contaminated on-site material, including historical fill and contaminated soil that is acceptable for reuse on-site, will be placed below the demarcation layer or impervious surface, and will not be reused within the cover system or within landscaping berms. Contaminated on-site material may only be used beneath the site cover as backfill for subsurface utility lines with prior approval from the NYSDEC Project Manager.

Proposed materials for reuse on-site must be sampled for full suite analytical parameters including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. The sampling frequency will be in accordance with DER 10 Table 5.4(e)4 unless prior approval is obtained from the NYSDEC Project Manager for modification of the sampling frequency. The analytical results of soil/fill material testing must meet the site use criteria presented in NYSDEC DER-10 Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil for all constituents listed, and the NYSDEC Sampling, Analysis, and Assessment of PFAS, dated April 2023, guidance values. Approvals for modifications to the analytical parameters must be obtained from the NYSDEC Project Manager prior to the sampling event.

Soil/fill material for reuse on-site will be segregated and staged as described in **Sections 1.2 and 1.3**. The anticipated size and location of stockpiles will be provided in the 15-day notification to the NYSDEC Project Manager. Stockpile locations will be based on the location of site excavation activities and proximity to nearby site features. Material reuse on-site will comply with requirements of NYSDEC DER-10 Section 5.4(e)4. Any modifications to the requirements of DER-10 Section 5.4(e)4 must be approved by the NYSDEC Project Manager.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

1.8 FLUIDS MANAGEMENT

Liquids to be removed from the site, including but not limited to, excavation, dewatering, decontamination waters, and groundwater monitoring well purge and development waters, will be

handled, transported, and disposed of off-site at a permitted facility in accordance with applicable local, state, and federal regulations. Dewatering, purge, and development fluids will not be recharged back to the land surface or subsurface of the site but will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e., local pond, stream, or river) will be performed under a State Pollutant Discharge Elimination System permit.

1.9 COVER SYSTEM RESTORATION

There is not currently a cover system on-site.

1.10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the QEP, as defined in 6 NYCRR Part 375, and will be in compliance with provisions in the SMP prior to receipt at the Site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC Project Manager allowing a minimum of 5 business days for review. A copy of the form is presented in Appendix J.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site.

Imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d), and DER-10 Section 5.4(e). Based on an evaluation of the land use, protection of groundwater and restricted residential soil cleanup objectives should be used to determine acceptable sources of clean fill. Soil that meets 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by the NYSDEC Project Manager. Soil material will be sampled for the full suite of analytical parameters, including PFAS and 1,4-dioxane. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils not immediately placed in the excavation will be stockpiled separately from excavated materials and covered to prevent dust releases.

1.11 STORMWATER POLLUTION PREVENTION

The site is less than 1-acre in size; therefore, a Stormwater Pollution Prevention Plan is not required. However, soil erosion and sediment control best management practices should be employed during any soil disturbance work at the site.

Erosion control measures and sediment barriers, traps, and collection devices will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a

logbook and maintained at the site and available for inspection by NYSDEC. Necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier, trap, and collection devices functional.

Undercutting, erosion, or flow by-passing of such control measures shall be repaired immediately with appropriate materials or adjustments of placement.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

1.12 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition. The NYSDEC Project Manager will be promptly notified of the discovery.

Sampling will be performed on product, sediment, and surrounding soils, etc., as necessary, to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (Target Analyte List metals; Target Compound List volatiles and semivolatiles, Target Compound List pesticides, and polychlorinated biphenyls) as well as PFAS and 1,4-dioxane, unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC Project Manager for approval prior to sampling. Any tanks will be closed as per NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone within 2 hours to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the PRR.

1.13 COMMUNITY AIR MONITORING PLAN

Any intrusive work at the site will require a Community Air Monitoring Plan (CAMP) unless characterization sampling indicates no concern. The work plan of the notice **(Section 1.1)** shall include a CAMP that is in compliance with Appendix 1A of DER-10. Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

Continuous air monitoring will be conducted for protection of the downwind community during site work activities, per the NYSDOH generic CAMP in DER-10 Appendix 1A. Continuous air monitoring for volatile organic compounds will be conducted by a minimum of one dedicated person and will use approved instrumentation during ground intrusive activities. Action levels will be developed by the contractor during any site work activities.

In addition to the on-site action levels, the following action levels (**Table 2**) have been established for air monitoring.

Table 2. Air Monitoring Action Levels

Parameter	Action Level	Action
Total particulates	2.5 times background and/or greater than 150 micrograms per cubic meter	Work ceases until mitigated
Visible dust	Visible dust as determined by the Engineer	Work ceases until mitigated

The locations of air monitoring instrumentation will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations. Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

1.14 ODOR CONTROL PLAN

This Odor Control Plan is capable of controlling emissions of nuisance odors off-site. Specific odor control methods to be used on a routine basis will include covering of excavated material stockpiles and application of a water-based odor suppression solution or foam (BioSolve or a similar product) to impacted material during active excavation operations. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted, and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the Property Owner's Remediation Engineer, and any measures that are implemented will be discussed in the PRR.

Necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams or odor suppression solutions to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (a) direct load-out of soils to trucks for off-site disposal; (b) use of chemical odorants in spray or misting systems; and (c) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

1.15 DUST CONTROL PLAN

Particulate monitoring must be conducted according to the CAMP provided in **Section 1.13**. If particulate levels at the site exceed the thresholds listed in the CAMP or if airborne dust is observed on the site or leaving the site, the dust suppression techniques listed below will be employed. The remedial party will also take measures listed below to prevent dust production on the site. A Dust Control Plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.

- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.

- Gravel will be used on roadways to provide a clean and dust-free road surface.

- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

1.16 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

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Appendix I.
Quality Assurance Project Plan

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Generic Quality Assurance Project Plan for Work Assignments

NYSDEC Standby Contract No. D009806

Prepared for

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

New York State Department of Environmental Conservation
Division of Environmental Remediation

Prepared by

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April 2020

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
mg/kg	Milligram(s) per kilogram
µg/L	Microgram(s) per liter
µg/m^3	Microgram(s) per cubic meter
CLP	Contract laboratory program
DQO	Data quality objective
DUSR	Data Usability Summary Report
EA	EA Engineering, P.C. and Its Affiliate EA Science and Technology
EDD	Electronic data deliverable
EPA	U.S. Environmental Protection Agency
IDL	Instrument detection limit
MDL	Method detection limit
No.	Number
NYSDEC	New York State Department of Environmental Conservation
PFAS	Per- and polyfluoroalkyl substances
QAPP	Quality assurance project plan
QA	Quality assurance
QC	Quality control
SOP	Standard operating procedure
SVOC	Semi-volatile organic compound
VOC	Volatile organic compound

1. PURPOSE AND OBJECTIVES

1.1 PURPOSE

This Generic Quality Assurance Project Plan (QAPP) has been prepared as a generic companion document to accompany site-specific Work Plans for the Standby Subcontract Work Assignments issued to EA Engineering, P.C. and its affiliate EA Science and Technology (EA) by the New York State Department of Environmental Conservation (NYSDEC) under Standby Contract Number (No.) D009806. The principal purpose of this document is to specify quality assurance (QA)/quality control (QC) procedures for the collection, analysis, and evaluation of data that will be legally and scientifically defensible. A site-specific QAPP Addendum will be provided when required to supplement this document for individual work assignments.

1.2 QUALITY ASSURANCE PROJECT PLAN OBJECTIVES

The QAPP provides general information and references Standard Operating Procedures (SOPs) applicable to the analytical sampling program detailed in each site-specific Work Plan. This information includes definitions and generic goals for data quality and required types and quantities of QA/QC samples. The procedures address field documentation; sample handling, custody, and shipping; instrument calibration and maintenance; auditing; data reduction, validation, and reporting; corrective action requirements; and QA reporting specific to the analyses performed by the laboratories (to be determined) under a standby subcontract agreement with EA.

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2. PROJECT ORGANIZATION AND RESPONSIBILITIES

Each work assignment will be managed through an organized effort of scientific and engineering personnel and technical resources. These efforts will employ pre-approved field procedures, sampling techniques, and analytical methods to accomplish the work assignment objectives. Effective program organization will accommodate these requirements while maintaining a manageable degree of control over these activities.

2.1 OVERALL PROJECT ORGANIZATION

The project-specific organizational and management plan will be detailed in each site-specific Work Plan. Each site-specific Work Plan will include an organizational chart that illustrates the project organization for the accomplishment of each effort.

The key technical management of work assignments will be accomplished by a designated Project Manager and an assigned project team. Additional individuals will be made available, if warranted. Each of the laboratories will have a designated Laboratory Project Manager who will serve as the liaison between the laboratory staff and the overall Project Manager.

For the purpose of QA/QC, each work assignment will have an assigned Project QA/QC Officer to provide guidance on technical matters and review technical documents relating to the work assignments. He/she will assess the effectiveness of the QA/QC program and recommend modifications when applicable. Additionally, the QA/QC Officer may delegate technical guidance to specially trained individuals under his/her direction.

The Program Health and Safety Officer, Mr. Peter Garger, is also an integral part of the project implementation teams. He will be responsible for the development, final technical review, and approval of the Generic Health and Safety Plan and project-specific Health and Safety Plans. In addition, he will provide authorization, if warranted, to modify personal protective equipment requirements based on field conditions. He will also provide final review of all health and safety monitoring records and personal protective equipment changes to ensure compliance with the provisions of the Health and Safety Plans.

2.2 LABORATORIES

The laboratories will perform chemical analyses of environmental samples collected for each work assignment, as necessary. The laboratories are capable of providing a complete range of analytical services consistent with U.S. Environmental Protection Agency (EPA) protocols. These laboratories will maintain their certification by the New York State Department of Health Environmental Laboratory Approval Program.

The laboratories will have their own provisions for conducting an internal QA/QC review of the data before they are released to EA. The Laboratory Project Managers will contact EA's Project Managers with any sample discrepancies or data concerns.

Hardcopy and electronic data deliverables (EDDs) and formatted QA/QC reports will be filed by the analytical laboratories when data are submitted to EA. Corrective actions (**Section 11**) will be reported to the EA Project Managers along with the QA/QC reports. The laboratories may be contacted directly by EA or NYSDEC personnel to discuss QA concerns.

3. QUALITY ASSURANCE/QUALITY CONTROL OBJECTIVES FOR DATA MEASUREMENT

3.1 INTRODUCTION

This section discusses QA objectives for work assignments. QA objectives are requirements specifying the quality of environmental data needed to support the decision-making process. The uncertainty must be maintained at levels that will allow the resultant data to be used for its intended purposes.

Data collected during work assignments typically will include field measurements and laboratory analytical data. This section reviews the various types of data anticipated and presents QA objectives for data collected in conjunction with work assignments.

3.2 DATA QUALITY CONTROL OBJECTIVES

Data quality objectives (DQOs) are qualitative and quantitative statements, which specify the quality of data required to support the decision-making process. DQOs are developed to achieve the level of data quality required for anticipated data use. DQOs are implemented so that, for each task, the data are legally and scientifically defensible. The development of DQOs for a specific site and measurement considers work assignment goals; data uses, types, and needs; and data collection. These factors determine whether the quality and quantity of data are adequate for its end use. Sampling protocols have been developed and sampling documentation and handling procedures have been identified to realize the required data quality.

DQOs are established prior to data collection and are not considered a separate deliverable. Rather, the DQO development process is integrated with the work assignment planning process, and the results are incorporated into the site-specific QAPP Addendum for the site location. DQOs will be specified for each planned data collection activity. The DQO process results in an effective plan, which details the chosen sampling and analysis options, and the statements of confidence in decisions made during the corrective action process. Confidence statements are possible through the application of statistical techniques to the data. The DQO process consists of the following steps:[1]

1. State the problem
2. Identify the goals of the study
3. Identify information inputs
4. Define the boundaries of the study
5. Develop the analytic approach
6. Specify performance or acceptance criteria
7. Develop the plan for obtaining data.

[1] EPA. 2016. Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA/240/B-06/001, February.

3.3 LABORATORY QUALITY ASSURANCE OBJECTIVES

The fundamental mechanisms that will be employed to achieve these quality goals in laboratory analyses can be categorized as prevention, assessment, and correction. These include:

- Prevention of defects in the quality through planning and design; documented instructions and procedures; and careful selection of skilled, qualified personnel.

- Quality assessment through a program of regular audits and inspections to supplement continual informal review.

- Permanent correction of conditions adverse to quality through a closed-loop corrective action system.

Overall compliance with laboratory QC procedures will be evaluated against the criteria specified for each method. Deviations will be reported in the narrative, which contains comments or problems encountered during fractional analyses of the samples. The narrative includes the laboratory's assessment of the impact on data usability and will address QC issues related to the following:

- ***Laboratory Method Performance*—**QC criteria for method performance must be met for target analytes for data to be reported. These criteria generally apply to instrument tune, calibration, method blanks, surrogates, and laboratory control samples.

- ***Sample Matrix Effects*—**QC samples are analyzed to determine measurement bias due to the sample, and may include surrogates, matrix spikes, matrix spike duplicates, and laboratory duplicates. If criteria are not met, matrix interferences are confirmed either by reanalysis or by inspection of the laboratory control sample results to verify that laboratory method performance is in control. Data are reported with appropriate qualifiers or discussion.

3.4 FIELD PARAMETERS AND QUALITY ASSURANCE OBJECTIVES

Water quality parameters consisting of pH, conductivity, dissolved oxygen, salinity, temperature, and turbidity will be measured to provide general surface water and groundwater quality information. These parameters will also be monitored for stability during purging of groundwater monitoring wells. Field test methods that will be utilized to measure these specific parameters will be presented in detail in site-specific Field Activity Plans.

Field screening of soil samples using a photoionization detector will be performed to assess the presence and relative concentrations of volatile organic vapors. The method for quantification of soil volatile organic compounds (VOCs) using headspace measurement, as well as operational protocols of the photoionization detector, will be presented in site-specific Field Activity Plans. Soil vapor, indoor/outdoor air, and soil/sediment sampling locations and monitoring wells will be surveyed with the accuracy and precision requirements discussed in site-specific Field Activity

Plans. Ground surface and top-of-casing elevations for each newly installed monitoring wells will be measured to the nearest 0.01 feet as referenced to the National Geodetic Vertical Datum of 1929.

For field QC data, no QA objectives have been determined by the NYSDEC. Field QC data will be maintained primarily for descriptive purposes and data variability. The Site Manager will be responsible for reviewing and evaluating the field QC data.

Similar samples will be collected using consistent sampling methods, analyzed using consistent analytical procedures, and reported in conventional units (e.g., micrograms per liter [µg/L], milligram per kilogram [mg/kg], and micrograms per cubic meter [$\mu g/m^3$] for analytical results). Therefore, the data will be comparable throughout the project.

3.5 DETECTION AND QUANTITATION LEVELS

In addition, analytical sensitivity is an important component of data quality, and is evaluated using analyte detection and quantitation levels.

3.5.1 Detection Limits

A detection limit has been defined by the Committee on Environmental Improvement of the American Chemical Society (Anal. Chem. 55:2210-2218 [1983]) as "the lowest concentration that can be determined to be statistically different from a blank." Various methods are available for determining detection limits, most of which are based on the standard deviation of measurements in the region near the blank responses. The following detection limits are determined routinely in the laboratory.

Instrument detection limits (IDLs) are determined using the protocols given in the inorganic and organic statements of work for the EPA Contract Laboratory Program (CLP). A standard deviation is calculated from replicate measurements of a low-level standard and multiplied by 3 to give the IDL. IDLs are used as an index of instrument performance that does not include sample effects; and therefore, represent the lowest detection limit achievable. IDLs can vary between instruments of the same type and can change when re-determined.

Method detection limits (MDLs) are determined using the EPA procedure published in 40 Code of Federal Regulations 136 Appendix B. The MDL is defined as "the minimum measured concentration of a substance that can be reported with 99 percent confidence that the measured concentration is distinguishable from method blank results." This procedure requires that sample processing steps of the analytical method be included in the determination of the MDL. Therefore, the sample matrix and sample preparation process, as well as the analytical instrumentation, influence MDLs. The value calculated from the spiked samples is called the MDLs. Spiked samples are prepared by the lab from a clean reference matrix, such as reagent water, and spoked with a known quantity of the analyteThe method blank samples are used to calculate the MDL_b, which is a very similar calculation that also calculates the 99 percent confidence level that the result is derived from the sample rather from contamination/noise. The MDL is the higher of the

two values (either the MDL_S calculated using spiked samples or the MDL_b calculated using method blanks). Because of the wide variety of matrix types analyzed by the laboratory, MDLs are routinely determined in reagent water or standard solid matrix. These MDLs represent; therefore, the optimum values, and the MDLs for actual sample matrices are likely to be higher. MDLs can be determined for specific matrices when requested by NYSDEC.

Unless superseded by other program, work assignment, or NYSDEC requirements, IDLs and MDLs are determined annually by the laboratories. In addition, IDLs and MDLs are re-determined after an instrument is moved or modified, and MDLs are re-determined after a method has been significantly changed. Where more than one instrument is used in sample analyses by a given technique (e.g., gas chromatograph/mass spectrometry, gas chromatograph, graphite furnace atomic absorption, or inductively coupled plasma), detection limit studies are performed for each instrument. A standard laboratory reporting limit is determined for each analyte based on the highest detection limit determined. Data for instruments are maintained for use in reporting data when project-specific requirements dictate lower detection limits.

When interpreting data and detection limits, it is important to remember that, when a measured concentration is greater than the detection limit, the analyte has the specified probability of actually being present (i.e., of having a true concentration greater than zero); however, the detection limit cannot be used to say anything about the presence or absence of an analyte that has a measured concentration less than the detection limit. From the definition of the MDL, there is a 1 percent chance that a sample with no analyte will produce a concentration greater than or equal to the MDL (false-positive). The probability is 50 percent; however, that a sample with a concentration at the MDL will be measured at less than the MDL (false-negative).

3.5.2 Quantitation Levels

To ensure better precision in low-level data and to reduce the false-negative error rate, quantitation limits have been proposed as the minimum concentration at which an analyte can be quantified with an acceptable degree of confidence. The American Chemical Society Committee on Environmental Improvement has recommended that quantitation limits be calculated by multiplying 10 times the standard deviation, giving a relative standard deviation of 10 percent. The Committee further advised that quantitative interpretation, decision making, and regulatory actions should be limited to data at or above the limit of quantitation. The laboratories will use the term “reporting limit” for the laboratory quantitation limit.

3.5.3 Project-Specific Quality Control and Reporting Limits

Reporting limits applicable to work assignments are presented in Tables 1A-1J. The relevant tables were prepared based on New York State Department of Health Soil Vapor/Indoor Air Decision Matrices, 6 New York Code of Rules and Regulations Part 375 Soil Cleanup Objectives, and NYSDEC Groundwater Criteria and EPA CLP Contract Required Quantitation Limits, which will be reviewed by the contracting laboratories. Any site-specific revisions will be addressed in the site-specific QAPP Addendums.

4. SAMPLING AND SAMPLE CUSTODY PROCEDURES

4.1 FIELD SAMPLING OPERATIONS

The collection and subsequent laboratory analyses of environmental samples will provide the majority of the data collected during the standby contract work assignments. The number and types of analyses to be performed and the matrix of each of the samples will be detailed in each site-specific Work Plan.

4.1.1 Sample Bottle Preparation

Chain-of-custody procedures begin with preparation of sample containers and preservatives to be used in sample collection. The contract laboratories will provide cleaned sample containers. Batch or Individual certified-clean Summa® canisters will be provided by contract laboratories. Sample kits (coolers containing chain-of-custody forms, custody seals, sample containers, preservatives, and packing materials) will be prepared by the contract laboratories in response to receipt of the analytical task order submitted by the Project Manager.

Container, preservation, and holding time requirements for aqueous and soil samples will be summarized in site-specific QAPP Addendums.

4.1.2 Sampling Procedures

Sampling protocols will be presented in site-specific Field Activity Plans. The protocols include standard sampling procedures for sample collection, accurate sample identification, and packing of samples for shipment. Each sample container is provided with a sample label, which is filled out at the time of sample collection. During sample collection, a chain-of-custody form is initiated, which accompanies the samples during shipment to the analytical laboratory.

4.2 LABORATORY SAMPLE RECEIPT

Upon receipt at the laboratory, a laboratory representative inspects the samples for integrity and checks the shipment against the chain-of-custody/analytical task order form. Discrepancies are addressed at this point and documented on the chain-of-custody form and the cooler checklist (an example will be provided in site-specific Field Activity Plans). Discrepancies are reported to the Laboratory Project Manager who contacts the Project Manager for resolution.

When the shipment and the chain-of-custody are in agreement, the custodian enters the samples into the Laboratory Information Management System and assigns each sample a unique laboratory number. This number is affixed to each sample bottle. The custodian then enters the sample and analysis information into the laboratory computer system.

4.2.1 Laboratory Sample Custody

The laboratory must satisfy the sample chain-of-custody requirements by implementing the following SOPs for laboratory/sample security:

- Samples are stored in a secure area
- Access to the laboratory is through a monitored area
- Visitors sign a visitor's log and are escorted while in the laboratory
- Only the designated sample custodians have keys to sample storage area(s)
- Transfers of samples in and out of storage are documented.

4.2.2 Sample Storage, Security, and Disposal

While in the laboratory, the samples and aliquots that require storage at 4 degrees Celsius (°C) ± 2°C are maintained in a locked refrigerator unless they are being used for analysis. The laboratory is responsible for sample storage and security to ensure that:

- Samples and extracts are stored for 60 days after the final analytical data report has been forwarded to the client. The samples, extracts, and digestates are then discarded in accordance with Occupational Safety and Health Administration guidance.

- Samples are not stored with standards or sample extracts.

5. CALIBRATION PROCEDURES AND FREQUENCY

Instruments and equipment used for analytical procedures are controlled by a formal calibration program, which verifies that equipment is of the proper type, range, accuracy, and precision to provide data compatible with specified requirements. Instruments and equipment that measure a quantity, or whose performance is expected at a stated level, are subject to calibration. Calibration is performed using reference standards or externally by calibration agencies or equipment manufacturers.

5.1 CALIBRATION SYSTEM

The following sections contain a discussion of the elements comprising the calibration system.

5.1.1 Calibration Procedures

Written procedures are used for all instruments and equipment subject to calibration. Whenever possible, recognized procedures, such as those published by the American Society of Testing and Materials or EPA, or procedures provided by manufacturers, are adopted. If established procedures are not available, a procedure is developed considering the type of equipment, stability characteristics of the equipment, required accuracy, and the effect of operational error on the quantities measured.

5.1.2 Calibration Frequency

Calibration frequency is based on the type of equipment, inherent stability, manufacturer's recommendations, values provided in recognized standards, intended data use, specified analytical methods, effect of error upon the measurement process, and prior experience.

5.1.3 Calibration Reference Standards

Two types of reference standards will be used by the contract laboratories for calibration:

- **Physical standards**, such as weights for calibrating balances and certified thermometers for calibrating working thermometers, refrigerators, and ovens, are generally used for periodic calibration.

- **Chemical standards**, such as Standard Reference Materials provided by the National Institute of Standards and Technology or EPA. These may include vendor-certified materials traceable to National Institute of Standards and Technology or EPA Standard Reference Materials. These are primarily used for operational calibration.

5.1.4 Calibration Failure

Equipment that cannot be calibrated or becomes inoperable is removed from service. Such equipment must be repaired and satisfactorily recalibrated before re-use. For laboratory equipment that fails calibration, analysis cannot proceed until appropriate corrective action is taken and the

analyst achieves an acceptable calibration. This is documented in a Non-Conformance Record, which is discussed in Section 11. Laboratory managers are responsible for development and implementation of a contingency plan for major equipment failure. The plan includes guidelines on waiting for repairs, use of other instrumentation, subcontracting analyses, and evaluating scheduled priorities.

5.1.5 Calibration Records

Records are prepared and maintained for each piece of equipment subject to calibration. Records demonstrating accuracy of preparation, stability, and proof of continuity of reference standards are also maintained. Copies of the raw calibration data are kept with the analytical sample data.

5.2 OPERATIONAL CALIBRATION

Operational calibration is generally performed as part of the analytical procedure and refers to those operations in which instrument response (in its broadest interpretation) is related to analyte concentration. Included are the preparation of standard response (calibration) curves and often the analysis of blanks.

5.2.1 Preparation of Calibration Curve

Preparation of a standard calibration curve is accomplished by the analysis of calibration standards, which are prepared by adding the analyte(s) of interest to the solvent that is introduced into the instrument. The concentrations of the calibration standards are chosen to cover the working range of the instrument or method. Sample measurements are made within this working range. The calibration curve is prepared by plotting or regressing the instrument responses versus the analyte concentrations. Concentrations of the analyzed samples are back-calculated from the calibration curve.

5.2.2 Blanks

Reagent and/or solvent blanks are analyzed to assess if the materials used to prepare the standards are free from interfering substances that could affect the analysis. A method blank is prepared whenever samples are processed through steps that are not applied to the calibration standards.

5.3 PERIODIC CALIBRATION

Periodic calibrations are performed for equipment (e.g., balances, thermometers) that is required in the analytical method, but that is not routinely calibrated as part of the analytical procedure. The periodic calibration requirements used by contract laboratories are provided in Table 2.

5.4 FIELD EQUIPMENT CALIBRATION

The procedures and frequencies for the calibration of field equipment are provided in Table 3.

6. ANALYTICAL PROCEDURES

6.1 FIELD ANALYTICAL PROCEDURES

Field analytical procedures include the measurement of temperature, conductivity, dissolved oxygen, pH, turbidity, organic vapors, and groundwater levels. Specific field measurement protocols will be described in greater detail in site-specific Field Activities Plans. Field measurement QC limits in terms of precision and accuracy are presented in Table 4.

6.2 LABORATORY ANALYTICAL PROCEDURES

Laboratory analytical requirements presented in the subsections below include a general summary of requirements related to each sample matrix to be analyzed.

Concentrations of target compounds and analytes will be analyzed according to the laboratory-specific method SOPs approved by the NYSDEC Analytical Services Protocol[2] and EPA SW-846 Methods listed in the table below. Low-level analysis of 1,4-dioxane is performed using SW846 Method 8270 or 8260, although 8270 can offer lower reporting limits. Per- and polyfluoroalkyl substances (PFAS) analytical methods are presently limited to groundwater EPA Method 537.1 , and ISO Method 25101 for drinking water. site-specific QAPPs should reflect the current understanding of analyses at the time of sampling, and reference NYSDEC's January 2020 *Guidelines for Sampling and Analysis of PFAS*. Additional information regarding the number and types of samples to be collected at each area of concern will be presented in site-specific Work Plans.

Analyte List	Matrices	Method No.
EPA CLP Target Compound List organics (VOCs/semi-volatile organic compounds [SVOCs])(1)	Groundwater, surface water, surface and subsurface soil, sediment, and debris	CLP Method OLM02.4 for VOCs CLP Method OLM02.4 for SVOCs including 1,4-dioxane by SIM ***or*** EPA SW-846 Method 8260 for VOCs EPA SW-846 Method 8270 for SVOCs EPA SW-846 Method 8270 SIM for 1,4-dioxane (aqueous)
EPA CLP Target Analyte List metals	Groundwater, surface water, surface and subsurface soil, sediment, and debris	CLP Method ISM02.4 or EPA SW-846 Method 6010 Mercury by EPA SW-846 Method 7470 (liquid) or 7471 (solid)
Polychlorinated biphenyls	Groundwater, surface water, surface and subsurface soil, sediment, and debris	EPA SW-846 Method 8082 or CLP Method OLM02.4
PFAS Analyte List (21 compounds)	Groundwater, surface water, drinking water, surface and subsurface soil, sediment, and debris	EPA Method 537.1 ISO 25101 (drinking water)
VOCs	Air and Soil Vapor	EPA TO-15

(1) Specific method to be used for VOC or SVOC analyses will be identified in each project-specific QAPP Addendum
(2) SIM Selected Ion Monitoring.

[2] NYSDEC. 2001 (as revised). *Analytical Services Protocol.*

Samples will be analyzed by the laboratory within the holding times presented in site-specific Field Activities Plans on a standard turnaround schedule.

6.3 SAMPLE MATRICES

6.3.1 Water

No filtering of groundwater samples will be performed unless pre-approved under a site-specific Field Activities Plan. Field filtration of surface water may be required and will be addressed in the project-specific QAPP Addendum, if necessary. Analytical results for analyses will be reported in units identified in Tables 1A-1J.

6.3.2 Soil, Sediment, and Debris

Analytical results of soil, sediment, and debris samples will be reported in terms of dry weight in the units identified in Tables 1A-1J.

6.3.3 Soil Vapor and Indoor/Outdoor Air

Analytical results for soil vapor and indoor/outdoor air samples will be reported in terms of volume in the units identified in Tables 1A-1J.

6.4 STANDARD OPERATING PROCEDURES

The contract laboratories will maintain a manual of procedures other than laboratory-specific analytical methods in a document-controlled SOP Manual. Laboratory Method SOPs will be maintained as controlled documents in the laboratory's Methods Manuals.

6.5 RECORDKEEPING

The requirements for laboratory recordkeeping are given in the laboratory's SOP Manual. Data entries are made in indelible, water-resistant ink. The date of the entry and the observer are clear on each entry. The observer uses his/her full name or initials. An initial and signature log is maintained so that the recorder of every entry can be identified. Information is recorded in a notebook or on other records at the time the observations are made. Recording information on loose pieces of paper is not allowed.

When a mistake is made, the wrong entry is crossed out with a single line initialed and dated by the person making the entry, and the correct information recorded. Obliteration of an incorrect entry or writing over it is not allowed; neither is the use of correction tape or fluid on any laboratory records.

7. FIELD AND LABORATORY QUALITY CONTROL CHECKS AND FREQUENCY

QC measurements for analytical protocols are designed to evaluate laboratory performance and measurement biases resulting from the sample matrix and field performance.

- ***Laboratory Method Performance***—QC criteria for method performance must be met for all target analytes for data to be reported. These criteria generally apply to instrument tune, calibration, method blanks, laboratory control samples, and Standard Reference Materials.

- ***Sample Performance***—The accuracy and precision of sample analyses are influenced by both internal and external factors. Internal factors are those associated with sample preparation and analysis. Internal factors are monitored by the use of laboratory QC samples. QC field samples are analyzed to determine any measurement bias due to the sample matrix based on evaluation of matrix spikes, matrix spike duplicates, and laboratory duplicates.

- ***Field Performance***—QC samples are used to evaluate the effectiveness of the sampling program to obtain representative samples, eliminating any cross contamination.

7.1 LABORATORY QUALITY CONTROL SAMPLES

Laboratory QC samples are included in each analysis to provide information on both method performance and sample measurement bias and are included in each analytical batch. A batch is defined as a group of field samples of similar matrix, not to exceed 20, which are processed as a unit using the same method and the same lots of standards and reagents. The laboratory QC samples discussed in the following sections are not counted in the maximum batch size of 20.

7.1.1 Method Blank

The method blank is used to monitor laboratory contamination. This is usually a sample of laboratory reagent water, or a standard solid matrix, processed through the same analytical procedure as the sample (i.e., digested, extracted, distilled). One method blank is prepared and analyzed with each analytical batch.

7.1.2 Laboratory Control Sample

A fortified method blank is analyzed with each analysis. These samples generally consist of a standard solid matrix or laboratory water fortified with the analytes of interest for single-analyte methods and selected analytes for multi-analyte methods according to the appropriate analytical method. The analyte recovery from each is used to monitor analytical accuracy and precision.

7.1.3 Matrix Spike

A matrix spike is an aliquot of a field sample, which is fortified with the analyte(s) of interest and analyzed to monitor measurement bias associated with the sample matrix. A matrix spike duplicate will be performed for every analytical batch.

7.1.4 Surrogates

Surrogates are organic compounds that are similar to analytes of interest in chemical composition, extraction, and chromatography, but are not normally found in environmental samples. Surrogates are added to field and QC samples in every batch. These compounds are used to monitor system performance, as well as sample measurement bias. Percent recoveries are calculated for each surrogate and evaluated against acceptance criteria.

7.2 FIELD QUALITY CONTROL SAMPLES

These samples are not included specifically as laboratory QC samples but are analyzed when submitted. Data for these QC samples are reported with associated samples.

7.2.1 Field/Rinsate Blanks

Field/rinsate blanks will be collected to evaluate the cleanliness of aqueous sampling equipment and sampling bottles, and the potential for cross-contamination of samples due to equipment handling and/or contaminants in the air. Field blanks will be collected at a frequency of one per 20 decontamination event for each type of sampling equipment (e.g., a groundwater bailer for groundwater) and, at a minimum, one per equipment type and/or media per day. Field/rinsate blanks will not be collected in conjunction with the air/vapor samples.

Field/rinsate blanks will be collected prior to the occurrence of any analytical field sampling event by pouring deionized or potable water over a piece of sampling equipment and into a sample container. The analytical laboratory will provide field blank water and sample jars with preservatives for the collection of all field blanks. Glass jars will be used for organic blanks. The field blanks, as well as the trip blanks, will accompany field personnel to the sampling location. The field blanks will be analyzed for the same analytes as the environmental samples being collected that day and shipped with the samples.

Field blanks will be collected in accordance with the procedures described below:

- Decontaminate sampler using the procedures specified in the site-specific QAPP addendum.

- Pour distilled/deionized water over the sampling equipment and collect the rinsate water in the appropriate bottles.

- Immediately place sample in a cooler and maintain a temperature of 4ºC until receipt by the laboratory.

- Fill out sample log, labels, and chain of custody forms, and record in field logbook.

7.2.2 Trip Blanks

The trip blank will be used to determine if any volatile organic cross-contamination occurs between aqueous samples during shipment. They are only appropriate for volatile organic samples in water. Trip blanks will be supplied by the analytical laboratory as aliquots of distilled, deionized water that will be sealed in a sample bottle prior to initiation of each day of field work. Glass vials (40 milliliters) with Teflon®-lined lids will be used for trip blanks. The sealed trip blank bottles will be placed in a cooler with the empty sample bottles and shipped to the site by laboratory personnel. If multiple coolers are necessary to store and transport aqueous VOC samples, then each cooler must contain an individual trip blank. Trip blanks will not be collected in conjunction with the air/vapor samples.

7.2.3 Field Duplicates

Field duplicates are two samples of the same matrix, which are collected, to the extent possible, from the same location at the same time using the same techniques. Field duplicates provide information on the precision of the sampling and analysis process. Field duplicates will be collected at a frequency of 1 duplicate per 20 sample media. Separate duplicate samples will be collected for the following media: surface and subsurface soil, sediment, surface water, groundwater, air, and soil vapor samples.

7.2.4 Temperature Blanks

Laboratory will use either an infrared instrument to measure the temperature of liquid samples or a temperature blank will be used to measure the temperature of liquid samples. If used, temperature blanks will be supplied by the analytical laboratory. If multiple coolers are necessary to store and transport aqueous samples, then each cooler must contain an individual temperature blank.

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8. PREVENTIVE MAINTENANCE

Periodic preventive maintenance is required for all sensitive field equipment. Instrument manuals will be kept on file for reference if equipment needs repair. The troubleshooting chapter of factory manuals may be used in assisting personnel in performing maintenance tasks. The frequency of preventive maintenance for field equipment is indicated in each operating instruction manual. Field equipment is checked by field personnel under the supervision of the Site Manager. It is the responsibility of EA's Technical Services Group's Site Manager to conduct preventive maintenance. A summary of a general preventative maintenance schedule is provided in Table 5.

Major instruments in the laboratory are covered by annual service contracts between the laboratory and the manufacturers. Under these agreements, regular preventive maintenance visits will be made by trained service personnel. Maintenance is documented and maintained in permanent records by the individual responsible for each instrument.

Laboratory management is responsible for preparation and implementation of the program, including verification of compliance. The laboratory preventive maintenance program includes the following:

- Listing of the instruments and equipment that are included in the program
- Frequency of maintenance considering manufacturer's recommendations and/or previous experience with equipment
- For each instrument in the program, a file is maintained for the following information:
  - List of spare parts maintained by the laboratory
  - External service contracts
  - Items to be checked and/or serviced during maintenance and directions for performing maintenance (if external service is not provided of if not stated in manufacturer's instrument manuals).

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9. QUALITY ASSURANCE PERFORMANCE AND SYSTEM AUDITS

Audits are systematic checks to determine the quality of operation of some activity or function in the field or laboratory. One field audit will be conducted to assure adherence to proper field and sampling procedures. Audits are of two types:

- ***Performance audits*** are independent safety and health, procedure, and/or sample checks made by a supervisor or auditor to arrive at a **quantitative** measure of the quality of the data produced by one section or the entire measurement process.

- ***System audits*** are onsite **qualitative** inspections and reviews of the QA system used by some part of or the entire measurement system. The audits are performed against the QAPP. A checklist is typically generated from the requirements and becomes the basis for the audit. The results of any deficiencies noted during the audit are summarized in an audit report.

Laboratory performance and system audits are performed by the QA staff to assess the effectiveness of the quality system. These internal audits are performed on a routine basis. Audits are also performed by certifying agencies. Audit reports and corrective actions are available to NYSDEC for review.

9.1 RESPONSIBILITY, AUTHORITY, AND TIMING

QA audits to be conducted for the project may include system, performance, and data audits. The Project QA Officer will keep a tentative schedule on record that details the number and types of audits.

9.2 FIELD AUDITS

Field performance audits will be conducted on an ongoing basis during a work assignment as field data are generated, reduced, and analyzed. Numerical manipulations, including manual calculations, will be documented. Records of numerical analyses will be legible, of reproduction quality, and sufficiently complete to permit logical reconstruction by a qualified individual other than the originator.

Indicators of the level of field performance include the analytical results of the blank and replicate samples. Each blank analysis will be considered an indirect audit of the effectiveness of measures taken in the field to ensure sample integrity (e.g., field decontamination procedures). The results of the field replicate analyses are an indirect audit of the ability of each field team to collect representative sample portions of each matrix type.

System audits of site activities will be accomplished by an inspection of all field site activities. During this audit, the auditor(s) will compare current field practices with standard procedures. The following elements will be evaluated during a field system audit:

- Activities conducted in accordance with the Work Plan
- Procedures and analyses conducted according to procedures outlined in the QAPP and Addendum
- Sample documentation
- Working order of instruments and equipment
- Level of QA conducted per each field team
- Contingency plans in case of equipment failure or other event preventing the planned activity from proceeding
- Decontamination procedures
- Level of efficiency with which each team conducts planned activities at one site and proceeds to the next
- Sample packaging and shipment.

After completion of the audit, any deficiencies will be discussed with the field staff and corrections identified. If any of these deficiencies could affect the integrity of the samples being collected, the auditor(s) will inform the field staff and corrections will be implemented immediately. The audit will be performed by the Project QA/QC Coordinator or the Site Manager.

9.3 LABORATORY PERFORMANCE AND SYSTEM AUDITS

The New York State Department of Health Environmental Laboratory Analytical Program CLP-certified laboratory that has satisfactorily completed performance audits and performance evaluation samples will be used for all sample analysis. The results of the most recent performance audits and performance evaluations will be made available upon request.

9.4 AUDIT PROCEDURES

Prior to an audit, the designated lead auditor prepares an audit checklist. During an audit and upon its completion, the auditor(s) will discuss the findings with the individuals audited and discuss and agree on corrective actions to be initiated. The auditor will then prepare and submit an audit report to the manager of the audited group and the Project Manager.

The manager of the audited group will then prepare and submit, to the Project QA Officer and the Project Manager, a plan for implementing the corrective action to be taken on non-conformances indicated in the audit report, the date by which such corrective action will be completed, and actions taken to prevent reoccurrence. If the corrective action has been completed, supporting

documentation should be attached to the reply. The auditor will ascertain (by re-audit or other means) if appropriate and timely corrective action has been implemented.

Records of audits will be maintained in the project files.

9.5 DOCUMENTATION

To ensure that the previously defined scope of the individual audits is accomplished and that the audits follow established procedures, a checklist will be completed during each audit. The checklist will detail the activities to be executed and ensure that the auditing plan is accurate. Audit checklists will be prepared in advance and will be available for review. Following each system, performance, and data audit, the Quality Services Manager will prepare a report to document the findings of the specific audit.

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10. DATA REDUCTION, VALIDATION, AND REPORTING

10.1 DATA REDUCTION

10.1.1 Field and Technical Data Reduction

Field personnel will record field data in bound field logbooks and on standard forms. After checking the validity of the data in the field notes, the Site Manager or his/her designee will reduce the data to tabular form, when possible, by entering the data into data files. Where appropriate, the data files will be set up for direct input into a work assignment database. Subjective data will be filed as hard copies for later review by the Project Manager and incorporation into technical reports, as appropriate.

10.1.2 Laboratory Data Reduction

Data reduction is the process by which raw analytical data generated from laboratory instrument systems is converted into usable concentrations. The raw data, which may take the form of area counts, instrument responses, or observations, are processed by the laboratory and converted into concentrations expressed in the parts per million or parts per billion range. Raw data from these systems include compound identifications, concentrations, retention times, and data system print-outs. Raw data are usually reported in graphic form, bar graph form, or tabular form. The laboratory will follow SOPs consistent with the data handling requirements of the applicable methods.

The laboratory reporting limits for each site must be less than or equal to those stipulated by each work assignment. The reporting limits will be presented in site-specific QAPP Addendum.

10.2 VALIDATION

10.2.1 Field and Technical Data Validation

Validation of objective field and technical data will be performed at two different levels. The first level of data validation will be performed at the time of collection by following standard procedures and QC checks. The Site Manager, who will review the data to ensure that the correct codes and units have been included, will complete the second level of data validation. After data reduction into tables and arrays is complete, the Site Manager will review data sets for anomalous values. The Project Manager, who will review field reports for reasonableness and completeness, will validate subjective field and technical data. In addition, the Site Manager will conduct random checks of sampling and field conditions.

10.2.2 Analytical Data Validation

If a work assignment requires the validation of analytical data, data validation will be performed to establish the data quality for work assignment data that are to be considered when making project decisions. Laboratories will submit results that are supported by sufficient back-up data and QA/QC results to enable the reviewer to conclusively determine the quality of the data. The

laboratory will review data prior to its release from the laboratory. Objectives for review are in accordance with the QA/QC objectives stated in each site-specific QAPP Addendum. The laboratory is required to evaluate their ability to meet these objectives. Outlying data will be flagged in accordance with laboratory SOPs and corrective action will be taken to rectify the problem.

A NYSDEC-approved qualified independent third-party data validator will review the data package to determine completeness and compliance in accordance with Attachment 1 (Scope of Services), Work Element V (Analytical QA/QC Activities) of the Standby Contract No. D009806 (**Appendix A**).

A narrative describing how the data did or did not meet the validation criteria is part of the data validation procedure. The validation assessment will describe the overall quality of the data and the data validation report will provide a written statement upon completion of the validation indicating whether or not the data are valid and usable and include a percent completeness value of usable data.

10.2.3 Data Usability Summary Report

A Data Usability Summary Report (DUSR) provides a thorough evaluation of analytical data without the third-party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meet the site/project specific criteria for data quality and data use. If a work assignment requires a DUSR, the DUSR will be developed by a NYSDEC-approved qualified environmental scientist in accordance with Attachment 1 (Scope of Services), Work Element V (Analytical QA/QC Activities) of the Standby Contract No. D009806 (**Appendix A**).

10.3 REPORTING

10.3.1 Field Measurements

Any field analysis results will be recorded in a dedicated field logbook at the time the results are available. The results will be tabulated and plotted in the office as part of the reporting tasks. Reports also will consist of the field logbook, required standard forms, photographic documentation, and daily QC reports.

10.3.2 Analytical Data

The content of analytical laboratory data packages designed for work conducted during a work assignment are site-specific and will include the following information:

- Pertinent physical data presented in concise, easy to follow formats (i.e., sample, number, client, date of sample preparation, date analyzed, percent moisture, etc.)

- Reference for analytical methodology used

- General discussion including a description of sample types, tests performed, any problems encountered, and general comments

- Data from each discrete sample reported using cross-referencing between normal samples and QC samples and including all pertinent dates, information, and reporting limits

- Reported data to include associated QC samples such as blanks, spikes and spike duplicates, laboratory duplicates, field duplicates, and appropriate check standards

- EDD that meet the NYSDEC EDD requirements

- Copies of chain-of-custody sheets

- Raw data.

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11. CORRECTIVE ACTION PROCEDURE DESCRIPTION

11.1 OBJECTIVES

The objectives of the corrective action procedures presented below are to ensure that recognized errors in performance of sample and data acquisition lead to effective remedial measures and that those steps are documented to provide assurance that any data quality deficiencies are recognized in later interpretation and are not recurrent.

11.2 RATIONALE

Many times, corrective measures are undertaken in a timely and effective fashion but go undocumented. In other cases, corrective actions are of a complex nature and may require scheduled interactions between departmental groups. In either case, documentation in a formal or informal sense can reinforce the effectiveness and duration of the corrective measures taken.

11.3 CORRECTIVE ACTION METHODS

11.3.1 Immediate Corrective Actions

Immediate corrective actions are of a minor or routine nature such as correcting malfunctioning equipment, correction of data transcription errors, and other such activities routinely made in the field, laboratory, or office by technicians, analysts, and other project staff.

11.3.2 Long-Term Corrective Actions

Long-term corrective action will be used to identify and eliminate causes of non-conformances which are of a complex nature and that are formally reported between management groups.

11.3.2 Corrective Action Steps

For long-term corrective actions, steps comprising closed-loop corrective action systems are as follows:

- Define the problem
- Assign responsibility for investigating the problem
- Investigate and determine the cause of the problem
- Determine a corrective action to eliminate the problem
- Assign and accept responsibility for implementing the corrective action
- Verify that the corrective action has eliminated the problem.

Non-conformance events associated with analytical work are documented by the laboratories' Non-Conformance Records, which are reviewed and approved by the Quality Services Manager.

11.3.3 Audit-Based Non-Conformances

Following audits, corrective action is initiated by documenting the audit finding and recommended corrective action on an audit finding report.

11.4 CORRECTIVE ACTION REPORT REVIEW AND FILING

Immediate and long-term corrective actions require review to assure that, during the time of non-conformance, erroneous data were not generated or that, if possible, correct data were acquired instead. Such confirmation and review is the responsibility of the supervisor of the staff implementing the corrective action. Confirmation will be acknowledged by notation and dated signature on the affected data record or appropriate form or by memorandum to cognizant project management.

11.5 CORRECTIVE ACTION REPORTS TO MANAGEMENT

The Project QA Officer will provide project management with corrective action reports. The Project Manager is informed verbally of non-conformance events as soon as possible and decisions made after evaluation are documented in the Non-Conformance Records. A copy of each Non-Conformance Record is maintained in the report.

12. QUALITY ASSURANCE/QUALITY CONTROL REPORTS

Fundamental to the success of this QA/QC is the active participation of the Project Manager and the Project QA Officer. The Program QA Officer will be advised of work assignment activities and will participate in development, review, and operation of the project. Project management will be informed of QA activities through the receipt, review, and/or approval of:

- Project-specific QA project plans
- Corporate and project-specific QA/QC plans and procedures
- Corrective action notices
- Non-conformance records.

Periodic assessment of field and laboratory QA/QC activities and data accuracy, precision, and completeness will be conducted and reported by the laboratory. Items to be included in the QA reports are the summary of results for the performance or the system audit, and where applicable:

- Assessment of adherence to work scope and schedule for the audited task
- Assessment of the precision, accuracy, and completeness of sample batches and subsequent status of data processing and analyses
- Significant QC problems and the status of any ongoing corrective actions
- Changes to the site-specific Work Plan
- Status of implementation of the site-specific Work Plan.

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Tables

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Table 1-A Analytical Reporting Limits EPA Method 8260b
Volatile Organic Compounds: Water and Soil

Analyte	Reporting Limit	
	Groundwater (µg/L)	Soil (ppm)
1,1,1,2-Tetrachloroethane	0.5	0.005
1,1,1-Trichloroethane	0.5	0.005
1,1,2,2-Tetrachloroethane	0.5	0.005
1,1,2-Trichloroethane	0.5	0.005
1,1-Dichloroethane	0.5	0.005
1,1-Dichloroethene	0.5	0.005
1,1-Dichloropropene	0.5	0.005
1,2,3-Trichloropropane	0.04	0.005
1,2-Dibromo-3-chloropropane	0.04	0.005
1,2-Dibromoethane	0.5	0.005
1,2-Dichlorobenzene	0.5	0.005
1,2-Dichloroethane	0.5	0.005
1,2-Dichloropropane	0.5	0.005
1,3-Dichlorobenzene	0.5	0.005
1,3-Dichloropropane	0.5	0.005
1,4-Dichlorobenzene	0.5	0.005
2,2-Dichloropropane	0.5	0.005
2-Butanone	10	0.01
2-Chlorotoulene	0.5	0.005
2-Hexanone	10	0.01
4-Chlorotoulene	0.5	0.005
4-Methyl-2-pentanone	0.5	0.005
Acetone	10	0.02
Benzene	0.5	0.005
Bromobenzene	0.5	0.005
Bromochloromethene	0.5	0.01
Bromodichloromethane	0.5	0.005
Bromoform	1	0.005
Bromomethane	1	0.01
Carbon disulfide	0.5	0.005
Carbon tetrachloride	0.5	0.005
Chlorobenzene	0.5	0.005
Chloroethane	1	0.01
Chloroform	0.5	0.005
Chloromethane	1	0.01
cis-1,2-dichloroethene	0.5	0.005
cis-1,3-dichloropropene	0.5	0.005
Dibromochloromethane	0.5	0.005
Dibromomethane	0.5	0.005
Dichlorodifluoromethane	0.5	0.005
Ethylbenzene	0.5	0.005
Isopropylbenzene	0.5	0.005
Methlyene chloride	5	0.02
n-Propylbenzene	0.5	0.005
Styrene	0.5	0.005
Tetrachloroethene	0.5	0.005
Toluene	0.5	0.005
trans-1,2-dichloroethene	0.5	0.005
trans-1,3-dichloropropene	0.5	0.005
Trichloroethene	0.5	0.005
Vinyl chloride	0.5	0.01
Xylene (Total)	0.5	0.005

NOTES: µg/L = Microgram(s) per liter
ppm = Parts per million

Table 1-B Analytical Reporting Limits EPA Method 8270c
Semi-Volatile Organic Compounds: Water and Soil

Analyte	Reporting Limit ppb	
	Groundwater (µg/L)	Soil (ppm)
1,4-Dioxane	0.2	0.067
1,2,4-Trichlorobenzene	5	0.067
1,2-Dichlorobenzene	3	0.33
1,3-Dichlorobenzene	3	0.33
1,4-Dichlorobenzene	3	0.33
2,2-oxybis(1-Chloropropane)	10	0.33
2,4,5-Trichlorophenol	10	0.33
2,4,6-Trichlorophenol	10	0.33
2,4-Dichlorophenol	5	0.33
2,4-Dimethylphenol	10	0.33
2,4-Dinitrophenol	10	0.67
2,4-Dinitrotoulene	5	0.33
2,6-Dinitrotoulene	5	0.33
2-Chloronapthalene	10	0.33
2-Chlorophenol	10	0.33
2-Methylnapthalene	10	0.33
2-Methylphenol	10	0.33
2-Nitroaniline	5	0.67
2-Nitrophenol	20	0.67
3,3-Dichlorobenzidine	5	0.67
3-Nitroaniline	5	0.67
4,6-Dinitro-2-methylphenol	20	0.67
4-Bromophenyl phenyl ether	10	0.33
4-Chloroaniline	5	0.33
4-Chlorophenyl phenyl ether	10	0.33
4-Cholor-3-methylphenol	10	0.33
4-Methylphenol	10	0.33
4-Nitroaniline	5	0.67
4-Nitrophenol	20	0.67
Acenaphthene	10	0.067
Acenaphthylene	10	0.067
Anthracene	10	0.067
Benzo(a)anthracene	0.002	0.33
Benzo(a)pyrene	10	0.067
Benzo(b)fluoranthene	0.002	0.067
Benzo(g,h,I)perylene	10	0.067
Benzo(k)fluoranthene	0.002	0.067
Bis(2-Chloroethoxy)methane	5	0.33
Bis(2-chloroethyl)ether	1	0.33
Bis(2-Ethylhexyl)phthalate	5	0.33
Butyl benzyl phthalate	10	0.33
Carbazole	10	0.067
Chrysene	0.002	0.067
Dibenz(a,h)anthracene	10	0.33
Dibenzofuran	10	0.33
Diethyl phthalate	10	0.33
Dimethyl phthalate	10	0.33
Di-n-butyl phthalate	10	0.33
Di-n-octyl phthalate	10	0.33
Fluoranthene	10	0.067

Table 1-B Analytical Reporting Limits EPA Method 8270c
Semi-Volatile Organic Compounds: Water and Soil

Analyte	Reporting Limit ppb	
	Groundwater (µg/L)	Soil (ppm)
Fluorene	10	0.067
Hexachlorobenzene	0.04	0.33
Hexachlorobutadiene	0.5	0.33
Hexachlorocyclopentadiene	5	0.67
Hexachloroethane	5	0.33
Indeno[1,2,3-cd]pyrene	0.002	0.067
Isophorone	10	0.33
Naphthalene	10	0.067
N-Nitroso-di-n-propylamine	10	0.33
Pentachorophenol	1	0.67
Phenanthrene	10	0.067
Phenol	1	0.33
Pyrene	10	0.067

NOTES:
µg/L = Microgram(s) per liter
ppm = Parts per million

Table 1-C Analytical Reporting Limits EPA Method 6010 (Target Analyte List Metals) and EPA Method 7470 (water) or 7471 (soil) for Mercury: Water and Soil

Analyte	Reporting Limit ppm	
	Groundwater (µg/L)	Soil (ppm)
Aluminum	2,000	2.0
Antimony	3	0.6
Arsenic	25	0.1
Barium	1,000	2.0
Beryllium	3	0.05
Cadmium	5	0.05
Calcium	50,000	50.0
Chromium	50	0.1
Cobalt	500	0.5
Copper	200	0.25
Iron	300	1.0
Lead	25	0.03
Magnesium	35,000	50.0
Manganese	300	0.15
Mercury (Method 7470)	0.7	0.002
Nickel	100	0.4
Potassium	50,000	50.0
Selenium	10	0.05
Silver	50	0.1
Sodium	20,000	50.0
Thallium	0.5	0.1
Vanadium	500	0.5
Zinc	5,000	0.2

NOTES:
µg/L = Microgram(s) per liter
ppm = Parts per million

Table 1-D Analytical Reporting Limits EPA Method TO-15 Standard Volatile Organic Compounds: Air

Analyte	Reporting Limit (µg/m3)	
	Standard	Low Level
1,1,1-Trichloroethane	100	1
1,1,2,2-Tetrachloroethane	100	1
1,1,2-Trichloroethane	100	1
1,1,2-Trichlorotrifluoroethane	100	1
1,1-Dichloroethane	100	1
1,1-Dichloroethene	100	1
1,2,4-Trichlorobenzene	100	1
1,2,4-Trimethylbenzene	100	1
1,2-Dibromoethane	100	1
1,2-Dichlorobenzene	100	1
1,2-Dichloroethane	100	1
1,2-Dichloropropane	100	1
1,3,5-Trimethylbenzene	100	1
1,3-Butadiene	100	1
1,3-Dichlorobenzene	100	1
1,4-Dichlorobenzene	100	1
1,4-Dioxane	100	1
2,2,4-Trimethylpentane	100	1
2-Butanone	100	1
2-Hexanone	100	1
4-Ethyltoluene	100	1
4-Methyl-2-Pentanone	100	1
Acetone	100	1
Allyl Chloride	100	1
Benzene	100	1
Benzyl Chloride	100	1
Bromodichloromethane	100	1
Bromoethene	100	1
Bromoform	100	1
Bromomethane	100	1
Carbon Disulfide	100	1
Carbon Tetrachloride	5	0.25
Chlorobenzene	100	1
Chloroethane	100	1
Chloroform	100	1
Chloromethane	100	1
cis-1,2-Dichloroethene	100	1
cis-1,3-Dichloropropene	100	1
Cyclohexane	100	1
Dibromochloromethane	100	1
Dichlorodifluoromethane	100	1
Dichlorotetrafluoroethane	100	1
Ethyl Acetate	100	1
Ethyl Benzene	100	1
Heptane	100	1
Hexachloro-1,3-Butadiene	100	1
Hexane	100	1
Isopropyl Alcohol	100	1

Table 1-D Analytical Reporting Limits EPA Method TO-15 Standard Volatile Organic Compounds: Air

Analyte	Reporting Limit (µg/m3)	
	Standard	Low Level
m/p-Xylene	100	1
Methyl tert-Butyl Ether	100	1
Methylene Chloride	100	1
o-Xylene	100	1
Propene	100	1
Styrene	100	1
t-1,3-Dichloropropene	100	1
Tetrachloroethene	100	1
Tetrahydrofuran	100	1
Toluene	100	1
trans-1,2-Dichloroethene	100	1
Trichloroethene	5	0.25
Trichlorofluoromethane	100	1
Vinyl Acetate	100	1
Vinyl Chloride	100	1

NOTES:
µg/m3 = Microgram(s) per cubic meter

Table 1-E Analytical Reporting Limits EPA Method 8082 (Polychlorinated Biphenyl Compounds Water, Soil, and Sediment)

Constituent	Reporting Limits[a]	
	Water (µg/L)	Soil, Sediment, Debris (ppm)
Aroclor 1016	0.1	0.1
Aroclor 1221	0.1	0.1
Aroclor 1232	0.1	0.1
Aroclor 1242	0.1	0.1
Aroclor 1248	0.1	0.1
Aroclor 1254	0.1	0.1
Aroclor 1260	0.1	0.1
Total polychlorinated biphenyls [b]	0.7	0.1

(a) Reporting limits shown are based on NYSDEC 2000 Analytical Services Protocol contract required quantitation limits and are for guidance purposes.
(b) Reporting limits shown for total polychlorinated biphenyls are the summation of the reporting limits for each Aroclor listed.
NOTES:
µg/L = Microgram(s) per liter
ppm = Parts per million

Table 1-F Analytical Reporting Limits EPA Superfund Analytical Services/CLP Method OLM02.4 Volatile Organic Compounds: Water, Soil, and Sediment

Constituent	Reporting Limits[a] (ppb)		
	Low Water	Low Soil, Sediment, Debris	Medium Soil, Sediment, Debris
Chloromethane	5	5	250
Bromomethane	5	5	250
Vinyl Chloride	5	5	250
Chloroethane	5	5	250
Methylene chloride	5	5	250
Acetone	5	5	250
Carbon disulfide	5	5	250
1,1-Dichloroethene	5	5	250
1,1-Dichloroethane	5	5	250
1,2-Dichloroethene (total)	5	5	250
Chloroform	5	5	250
1,2-Dichloroethane	5	5	250
2-Butanone	5	5	250
1,1,1-Trichloroethane	5	5	250
Carbon tetrachloride	5	5	250
Bromodichloromethane	5	5	250
1,2-Dichloropropane	5	5	250
cis-1,3Dichloropropene	5	5	250
Trichloroethene	5	5	250
Dibromochloromethane	5	5	250
1,1,2-Trichloroethane	5	5	250
Benzene	5	5	250
trans-1,3-Dichloropropene	5	5	250
Bromoform	5	5	250
4-Methyl-2-pentanone	5	5	250
2-Hexanone	5	5	250
Tetrachloroethene	5	5	250
Toluene	5	5	250
1,1,2,2-Tetrachloroethane	5	5	250
Chlorobenzene	5	5	250
Ethylbenzene	5	5	250
Styrene	5	5	250
Total Xylenes	5	5	250

(a) Reporting limits presented are EPA Superfund Analytical Services/Contract Laboratory Program (CLP) contract required quantitation limits. Quantitation limits for soil, sediment, and debris are based on dry-weight. Specific quantitation limits are highly matrix dependent.
NOTES:
ppb = Parts per billion

Table 1-G Analytical Reporting Limits EPA Superfund Analytical Services/CLP Method OLM02.4 Semi-volatile Organic Compounds: Water, Soil, and Sediment

Constituent	Reporting Limits[a] (ppb)		
	Water	Low Soil, Sediment, Debris	Medium Soil, Sediment, Debris
1,4-Dioxane	2	67	2,000
Phenol	5	170	5,000
bis(2-chloroethyl)ether	5	170	5,000
2-Chlorophenol	5	170	5,000
1,2-Dichlorobenzene	5	170	5,000
1,3-Dichlorobenzene	5	170	5,000
1,4-Dichlorobenzene	5	170	5,000
2-Methylphenol	5	170	5,000
2,2'-oxybis (1-chloropropane)	5	170	5,000
4-Methylphenol	5	170	5,000
N-Nitroso-di-n-propylamine	5	170	5,000
Hexachloroethane	5	170	5,000
Nitrobenzene	5	170	5,000
Isophorone	5	170	5,000
2-Nitrophenol	5	170	5,000
2,4-Dimethylphenol	5	170	5,000
bis(2-chloroethoxy)methane	5	170	5,000
2,4-Dichlorophenol	5	170	5,000
1,2,4-Trichlorobenzene	5	170	5,000
Naphthalene	5	170	5,000
4-Chloroaniline	5	170	5,000
Hexachlorobutadiene	5	170	5,000
4-Chloro-3-methylphenol	5	170	5,000
2-Methylnaphthalene	5	170	5,000
Hexachlorocyclopentadiene	5	170	5,000
2,4,6-Trichlorophenol	5	170	5,000
2,4,5-Trichlorophenol	10	330	10,000
2-Chloronaphthalene	5	170	5,000
2-Nitroaniline	10	330	10,000
Dimethylphthalate	5	170	5,000
Acenaphthylene	5	170	5,000
2,6-Dinitrotoluene	5	170	5,000
3-Nitroaniline	5	330	10,000
Acenaphthene	5	170	5,000

Table 1-G Analytical Reporting Limits EPA Superfund Analytical Services/CLP Method OLM02.4 Semi-volatile Organic Compounds: Water, Soil, and Sediment

Constituent	Reporting Limits[(a)] ppb		
	Water	Low Soil, Sediment, Debris	Medium Soil, Sediment, Debris
2,4-Dinitrophenol	10	330	10,000
4-Nitrophenol	10	330	10,000
Dibenzofuran	5	170	5,000
2,4-Dinitrotoluene	5	170	5,000
Diethylphthalate	5	170	5,000
4-Chlorophenyl phenyl ether	5	170	5,000
Fluorene	5	170	5,000
4-Nitroaniline	10	330	10,000
4,6-Dinitro-2-methylphenol	10	330	10,000
N-nitrosodiphenylamine	5	170	5,000
4-Bromophenyl phenyl ether	5	170	5,000
Hexachlorobenzene	5	170	5,000
Pentachlorophenol	10	330	10,000
Phenanthrene	5	170	5,000
Anthracene	5	170	5,000
Carbazole	5	170	5,000
Di-n-butyl phthalate	5	170	5,000
Fluoranthene	5	170	5,000
Pyrene	5	170	5,000
Butyl benzyl phthalate	5	170	5,000
3,3'-Dichlorobenzidine	5	170	5,000
Benz(a)anthracene	5	170	5,000
Chrysene	5	170	5,000
bis(2-Ethylhexyl)phthalate	5	170	5,000
Benzo(b)fluoranthene	5	170	5,000
Benzo(k)fluoranthene	5	170	5,000
Benzo(a)pyrene	5	170	5,000
Indeno(1,2,3-cd)pyrene	5	170	5,000
Dibenzo(a,h)anthracene	5	170	5,000
Benzo(g,h,i)perylene	5	170	5,000

(a) Reporting limits presented are EPA Superfund Analytical Services/Contract Laboratory Program (CLP) contract required quantitation limits. Quantitation limits for soil, sediment, and debris are based on dry-weight. Specific quantitation limits are highly matrix dependent.
NOTES:
ppb = Parts per billion

Table 1-H Analytical Reporting Limits EPA Superfund Analytical Services/CLP Method ISM02.4 Metals: Water, Soil, and Sediment

Constituent	Reporting Limits[a]	
	Water (ppb)	Soil, Sediment, Debris (ppm)
Aluminum	200	20
Antimony	60	6
Arsenic	10	1
Barium	200	20
Beryllium	5	0.5
Cadmium	5	0.5
Calcium	5,000	500
Chromium	10	1
Cobalt	50	5
Copper	25	2.5
Iron	100	10
Lead	10	1
Magnesium	5,000	500
Manganese	15	1.5
Mercury	0.2	0.1
Nickel	40	4
Potassium	5,000	500
Selenium	35	3.5
Silver	10	1
Sodium	5,000	500
Thallium	25	2.5
Vanadium	50	5
Zinc	60	6
Cyanide	10	2.5

(a) Reporting limits presented are EPA Superfund Analytical Services/Contract Laboratory Program (CLP) contract required detection limits for inorganics analyzed with ICP-AES (Inductively Coupled Plasma-Atomic Emission Spectroscopy.
NOTES:
ppb = Parts per billion
ppm = Parts per million

Table 1-I Analytical Reporting Limits EPA Clean Water Method 537.1 Per- and Polyfluoroalkyl Substances (PFAS)

Constituent[(a)]	Reporting Limits	
	Water (ng/L)	Soil, Sediment, Debris (µg/kg)
Perfluorooctanesulfonic acid (PFOS)	2	1
Perfluorooctanoic acid (PFOA)	2	1
Perfluorobutanoic acid (PFBA)	2	1
Perfluoropentanoic acid (PFPeA)	2	1
Perfluorohexanoic acid (PFHxA)	2	1
Perfluorobutanesulfonic acid (PFBS)	2	1
Perfluoroheptanoic acid (PFHpA)	2	1
Perfluorohexanesulfonic acid (PFHxS)	2	1
Perfluorononanoic acid (PFNA)	2	1
Perfluorodecanoic acid (PFDA)	2	1
Perfluoroundecanoic acid (PFUdA or PFUnA)	2	1
Perfluorodecanesulfonic acid (PFDS)	2	1
Perfluorododecanoic acid (PFDoA)	2	1
Perfluorotridecanoic acid (PFTrDA)	2	1
Perfluorotetradecanoic acid (PFTeDA)	2	1
Perfluorohexadecanoic acid (PFHxDA)	2	1
Perfluorooctadecanoic acid (PFODA)	2	1
N-methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	2	1
N-ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	2	1
Propanoic acid, 2,3,3,3-tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy) (PFPrOPrA*)	2	1
Dodecafluoro-3H-4,8-dioxanonanoate (NaDONA*)	2	1

(a) PFAS Analyte List (21 compounds). The site-specific QAPP should list all PFAS compounds of interest.
NOTES:
ng/L = Nanogram(s) per liter
µg/kg = Microgram(s) per liter

Table 1-J Analytical Reporting Limits ISO Method 25101 Per- and Polyfluoroalkyl Substances (PFAS)

Constituent	Reporting Limits Drinking Water (ng/L)
Perfluorooctanesulfonic acid (PFOS)	2
Perfluorooctanoic acid (PFOA)	2
Perfluorononanoic acid (PFNA)	2
Perfluorobutanesulfonic acid (PFBS)	2
Perfluoroheptanoic acid (PFHpA)	2
Perfluorohexanesulfonic acid (PFHxS)	2

NOTES:
ng/L = Nanogram(s) per liter

Table 2 Summary of Periodic Laboratory Calibration Requirements

Instrument	Calibration Frequency	Acceptance Limits	Corrective Actions
Analytical Balances	Daily: Sensitivity (with a Class P weight)	0.001 g	Adjust sensitivity
	Monthly: Checked with Class S weights	Standard deviation of <0.1 mg	Service balance
	Annually: Calibrated by outside vendor against certified Class S weights	Standard deviation of <0.1 mg	Service balance
Thermometers	Annually: Calibrated against certified National Institute of Standards and Technology thermometers by outside vendor	± 0.5°C	Tag and remove from service
Automatic Pipettors	Quarterly: Gravimetric check	High volume (>100 mL): ≤1.0% relative error as relative standard deviation	Service or replace
		Low volume (<100 mL): ≤2.0% relative error as relative standard deviation	

Table 3 Field Instrumentation Calibration Frequency

Instrument	Frequency of Calibration Check	Calibration Standard
pH Meter	Prior to use – daily	Commercially prepared pH buffer solutions (4.01, 7.00, 10.00)
Conductivity Meter	Prior to use – daily	Commercially prepared saline solution (12.9 mS/cm)
Water Level Meter	Prior to initiating field work	100-ft engineer's tape
Dissolved Oxygen Meter	Per sampling event	Saturation
Photoionization Detector	Prior to use – daily	100 ppm isobutylene
Turbidity	Prior to use – daily	10 NTU, 200 NTU

NOTES:
ft = Foot (feet)
mS/cm = MilliSiemens(s) per centimeter
NTU = Nephelometric turbidity units
ppm = Part(s) per million

Table 4 Field Measurement Quality Control Objectives

Field Parameter	Precision[(a)]	Accuracy
Water Temperature	±1°C	±1°C (instrument capability)
pH	±1 pH Standard Unit	±1 pH Standard Unit (instrument capability)
Conductivity	±1 mS/cm	±5% standard
Dissolved Oxygen	±0.02 mg/L	±5%
Turbidity	±1.0 Nephelometric turbidity units	±2% standard
Water Level	±0.1 ft	±0.01 ft

(a) Precision units presented in applicable significant figures.
% = Percent
°C = Degrees Celsius
ft = Foot (feet)
mS/cm = milliSiemen(s) per centimeter
mg/L = Milligram(s) per liter

Table 5 Preventive Maintenance Summary

Maintenance	Frequency
Conductivity, pH, Dissolved Oxygen Meters	
Store in protective casing	D
Inspect equipment after use	D
Clean probes	D
Keep logbook in instrument	D
Have replacement meter available	D
Replace probes	X
Return to manufacturer for service	X
Calibration	D
Turbidity Meter	
Store in protective casing	D
Inspect equipment after use	D
Clean sample cells	D
Clean lens	M or X
Check and recharge batteries	D
Keep logbook in instrument	D
Have replacement meter available	D
Return to manufacturer for service	X
Calibration	D
Thermometer	
Store in protective casing	D
Inspect equipment after use	D
Have replacement thermometer available	D
Water Level Meter	
Store in protective covering	D
Inspect equipment after use	D
Check indicators/batteries	D
Keep logbook on instrument	D
Have replacement meter available	X
Photoionization Detector	
Store in protective casing	D
Inspect equipment after use	D
Check and recharge batteries	D
Clean ultraviolet lamp and ion chamber	M or X
Keep logbook in instrument	D
Have replacement meter available	D
Return to manufacturer for service	X
Calibration	D

NOTES:
D = Daily
M = Monthly
X = Operator's discretion

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Appendix A

Data Usability Summary Report Guidelines

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completed and meets the requirements of the Construction Contract. Once this inspection has been performed, the Consultant shall deliver to the Department a written notice with regard to the disposition of the project. If the Consultant determined that the project has been satisfactorily completes according to the Construction Contract plans and specifications, certification to this fact shall be made to the Department by the Consultant.

- All files, reports, and other documentation are to be turned over to the Department at the completion of the project, including one copy in an electronic format that complies with the Department's Electronic Document Standards or as otherwise directed by the Department. All data generated under the Contract shall be submitted in an electronic data deliverable (EDD) that complies with the Department's Electronic Data Warehouse Standards or as otherwise directed by the Department.

Task VII. Site Management Plans

In many instances there is a requirement for some degree of regular operation and maintenance activity associated with completed remedial action projects. A Site Management Plan, prepared in accordance with Section 6.2 of DER-10, is needed to provide detailed description, schedules, budgets, HASP, and reporting/recordkeeping requirements (e.g., OM&M and the environmental easement) for the operation and maintenance of a remedial site.

Task VIII. Construction Certification Report

The Consultant shall prepare a construction certificate report acceptable to the Department. The report shall describe all variations from the Construction Contract documents, confirmatory soil sampling results, final qualities, aerial and vertical survey of the extent of the work including the location of confirmatory samples, and summary record drawings. The report shall include a New York State Licensed P.E. certification that work was completed in accordance with the approved design.

Task IX. Final Remediation Report

At the request of the Department, prepare a site-wide final remediation report, in accordance with Section 5.8 of DER-10, acceptable to the Department. The report shall describe all previous components of remedial work performed at the site. It shall describe the overall implementation of the remedy as described in the Record of Decision (ROD). It shall incorporate by reference all previous construction certification reports and include drawings that show any and all required engineering controls to maintain the integrity of the remedy. The report shall include a New York State Licensed P.E. certification that work was completed in accordance with the ROD.

Work Element V – Analytical Quality Assurance/Quality Control Activities (QA/QC)

General: This work element may include development of Quality Assurance Project Plans, oversight of independent third-party validation, and/or data usability assessments by the Consultant's Quality Assurance Officer (QAO).

Subtask A: Data Validation Scope of Work

Data Validation is the systemic process by which the data quality is determined with respect to data quality criteria that are defined in project and laboratory quality control programs and in the referenced analytical methods. The data validation process consists of an assessment of the acceptability or validity of project data with respect to stated project goals and requirements for data usability. Data validation consists of editing, screening, checking, auditing, certification, review, and interpretation. The purpose of data validation is to define and document analytical data quality and determine if the data quality is sufficient for the intended use(s) of the data. In accordance with DEC requirements, all project data must be of known and acceptable quality. Data validation is performed to establish the data quality for all data which are to be considered when making project decisions. Laboratories will be required to submit results which are supported by sufficient back-up data and QA/QC results to enable the reviewer to conclusively determine the quality of data.

Subtask B: Duties and Qualifications of a Data Validator

- The following qualifications and requirements are established for the Consultant or subcontractor to the Consultant or retained by a responsible party functioning under the guidance and direction of an order of consent. The data validator shall be independent of the laboratory generating the data.
- The data validator shall demonstrate that all staff members involved in the date validation process have:
  - A Bachelor's degree in chemistry or natural sciences
  - One (1) year experience in implementation and application of the protocol(s) used in generating the date for which they are responsible, the successful completion of an EPA data validation training course or equivalent, as evidenced by a certificate of completion, may be substituted for the analytical experience requirement
  - A minimum of one (1) year experience evaluating data packages for contract and protocol compliance.
- Consistent with the Division of Environmental Remediation's Quality Assurance Program Plan (QAPP), all laboratory data generated in support of any investigation, remediation, or monitoring activity carried out under the Division's program responsibility shall be developed under the administrative and operational control of a QAPP. To this end, the QAPP shall become an integral part of the Project and those portions that pertain to the development and production of analytical data shall define the task of the laboratory charged with developing and producing this data. The site-specific variances to the QAPP shall include the following:
  - The number and types of sampling to be analyzed
  - Sampling holding times to be observed and the time from which these holding times shall be measured
  - Site specific limits of concern for each of the analytes listed in each of the matrices to be sampled

- The matrix specific method detection limits that must be obtained for each of the analytes and matrices listed (this value should be in the neighborhood of 1/5 the site-specific limit of concern)
- Analytical protocols that shall be employed including any special handling or required cleanup procedures
- The frequency and types of any required quality control samples (e.g., trip blanks, rise blanks, replicates, matrix samples, matrix spike duplicates, and matrix spike blanks)
- Identification of any critical samples and any special analytical treatment that may be required
- Required deliverables and supporting documentation where these differ from or are not part of the required analytical protocols
- Library search of the top ten (1) Tentatively Identified Compounds.

- In order to facilitate the date validation process, copies of the QAPP (addressing the above referenced points of information), together with the project required deliverables and supporting documentation, and laboratory subcontract shall be submitted to the Data Validator contracted to carry out the data validation portion of the Contract.

Task I. Completeness

- The Data Validator (DV) shall review the data package to determine completeness. A completed data package will consist of the following components:
  - Chain of Custody forms for all samples
  - The case narrative(s) including all sample/analysis summary forms
  - QA/QC summaries including all supporting documentation
  - Instrument and method of performance data, including equipment and process blanks
  - Documentation showing the laboratory's ability to attain the Contract specific method detection limits for all target analytes in all required matrices
  - All data report forms including examples of the calculations used in determining final concentrations
  - All raw data used in the identification and quantitation of the Contract specific target limits.
- All deficiencies in the requirement for completeness shall be reported to the Consultant immediately. The laboratory shall be contacted by the Consultant's QAO and shall be given ten (10) days to produce the documentation necessary to remove the deficiencies.

Task II. Compliance

- The DV shall review the data package to determine compliance with those portions that pertain to the production of laboratory data. Compliance is defined by the following criteria:
  - The date package is complete as defined in Task I above

- The date has been produced and reported in a manner consistent with the requirements of the QAPP and the laboratory subcontract
- All protocol required QA/QC criteria have been met
- All instrument tuning and calibration requirements have been met for the time frame during which the analyses were completed
- All protocol requiring initial and continuing calibration data is present and documented
- All data reporting forms are complete for all samples submitted (including all sample dilution/concentration factors and all premeasurement sample cleanup procedures)
- All problems encountered during the analytical process have been reported in the case narrative along with any and all corrective actions taken by the laboratory.

- This task requires that the DV conduct a detailed comparison of the reported data with the raw data submitted as part of the supporting documentation package. It is the responsibility of the DV to determine that the reported data can be completely substantiated by applying protocol defined procedures for the identification and quantification of the individual analytes. To assist the DV in this determination the following documents are recommended, however the EPA Functional Guidelines will be used for format only. The specific requirements noted in the project QAPP are prerequisite (e.g., holding times or specific analytical project needs), to those noted in the Functional Guidelines:
  - The particular protocol(s) under which the date was generated (e.g., EPA SW-845; EPA Series 500 Protocols)
  - Data validation guidance documents such as:
    - "National Functional Guidelines for Inorganic Superfund Methods Data Review (ISM02.4)" at https://www.epa.gov/clp/national-functional-guidelines-inorganic-superfund-methods-data-review-ism024
    - Table 2: Region 2 RCRA and CERCLA Field and Data Validation Standard Operating Procedures (SOPs) at https://www.epa.gov/quality/region-2-quality-assurance-guidance-and-standard-operating-procedures
  - NOTE: These documents undergo periodic revisions, the most current documents and guidance apply.
- The DV shall submit a final report covering the results of the data review process. This report shall be submitted to the Department Project Manager or his/her designee and shall include the following:
  - A general assessment of the data packages as determined by the accomplishment of Tasks I-II above
  - Detailed description of any and all deviations from required protocols, including references to the portion of the protocols involved in the alleged deviations
  - Any and all failures in the DV's attempt to reconcile the reported data with the raw data from which it was derived, including telephone logs should be included in the validation report

- A detailed assessment by the DV of the degree the data has been compromised by any deviations from the protocol, QA/QC breakdowns, lack of analytical control, etc., that occurred during the analytical process
- The report shall include, a copy of the laboratory's case narrative including the Department required sample analysis summary sheets, as an attachment
- The report shall include an overall appraisal of the data package
- The validation report shall include a chart presented in spreadsheet format, consisting of site name, sample numbers, data submitted to the laboratory, year and number of the analytical protocol used, matrix, fractions analyzed (e.g., volatiles, semi-volatiles, pesticides/PCBs, Metals, CN). Space should be provided for notations of non-compliance and a column for an explanation of such violation (see following form):

Group #	Date	Protocol No.	Sample No.	Matrix	VOA Compliancy	Pest/PCB Compliancy	BCN Compliancy	Metals Compliancy	CN	Totals	NonCompliance

Task III. Data Usability Summary Report (DUSR) Scope of Work

- The Data Usability Summary Report (DUSR) provides a thorough evaluation of analytical data without the costly and time-consuming process of third party validation. The primary objective of a DUSR is to determine whether the data, as presented, meets the site-specific criteria for data quality and data use.
- The development of the DUSR must be performed by an experienced environmental scientist, such as the project QAO, fully capable of conducting a full data validation. Furthermore, the DUSR is developed from Department approved guidelines or a USEPA Contract Laboratory Protocol (CLP) deliverables package.
- The DUSR and the data deliverables package will be reviewed by quality assurance staff in the Department's Bureau of Technical Support. In most cases, this review will result in agreement or minor differences that can be reconciled. If data validation is found to be necessary (e.g., pending litigation) this can be carried out at a later date on the same package used for the development of the DUSR.

The environmental scientist preparing the DUSR must hold a bachelor's degree in relevant natural or physical science or field of engineering and must submit a resume documenting experience in environmental sampling, analysis, and data review.

Task IV. Preparation of the DUSR

- The DUSR is developed by reviewing and evaluating the analytical data package. During the course of this review the following questions must be asked and answered:
  - Is the data package complete as defined under the requirements for the most current version of Department approved guidelines or USEPA CLP deliverables?
  - Have all holding times been met?
  - Do all the QC data: (blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls, and sample data) fall within the protocol required limits and specifications?
  - Have all the data been generated using established and agrees upon analytical protocols?
  - Does an evaluation of the raw data conform the results provided in the data summary sheets and quality control verification forms?
- Evaluation of Matrix Spike Blanks (MSB) data – If the MSB recovery is less than the Department criteria the positive results should be qualified as J, estimated biased low. If the MSB recovery is less than the Department criteria but greater than ten percent (10%), the nondetects should be qualified J, biased low. If the MSB recovery is less than ten percent (10%), the nondetect data must be rejected.
- Any QC exceedances must be numerically specified in the DUSR and the corresponding QC summary sheet from the data package should be attached to the DUSR.
- All data that would be rejected by the EPA Region 2 Data Validation Guidelines must also be rejected in the DUSR.
- Once the data package has been reviewed and the above questions answered the DUSR describes the samples and analytical parameters. Data deficiencies, analytical protocol deviations and quality control problems are identified and their effect on the data discussed. The DUSR shall also include recommendations on resampling/reanalysis. All data quantifications must be documented following the most current version of the Department approved guidelines or the USEPA Region 2 Validation Guidelines.

Work Element VI – Site Response Activities/Interim Remedial Measures (IRM)

General: This work element may include short term response activities to alleviate environmental or health risk at a site. Interim remedial measures such as excavation, drum removals, short term operation of facilities, and other activities may also be included.

- Conditions at sites with hazardous waste, hazardous substance or petroleum contamination often require immediate response actions to protect human health and the environment. The Consultant is expected, whether directly or through subcontract, to perform the following response activities/interim remedial measures (IRMs):

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Appendix J.
Site-Specific Health and Safety Plan

Crown Dykman
City of Glen Cove, New York

Site-Specific Health and Safety Plan

NYSDEC Site No. 130054

NYSDEC State Superfund Standby Contract
(Work Assignment No. D009806-34)

Prepared for

New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
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May 2025

Revisions to Approved Health and Safety Plan

Revision Number	Date	Summary of Revision	New York State Department of Environmental Conservation Approval Date
0	November 2023	Create initial document for site.	
1	May 2025	Modified sampling frequency, per SMP	

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Attachment B. Safety Data Sheets

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Attachment D. Site Entry and Exit Log

Attachment E. Emergency Telephone Number and Hospital Directions

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
°F	Degrees Fahrenheit
AHA	Activity Hazard Analysis
CFR	Code of Federal Regulation
COVID-19	Coronavirus Disease 2019
CPR	Cardiopulmonary resuscitation
CRZ	Contamination Reduction Zone
CSZ	Clean/Support Zone
dBA	A-weighted decibel
DCE	Dichloroethene
DEET	Diethyltoluamide
DER	Division of Environmental Remediation
EA	EA Engineering and Geology, P.C.
EPA	U.S. Environmental Protection Agency
EZ	Exclusion Zone
ft	Foot (feet)
HASP	Health and Safety Plan
kV	Kilovolt(s)
L	Liter
NIOSH	National Institute for Occupational Health and Safety
NYSDEC	New York State Department of Environmental Conservation
OSHA	Occupational Safety and Health Administration
oz	Fluid ounce
PCE	Tetrachloroethene
PID	Photoionization detector
ppb	Part(s) per billion
PPE	Personal protective equipment
SDS	Safety data sheet
SHSO	Site Health and Safety Officer
TCE	Trichloroethene

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

VC	Vinyl Chloride
VOC	Volatile organic compound

1. INTRODUCTION

1.1 OBJECTIVE

This Site-Specific Health and Safety Plan (HASP) has been developed for the sole use of EA's employees while performing activities at the site. This HASP is not intended for firms who do not participate in EA training and health and safety programs or are not under direct subcontract to EA. No subcontractor activities under EA are anticipated at the site currently. The objective of this Site-Specific HASP is to provide personnel with protection standards and mandatory safety practices, procedures, and contingencies to be followed while performing field activities for the Crown Dykman Site. The typical work activities addressed within this HASP include the following on-site field activity:

- Groundwater gauging and sampling (Performed bi-annually)
- Annual Site Inspections
- New York State Department of Environmental Conservation (NYSDEC) Representation Oversight of Site Construction Activities

Each of these activities is summarized below.

1.1.1 Groundwater Gauging and Sampling (Performed Every Five Quarters)

Groundwater samples will be collected from an existing network of 21 monitoring wells. Twice a year, samples will be analyzed for volatile organic compounds (VOCs) to characterize the current groundwater plume. Main VOCs of concern are trichloroethene (TCE), tetrachloroethene (PCE), 1,2-dichloroethene (DCE), and vinyl chloride (VC). Once per year the samples will also be analyzed for per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane to determine if these contaminants have impacted the site groundwater.

1.1.2 Annual Site Inspections

Annual site inspections of the site will be conducted by EA personnel to ensure that all elements of the Site Management Plan are fulfilled and/or remedial actions are still in-place.

1.1.3 NYSDEC Representation Oversight of Site Construction Activities

When construction activities at the site by current site owner commence, EA personnel will serve as on-site NYSDEC representative to ensure that all Site Management Plan actions are addressed or completed.

The safety organization, procedures, and protective equipment for this HASP have been established based on an analysis of potential physical, chemical, and biological hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential for accident or injury. One copy of this HASP will be maintained for use during scheduled field activities. The copy will be made available for site use/employee review.

The HASP describes the procedures that must be followed during referenced site activities. Operational changes that could affect the health and safety of personnel, the community, or the environment will not be made without the prior approval of the Project Manager and the Program Health and Safety Officer. This document will be periodically reviewed to ensure that it is current and technically correct. Changes in site conditions and/or the scope of work will involve a review and modification to the HASP. Such changes will be completed in the form of a numbered revision.

The provisions of this HASP are mandatory for EA personnel working at the site. Visitors to the work site must also abide by the requirements of the HASP.

This Site-Specific HASP should be used in conjunction with EA's Generic Health and Safety Plan for Work Assignments, NYSDEC Standby Contract No. D009806, Revision 01, dated March 2023.

1.2 SITE AND FACILITY DESCRIPTION

The site is located at 66 Herb Hill Road, in the City of Glen Cove, Nassau County, New York (**Figure 1**). The site is approximately one acre and is currently a vacant lot. All buildings that once occupied the site were recently demolished (2022 to 2023 time period). The site is located in a generally commercial and light industrial area of Glen Cove.

Dykman Laundry and Cleaners occupied the property from 1932 to 1975, while Crown Uniform Service, a dry cleaner and uniform service, occupied the building from 1975 to 1983. Crown Uniform Service used both Stoddard Solvent (a petroleum-based mixture also known as varnoline) and PCE during its operational history. After 1983, a number of different commercial tenants occupied the building, including auto repair businesses, another cleaners, and a woodworking shop. The woodworking shop reportedly stored and used various lacquers and thinners at the Site. Numerous subsurface investigations were conducted at the site, and it was determined that VOCs were the primary contaminants of concern at the site.

1.3 POLICY STATEMENT

The site management field crew will be familiar with the HASP for site management activities that they are involved in. Prior to entering the site, this HASP will be reviewed, and the agreement to comply with the requirements will be signed by field crew and visitors and be maintained in the HASP Review Record (**Attachment A**).

Operational changes that could affect the health and safety of personnel, the community, or the environment will not be made without the prior approval from NYSDEC, the Project Manager, and the Health and Safety Representative. This document will be periodically reviewed to ensure that it is current and technically correct. Changes in site conditions and/or the scope of work will require a review and modification to the HASP. Such changes will be completed in the form of a revision of the HASP Addendum.

By signing a HASP Review Record, any visitors acknowledge their responsibility to comply with the occupational health and safety requirements defined in this HASP. Site management field crew or visitors on-site will be informed of site emergency response procedures and potential safety, or health hazards associated with the operations conducted in support of work assignments.

1.4 REFERENCES

This HASP addresses the following regulations and guidance documents:

- Quick Selection Guide to Chemical Protective Clothing, K. Forsberg and S.Z. Mansdorf, 3rd Ed. (1997)
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, National Institute (NOISH) for Occupational Safety and Health, Occupational Safety and Health Administration (OSHA), U.S. Coast Guard, U.S. Environmental Protection Agency (EPA) (86-116, October 1985)
- Occupational Safety and Health Administration Standards for General Industry, 29 Code of Federal Regulations (CFR) 1910
- OSHA Standards for Hazard Communication, 29 CFR 1910.1200/1926.59
- OSHA Standard for Respiratory Protection, 29 CFR 1910.134
- OSHA Standards for Construction Industry, 29 CFR 1926
- NIOSH for Pocket Guide to Chemical Hazards, Department of Health and Human Services, PHS, Center for Disease Control, NIOSH (2005)
- Threshold Limit Values, American Conference of Government Industrial Hygienists (2011).

1.5 DEFINITIONS

The following definitions are applicable to this HASP:

- ***Site—***The area where field activities are to be performed.
- ***Project—***On-site work performed under the scope of site management for the Crown Dykman Site.
- ***Project Manager—***The individual(s) who will have overall responsibility for site management. The Project Manager will provide services associated with the implementation of the Site Management Plan.

- ***On-site Personnel—***All personnel involved with a work assignment.

- ***Visitor—***Personnel, except the on-site personnel. Visitors must receive approval to enter the site.

- ***Exclusion Zone (EZ)—***Portion of the site where hazardous substances are, or are reasonably suspected to be, present in the air, water, or soil.

- ***Contamination Reduction Zone (CRZ)—***Area between the Exclusion Zone and Clean Zone that provides a transition between contaminated and clean areas. Decontamination stations are located in this zone.

- ***Clean/Support Zone (CSZ)—***The rest of the site. Support equipment is located in this zone.

2. ROLES AND RESPONSIBILITIES

2.1 PERSONNEL

Field crew employees are responsible for reading, understanding, and meeting the health and safety requirements contained in this HASP. A HASP Review Record sign-off sheet is provided as **Attachment A**. Employees are required to implement these procedures when carrying out daily operations and site-specific field activities. This will include receiving appropriate training and medical monitoring and using health and safety equipment (to include personal protective equipment [PPE]) to safely conduct site operations. This may include maintaining appropriate grooming standards (removal or proper trimming of beards, mustaches, and sideburns) to ensure the proper fit of respiratory protection. Employees will review each field activity prior to commencement to consider the potential health and safety hazards and the measures to be taken in the event of an emergency. Employees will know where safety data sheets (SDS) **(Attachment B**), first aid supplies, and emergency equipment are maintained. The Site Manager or Program Health and Safety Officer will be notified of potential health and safety hazards, near-miss conditions, or incidents present on the job site or unusual effects believed to be related to hazardous chemical exposures. Failure to follow established health and safety procedures could result in immediate dismissal from the site, and if repeated, a potential loss of employment.

2.1.1 Responsibilities

Clear lines of authority will be established for enforcing compliance with the safety, health, and contingency procedures consistent with industry policies and procedures. Designated personnel will be responsible for implementation of the HASP during field activities. This includes field supervision; implementing and directing emergency operations; coordinating with on-site and off-site emergency responders; enforcing safe work practices and decontamination procedures (if needed); ensuring proper use of PPE (**Attachment C**); communicating site safety program modifications and requirements to site personnel; proper reporting of injuries, illnesses, and incidents to the appropriate internal and external organizations; and containing and controlling the loss of potentially hazardous materials to soil, air, and surface/groundwater during field operations.

In the event of an on-site injury, occupational illness, near-miss, or environmental contamination incident, the following organizations/individuals will be notified as appropriate:

- Site Manager
- Site Health and Safety Officer (SHSO) and/or Field Team Leader
- Project Manager
- Program Health and Safety Officer
- Corporate Health and Safety Officer
- NYSDEC representatives
- Other organizations or persons as appropriate.

2.2 SITE HEALTH AND SAFETY OFFICER AND/OR FIELD TEAM LEADER

The SHSO and/or Field Team Leader is responsible for coordination of on-site contingency operations and the Site Health and Safety Program. The SHSO and/or Field Team Leader will be on-site at all times during work assignment field activities and will be responsible for daily compliance with site health and safety requirements. The SHSOs and/or Field Team Leader responsibilities include:

- Conducting visual inspections of the work site
- Stopping work when imminent safety or health risks exist or as outlined in this HASP
- Authorizing for personnel to perform field activities on-site (i.e., relative to medical examinations and training)
- Implementing the use of forms
- Implementing the guidance within this HASP, which includes review of HASP; project scope of work; and review/compliance of all Activity Hazard Analyses (AHAs). AHAs are provided in **Attachment F.**
    - AHAs will also be updated in field if hazards not specified on current AHA are identified.
- Providing an initial health and safety briefing to site workers and visitors
- Evaluating reported hazardous conditions and recommending corrective actions
- Conducting necessary health and safety monitoring
- Identifying, investigating, and preparing incident reports as necessary
- Consulting with the Program Health and Safety Officer or Project Manager for guidance on occupational health and safety and contingency issues affecting a specific work assignment
- Providing technical support and guidance in the modification of HASP requirements
- Evaluating on-site environmental monitoring results and providing reporting requirements to the Project Manager.

During an emergency, the Site Manager (or the Alternate in the absence of the Site Manager) will be responsible for initiating and coordinating emergency responses/contingency operations.

The SHSO/Field Team Leader will have the authority to make on-the-spot corrections dealing with safety, health, and environmental pollution infractions. If it is determined that the infraction cannot be remedied immediately and is of such a nature that continuance of the field activity could result in significant illness, injury, environmental contamination, and violations, the SHSO/Field Team Leader will have the authority to order a cessation of the activity until such time as the problem can be remedied.

2.3 PROJECT MANAGER

The Project Manager will have overall responsibility for site field activities and will be the primary contact during the work assignment field activities. The primary responsibilities of the Project Manager include:

- Assuring compliance with this HASP
- Coordinating field activities with the Site Manager
- Approving HASP Addendums and revisions
- Reviewing individual training and medical records prior to work start
- Providing overall supervisory control for health and safety protocols in effect for a work assignment
- Assigning the Site Manager and SHSO/Field Team Leader
- Assuring adequate resources are available for carrying out this HASP
- Preparing and submitting project reports.

2.4 SITE MANAGER

The Site Manager's responsibilities include but are not limited to:

- Providing technical support to the SHSO/Field Team Leader
- Evaluating on-site environmental monitoring results and reporting to the Project Manager and Program Health and Safety Officer
- Being responsible for initiating the evacuation of the work site when needed, communicating with off-site emergency responders, and coordinating activities of on-site and off-site emergency responders
- Determining if the abatement of hazardous conditions is sufficient prior to allowing resumption of field activities after an emergency.

2.4.1 Subcontractors

No work activities involving subcontractors are anticipated at the site.

2.5 VISITORS

Visitors entering the on-site work areas will be required to sign the Entry/Exit Log (**Attachment D**) and to read and verify their understanding and willingness to comply with this HASP. Visitors will be accompanied by the Project Manager, SHSO and/or Field Team Leader while on-site at all times.

3. RISK ANALYSIS

3.1 PROJECT SCOPE OF WORK

Based on the field activities detailed in the Site Management Plan and Section 1, the following potential hazard conditions may be anticipated:

- Personnel may be injured during physical lifting and handling of heavy equipment, construction materials, or containers. Additionally, personnel may encounter slip, trip, and fall hazards associated with sampling within the structures. Precautionary measures should be taken in accordance with this HASP.

- Field operations conducted during the winter months can impose excessive heat loss to personnel conducting strenuous activities during unseasonably cold weather days and can impose cold-related illness symptoms during unseasonably cold weather days or when the wind chill is high. In addition, heavy rains, electrical storms, and high winds may create extremely dangerous situations for employees.

- Field operations conducted during the summer months can impose heat stress on field personnel conducting strenuous activities during unseasonably hot weather days. Because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses and be able to recognize these signs and symptoms in both themselves and their co-workers.

- Work around certain types of equipment often creates excessive noise. Noise can cause workers to be startled, annoyed, or distracted; can cause physical damage to the ear, pain, and temporary and/or permanent hearing loss; and can interfere with communication. If workers are subjected to noise exceeding an 8-hour time-weighted average sound level of 85 A-weighted decibels (dBA), hearing protection will be selected with an appropriate noise reduction rating to comply with 29 CFR 1910.95 and to reduce noise below levels of concern.

- Site management activities intended to monitor remaining contamination often require employees to be in direct proximity or contact with hazardous substances. Groundwater sampling presents low risk and can be minimized through the use of PPE (nitrile gloves). Air monitoring equipment will be used to monitor airborne organic vapors

- Entry into a confined space in support of this project is forbidden. However, it is not anticipated that confined space entry will be required during the completion of the field activities.

- Biological Hazards—Potential hazards may be present at the site due to bites from stray domestic and wild animals (to include rodents), spiders, bees, and other venomous anthropods. Potential hazards may also be present at the site in the form of poisonous plant life, which can result in skin rashes or abrasions. In the case of an animal or insect bite that can be serious or fatal, workers must seek immediate medical attention and report the

incident to the SHSO/Field Team Leader prior to leaving the site. An employee known to be allergic or sensitive to poisonous insects should alert the Site Manager and SHSO/Field Team Leader.

- SDS for chemicals that may be used on-site are provided in **Appendix B**.

The potential chemicals of concern that may be present at the site include, but are not limited to, VOCs including TCE, PCE, 1,2-DCE, VC, PFAS, and 1,4-dioxane. SDSs for these chemicals are provided in **Attachment B**.

3.2 HAZARD COMMUNICATION

A written OSHA Hazard Communication Program for Construction (required by 29 CFR 1910.1200/1926.59) will be maintained on-site during field activities. Employees will be informed of the Hazard Communication Program's existence, contents, and location. This Program will be kept with the SDSs and contain a list of site-specific chemicals present. The list will be cross-referenced with the applicable SDS for ease in SDS accessibility.

An SDS for each chemical brought on-site during field activities will be maintained on-site by the SHSO/Field Team Leader. Site workers and visitors will be informed of the Hazard Communication Program, their legal rights under the Program, the location of the chemical inventory, and the location of the SDS.

Employee awareness of chemical identities, health and physical hazards, and characteristics is essential to safely handle chemicals and minimize potential hazards. The Hazard Communication Program must follow the OSHA requirements listed in 29 CFR 1910.1200/1926.59.

3.2.1 Hazard Communication Labeling

In-house containers will be properly labeled so that workers understand the contents of containers. Container labels will contain at least information on the name of the product or container, chemical(s) in the product, manufacturer's name and address, protective equipment required for the safe handling of the product, and first aid procedures in case of overexposure to product contents.

3.2.2 Hazard Communication Training

Site employees and visitors must be informed of the Hazard Communication Program, their legal rights under the program, and location of chemical inventory and SDS files. The employee's supervisor must describe hazardous substances used and provide information concerning:

- Nature of potential hazards
- Appropriate work practices
- Appropriate control programs
- Appropriate protective measures
- Methods to detect presence or release of hazardous substances

- Emergency procedures

3.3 CHEMICAL HAZARDS

Field operation precautions and preventive measures for site management activities are described in the following paragraphs:

- ***Groundwater Sampling***—VOCs including TCE, PCE, VC, 1,2-DCE, and potentially PFAS and 1,4-dioxane may be encountered. Potential routes of worker exposure are through dermal contact and ingestion; wear PPE when in contact with groundwater (Section 5 for specific PPE).

  — Maximum groundwater concentrations of contaminants of concern detected from previous sampling events are as follows: TCE (17,000 parts per billion [ppb]), PCE (140,000 ppb), 1,2-DCE (50,000 ppb), and VC (2,500 ppb).

- ***Annual Site Inspections***—No contact with site contaminants are anticipated when performing annual site inspections. However, inspections should be performed in Level D PPE at a minimum (Section 5 for specific PPE).

- ***NYSDEC Representation Oversight of Site Construction Activities***—No contact with site contaminants are anticipated when performing oversight activities. However, inspections should be performed in Level D PPE at a minimum (Section 5 for specific PPE).

Dermal contact is a potential concern during the above tasks due to the possible presence of skin irritants such as VOCs, tetrachloroethylene, 1,1,1-tricholoroethane, PFAS, and 1,4-dioxane that may be absorbed through the skin. This information is based upon a worst-case scenario. Dermal protection listed in Section 5 must be worn during field activities involving contact with soil and groundwater.

A description of the requirements for the different levels of PPE, as well as upgrade/downgrade requirements, is provided in Section 5. Although ingestion of contaminants is also a primary source of exposure, vigilance by site health and safety personnel will ensure proper use of PPE and personal hygiene to practically eliminate this route of exposure.

3.3.1 Direct-Reading Instrumentation

A photoionization detector (PID), such as a MiniRAE 3000 or MultiRAE, equipped with a 11.7 electron volt lamp, will be used to screen the breathing zone of employees during groundwater sampling tasks.

All PID sampling will be conducted by SHSO/Field Team Leader or designee of the SHSO/Field Team Leader. Readings will be taken at regular intervals (i.e., at least once daily) from the breathing zone of employees during groundwater sampling activities, or more frequently when noticeable odors are present. Readings (and corrective action(s) if necessary) will be recorded on the groundwater sampling log form.

Out of all the contaminants of concern, VC had a correction factor of 0.6 and is the lowest PID measurement at exceedance; therefore, vinyl chloride shall be used as the limiting contaminant of concern and action limit for air monitoring. The action limit on the PID will therefore be 1.67 parts per million above background, with background determined by upwind perimeter PID reading(s).

If the action level is reached, then personnel shall step away from the source of the vapors until the site ambient conditions return to baseline. If the action limit will not abate within 30 seconds a total of five consecutive times, then site workers shall add engineering controls (work cross-gradient from source, add fans). If fans cannot abate the ambient vapors below action limits, then work will stop, and the SHSO/Field Team Leader shall contact the Safety and Health Manager. If a resolution cannot be reached, then work shall cease, and the path forward shall be revised.

3.3.2 Chemicals for Equipment Calibrations and Operations

In addition to the potential compounds detected at a site, the following chemicals are typically used during investigative field activities:

- Isopropyl alcohol
- Hydrochloric Acid
- Alconox
- Nitric acid.

These chemicals will be used for decontamination of equipment and used as preservative for groundwater samples. The anticipated occupational exposures from these operations are considered negligible.

3.4 PHYSICAL HAZARDS

Physical hazards can potentially be present during field activities. These physical hazards may include, but not be limited to:

- Fire/explosion hazards
- Heat stress
- Equipment hazards
- Vehicle and pedestrian hazards
- Noise hazards
- Electrical hazards
- Utilities
- Weather hazards.

Physical hazards are listed below for each field activity that is scheduled to take place at the site:

- ***Groundwater Sampling***—General physical hazards, cold/heat stress, and noise hazards.

- ***Annual Inspection Activities***—General safety hazards, noise hazards, cold/heat stress, and biological hazards.

- ***NYSDEC Representation Oversight of Site Construction Activities***—General safety hazards, heavy equipment hazards, electrical hazards, underground utilities, fire/explosion, noise hazards, cold/heat stress, and biological hazards

The site will be visually inspected for the presence of general safety hazards (e.g., trip/slip hazards, unstable surfaces or steep grades, sharp objects) prior to beginning work. If hazards are present, these hazards will be recorded, and precautionary measures taken to prevent injury.

3.4.1 Fire/Explosion Hazards

The potential for fire and/or explosion emergencies is always present on a site. Substances capable of creating fire and explosion at a site include methane gas, petroleum-contaminated soil, and other flammable vapors. Workers must continuously monitor the work area for combustible or explosive gases when operations have the potential to generate sparks. Employees should always be alert for unexpected events, such as ignition of chemicals or sudden release of materials under pressure and be prepared to act in these emergencies.

Field vehicles will be equipped with a fire extinguisher. Employees must be trained in the proper use of fire suppression equipment. However, large fires that cannot be controlled with a fire extinguisher should be handled by professionals. The proper authorities should be notified in these instances.

3.4.2 Heat Stress and Heat-Related Illness

The use of protective equipment, if required, may create heat stress. Monitoring of personnel wearing impermeable personal protective clothing should commence when the ambient temperature is 70 degrees Fahrenheit (°F) or above. Monitoring frequency should increase as ambient temperature increases, or as slow recovery rates are observed. Heat stress monitoring will be performed by a person with a current first-aid certification who is trained to recognize heat stress symptoms. For monitoring the body's recuperative abilities to excess heat, one or more of the following techniques will be used. Other methods for determining heat stress monitoring, such as the wet bulb globe temperature index from the American Conference of Governmental Industrial Hygienist Threshold Limit Value Booklet (2011), can be used.

To monitor the worker:

- Measure heart rate by counting the radial pulse during a 30-second period as early as possible in the rest period.

- If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.

- If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third.

- Measure oral temperature using a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).

- If oral temperature exceeds 99.6°F (37.6 Degrees Celsius [°C]), shorten the next work cycle by one-third without changing the rest period.

- If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following work cycle by one-third.

- Do not permit a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

3.4.2.1 Prevention of Heat Stress

Proper training and preventive measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat-related illness.

To avoid heat stress, the following steps should be taken:

- Adjust work schedules

- Modify work/rest schedules according to monitoring requirements

- Mandate work slow-downs, as needed

- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided

- Provide shelter (air conditioned, if possible) or shaded areas to protect personnel during rest periods

- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, i.e., 8 fluid ounces (oz) (0.23 liter [L]) of water must be ingested for approximately every 8 oz (0.23 kilogram) of weight loss. The normal thirst mechanism is not sensitive enough to ensure that enough water will be consumed to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:

  — Maintain water temperature 50 to 60°F

— Provide small disposable cups that hold about 4 oz (0.1 L)

— Have workers drink 16 oz (0.5 L) of fluid (preferably water or dilute drinks) before beginning work

— Urge workers to drink a cup or two every 15 to 20 minutes, or at least every monitoring break. A total of 1 to 1.6 gallons (4 to 6 L) of fluid per day are recommended, but more may be necessary to maintain body weight

— Train workers to recognize the symptoms of heat-related illness.

3.4.3 Cold-Related Illness

If work takes place in the winter months, effects of cold exposure are possible during the performance of field activities. Injury from cold exposure may occur in persons working outdoors during a period when temperatures average below freezing. The extremities, such as fingers, toes, and ears, are the most susceptible to frostbite.

3.4.3.1 Prevention of Cold-Related Illness

To avoid cold-related illness, the following steps should be taken:

- Educate workers to recognize the symptoms of frostbite and hypothermia
- Identify and limit known risk factors
- Assure the availability of an enclosed, heated environment on or adjacent to the site
- Assure the availability of dry changes of clothing
- Develop the capability for temperature recording at the site
- Assure the availability of warm drinks.

3.4.4 Heavy Equipment Hazards

No work activities involving heavy equipment are anticipated at the site.

3.4.5 Vehicle and Pedestrian Hazards

Vehicle traffic or pedestrians, particularly in busy areas, may be susceptible to site hazards or may present a hazard to site workers. Equipment must be located in an area that does not present a hazard to bystanders. Barriers must be used to separate the work areas from both vehicular and pedestrian traffic areas and to prevent inadvertent entry into the work area. When possible, work in high traffic areas will be performed when traffic is minimal. Safety cones (with a minimum height of 28 inches) will be placed around the work area to create a buffer zone. Workers should wear safety vests or reflective material to enhance visibility in these areas. The buffer zone will be maintained even when work is not being performed in the area to prevent unauthorized access and to make the work site visible.

3.4.6 Noise Hazards

Work around certain equipment often creates excessive noise. Noise can cause workers to be startled, annoyed, or distracted; can cause physical damage to the ear, pain, and temporary and/or permanent hearing loss; and can interfere with communication. If workers are subjected to noise exceeding an 8-hour time-weighted average sound level of 85 dBA, hearing protection will be selected with an appropriate noise reduction rating to comply with 29 CFR 1910.95 and to reduce noise levels below levels of concern.

3.4.7 Electrical Hazards

Overhead power lines, electrical wiring, electrical equipment, and buried cables pose risks to workers of electric shock, burns, heart fibrillation, and other physical injuries, as well as fire and explosion hazards. Workers will take appropriate protective measures when working near live electrical parts, including inspection of work areas to identify potential spark/ignition sources, maintenance of a safe distance, proper illumination of work areas, provision of barriers to prevent inadvertent contact, and use of non-conductive equipment. If wiring or other electrical work is needed, it must be performed by a qualified electrician.

General electrical safety requirements include:

- Electrical wiring and equipment must be a type listed by UL, Factory Mutual Engineering Corporation, or other recognized testing or listing agency.

- Installations must comply with the National Electrical Safety Code or the National Electrical Code regulations.

- Portable and semi-portable tools and equipment must be grounded by a multi-conductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle.

- Tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double insulated tools must be distinctly marked and listed by UL or FM.

- Live parts or wiring or equipment must be guarded to prevent persons or objects from touching them.

- Electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.

- Circuits must be protected from overload.

- Temporary power lines, switch boxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.

- Plugs and receptacles must be kept out of water unless equipped with approved submersible construction.

- Extension outlets must be equipped with ground fault circuit interrupters.

- Attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment.

- Extension cords or cables must be inspected prior to each use and replaced if worn or damaged. Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire.

- Flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician.

3.4.7.1 High Voltage Hazards

Employees may be required to work around sources of high voltage at the site. Caution should be exercised to minimize contact with high voltage equipment, including contact between sampling equipment and potentially charged items. The minimum working distances from power transmission and distribution lines and equipment that will be allowed at the site are presented in the following table.

High Voltage Clearances

Nominal System Voltage	Minimum Required Clearance
0-50 kV	10 ft
51-100 kV	12 ft
101-200 kV	15 ft
201-300 kV	20 ft
301-500 kV	25 ft
501-750 kV	35 ft
751-1,000 kV	45 ft

Notes:
ft =Foot (feet)
kV = Kilovolt(s)

3.4.8 Utilities

No invasive subsurface work activities are anticipated at the site, therefore; the involvement of utilities is not anticipated.

3.4.9 Weather Hazards

Weather conditions should always be taken into consideration. Heavy rains, electrical storms, high winds, and extreme temperatures, for example, may create extremely dangerous situations for employees. Equipment performance may also be impaired because of inclement weather. Whenever unfavorable conditions arise, the Site Manager and SHSO/Field Team Leader will evaluate both the safety hazards and ability of the employees to effectively perform given tasks under such conditions. Activities will be halted at their discretion.

Wind direction should be accounted for when positioning equipment at sampling locations. If exposure to organic vapors is anticipated, workers should locate upwind of the sampling point. Wind direction often changes abruptly and without warning, so personnel should always be prepared to reposition, if necessary.

3.5 BIOLOGICAL HAZARDS

Potential hazards may be present at the site due to bites from stray domestic and wild animals (to include rodents), spiders, bees, and other venomous arthropods, ticks may be encountered during field operations potentially resulting in Lyme disease, rabies, or punctures from sharp objects presenting a possible hazard from tetanus. In the case of an animal or insect bite that can be serious or fatal, workers must seek immediate medical attention and report the incident to the SHSO/Field Team Leader prior to leaving the site. An employee known to be allergic or sensitive to poisonous insects should alert the Site Manager and SHSO/Field Team Leader. Prompt medical attention procedures, as outlined in Section 8.2 of this HASP will be followed in the event of animal bites (since many animals carry rabies or other diseases/viruses).

3.5.1 Bloodborne Pathogens

During the conduct of site operations, field crew may be exposed to blood and body secretions in support of emergency response operations where site personnel have been injured and require first aid and/or cardiopulmonary resuscitation (CPR). Due to the potential that blood and body secretions may contain disease causing organisms such as Hepatitis B virus and Human Immunodeficiency virus, in an emergency response situation, employees electing to provide first aid and CPR support, until the arrival of a competent on-site medical responder, should take appropriate measures to reduce or eliminate their potential for contact and exposure. The concept of “Universal Precautions” will be followed, which refers to the practice of assuming a potential hazard is present in a patient’s bodily fluids. Employees providing first aid support should wear the appropriate PPE to prevent or reduce their potential for contact and exposure. This will typically be accomplished through the use of rubber gloves, splash-proof eye protection, and the use of mouth-to-mouth guards and proper cleanup (good sanitation and hygiene) following an incident. Hands and face should be thoroughly washed with water and an antiseptic soap or cleanser following an incident, or antiseptic containing disposable towelettes used in the absence of appropriate field washing facilities. The Program Health and Safety Officer should be notified of potential employee exposures to blood and body fluids while conducting work in support of this project.

3.5.2 West Nile Virus

West Nile virus is a member of the Japanese encephalitis complex of flaviviruses, transmissible by mosquitoes, and can cause febrile, sometimes fatal human illness. Until 1999, this virus had never been reported in the Western Hemisphere. Mosquitoes, primarily bird-feeding species, are the primary vectors of West Nile virus, although the virus has been isolated from other bird-feeding arthropods, including some tick species. The natural transmission cycle of the virus involves a bird-mosquito cycle but may include a tick-bird cycle where soft ticks (Argasidaes) or hard ticks (Ixodidaes) are found feeding on reservoir birds. The urban cycle of the disease requires species of mosquitoes that will feed on free-ranging or domestic birds and people. The unprecedented introduction of West Nile virus into the metropolitan area of New York City in the late-Summer of 1999 has resulted in a large-scale review of existing programs and required resources to address this threat. Representatives of several local health units and state and federal agencies met to address each of the significant surveillance and response issues associated with this mosquito-borne disease. As a result of these discussions and consultation with community groups, the New York State Department of Health has developed a set of complementary action plans to prevent a further episode of West Nile virus infections.

According to New York State Department of Health, outdoor workers should take the following precautions to minimize potential exposure to the West Nile virus from adult mosquito bites:

- It is not necessary to change standard work health and safety practices outdoors unless there is evidence of the mosquito-borne disease.

- If the West Nile virus is identified in an area, workers should be advised of the precautions that they may choose to take to try to reduce the risk of mosquito bites:

  — Wear shoes, socks, long pants, and a long-sleeved shirt when outdoors for long periods of time or when mosquitoes are most active (between dusk and dawn). Maintain body fluids to avoid heat stress.

  — Consider the use of mosquito repellent, according to directions, when it is necessary to be outdoors for long periods or at times when mosquitoes are most active.

3.5.3 Lyme Disease

Lyme disease commonly occurs in summer and is transmitted by the bite of infected ticks. “Hot spots” in the United States include New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin. Few cases have been identified in other states. Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull’s eye, which expands outward in a circular manner. The victim may have a headache, weakness, fever, a stiff neck, swilling and pain in the joints, and eventually, arthritis.

Tick repellant containing diethyltoluamide (DEET) or permethrin should be used when working in tick-infested areas, and pants legs should be tucked into boots. In addition, workers should search the entire body every 3 or 4 hours for attached ticks. Ticks should be removed promptly

and carefully without crushing, since crushing can squeeze the disease-causing organism into the skin. A gentle and steady pulling action should be used to avoid leaving the head or mouth parts in the skin. Hands should be protected with surgical gloves when removing ticks.

3.5.4 Pandemic Response

During a pandemic, field crew must take precautionary steps to avoid the spread of communicable diseases. Some precautionary steps in each project task listed below may include the following:

- No carpooling where possible to maintain social distancing and reduce transmission between coworkers.
- Minimize employees in small spaces to avoid crowding and maintain 6 ft between workers.
- When a 6-ft distance cannot be maintained between field crew, face coverings will be worn (e.g., a scarf, bandana, or face mask).
- Maintain diligent use of PPE including nitrile gloves and safety glasses to limit contact with eyes.
- Field crew shall frequently clean hands with soap and water for at least 20 seconds especially if in a public place, or after blowing nose, coughing, or sneezing.
    - If soap and water are not readily available, field crew shall use a hand sanitizer that contains at least 60 percent alcohol.
    - Field crew shall avoid touching eyes, nose, and mouth with unwashed hands or with gloved hands.
- Field crew should discuss work roles prior to the start of work to reduce passing tools, logbooks, iPads, and other equipment between individuals.
- Any field crew or potential site visitors should be excused from jobsite if the following pertains to them:
    - Currently experiencing fever, chills, a cough, sore throat, or shortness of breath.
    - Has been in contact with someone who has been medically diagnosed with Coronavirus Disease 2019 (COVID-19).
    - Has traveled to a country that has a high level of COVID cases within the last 14 days.
    - Has been in contact with anyone, including family members, who have traveled to a country that has a high level of COVID cases within the last 14 days.

4. GENERAL SAFETY PRACTICES

4.1 SAFETY PROCEDURES

Safe work practices that will be followed by site workers include, but are not limited to, the following rules:

- At least one copy of this HASP must be at the project site, in a location readily available to personnel, and reviewed by project personnel prior to starting work.
- Site personnel must use the buddy system.
- Potentially contaminated PPE must not be removed from the work area before being cleaned or properly packaged and labeled.
- Potentially contaminated waste, debris, and clothing must be properly contained, and legible and understandable precautionary labels affixed to each container to define its content.
- Removing potentially contaminated soil or debris from protective clothing or equipment with compressed air, shaking, or any other means that may re-suspend contaminants into the air is prohibited.
- Eat, drink, and smoke only in those areas designated by the Site Manager/SHSO/Field Team Leader. These activities will not take place within any work zone.
- Large bulk containers, such as 55-gallon drums, must only be moved with the proper equipment, and must be secured to prevent dropping or loss of control during transport.
- Emergency equipment such as eyewash, fire extinguishers, etc. must be staged in readily accessible locations.
- An EZ, CRZ, and CSZ must be set up at the well location being sampled.
    - The EZ will be a minimum of 5 ft from the well head.
- Employees must be aware, and inform their partners or fellow team members, of the potential non-visible effects of exposure to toxic materials. The symptoms of such exposures may include:
    - Headaches
    - Dizziness
    - Nausea
    - Blurred vision

- Cramps
- Irritation of eyes, skin, or respiratory tract.

- Visitors to the Site must adhere to the following:

  - Visitors must report to the Site Manager or SHSO/Field Team Leader upon arrival to get site orientation.

  - Visitors must be accompanied by Site Manager and/or SHSO/Field Team Leader at all times when on-site.

  - Visitors will not be allowed in area of work activities (i.e. – groundwater sampling).

Each employee required to take prescription drugs will notify the SHSO/Field Team Leader prior to the start of work, and upon approval, may take prescription drugs away from the area of work activities only. Controlled or unauthorized drugs will **not** be permitted on-site at any time.

4.2 BUDDY SYSTEM

On-site personnel must use the buddy system. Visual contact must be maintained between crew members, and crew members must observe each other for signs of chemical exposure, and heat or cold stress. Indications of adverse effects include, but are not limited to:

- Changes in complexion and skin coloration
- Changes in coordination
- Changes in demeanor
- Excessive salivation and pupillary response
- Changes in speech pattern.

Team members must also be aware of potential exposure to possible safety hazards, unsafe acts, or non-compliance with safety procedures.

If protective equipment or noise levels impair communications, pre-arranged hand signals must be used for communication. Personnel must stay within line of sight of another team member.

4.3 EMERGENCY EQUIPMENT

Adequate emergency equipment for the activities conducted on-site and as required by applicable sections of 29 CFR 1910 and 29 CFR 1926 must be maintained on-site. Personnel will be provided with access to emergency equipment including, but not limited to, the following:

- Emergency eyewash unit(s) (portable) meeting American Nation Standards Institute Z358.1-1990

- Fire extinguishers of adequate size, class, number, and location (one in each EA vehicle) as required by applicable sections of 29 CFR 1910 and 29 CFR 1926.

- First aid kit of adequate size for the number of personnel on-site.

4.4 PERSONAL HYGIENE AND SANITATION

4.4.1 Break Area

Breaks will be taken away from the active work area after site personnel complete any required decontamination procedures. There will be no smoking, eating, drinking, or chewing gum or tobacco in the area of work activities.

4.4.2 Potable Water

The following rules apply for project field operations:

- An adequate supply of potable water will be provided at the work site. Potable water must be kept away from hazardous materials, contaminated clothing, and contaminated equipment.

- Portable containers used to dispense drinking water must be capable of being tightly closed and must be equipped with a tap dispenser. Water must not be consumed directly from the container, nor dipped from the container.

- Containers used for drinking water must be clearly marked and not used for any other purpose.

- Disposable cups will be supplied; both a sanitary container for unused cups and a receptacle for disposing of used cups must be provided.

4.4.3 Sanitary Facilities

No access to facilities for washing before eating, drinking, or smoking will be provided directly on-site. However, local businesses located adjacent to the site can be used for sanitary purposes. Personnel are required to wash off exposed skin surfaces prior to eating, smoking, or drinking following site operations and work activities.

4.4.4 Lavatory

No toilet facilities will be provided directly on-site. However, local businesses located adjacent to the site can be used for lavatory purposes.

4.4.5 Trash Collection

Trash from work activities will be bagged in trash bags and disposed of as miscellaneous trash.

4.5 SPILL CONTROL PLAN

Personnel must take every necessary precaution to minimize the potential for spills during site operations. On-site personnel are obligated to report immediately any discharge, no matter how small, to the Project Manager. In the event of a significant spill, containment, control, and cleanup procedures will adhere to NYSDEC Technical Procedural Guidance document for personnel health and safety protection.

Spill equipment (i.e., absorbent towels) will be kept in EA site vehicles to clean up minor spills[1]. Any spill that is not considered a minor spill will be addressed by safety and emergency professionals. Sorbent materials used for the cleanup will be containerized and labeled separately from other wastes. In the event of a spill, the Project Manager will follow the provisions outlined in the NYSDEC Spill Guidance Manual to contain and control released materials and to prevent the spread to off-site areas.

1 A minor chemical spill is one that staff are capable of handling safely without the assistance of safety and emergency personnel.

5. PERSONAL PROTECTIVE EQUIPMENT

5.1 LEVELS OF PROTECTION

Based upon currently available information, the site is considered non-hazardous and will require Level D protection for currently anticipated conditions and activities. Site monitoring does not include intrusive activities, so unknown chemical hazards will not be encountered. Level D protection is sufficient for the monitoring activities covered by this HASP. The PPE Activity Record form is provided in **Attachment C**.

5.1.1 Level D Personal Protective Equipment

Level D will be worn for initial entry on-site and initially for all activities and will consist of the following:

- Coveralls or appropriate work clothing
- Steel-toe, steel-shank safety boots/shoes
- Hard hats (when overhead hazards are present or as required by the SHSO/Field Team Leader)
- Chemical resistant gloves (nitrile/neoprene) when contact with potentially contaminated soil or water is expected
- Safety glasses with side shields
- Hearing protectors (during drilling or other operations producing excessive noise)
- Boot covers (optional unless in contact with potentially contaminated soil or water)
- Poly coated coveralls (when contact with contaminated soil and water is anticipated, e.g., when surging/pumping wells and pressure-washing equipment).

Insulated clothing, hats, etc. must be worn when temperatures or wind chill fall below 40°F.

5.2 HEARING PROTECTION

Hearing protection must be available and properly worn whenever noise levels exceed 85 dBA (noise level at which a normal conversation cannot be carried on at a 3-ft distance). When the SHSO/Field Team Leader determines that a potential excessive noise exposure exists, a sound level meter will be used for measurements. Two types of hearing protection will be available on-site: foam earplugs and earmuffs. The hearing protectors will have a Noise Reduction Rating sufficient to reduce the sound level to below 85 dBA.

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6. EMPLOYEE TRAINING

6.1 SITE WORKERS

Personnel who will be performing non-hazardous on-site tasks are not required to have been trained according to United States Department of Labor OSHA Standard, 29 CFR 1910.120/29 CFR 1926.65 *Hazardous Waste Operations and Emergency Response.* These workers will have appropriate health and safety training based upon their specific job tasks and activities.

The Site Manager, SHSO/Field Team Leader, and personnel conducting the site monitoring activities (e.g., groundwater monitoring) will be trained as required to meet the United States Department of Labor OSHA Standard, 29 CFR 1910.120/29 CFR 1926.65, *Hazardous Waste Operations and Emergency Response* to qualify as a hazardous waste site worker and supervisor. Training will include:

- A minimum of 40 hours of initial off-site instruction
- A minimum of 3 days of actual field experience under the direct supervision of a trained, experienced supervisor
- An 8-hour refresher training period annually
- Additional training that addresses unique or special hazards/operational requirements
- First aid and CPR.

On-site management and supervisors who are directly responsible for or who supervise employees will receive at least 8 additional hours of specialized management training. Copies of training certificates and dates of attendance will be available through the SHSO/Field Team Leader upon request.

6.2 SITE-SPECIFIC TRAINING

The SHSO/Field Team Leader will be responsible for developing a site-specific occupational hazard training program and providing training to personnel who are to work at the site. At a minimum, this training will consist of the following topics:

- Names of personnel responsible for site health and safety
- Safety, health, and other hazards at the site
- Proper use of PPE
- Work practices by which the employee can minimize risk from hazards
- Safe use of engineering controls and equipment on the site
- Acute effects of compounds at the site
- Decontamination procedures.

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7. MEDICAL SURVEILLANCE

7.1 MEDICAL EXAMINATIONS

Site workers potentially involved with the field sampling operations must have satisfactorily completed a comprehensive medical examination by a licensed occupational physician within 12 months (or 24 months with the approval of the consulting physician) prior to the start of site operations. The date of medical examination of each qualified person will be maintained on-site with the project field team. Medical surveillance protocols must comply with 29 CFR 1910.120/29 CFR 1926.65.

Medical examinations and consultations must be provided for employees covered by this program on the following schedule:

- Prior to assignment
- At least annually for employees covered by the program
- At termination of employment or reassignment to an area where the employee would not be covered if the employee has not been examined within the past 6 months
- As soon as possible upon the development of signs or symptoms that may indicate an overexposure to hazardous substances or health hazards
- More frequently if the physician deems such examination necessary to maintain employee health.

7.2 RECORDS

An accurate record of the medical surveillance and exposure will be maintained for each employee for a period of no less than 30 years after the termination of employment, as per 29 CFR 1910.1020. Records must include at least the following information about the employee:

- Name and social security number
- Physician’s written opinions, recommendations, limitations, and test results
- Employee medical complaints related to hazardous waste operations
- Information provided to the physician by the employee concerning possible exposures, accidents, etc.

7.3 FIRST AID AND MEDICAL TREATMENT

Persons on-site must report a near-miss incident, accident, injury, or illness to their immediate supervisor or the Site Manager. First aid will be provided by the designated site first aider. Injuries

and illnesses requiring medical treatment must be documented. The Site Manager must conduct an accident investigation as soon as emergency conditions no longer exist, and first aid and/or medical treatment has been ensured. The accident/incident report must be completed and submitted to the Corporate Health and Safety Officer within 24 hours after the incident.

If first aid treatment is required, first aid kits are kept in EA field vehicles. If treatment beyond first aid is required, the injured individual(s) should be transported to the medical facility. If the injured is not ambulatory or shows signs of not being in a comfortable or stable condition for transport, then an ambulance/paramedics should be summoned. If there is a doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

8. ACCIDENT PREVENTION AND CONTINGENCY PLAN

8.1 ACCIDENT PREVENTION

Field personnel will receive health and safety training prior to the initiation of site activities. On a day-to-day basis, individual personnel should be constantly alert for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. Rapid recognition of dangerous situations can avert an emergency. Before daily work assignments, regular meetings should be held.

Discussion should include:

- Tasks to be performed
- Time constraints (e.g., rest periods, cartridge changes)
- Hazards that may be encountered, including their effects, how to recognize symptoms and monitor them, concentration limits, or other danger signals
- Emergency procedures.

8.2 CONTINGENCY PLAN

8.2.1 Emergency Recognition

Prior to work startup, personnel must be familiar with emergency condition identification, notification, and response procedures. **The emergency telephone numbers for local emergency response and reporting organizations and directions and map to the nearest hospital are included in Attachment E. NOTE: The HASP will be left open to the emergency contacts page at all times during site activities.** The Site Manager and SHSO/Field Team Leader will rehearse/review emergency procedures and/or applicable site contingencies initially during site orientation and as part of the ongoing site safety program. On-site emergencies will ultimately be handled by off-site emergency personnel. Initial response and first-aid treatment, however, will be provided on-site.

Person(s) identifying an accident, injury, emergency condition, or a scenario requiring implementation of a response in support of this Plan will immediately take actions to report the situation to the Site Manager. Notification may take place by runner, hand-held radio, or telephone. The Site Manager/SHSO/Field Team Leader will initiate the required response based upon the type of incident, following the procedures contained in this HASP. A chain-of-command and sign-in sheets for personnel on the site will be established at the beginning of each workday to ensure personnel are accounted for and who will take control should the Site Manager or SHSO/Field Team Leader become injured. The following items constitute those site conditions requiring an emergency response or contingency action in accordance with this HASP:

- Fire/Explosion:

- The potential for human injury exists
- Toxic fumes or vapors are released
- The fire could spread on-site or off-site, and possibly ignite other flammable materials or cause heat-induced explosions
- The use of water and/or chemical fire suppressants could result in contaminated runoff
- An imminent danger of explosion exists.

- Natural Disaster:
  - A rainstorm exceeds the flash flood level
  - The facility is in a projected tornado/hurricane path, or a tornado/hurricane has damaged facility property
  - Severe wind gusts are forecasted or have occurred and have caused damage to the facility.

- Medical Emergency:
  - Overexposure to hazardous materials
  - Trauma injuries (broken bones, severe lacerations/bleeding, burns, animal bites)
  - Eye or significant skin contact with hazardous materials
  - Loss of consciousness
  - Heat stress (heat stroke)
  - Heart attack
  - Respiratory failure
  - Allergic reaction.

- Discovery of Unanticipated Hazards (e.g., unmarked utility lines, heavily contaminated material).

Follow-up operations to evaluate and control the source of fire, explosions, and hazardous materials incidents will occur only after discussion with the Project Manager and Site Manager. The Site Manager will act as the Emergency Coordinator at the site to coordinate on-site activities and contingencies until the arrival of outside response organizations. If the Site Manager is unable to act as the Emergency Coordinator, then the authority to take action will be transferred to the SHSO/Field Team Leader, or other designee, as indicated in the daily updated chain-of-command.

8.2.2 Emergency Procedures

In the event of an emergency, the information available at that time must be properly evaluated and the appropriate steps taken to implement the Emergency Response Plan. The Site Manager (or SHSO/Field Team Leader if the Site Manager is part of the emergency) will assume command of the situation. He/she will alert the emergency management system and evacuate personnel to the pre-designated evacuation location. In a site emergency, the Site Manager (or the SHSO/Field Team Leader if the Site Manager is not available) must sound an emergency alarm (designated as an air horn or car horn) repeatedly several times, upon hearing work must stop, and personnel must move to the pre-designated evacuation location. If the emergency situation cannot be conveyed by word of mouth, a whistle or other horn will be sounded. Three short blasts, separated by a 2-second silence, will be used as the emergency signal. First aid will be administered only to limit further injury and stabilize the victim. The local Emergency Medical Services must be notified immediately, if needed. The routes to the nearest hospital are shown in **Attachment E**. The Site Manager/SHSO/Field Team Leader will make required notifications to include, but not be limited to, the NYSDEC representative and Project Manager, as defined in Section 2 and the appropriate federal and state agencies.

Site personnel will have the capability of notifying emergency responders directly from the site using the phone in the company vehicle or in the site support office. In the event of an accident/incident, the Project Manager should be immediately notified of a reportable accident/incident or contingency.

The following information will be provided when reporting an emergency:

1. Name and location of person reporting
2. Location of accident/incident
3. Name and affiliation of injured party
4. Description of injuries, fire, spill, or explosion
5. Status of medical aid and/or other emergency control efforts
6. Details of chemicals involved
7. Summary of accident, including suspected cause and time it occurred
8. Temporary control measures taken to minimize further risk.

This information is not to be released to parties other than those listed in this section and Emergency Response Team members. Once emergency response agencies have been notified, the Project Manager will be notified immediately.

8.2.3 Chemical Exposure

If a member of the field crew demonstrates symptoms of chemical exposure, the procedures outlined below should be followed:

- Another team member (buddy) should remove the individual from the immediate area of contamination. The buddy should communicate to the Site Manager (via voice and hand

signals) of the chemical exposure. The Site Manager should contact the appropriate emergency response agency.

- Precautions should be taken to avoid exposure of other individuals to the chemical.
- If the chemical is on the individual's clothing, the chemical should be neutralized or removed if it is safe to do so, or the clothing should be removed and bagged.
- If the chemical has contacted the skin, the skin should be washed with copious amounts of water.
- In case of eye contact, an emergency eye wash should be used. Eyes should be washed for at least 15 minutes.

Chemical exposure incidents must be reported in writing to the Program Health and Safety Officer. The SHSO/Field Team Leader or Site Manager is responsible for completing the accident report.

8.2.4 Personal Injury

Personnel should always be alert for signs and symptoms of illnesses related to chemical, physical, and on-site health hazards. Severe injuries resulting from accidents must be recognized as emergencies and treated as such. If feasible, in the field, at least two people currently trained in first aid/CPR must be present on-site. This will normally be the Field Manager and SHSO/Field Team Leader.

In a medical emergency, the Site Manager (or the SHSO/Field Team Leader if the Field Manager is not available) must sound the emergency air horn or car horn several times, upon which work must stop and personnel must move to the pre-designated evacuation location. If the emergency situation cannot be conveyed by word of mouth, a whistle or other horn will be sounded. Three short blasts, separated by a 2-second silence, will be used as the emergency signal. Personnel currently trained in first aid will evaluate the nature of the injury, decontaminate the victim (if necessary), and initiate first aid assistance immediately and transport if appropriate. First aid will be administered only to limit further injury and stabilize the victim. The local Emergency Medical Services must be notified immediately, if needed. The routes to the nearest hospital are shown in **Attachment E**. Although not anticipated, victims who are heavily contaminated with toxic or dangerous materials must be decontaminated before being transported from the site. Decontamination will consist of removal of contaminated coveralls/clothing and wrapping the victim in a sheet or other cloth like material. No persons will re-enter the site of injury/illness until the cause of the injury or symptoms has been determined and controlled. At no time will personnel transport victims to emergency medical facilities unless the injury does not pose an immediate threat to life and transport to the emergency medical facility can be accomplished without the risk of further injury. Emergency Medical Services will be used to transport serious injuries off-site unless deemed otherwise by the Site Manager/SHSO/Field Team Leader.

The Site Manager must complete an Accident/Loss and Incident Report and submit it to the Project Manager within 24 hours of the following types of incidents:

- Job-related injuries and illnesses
- Accidents resulting in loss or damage to property
- Accidents involving vehicles and/or vessels, whether or not they result in damage to property or personnel
- Accidents in which there may have been no injury or property damage, but which have a high probability of recurring with at least a moderate risk to personnel or property
- Near-miss incidents, which could have resulted in any of the conditions defined above.

An accident that results in a fatality or the hospitalization of three or more employees must be reported within 8 hours to the U.S. Department of Labor through the Project Manager.

In order to support on-site medical emergencies, first aid/emergency medical equipment will be available at the following locations:

- First-aid kit; work vehicle
- Eye wash; work vehicle
- Emergency alarm; horn on the work vehicle
- Copy of the HASP, work vehicle
- Telephone; work vehicle.

The eye wash kit must be portable and capable of supplying at least a 15-minute supply of potable water to the eyes.

8.2.5 Operations Shutdown

The Site Manager, SHSO/Field Team Leader, or the Project Manager may mandate operations shutdown. Conditions warranting work stoppage will include (but are not limited to):

- Uncontrolled fire
- Explosion
- Uncovering potentially dangerous buried hazardous materials
- Condition immediately dangerous to life and health or the environment
- Potential for electrical storms
- Treacherous weather-related conditions
- Limited visibility.

8.2.6 Evacuation Procedures

In the event the site must be evacuated, the following procedures should be followed:

- The Site Manager will initiate evacuation procedures by signaling to leave the site.
- Personnel in the work area should evacuate the area and meet in the common designated area.
- Personnel suspected to be in or near the work area should be accounted for and the whereabouts of missing persons determined immediately.

Further instruction will then be given by the Site Manager.

8.2.7 Procedures Implemented in the Event of a Major Fire, Explosion, or On-site Health Emergency Crisis

Fire and explosion must be immediately recognized as an emergency. The SHSO/Field Team Leader (or Site Manager if SHSO/Field Team Leader is not available) must sound an emergency signal, and personnel must be decontaminated (if necessary) and evacuated to the pre-designated evacuation location.

Only persons properly trained in fire suppression and other emergency response procedures will support control activities. Control activities will consist of the use of on-site portable fire extinguishers for limited fire suppression and employee evacuation. Upon sounding the emergency alarm, personnel will evacuate the hazard location and assemble at the designated site meeting area.

Only those site personnel trained in the use of portable fire extinguisher use will attempt to suppress a site fire. Small multipurpose dry chemical extinguishers will be maintained in each vehicle on-site. Fires not able to be extinguished using on-site extinguishers will require the support of the local fire department.

The Site Manager should take measures to reduce injury and illness by evacuating personnel from the hazard location as quickly as possible. The Site Manager must then notify the local fire department. The Site Manager will determine proper follow-up actions. Site personnel will not resume work during or after a fire/explosion incident until the emergency coordinator has directed that the incident is over, and work may resume. During the incident, site personnel will remain outside the incident area and obey the instructions of the Emergency Coordinator.

8.2.8 Emergency Telephone Numbers

Attachment E provides a listing of emergency telephone numbers.

8.3 SPILL CONTAINMENT PROCEDURES

Small incidental spills, (i.e., those which cause no injury to personnel or the public), may be cleaned up quickly and easily. For large spills, (i.e., those that contaminate personnel or the environment), attend to first aid measures first, stop the source of the spill if possible, and then notify appropriate emergency response services. Safety of workers will be managed by adhering to policies and procedures outlined in the NYSDEC Technical Procedural Manual for Personal Health and Safety Protection.

Spills of hazardous materials or wastes which are listed by EPA as having a reportable quantity value must be reported to appropriate federal, state, and local agencies if a reportable quantity or greater is released. The Site Manager is responsible for determining the appropriate agencies prior to work startup.

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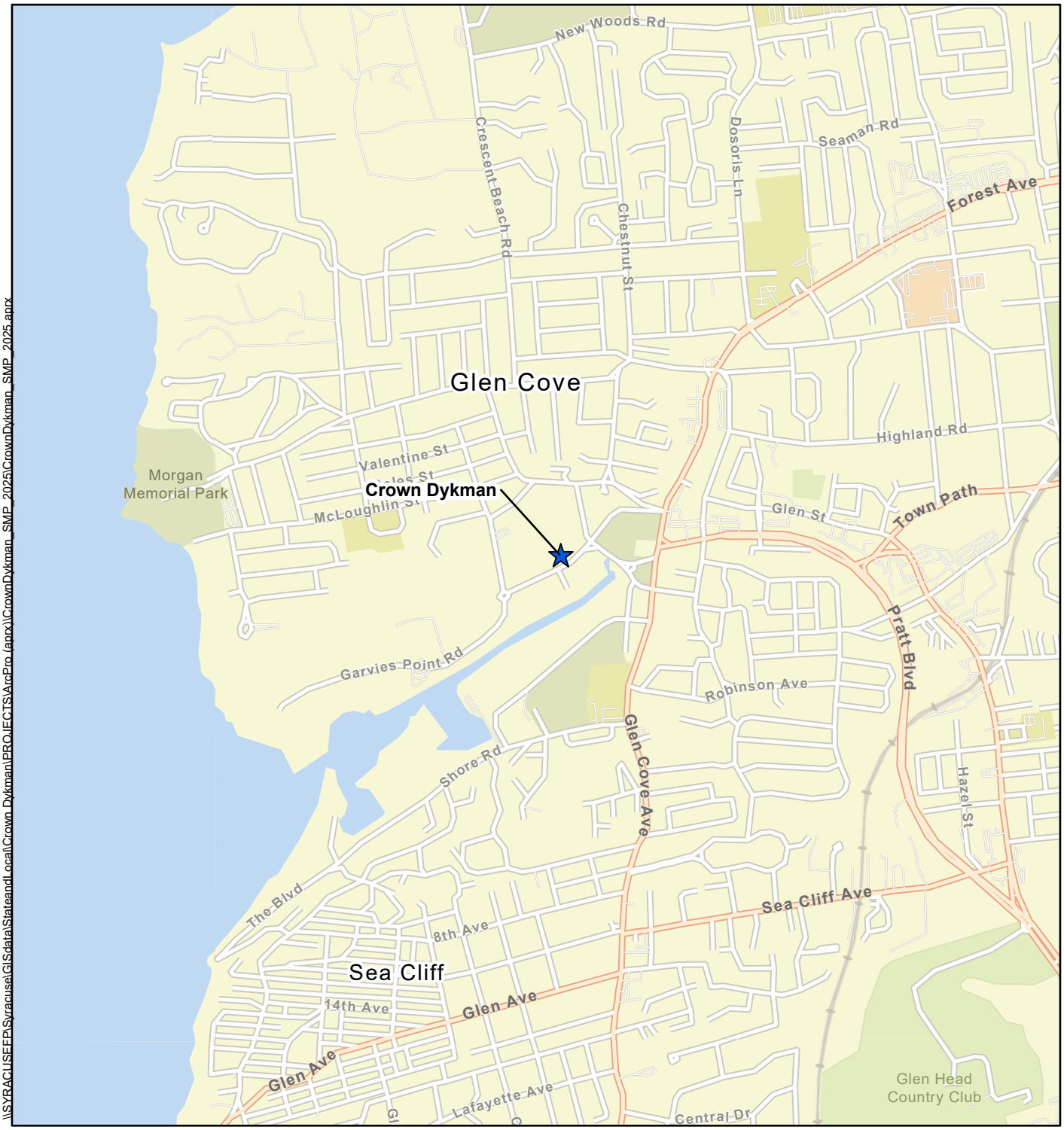
Figures



\\SYRACUSEFP\Syracuse\GISdata\StateandLocal\Crown Dykman\PROJECTS\ArcPro (aprx)\CrownDykman_SMP_2025\CrownDykman_SMP_2025.aprx

0 1,000 2,000
Feet

N

Legend

★ Site Location

Figure 1-1
SITE LOCATION
Crown Dykman (130054)
Glen Cove, NY

Map Date: 1/30/2025
Projection: NAD 1983 (2011) State Plane
New York Long Island (Feet)

NEW YORK STATE | Department of Environmental Conservation

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Attachment A

Health and Safety Plan Review Record

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Health and Safety Plan Review Record

I have read the Health and Safety Plan for this site and have been briefed on the nature, level, and degree of exposure likely as a result of participation in this project. I agree to conform to all the requirements of this Plan.

Site: Crown Dykman, 66 Herb Hill Road, Glen Cove, New York			
Name	**Signature**	**Affiliation**	**Date**

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Attachment B

Safety Data Sheets

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Attachment C

Personal Protective Equipment Activity Record

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Personal Protective Equipment Activity Record

Site: Crown Dykman, 66 Herb Hill Road, Glen Cove , New York		
Weather Condition:		**On-site Hours: From**
		To
Changes in Personal Protective Equipment Levels[(a)]	**Work Operations**	**Reasons for Change**
Site Health and Safety Plan Violations	**Corrective Action Specified**	**Corrective Action Taken (yes/no)**
Observations and Comments:		
Completed by: _____ **Site Health and Safety Officer** **Date**		
(a) Only the Site Health and Safety Officer may change personal protective equipment levels, using only criteria specified in the Health and Safety Plan.		

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Attachment D

Site Entry and Exit Log

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Site Entry and Exit Log

Site: Crown Dykman, 66 Herb Hill Road, Glen Cove , New York				
Name	**Date**	**Time of Entry**	**Time of Exit**	**Initials**

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Attachment E

Emergency Telephone Number and Hospital Directions

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Emergency Telephone Numbers and Hospital Directions

Site: Crown Dykman, 66 Herb Hill Road, Glen Cove, New York	
Police: City of Glen Cove Police Department –	9-1-1
Fire: City of Glen Cove Fire Department	9-1-1
Ambulance: Glen Cove Ambulance Services	9-1-1 or 516.676.2311
Hospital: Glen Cove Hospital	516.674.7300
New York Regional Poison Control Center: 259 1st Street, Mineola, New York	(516) 542-2323 800-222-1222 (emergency)

Directions to Glen Cove Hospital, 101 St. Andrews Lane, Glen Cove, , New York 11542

Head northeast on Herb Hill Road (0.3 miles), turn left onto Brewster Street (0.3 miles), continue onto School Street (0.1 miles), continue onto Forest Avenue (0.2 miles), turn right onto Elliot Place (364 feet), turn left onto St. Andrews Lane (0.3 miles), and turn right (151 feet) and hospital at 101 St. Andrews Lane. Trip is 1.3 miles. Travel time is approximately 6 minutes.

Map to Hospital

Directions to Glen Cove Hospital:
Head northeast on Herb Hill Road (0.3 miles), turn left onto Brewster Street (0.3 miles), continue onto School Street (0.1 miles), continue onto Forest Avenue (0.2 miles), turn right onto Elliot Place (364 feet), turn left onto St. Andrews Lane (0.3 miles), and turn right (151 feet) and hospital at 101 St. Andrews Lane. Trip is 1.3 miles. Travel time is approximately 6 minutes.

Attachment F

Activity Hazard Analysis

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Appendix K.
Site Management Forms

Summary of Green Remediation Metrics for Site Management

Site Name: _____ Site Code: _____
Address: _____ City: _____
State: _____ Zip Code: _____ County: _____

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date: _____

Current Reporting Period
Reporting Period From: _____ To: _____

Contact Information
Preparer's Name: _____ Phone No.: _____
Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

CERTIFICATION BY CONTRACTOR

I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application.

_____

Date **Contractor**

FIELD CALIBRATION FORM
Horiba U-52
pH, CONDUCTIVITY, AND TURBIDITY

CALIBRATION
DATE:
TIME:
METER ID:

pH CALIBRATION

pH STANDARD	INITIAL READING	FINAL READING
4.0		

CONDUCTIVITY CALIBARATION

CONDUCTIVITY STANDARD	STANDARD READING	FINAL READING
4.49		

TURBIDITY CALIBRATION

STANDARD	INITIAL READING	FINAL READING
0 NTU		

COMMENTS

SIGNATURE

FIELD CALIBRATION FORM

Site Name:

INSTRUMENT:	INSTRUMENT ID No:
OPERATOR:	WEATHER:
SPAN GAS TYPE:	DATE:
CALIBRATION NOTES:	
COMMENTS:	
SIGNATURE:	DATE:

WELL PURGING AND SAMPLING RECORD

Site Name/Location	Project No:	Page of
Well ID	Date	Time
Well Site Description		
Weather/Temp		
Field Technician		

WELL CONSTRUCTION DATA

TOC Elevation (ft amsl)	Screened Interval (ft bgs)
Well Diameter (in.)	Nominal Borehole Diameter (in.)

FIELD MEASUREMENTS

Well Depth (gauge after sampling) (ft)	Gallons per foot of depth
Depth to product (ft)	Static water level (ft)
Product column height (ft)	Water column height (ft)
Product volume (Gallons)	Water volume (Gallons)

PURGE INFORMATION

Pump Type / ID		Water Quality Meter Type / ID
Pump Intake Depth (ft)		Flow-Thru Cell Volume (L)
Purge Start Time		Appearance/Odor (Start)
Purge End Time		Appearance/Odor (End)
Average Purge Rate (mL/min)		Total Drawdown (ft)
Well Went Dry (Y/N)	Stop Time	Volume removed (L)
Recovery Time	Recovery Rate (mL/min)	Restart Purge Time
Total Volume Removed (L)		Total Pump Time (min)

Date	Time	Purge Rate (mL/min)	Volume Removed (LPM)	pH (+/-0.1)	Cond. (µS/cm) (+- 3%)	Temp. (°C) (+- 3%)	ORP (mV) (+/- 10)	Turbidity (NTU) +/-10% or <5 NTU	DO (mg/L) +/-10% or <0.5 mg/L	Depth to Water (ft below TOC)

COMMENTS _____

SAMPLE COLLECTION

Sample Date	Sample Time
Sample ID	
QA/QC Collected / ID	Sample Appearance/Odor
Analyses	
Sampler	Signature

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e) and 6NYCRR Part 360.13. Use of this form is not a substitute for reading the applicable regulations and Technical Guidance document.

SECTION 1 – SITE BACKGROUND

The allowable site use is: Choose an item

Have Ecological Resources been identified? Choose an item

Is this soil originating from the site? Choose an item

How many cubic yards of soil will be imported/reused? Choose an item

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone? Choose an item

Does it contain less than 10%, by weight, material that passes a size 100 sieve? Choose an item

Is this virgin material from a permitted mine or quarry? Choose an item

Is this material recycled concrete or brick from a DEC registered processing facility? Choose an item

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.4(e)5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

_____ _____

Signature Date

_____

Print Name

_____

Firm

Revised April 2023

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Appendix L.
Field Activities Plan

Generic Field Activities Plan for Work Assignments

NYSDEC Standby Contract No. D009806

Prepared for

New York State Department of Environmental Conservation
Division of Environmental Remediation

Prepared by

EA Engineering, P.C. and Its Affiliate
EA Science and Technology
269 W. Jefferson Street
Syracuse, New York 13202

March 2023

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Generic Field Activities Plan for Work Assignments

NYSDEC Standby Contract No. D009806

Prepared for

New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233

Prepared by

EA Engineering, P.C. and Its Affiliate
EA Science and Technology
269 West Jefferson Street
Syracuse, New York 13202

Revision No.	Description of changes	Date Revisions Completed	Author(s)
00	Original submittal	Not applicable	AE
01	Added reference to NYSDEC guidance on PFAS analysis and sampling	4/3/2020	AE
02	Added/updated new/revised EA SOPs.	3/3/2023	MEM

March 2023
Version: Revision 02

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Generic Field Activities Plan for Work Assignments

NYSDEC Standby Contract No. D009806

Prepared for

New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233

Prepared by

EA Engineering, P.C. and Its Affiliate
EA Science and Technology
269 West Jefferson Street
Syracuse, New York 13202

3 March 2023

Donald Conan, P.E., P.G., Program Manager
EA Engineering, P.C.

Date

3 March 2023

Frank DeSantis Jr., Deputy Program Manager
EA Science and Technology

Date

March 2023
Version: Revision 02

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Figure 1. Typical Monitoring Well Construction Diagram

Figure 2. Typical Temporary Soil Vapor Point Construction Diagram

Figure 3. Typical Sub-Slab Vapor Sample Point Construction Diagram

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Appendix A. EA Standard Operating Procedures

Appendix B. Field Forms

LIST OF ACRONYMS AND ABBREVIATIONS

µg/m^3	Microgram(s) per cubic meter
CAMP	Community Air Monitoring Plan
COC	Contaminants of concern
DER	Division of Environmental Regulation
EA	EA Engineering, P.C. and its affiliate EA Science and Technology
ELAP	Environmental Laboratory Approval Program
EPA	U.S. Environmental Protection Agency
FAP	Field Activities Plan
ft	Foot (feet)
NAD 83	North American Datum of 1983
NAVD 88	North American Vertical Datum of 1988
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
P.E.	Professional Engineer
P.G.	Professional Geologist
PID	Photoionization detector
ppm	Part(s) per million
QAPP	Quality Assurance Project Plan
SOP	Standard Operating Procedure
SVI	Soil vapor intrusion
VI	Vapor intrusion
VOC	Volatile organic compound

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1. PURPOSE AND OBJECTIVES

1.1 PURPOSE

This Generic Field Activities Plan (FAP) has been prepared as a generic document of potential field activities that EA Engineering, P.C. and its affiliate EA Science and Technology (EA) may perform or oversee work assignments issued by the New York State Department of Environmental Conservation (NYSDEC) under Division of Environmental Remediation (DER) Standby Engineering Services Contract No. D009806. The principal purpose of this document is to define, detail, and provide rationale for potential field activities that may be performed with each work assignment.

1.2 FIELD ACTIVITY PLAN OBJECTIVES

The elements of this Generic FAP have been prepared in accordance with the current version and applicable guidelines and requirements of the NYSDEC and the New York State Department of Health (NYSDOH), including *DER-10 Technical Guidance for Site Investigation and Remediation* (NYSDEC). In addition, technical guidance from the U.S. Environmental Protection Agency (EPA) has been incorporated into the planning for potential field activities.

Working with standardized approaches to field activities assures all participants (field personnel, clients, and other stakeholders) that effective, consistent processes are followed, and quality is maintained for the project. EA has developed Environmental Standard Operating Procedures (SOPs) to represent EA standards for work performance. These SOPs represent an important part of EA's overall Quality Program and are regularly reviewed and updated, as necessary.

An initial step in every work assignment is the development of a site-specific Work Plan, which will describe the specific work activities to be performed. Site-specific work plans will include this FAP, will be developed separately under each individual work assignment, or as requested by the NYSDEC.

Where applicable, and to promote consistency across the program, EA's SOPs have been referenced in the following sections of this FAP, and referenced SOPs are included in **Appendix A**. If site-specific conditions or requests from NYSDEC result in a change to a standardized approach in the SOPs, changes will be made in consultation with NYSDEC and EA's technical staff, and those changes will be documented in the site-specific Work Plan. Current versions of SOPs will be used during development of Site-Specific Work Plans, and the best available information will be incorporated. EA SOPs may not have been developed for all proposed work. In those cases, details of the proposed work will be described in Site-Specific Work Plans.

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2. BRIEF DESCRIPTION AND RATIONALE OF FIELD ACTIVITIES

The primary focus of a work assignment is to evaluate existing onsite conditions, groundwater flow direction, the nature and extent of potential contamination, and possible human exposure to contaminants through a systematic site investigation/characterization or a full-scale remedial investigation.

The following tasks are anticipated to be completed by EA under Standby Contract No. D009806 as part of a site investigation/characterization and/or remedial investigation:

- ***Section 3 Direct-Push/Macro-Core® Drilling and Sampling*—**Identify possible source areas, characterize the overall volume and distribution of contaminants in an area of concern and delineate the limit and extent of contaminants of concern (COCs).

- ***Section 4 Monitoring Well Installation, Construction, and Decommissioning*—**Identify hydrogeologic characteristics, groundwater constituents, contaminant plume transport, and the hydraulic relationship between the site and localized groundwater flow.

- ***Section 5 Monitoring Well Development*—**Develop new or existing wells using surging and/or pumping techniques. Monitor temperature, conductivity, pH, and turbidity for stabilization and appropriate values.

- ***Section 6 Groundwater Monitoring and Sampling*—**Conduct periodic monitoring and/or sampling events to delineate the extent of COCs within a groundwater monitoring well network. Monitor groundwater elevations to determine the local groundwater flow gradient and direction.

- ***Section 7 Exploratory Test Pits/Trenches*—**Provide field identification and verification of potential contaminant source areas, subsurface impact areas, and visual classification of geology.

- ***Section 8 Surface Water Sampling*—**Collect water samples from surface water bodies (i.e., storm sewers, ditches, streams, etc.) on or adjacent to the site that may receive or convey site COCs.

- ***Section 9 Sediment Sampling*—**Collect sediment samples on or adjacent to the site, typically completed in conjunction with surface water sampling.

- ***Section 10 Soil Vapor Point Installation and Sampling*—**Install soil vapor points using direct-push technologies for the purpose of collecting representative soil vapor samples for laboratory analysis, at relevant locations as determined by the NYSDEC and in consultation with the NYSDOH.

- ***Section 11 Vapor Intrusion Evaluation—***Evaluate the migration of vapors into onsite and offsite residential, commercial, and/or industrial structures through the collection of sub-slab vapor, indoor air, and outdoor ambient air samples.

- ***Section 12 Community Air Monitoring Plans—***Monitor volatile organic compounds (VOCs) and particulate levels at the perimeter of the work area in real-time. May consist of a combination of continuous and periodic monitoring, which will be contingent upon site-specific field and construction activities. Continuous monitoring is required for all ground intrusive activities. Periodic monitoring is required during non-intrusive activities

- ***Section 13 Storage and Disposal of Waste—***EA will provide proper storage, handling, and disposal of investigative-derived waste.

- ***Section 14 Site Survey and Base Map Preparation—***Involves the surveying of all investigation/characterization locations, performing a topographic survey, and preparation of a site base map by a licensed professional land surveyor. EA will locate all field sampling locations using a high-precision global positioning system unit as directed by the NYSDEC.

- ***Section 15 References.***

Details of each anticipated field activity are provided in the following sections.

3. DIRECT-PUSH/MACRO-CORE® DRILLING AND SAMPLING

The purpose of direct-push/Macro-Core® drilling and sampling is to evaluate the shallow overburden at a site and to assess the nature and extent of contamination. During a direct-push/Macro-Core® drilling program, subsurface soil samples are collected continuously from each soil boring until a target depth is reached, or boring refusal. Soil borings are commonly used to classify shallow overburden soils, collect soil samples, delineate the limits and extent of COCs, install temporary monitoring wells/piezometers, and install soil vapor points. Subsurface soil is extracted, screened, and classified to identify soil types, visualize potential contaminants, assess VOC vapors within the soil, and collect representative soil samples from selected depth intervals. Locations of proposed soil samples and rationale for selection for laboratory analysis will be made on a site-specific basis in consultation with NYSDEC. A Community Air Monitoring Plan (CAMP) that includes continuous monitoring is required during ground intrusive activities (Section 12).

An example soil boring log is provided in **Appendix B**. Some or all the following EA SOPs may apply to direct-push drilling and sampling activities:

- SOP-001: Labels
- SOP-002: Chain of Custody Forms
- SOP-003: Subsurface Utility Clearance
- SOP-004: Sample Packing and Shipping
- SOP-005: Field Decontamination
- SOP-011: Photoionization Detector
- SOP-016: Field Logbooks and Surface Water, Groundwater, and Soil-Sediment Field Checklists
- SOP-017: Ground Penetrating Radar Survey
- SOP-025: Soil Sampling
- SOP-028: Well and Boring Abandonment
- SOP-039: Sample Preservation and Container Requirements
- SOP-042: Disposal of Investigation-Derived Material
- SOP-047: Direct-Push Technology Sampling

- SOP-056: XRF Analysis of Soil
- SOP-073: Sampling Per- and Polyfluorinated Alkyl Substances

4. MONITORING WELL INSTALLATION, CONSTRUCTION, AND DECOMMISSIONING

Monitoring wells are installed and constructed to identify hydrogeologic characteristics, groundwater constituents, contaminant plume transport, and the hydraulic relationship between the site and localized groundwater flow direction. Monitoring wells may be installed in overburden or bedrock and within confined and/or unconfined aquifers in order to delineate the nature and extent of a contaminant plume on a horizontal and vertical basis. The exact locations of monitoring wells are based upon the information collected during the field investigation activities, knowledge of the existing distribution of contaminants, historical data and/or preliminary site assessment results. Monitoring well locations will be determined on a site-specific basis. The typical construction of a monitoring well is depicted on **Figure 1**. Monitoring well decommissioning will be conducted in a manner consistent with *CP-43: Groundwater Monitoring Well Decommissioning* Policy (NYSDEC). A Community Air Monitoring Plan (CAMP) that includes continuous monitoring is required during ground intrusive activities (Section 12).

Some or all the following EA SOPs apply to monitoring well installation, construction, and decommissioning activities:

- SOP-003: Subsurface Utility Clearance
- SOP-011: Photoionization Detector
- SOP-016: Field Logbooks and Surface Water, Groundwater, and Soil/Sediment Field Checklists
- SOP-017: Ground Penetrating Radar Survey
- SOP-019: Monitoring Well Installation
- SOP-028: Well and Boring Abandonment
- SOP-032: Piezometer Installation

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5. MONITORING WELL DEVELOPMENT

Groundwater monitoring wells installed at a site will be developed prior to sampling, in order to purge any drilling fluids or sediment that may have entered the well through the filter pack and well screen during installation. In some cases, existing monitoring wells may also require development. Well development helps to establish good hydraulic connection between the well and the surrounding formation and to remove fine-grained material that may have infiltrated the sand pack and/or well during installation. Well development procedures are described in EA SOP-019, Monitoring Well Installation. An example monitoring well development log is provided in **Appendix B**.

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6. GROUNDWATER MONITORING AND SAMPLING

Groundwater samples may be collected from temporary and permanent monitoring wells. A monitoring well sampling log is provided in **Appendix B**. Some or all the following EA SOPs apply to groundwater monitoring and sampling activities. If sampling activities include analysis for per- and polyfluorinated substances (PFAS), refer to EA SOP-073, and *Guidelines for Sampling and Analysis of PFAS* (NYSDEC 2020).

- SOP-001: Labels
- SOP-002: Chain-of-Custody Form
- SOP-003: Subsurface Utility Clearance
- SOP-004: Sample Packing and Shipping
- SOP-005: Field Decontamination
- SOP-010: Water Level and Well Depth Measurement
- SOP-011: Photoionization Detector
- SOP-013: Collection of Monitoring Well Samples
- SOP-016: Field Logbooks and Surface Water, Groundwater, and Soil/Sediment Field Checklists
- SOP-033: Aquifer Hydraulic Testing
- SOP-039: Sample Preservation and Container Requirements
- SOP-043: Multi-probe Water Quality Monitoring Instruments
- SOP-044: Assessment of Existing Wells Using Downhole Geophysics
- SOP-046: Aqueous Diffusion Samplers
- SOP-048: Low-flow Sampling
- SOP-051: Low-flow Purge and Sampling with Dedicated Pumps
- SOP-055: Continuous Multi-Channel Tubing Groundwater Sample Collection
- SOP-056: XRF Analysis of Soil

- SOP-073: Sampling for Per- and Polyfluorinated Alkyl Substances

7. EXPLORATORY TEST PITS/TRENCHS

When detailed observation of subsurface soil and/or fill material is necessary, exploratory test pits/trenches can be utilized for visual inspection and collection of subsurface soil samples. Test pits/trenches will utilize either a backhoe, an excavator, or similar equipment, to remove significant amounts of subsurface soil/fill material for visual inspection and soil classification. Procedures for test pit and trench sampling are described below. A Community Air Monitoring Plan (CAMP) that includes continuous monitoring is required during ground intrusive activities (**Section 12**). Some or all the following EA SOPs may apply to test pit and trenching activities:

- SOP-001: Labels
- SOP-002: Chain-of-Custody Form
- SOP-003: Subsurface Utility Clearance
- SOP-004: Sample Packing and Shipping
- SOP-005: Field Decontamination
- SOP-011: Photoionization Detector
- SOP-016: Field Logbooks and Surface Water, Groundwater, and Soil-Sediment Field Checklists
- SOP-017: Ground Penetrating Radar Surveys
- SOP-025: Soil Sampling
- SOP-039: Sample Preservation and Container Requirements
- SOP-040: Confined Space Entry
- SOP-073: Sampling for Per- and Polyfluorinated Alkyl Substances

7.1 PROCEDURES FOR TEST PIT/TRENCHING SAMPLING

The appropriate equipment will be chosen based on site-specific conditions and the goals of the sampling program. The following procedures will be utilized during test pit/trench installation and sampling.

- Remove a 3 feet (ft) wide section of soil to a depth of approximately 1 ft below ground surface. Place excavated soils on plastic sheeting or per the requirements of the site-specific work plan.

- Screen and classify the excavated material to identify soil types, perform visual inspection for signs of contamination, and collect representative soil samples from selected depth intervals. Assess VOC vapors within the soil using photoionization detectors (PID), flame ionization detectors, and/or visual and olfactory observations.

- Continue excavation by removing shallow layers of soil for classification until the desired depth of the test pit/trench is reached.

- The selection of subsurface soils for laboratory analysis will be made in consultation with NYSDEC based the following parameters:

  — Subsurface soil materials that exhibit visual or olfactory signs of contamination

  — Subsurface soil materials that cause a sustained response above the measured background response on a calibrated PID or flame ionization detectors flame ionization detectors screening instrument.

- Following sample collection, backfill the excavation with the excavated soil/fill material and flag the corners of the test pit for future surveying.

Soil samples will be collected from the most contaminated interval at each test pit location utilizing visual observations and measurements from instruments such as a PID or FID to determine which samples will be sent for laboratory analysis. If no contamination is detected or observed, a subsurface soil sample is collected from the base of the test pit/trench.

Test pits/trenches will be classified and logged according to EA SOP-016. A field record of each pit or trench classification, sampling interval, PID reading, and other field observations will be recorded on a test pit/trench log form (**Appendix B)**.

Soil samples collected will be labeled, handled, and packaged following the procedures described EA SOP-025, the Generic Quality Assurance Project Plan (QAPP), and site-specific QAPP Addendum. If sampling activities include analysis for PFAS, refer to EA SOP-073, and *Guidelines for Sampling and Analysis of PFAS* (NYSDEC 2020). Quality assurance/quality control samples will be collected at the frequency detailed in the Generic QAPP, and site-specific QAPP Addendum.

8. SURFACE WATER SAMPLING

Surface water sampling may be required in marine and estuarine systems, streams, river, ditches, lakes, ponds, and lagoons. A surface water sampling log is provided in **Appendix B**. If sampling activities include analysis for PFAS, refer to EA SOP-073, and *Guidelines for Sampling and Analysis of PFAS* (NYSDEC 2020). Some or all the following EA SOPs may apply to surface water sampling activities:

- SOP-001: Labels
- SOP-002: Chain-of-Custody Forms
- SOP-003: Subsurface Utility Clearance
- SOP-004: Sample Packing and Shipping
- SOP-005: Field Decontamination
- SOP-007: Surface Water Sampling
- SOP-016: Field Logbooks and Surface Water, Groundwater and Soil-Sediment Field Checklists
- SOP-035: Small Boat Operations
- SOP-039: Sample Preservation and Container Requirements
- SOP-043: Multiprobe Water Quality Monitoring Instruments
- SOP-073: Sampling for Per- and Polyfluorinated Alkyl Substances

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9. SEDIMENT SAMPLING

Sediment sampling may be required to characterize contamination from sediment in streams, rivers, ditches, lakes, ponds, lagoons, and marine and estuarine systems. The collection of benthic organisms and fish is often conducted in conjunction with sediment sampling. Example sampling logs for sediment and fish are provided in **Appendix B**. If sampling activities include analysis for PFAS, refer to EA SOP-073, and *Guidelines for Sampling and Analysis of PFAS* (NYSDEC 2020). Some or all the following EA SOPs may apply to sediment sampling activities:

- SOP-001: Labels
- SOP-002: Chain-of-Custody Forms
- SOP-003: Subsurface Utility Clearance
- SOP-004: Sample Packing and Shipping
- SOP-005: Field Decontamination
- SOP-016: Field Logbooks and Surface Water, Groundwater and Soil-Sediment Field Checklists
- SOP-021: Sediment Sampling
- SOP-022: Sediment and Benthic Macroinvertebrate Sampling with Eckman Grab
- SOP-035: Small Boat Operations
- SOP-038: Redox Potential Measurements
- SOP-039: Sample Preservation and Container Requirements
- SOP-041: Sludge-Lagoon Sampling
- SOP-042: Disposal of Investigation-Derived Material
- SOP-054: Collection of Fish Tissue for Chemical Analysis
- SOP-064: Sediment Boring Logs
- SOP-073: Sampling for Per- and Polyfluorinated Alkyl Substances

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10. SOIL VAPOR POINT INSTALLATION AND SAMPLING

The primary purpose of a soil vapor investigation is to characterize and quantify the lateral and longitudinal extents of soil vapor contamination within the vadose zone. The soil vapor data may be used to evaluate the potential for vapor intrusion (VI) in structures located onsite, downgradient of the site, or adjacent to the sampling locations.

Vadose zone monitoring can be used to develop subsequent site characterization activities such as installation of groundwater monitoring points. The vadose zone monitoring will be completed using an acceptable soil gas methodology and will include the collection of quality assurance and quality control samples.

The typical construction of a soil vapor point is depicted on **Figure 2**, and **Figure 3** shows the typical construction of a sub-slab soil vapor point. The following EA SOPs apply to soil vapor point installation and sampling activities:

- SOP-001: Labels
- SOP-002: Chain-of-Custody Forms
- SOP-003: Subsurface Utility Clearance
- SOP-004: Sample Packing and Shipping
- SOP-005: Field Decontamination
- SOP-006: Summa Canister Sampling
- SOP-011: Photoionization Detector
- SOP-016: Field Logbooks and Surface Water, Groundwater, and Soil/Sediment Field Checklists
- SOP-020: Active Soil Gas Sampling
- SOP-026: Active Soil Gas Analysis
- SOP-027: Passive Soil Gas Surveys
- SOP-047: Direct-Push Technology Sampling

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11. VAPOR INTRUSION EVALUATION

The planning and implementation of any VI evaluation will be completed in accordance with the current versions of *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH) and *DER-10 Technical Guidance for Site Investigation and Remediation* (NYSDEC).

Indoor air sampling and analysis is performed at structure locations identified by the NYSDEC and NYSDOH. The overall goal of a VI evaluation is to determine and evaluate the potential for VI into these structures.

Notices of solicitation to participate in the indoor air monitoring program should include an access agreement granting permission to perform the work. Negotiation of access agreements with affected property owners will be conducted by NYSDEC. If property owners refuse to provide access to the site, NYSDEC may seek access though Environmental Conservation Law (ECL) Article 27 § 1309, (3)-(4) and § 1313(3), which authorizes NYSDEC or its authorized agents to enter upon any site, areas near such site, or area on which it has reason to believe that contaminants were disposed or discharged for purposes of inspection, sampling and testing, implementing a remedial program, long-tern operation and maintenance, and temporary occupancy.

Prior to initiating the air sampling, property owners will be contacted by NYSDEC or NYSDOH to discuss the sampling program and schedule the sampling. The NYSDEC Project Manager will provide EA with a copy of the correspondence and indoor air sampling schedule.

Procedures for elements of a VI evaluation are described below. Soil vapor sampling logs are provided in **Appendix B**. Also, some or all the following EA SOPs may apply to VI evaluation activities:

- SOP-001: Labels
- SOP-002: Chain-of-Custody Forms
- SOP-003: Subsurface Utility Clearance
- SOP-004: Sample Packing and Shipping
- SOP-005: Field Decontamination
- SOP-006: Summa Canister Sampling
- SOP-011: Photoionization Detector
- SOP-016: Field Logbooks and Surface Water, Groundwater, and Soil/Sediment Field Checklists
- SOP-020: Active Soil Gas Sampling

- SOP-026: Active Soil Gas Analysis
- SOP-027: Passive Soil Gas Surveys
- SOP-047: Direct-Push Technology Sampling

11.1 INDOOR AIR SAMPLE COLLECTION

An inspection of general site conditions will be performed at each property location as part of the VI evaluation. Field activities should not be scheduled without the following:

- Either a voluntary access agreement or other authorization by NYSDEC to enter the property, and
- Verbal communication with property owner confirming the sampling activity schedule.

The inspection will include the following activities:

- Completion of the NYSDOH Indoor Air Quality Questionnaire and Building Inventory included in Indoor Air Sampling and Analysis Guidance. A sample of the questionnaire is included in **Appendix B**.
- Documentation of weather conditions outside and temperature inside.
- Ambient air (indoor and outdoor) screening using field equipment (i.e., parts per billion PID).
- Selection of air sampling locations.

Indoor air samples will be collected at structures during the soil vapor intrusion (SVI) evaluation in accordance with the NYSDOH SVI Guidance and applicable EA SOPs.

Prior to initiating the sampling, the serial number of the canisters and associated regulators will be recorded on the field sampling forms. Field sampling forms will include the collection of canister/regulator serial numbers, sample identifications, sample start date/times, vacuum gauge pressures, and required analysis. Indoor air sampling field forms are provided in **Appendix B**.

11.2 OUTDOOR AIR SAMPLE COLLECTION

Outdoor ambient air samples will be collected to determine outdoor air quality during the sampling event. Outdoor ambient air samples will be collected at the same time as any sub-slab vapor or indoor air sampling activities. Outdoor air samples will be collected in accordance with the NYSDOH SVI Guidance, and any applicable EA SOPs.

Prior to initiating the sampling, the serial number of the canisters and associated regulators will be recorded on the field sampling forms. Field sampling forms include the collection of canister/regulator serial numbers, sample identifications, sample start date/times, vacuum gauge pressures, and required analysis (EPA Method TO-15).

11.3 LABORATORY ANALYSIS OF AIR SAMPLES

Air samples will be analyzed by an ELAP-certified laboratory. Detection limits for the analyzed compound list will be defined by the NYSDEC and NYSDOH prior to sample submittal and outlined in the site-specific work plan. For specific parameters identified by NYSDOH where the selected parameters may have a higher detection limit (e.g., acetone), the higher detection limits will be designated by NYSDOH.

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12. COMMUNITY AIR MONITORING PLANS

In accordance with DER-10, A Community Air Monitoring Plan (CAMP) will be developed at sites in which the public using the site, surrounding community, or site workers may be exposed to contamination at the site. A site-specific CAMP will be prepared for sites in which intrusive activities at the site may impact site workers or the surrounding community. The following sections provide generic information regarding CAMPs, which may be implemented at a site, based upon the intrusive work completed at the site, and in accordance with the NYSDEC and NYSDOH. The NYSDOH Generic CAMP, provided in Appendix 1A of DER-10, shall be the basis for development of site-specific CAMPs for intrusive site work. Additional guidance for fugitive dust and particulate monitoring is provided in Appendix 1B of DER-10. EA SOP-011 (Photoionization Detector) applies to community air monitoring activities. Community air monitoring shall be based on contaminants of concern, proposed work activities, and site-specific features.

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13. STORAGE AND DISPOSAL OF WASTE

EA is responsible for the proper storage, handling, and disposal of investigative-derived waste (IDW); including personal protective equipment, solids and liquids generated during the well drilling, well development, and well sampling activities. Management of IDW will be conducted in accordance with *DER-10 Technical Guidance for Site Investigation and Remediation* (NYSDEC) and EA's SOP-042: Disposal of Investigation-Derived Material.

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14. SITE SURVEY AND BASE MAP PREPARATION

A site survey will involve the surveying of all soil boring locations, monitoring well locations, test pit locations, soil vapor point locations, and surface water/sediment sampling locations, performing a topographic survey, and preparation of a site map (typically based upon a previous base map or site control markers). To ensure the collection of consistent elevation data, each of the existing monitoring wells or other pertinent locations will be included in the site survey.

A detailed topographic base map of the site and immediate vicinity will be developed. All relevant features of the site and adjacent areas will be plotted. Elevations will be referenced to the North American Vertical Datum of 1988 (NAVD 88), and all horizontal locations will be referenced to the North American Datum of 1983 (NAD 83). The base map will be used to accurately plot all sampling locations including soil borings, monitoring wells, and all other sample/monitoring locations. Elevations of all monitoring well casings will be established to within 0.01 ft. A permanent reference point will be marked on the interior of all well casings to provide a point to collect future groundwater elevation measurements.

The site map will also include site-specific features associated with the characterization/ investigation (i.e., surface water drainage, above and underground storage tanks, buildings, drywells, cesspools). Additionally, engineering controls implemented or to be implemented at the site must be clearly labeled. Contours will be plotted at 1-ft intervals. The location and elevation of each survey point will be surveyed by a New York State licensed surveyor. The estimated survey area will include the entire site boundary. The site tax map number will also be identified. The tax maps will be reviewed, and the property lines of the parcels will be plotted on the base map.

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15. REFERENCES

EA Engineering, P.C. and Its Affiliate EA Science and Technology (EA). 2020. *Generic Quality Assurance Project Plan for Work Assignments.* March.

———. 2020. *Generic Health and Safety Plan for Work Assignments.* February.

New York State Department of Environmental Conservation (NYSDEC). *DER-10 Technical Guidance for Site Investigation and Remediation.* May.

———. 2009. *CP-43: Groundwater Monitoring Well Decommissioning* Policy. November.

———. 2020. *Guidelines for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Remedial Programs*. January.

New York State Department of Health (NYSDOH). *Guidance for Evaluating Soil Vapor Intrusion in the State of New York. New York State Department of Health, Division of Environmental Health Assessment, Center for Environmental Health.* October.

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Figures

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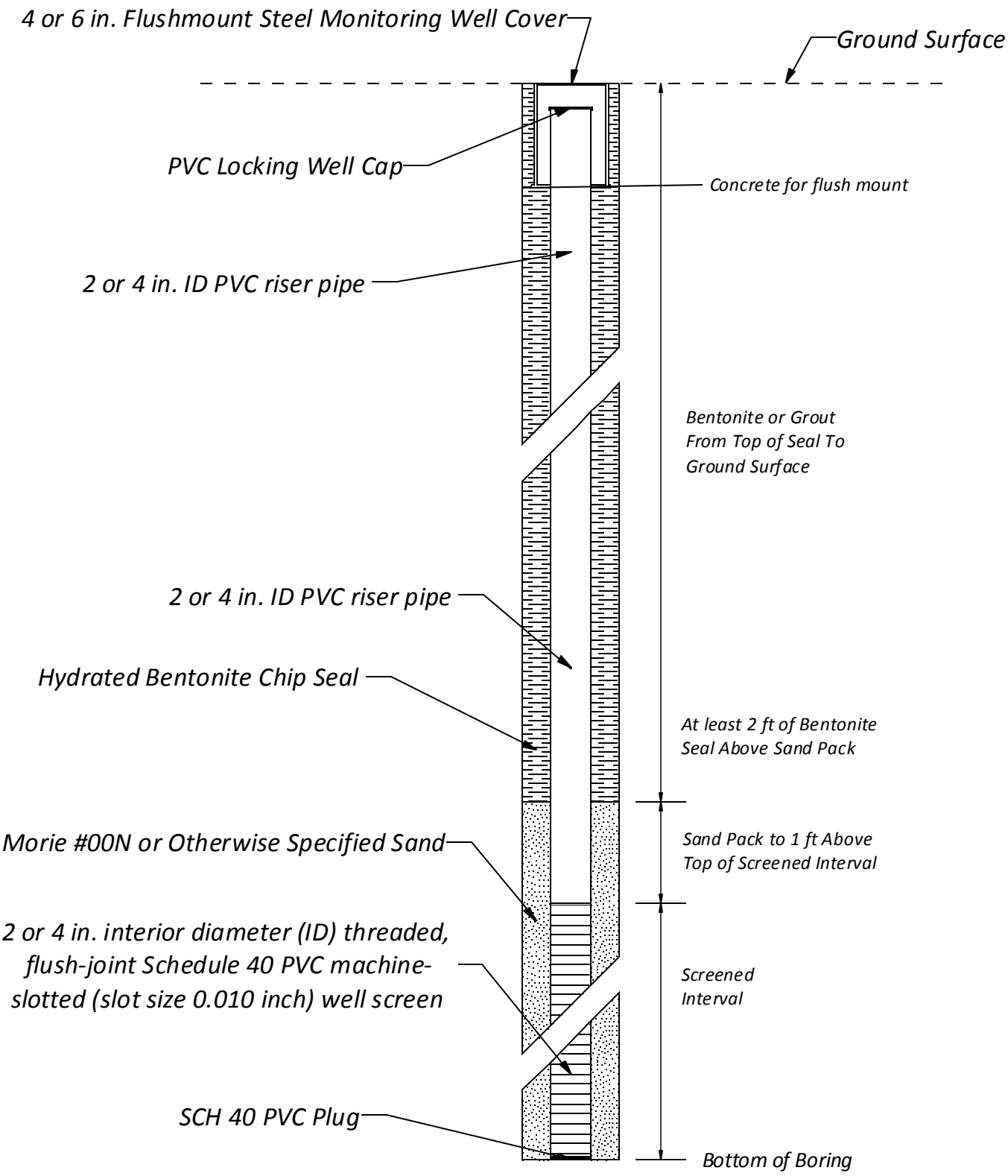
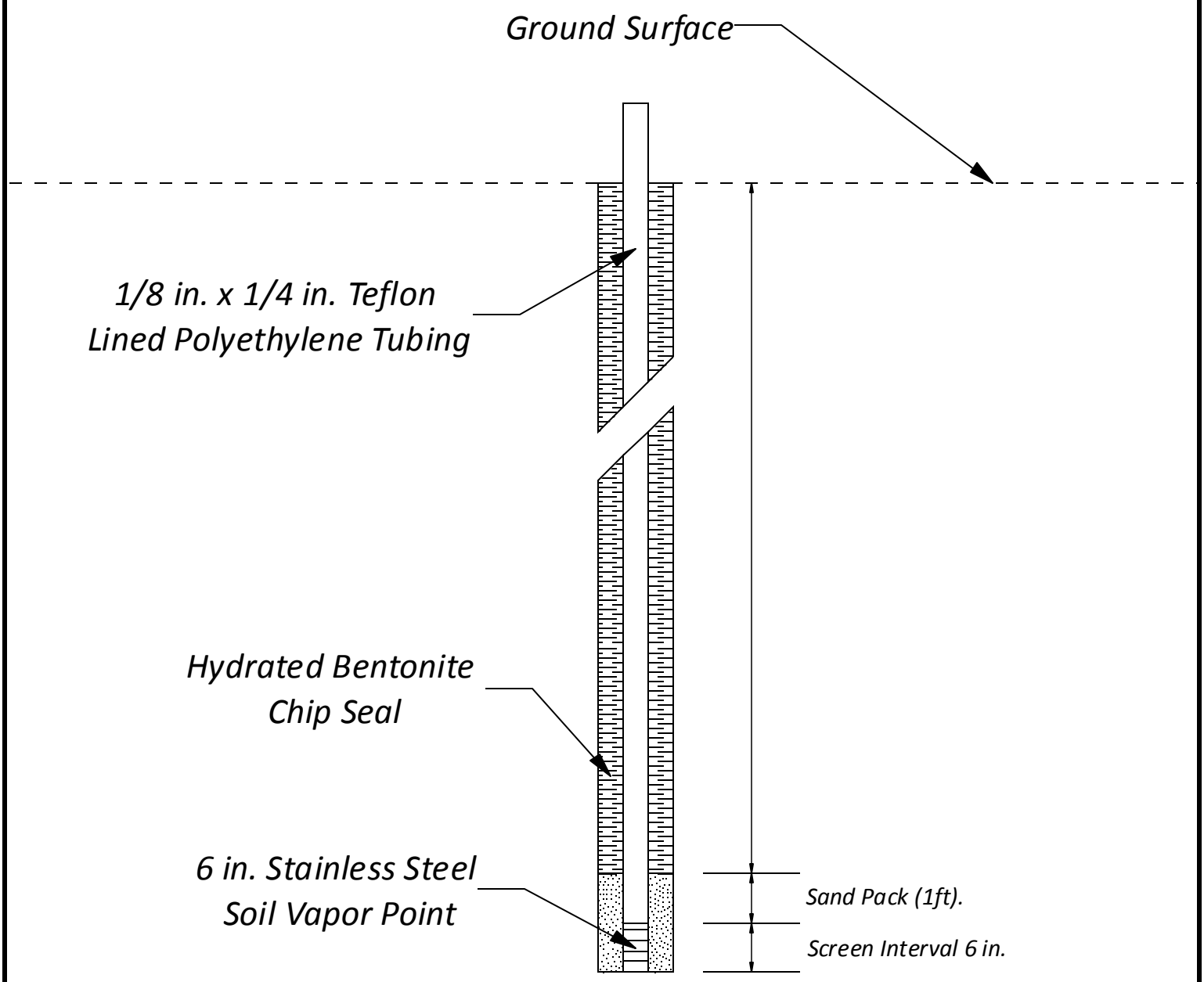


NYSDEC
CONTRACT NO. D009806
GENERIC FIELD ACTIVITIES PLAN

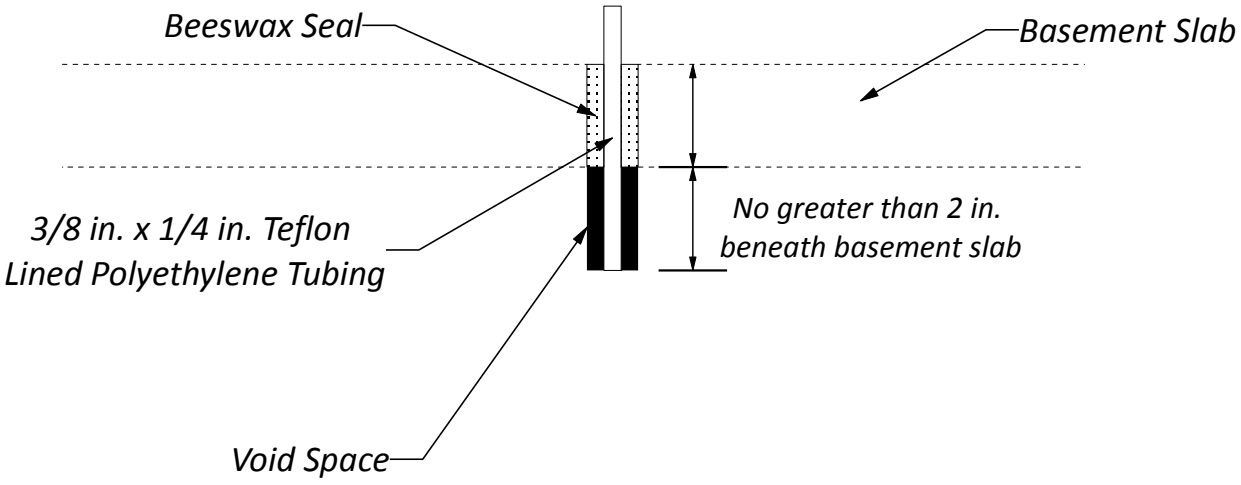
Figure 1
Typical Monitoring Well
Construction Diagram

NEW YORK STATE | Department of Environmental Conservation



Soil vapor sampler set at 8 ft bgs or 1 ft above water table

Figure 2
Typical Temporary Soil Vapor
Point Construction Diagram



NYSDEC
CONTRACT NO. D009806
GENERIC FIELD ACTIVITIES PLAN

Figure 3
Typical Sub-Slab Vapor Sample
Point Construction Diagram

NEW YORK STATE | Department of Environmental Conservation

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Appendix A

EA Standard Operating Procedures

SOP No.	Title
001	Labels
002	Chain-of-Custody Form
003	Subsurface Utility Clearance
004	Sample Packing and Shipping
005	Field Decontamination
006	Summa Canister Sampling
007	Surface Water Sampling
008	Trimble Geo 7X Global Positioning System Units
009	Fieldwork during Times of High Risk for Wildfire
010	Water Level and Well Depth Measurements
011	Photoionization Detector
012	Drone Operations
013	Collection of Monitoring Well Samples
014	Collection of Production Well Samples
016	Field Logbooks and Surface Water, Groundwater, and Soil/Sediment Field Checklists
017	Ground Penetrating Radar Survey
019	Monitoring Well Installation
020	Active Soil Gas Sampling
021	Sediment Sampling
022	Sediment and Benthic Macroinvertebrate Sampling with Eckman Grab
025	Soil Sampling
026	Active Soil Gas Analysis
027	Passive Soil Gas Surveys
028	Well and Boring Abandonment
029	Extraction Wells
032	Piezometer Installation
033	Aquifer (Hydraulic) Testing
034	Drum Sampling
035	Small Boat Operations
039	Sample Preservation and Container Requirements
040	Confined Space Entry
041	Sludge/Lagoon Sampling
042	Disposal of Investigation-Derived Material
043	Multi-Probe Water Quality Monitoring Instruments
044	Assessment of Existing Wells Using Downhole Geophysics
046	Aqueous Diffusion Samplers
047	Direct-Push Technology Sampling
048	Low-Flow Sampling
051	Low Flow Purge and Sampling with Dedicated Pumps
053	Concrete Coring

SOP No.	Title
054	Collection of Fish Tissue for Chemical Analysis
055	Continuous Multi-Channel Tubing Groundwater Sample Collection
056	XRF Analysis of Soil
057	Incremental Sampling Methodology
064	Sediment Boring Logs
071	In Situ Respiration Testing of a Bioventing System
072	Non-Aqueous Phase Liquid Baildown Testing
073	Sampling for Per- and Polyfluorinated Alkyl Substances

Standard Operating Procedure No. 001
for
Sample Labels

Prepared by

EA Engineering, Science, and Technology, Inc., PBC
225 Schilling Circle, Suite 400
Hunt Valley, Maryland 21031

Revision 1
November 2018

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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are any client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**also check Box A**), or if this SOP is being used with no changes (**only check Box B**).

☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 001	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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2. MATERIALS 1

3. PROCEDURE 1

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3.2 ROUTINE CHECK 2
3.3 RECORD INFORMATION 2

3.3.1 Logbook Entry 3

4. MAINTENANCE 3

5. PRECAUTIONS 3

6. REFERENCES 3

DOCUMENT REVISION HISTORY

ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	29 November 2018	Systematic review and update	Dan Hinckley Sheena Styger Sanita Corum	Matthew Bowman

1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to delineate protocols for the use of sample labels. Every sample will have a sample label uniquely identifying the sampling point and analysis parameters. An example label is provided below. Other formats with similar levels of detail are acceptable. Some project software including Scribe (U.S. Environmental Protection Agency (EPA)-associated projects) and FUDSchem (U.S. Army Corps of Engineers-associated projects) can generate pre-prepared labels thus minimizing efforts in the field.

NOTE: It is important to review with the Project/Program Manager to determine if client or project-specific modifications to this SOP are required. For example, if using EPA laboratories, case numbers may be assigned in lieu of having site or project names on the label.

PROJECT NAME _____ PROJECT NUM. _____
SAMPLE LOCATION/SITE ID _____
DATE: ____/____/____ TIME: _____:_____
ANALYTES: METALS VOC EXPLOSIVES ORGANICS OTHER
FILTERED: [NO] [YES]
PRESERVATIVE: [NONE] [HNO_3] [OTHER _____]
SAMPLER: _____

2. MATERIALS

The following materials may be required:

- Sample label
- Indelible marker.

3. PROCEDURE

The following sections describe how to use the sample labeling system.

3.1 LABEL INFORMATION

As each sample is collected/selected, fill out a sample label. Enter the following information on each label:

- Project name (do not include if there is a project or client-specific requirement to exclude)
- Project Number (or Case Number, as applicable)
- Location/site identification—enter the media type (i.e., well number, surface water, soil, etc.) sampling number, and other pertinent information concerning where the sample was taken
- Date of sample collection
- Time of sample collection
- Analyses to be performed (NOTE: Due to number of analytes, details of analysis should be arranged with laboratory *prior to start of work)*
- Whether filtered or unfiltered (water samples only)
- Preservatives (water samples only)
- Number of containers for the sample (e.g., 1 of 2, 2 of 2).

3.2 ROUTINE CHECK

Double-check the label information to make sure it is correct. Detach the label, remove the backing, and apply the label to the sample container. Cover the label with clear tape, ensuring that the tape completely encircles the container.

3.3 RECORD INFORMATION

Record the sample number and designated sampling point in the field logbook, along with the following sample information:

- Time of sample collection (each logbook page should be dated)
- Location of the sample
- Organic vapor meter or photoionization meter readings for the sample (when appropriate)
- Any unusual or pertinent observations (oily sheen on groundwater sample, incidental odors, soil color, grain size, plasticity, etc.)
- Number of containers required for each sample

- Whether the sample is a quality assurance sample (split, duplicate, matrix spike/matrix spike duplicate, or blank).

3.3.1 Logbook Entry

A typical logbook entry might look like this:

- 7:35 a.m. Sample No. MW-3. Photoionization Detector = 35 parts per million.
- Petroleum odor present. Sample designated MW-3-001.

NOTE: Duplicate samples may be given a unique sample designation rather than the actual sample number with an added prefix or suffix. This will prevent any indication to the laboratory that this is a duplicate sample thus making it "blind" to the laboratory. This fictitious sample number must be listed in the logbook along with the actual location of the sample.

4. MAINTENANCE

Not applicable.

5. PRECAUTIONS

If "blind" field duplicate samples have been called for, then no indication of which samples are duplicates is to be provided to the laboratory.

6. REFERENCES

Not applicable.

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Standard Operating Procedure No. 002
for
Chain-of-Custody Form

Prepared by

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Hunt Valley, Maryland 21031

Revision 1
November 2018

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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are any client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**also check Box A**), or if this SOP is being used with no changes (**only check Box B**).

☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 002	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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2. MATERIALS 1

3. PROCEDURE 1

4. MAINTENANCE 2

5. PRECAUTIONS 2

6. REFERENCES 2

DOCUMENT REVISION HISTORY

ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	29 November 2018	Systematic review and update	Dan Hinckley, Sheena Styger, Sanita Corum	Matthew Bowman

1. SCOPE AND APPLICATION

A chain-of-custody record (attached) is used as physical evidence of sample custody and as a permanent record for each sample collected. A chain-of-custody record documents the exchange and transportation of samples from the field to the laboratory. The purpose of this Standard Operating Procedure (SOP) is to delineate protocols for use of the chain-of-custody form. Three example forms are provided as Figures SOP002-1 (EA's standard electronic chain-of-custody form), SOP002-2 (EA's Toxicology Laboratory chain-of-custody form), and SOP002-3 (U.S. Environmental Protection Agency [EPA] Scribe chain-of-custody form). Other formats with similar levels of detail are acceptable.

Most EPA projects utilize sampling and chain-of-custody instructions as documented in EPA's Samplers Guide (2014), which includes the use of Scribe, an in-house software program used to establish computer records of all environmental data and includes generation of chain-of-custodies. Using Scribe requires training, and the software and guidance can be found at the following link: https://response.epa.gov/site/site_profile.aspx?site_id=ScribeGIS. Training on Scribe is necessary and can be obtained through the Scribe weblink.

All new U.S. Army Corps of Engineers projects require the use of Formerly Used Defense Sites chemistry database (FUDSchem), which can be found at the following link: http://fudschem.com/public/framework/bannerhtml.aspx?dsn=systm&idhtml=10642&themesuffix=default&banner=banner_fudschem.jpg. This software will generate chain-of-custody forms specific to the sampling session. As with Scribe, FUDSchem training is necessary.

It is essential that chain-of-custody forms be completed properly, and that sample relinquishment be signed and dated appropriately. Laboratories use chain-of-custodies as their statement of work and, if it is not correct, the samples will not be analyzed appropriately. Sample custody documentation assures that the particular samples have been in secure locations, and that none of them have been tampered with, thus assuring appropriate results.

2. MATERIALS

The following materials may be required: chain-of-custody form and indelible ink pen.

3. PROCEDURE

- Give the site name and project name/number.
- Enter the sample identification code.
- Indicate the sampling dates for all samples.
- List the sampling times (military format) for all samples.

- Enter the total number of containers per cooler.
- List the analyses/container volume.
- Obtain the signature of sample team leader.
- State the carrier service and airbill number, analytical laboratory, and custody seal numbers (if applicable).
- Sign, date, and time the "relinquished by" section. Be sure the carrier signs and enters dates and time of acceptance of the samples.
- Upon completion of the form, retain a copy or portable document format, and affix the laboratory copy to the inside of the sample cooler in a zip-seal bag to protect from moisture, to be sent to the designated laboratory.

4. MAINTENANCE

Not applicable.

5. PRECAUTIONS

None.

6. REFERENCES

U.S. Environmental Protection Agency (EPA). 2014. Sampler's Guide, Contract Laboratory Program Guidance for Field Samplers. EPA/540/R014/013, Directive 92400.2-147. October.

Figures

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Figure SOP002-1 EA Chain-of-Custody Form

Company Name:	Project Manager or Contact: Phone:	Parameters/Method Numbers for Analysis	Chain-of-Custody Record
Project No. Dept.: Task:	Project Name:		EA Laboratories 231 Schilling Circle Hunt Valley, MD 21031 Telephone: (410) 584-7000
Sample Storage Location:	P.O. No.:		**Report Deliverables:** **1 2 3 4 D E** **EDD: Yes/No** **DUE TO CLIENT: _____**
Page of	**Report No.:**		

Date	Time	Water	Soil	Sample Identification 19 Characters	**No. of Containers**														**EA Labs Accession Number**	Remarks
				XXXXXXXXXXXXXXXXXX																**LPM**:
				XXXXXXXXXXXXXXXXXX																
				XXXXXXXXXXXXXXXXXX																
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Project No. Dept.: Task:	Project Name:		EA Laboratories 231 Schilling Circle Hunt Valley, MD 21031 Telephone: (410) 584-7000
Sample Storage Location:	P.O. No.:		**Report Deliverables:** **1 2 3 4 D E** **EDD: Yes/No** **DUE TO CLIENT: _____**
Page of	**Report No.:**		

Date	Time	Water	Soil	Sample Identification 19 Characters	**No. of Containers**													**EA Labs Accession Number**	Remarks
				XXXXXXXXXXXXXXXXXX															
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				XXXXXXXXXXXXXXXXXX															
				XXXXXXXXXXXXXXXXXX															

Samples by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Date/Time	Received by Laboratory: (Signature)	Date/Time	Airbill Number:	Sample Shipped by: (Circle) Fed Ex. Puro. UPS Hand Carried Other:

Cooler Temp. _____C pH: ___ Yes ___ No Comments: Custody Seals Intact ___ Yes ___ No

NOTE: Please indicate method number for analyses requested. This will help clarify any questions with laboratory techniques.

Figure SOP002-2 EA Toxicology Laboratory Chain-of-Custody Form

Client:	Project Manager: Phone: Project Contact: Phone:	No. of Containers																									
Project Name: Project#:																											
Page 1 of 1																											
Sample Collected		Matrix		SAMPLE IDENTIFICATION																							
Date	Time	Sediment	Water																								
Sampled by: (Signature)		Date/Time		Relinquished by: (Signature)																						Date/Time	
Relinquished by: (Signature)		Date/Time		Received by Laboratory: (Signature)																						Date/Time	

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Figure SOP002-3 EPA Scribe Chain-of-Custody Form

Page 1 of 1

USEPA
Lab Contact: John Smith
CarrierName: UPS
AirbillNo:
1Z2886820195095104

CHAIN OF CUSTODY RECORD
Site #: 47909
Contact Name: Michael Smith
Contact Phone: 800-332-0534

No: 5-112818-101859-0021
Cooler #: 13
Case #: 47909
Lab Phone: 800-660-1990

Lab #	Sample #	Location	Analyses	Matrix	Sample Date	Sample Time	Numb Cont	Container	Preservative	Lab QC
	HT18-01	HT18-01	MI 10 Metals + FE, NI 34PAHs, PCBs, TOC, Moisture	Sediment			1	8 oz amber	4 C	
	HT18-02	HT18-02	MI 10 Metals + FE, NI 34PAHs, PCBs, TOC, Moisture	Sediment			1	8 oz amber	4 C	
	HT18-03	HT18-03	MI 10 Metals + FE, NI 34PAHs, PCBs, TOC, Moisture	Sediment			1	8 oz amber	4 C	

Special Instructions:	SAMPLES TRANSFERRED FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt

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Standard Operating Procedure No. 003
for
Subsurface Utility Clearance

Prepared by

EA Engineering, Science, and Technology, Inc., PBC
225 Schilling Circle, Suite 400
Hunt Valley, Maryland 21031

Revision 1
July 2018

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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are any client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**also check Box A**), or if this SOP is being used with no changes (**only check Box B**).

☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 003	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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ATTACHMENT B: 811 UTILITY LOCATE BROCHURE
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DOCUMENT REVISION HISTORY

ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	6/28/2018	Systematic review and update	Matt Bowman	Pete Garger

1. SCOPE AND APPLICATION

1.1 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to prevent injury to workers and damage to subsurface structures (including tanks, pipe lines, water lines, gas lines, electrical service, etc.) during ground disturbance activities (including drilling, augering, sampling, use of direct-push technologies, excavation, trenching, concrete coring or removal, fence post installation, grading, or other similar subsurface operations).

1.2 LIMITATIONS

The procedures set forth in this document are general guidance, but may not be entirely applicable to particular sites based on the site-specific considerations. The Project Manager is responsible for making a site-specific evaluation of each site to determine how subsurface utility clearance procedures should be utilized or modified. If safety or other site-specific considerations require a modified or different procedure, the Project Manager should review the modified procedure with the Business Unit Director, Profit Center Manager, or Senior Technical Reviewer. Evaluation support of modified procedures may be provided by the Corporate Health and Safety Director or the Lead Construction Quality Engineer.

Special considerations may be required for utility location activities at complex or challenging project sites (underwater utilities, hazardous waste sites, etc.). Additional subsurface utility clearance procedures should be added as appropriate for difficult sites. When health and safety risks to workers or potential utility damage cannot be effectively managed through utility location, clearance, and protection measures, the Project Manager must consider the modification of ground disturbance activities (e.g., establishing a safe offset from high risk utilities). In these cases, detailed coordination with the client and/or regulatory staff is likely required.

1.3 SCOPE

This SOP provides minimum guidance for subsurface utility clearance activities, which must be followed prior to and during ground disturbance activities at EA project sites. Even after completing the subsurface utility clearance activities required in this SOP, all ground disturbance activities should proceed with due caution.

Deviations from this SOP may be provided on an exception basis for specific situations, such as underground storage tank systems removals, verified aboveground/overhead services/lines, undeveloped land/idle facilities, shallow groundwater conditions, soil stability, or well construction quality assurance/quality control concerns, etc.

EA or its subcontractors are responsible for, and shall ensure that, all ground disturbance activities are completed safely, without incident, and in accordance with applicable federal, state, and local regulations.

This SOP shall not override any site-specific or consultant/contractor procedures that are more stringent or provide a greater degree of safety or protection of health or the environment.

2. PROCEDURES

The EA Project Manager or his/her designee must complete the Subsurface Utility Clearance Checklist (Attachment A) in conjunction with the following procedures. The checklist must be completed before initiating any ground disturbance activities. The completed checklist must be submitted to the appropriate team individuals, subcontractors, and/or the client and included in the project files.

2.1 SAFETY

A Health and Safety Plan must be available onsite and followed by all contractors and subcontractors.

Work areas should be defined and secured with safety cones, safety tape, construction fence, other barriers, or signs as appropriate.

Site work permits must be obtained as required by site procedures. Based on site conditions or classification, the use of intrinsically-safe equipment may be required.

To ensure the safety of all onsite personnel and subsurface structure integrity, consideration should be given to de-energizing and locking out selected site utilities or temporarily shutting down a portion of or the entire facility.

2.2 SUBSURFACE UTILITY LOCATION ACTIVITIES

To gather all relevant information about potential subsurface structures prior to ground disturbance activities, the project team should pursue multiple lines of evidence on the type, location, depth, size, material of construction, and status (active/abandoned) of all utilities within and near the area planned for ground disturbance activities. A minimum of three lines of evidence should be obtained and documented; however, additional lines of evidences should be secured when possible. Lines of evidence may include the following:

- Historical Site Information
- Public Utility Mark-Out (One Call – 811)
- Private Utility Mark-Out
- Site Inspection
- Client/Facility Interviews and Coordination.

2.2.1 Historical Site Information

The most recent as-built drawings and/or site plans (including underground storage tank, product, and vent lines) should be obtained, as available.

NOTE: As-built drawings may not accurately depict the locations and depths of improvements and subsurface structures and should, therefore, not be **solely** relied upon.

EA should obtain any other site information such as easements, right-of-ways, historical plot plans, fire insurance plans, tank (dip) charts, previous site investigations, soil surveys, boring logs, and aerial photographs, etc. as relevant to the planned ground disturbance activities. Where applicable, EA should also contact contract personnel who may have historical site knowledge.

2.2.2 Public and Private Utility Mark-Outs

EA must ensure that a thorough mark-out at the site is completed to locate electrical, gas, telephone, water, sewer, low voltage electric lines, product delivery pipelines, fiber optic, and all other subsurface utilities/services.

- Where available, public utility companies must be contacted to identify subsurface utilities. (This can be accomplished through the One-Call system in most instances.) Attachment B provides a brochure for the 811 Utility Locate Call Center.

- In addition, where available and warranted by site conditions, a private utility/pipeline mark-out company should be contracted to perform an electronic subsurface survey to identify the presence of suspected hazardous or critical subsurface utilities and structures. In some cases, this is necessary to confirm public utility mark-outs in the vicinity of planned ground disturbance activities.

EA will review all available site plan subsurface information with the private mark-out company to assist in locating utilities and other subsurface structures.

NOTE: Mark-outs may not accurately depict the exact locations of improvements and subsurface structures and should, therefore, not be **solely** relied upon.

Where possible, EA personnel are encouraged to be onsite at the time of subsurface mark-outs. This is to ensure accuracy and understanding of subsurface utility structures identified and provides an opportunity to exchange information with mark-out company personnel regarding planned work activities.

Subsurface utility structures should be marked throughout the entire work area(s) with adequate materials (e.g., site conditions may require paint and tape/flags). Ground disturbance activities must be started within 30 days of mark-out, unless local ordinances specify a shorter time period.

If activities are not started within required time period or markings have faded, mark-outs must be redone.

EA personnel will record time and date of mark-out request and list all companies contacted by the service and confirmation number. This information should be available for review onsite and checked off after visual confirmation of markings.

2.2.3 Site Inspection

To compare the site plan to actual conditions based on information gathered in other lines of evidence, a site inspection should be performed to identify potential signs of subsurface utilities. These signs may include:

- Signage identifying subsurface utilities
- Asphalt patching or paving scars
- Pull boxes, junction boxes, valve box covers, or manhole covers
- Sewer drains and clean-out traps
- Meters and light poles
- Piping or conduit on the walls or roofs of buildings
- Linear ground depressions
- Markings from previous utility mark-out efforts
- Other utilities including fire hydrants, on/below grade electrical transformers, splice cages, sprinkler systems, steam lines (including insulated tanks that may indicate steam lines), and cathodic protection on lines/tanks.

EA will document all findings and update the site plan with this information. In some regions, it may be more effective and efficient to conduct the site inspection at the same time the contractor performing the ground disturbance activity is mobilized to the site. The site inspection may include others as determined by the consultant/contractor and the Project Manager.

2.2.4 Client/Facility Interviews and Coordination

Knowledgeable client and facility staff familiar with site utilities should be interviewed to obtain information and documentation on potential subsurface utility locations, depth, etc. Results of these interviews should be documented and included with the Subsurface Utility Clearance Checklist. On third party sites, close coordination with the site owner's representatives for mark-outs, review of as-builts, and other information reviews should be conducted prior to any ground

disturbance work. Project Managers are encouraged to provide updated as-built information to the client.

EA will review the selected ground disturbance locations with the client. EA will not proceed with the subsurface activities until the plan has been discussed with the client. During execution of the project, if subsurface activities are required outside of the area previously approved by the client, EA will submit these changes to the client for approval prior to execution.

2.2.5 Ground Disturbance Activity Sequence

When practical, EA will plan ground disturbance activities starting at the point farthest from the location of suspected underground improvements. This is done to determine the natural subsurface conditions and to allow EA site personnel to recognize fill conditions.

Experience has shown that the following warning signs may indicate the presence of a subsurface structure:

- Warning tape (typically indicative of underground services).
- Pea gravel/sand/non-indigenous material (typically indicative of tanks or lines).
- Red concrete (typically indicative of electrical duct banks).
- The abrupt absence of soil recovery in a hand auger. This could indicate pea gravel or sand that has spilled out of the auger. This may not be indicative in areas where native soil conditions typically result in poor hand auger recoveries.
- Any unexpected departure from the native soil or backfill conditions as established by prior onsite digging.

If any of these conditions is encountered by EA site personnel, digging should stop and the client should be contacted.

3. UTILITY PROTECTION MEASURES DURING GROUND DISTURBANCE ACTIVITIES

After mobilization, but prior to the primary ground disturbance activities, the physical location of subsurface utilities should be cleared and verified whenever possible and practical. The clearance method used to clear and verify the subsurface utilities should be compatible with the inherent associated risk given the type of facility/property, subsurface utility material of construction, utility depth, soil stratigraphy, and the location of the ground disturbance activity, such that required delineation is obtained. It should be noted that in areas where there is paving, sufficient paving should be removed to allow clear visibility of the subsurface conditions during

clearance activities. The following is a list of potential clearance methods that may be used on a job site:

- Vacuum digging
- Probing
- Hand digging
- Hand augering
- Post-hole digging.

EA personnel will evaluate the potential for electrical shock or fire/explosion for each subsurface disturbance project and will evaluate as necessary the use of non-conductive or non-sparking tools (i.e., fiberglass hand shovels, and thick electrically insulating rubber grips on hand augers or probes). The potential need for the use of non-conductive materials, electrical safety insulated gloves, and footwear will also be evaluated on a case-by-case basis.

For drilling, direct-push technology, fence post installation, or other borehole installation, the area to be delineated will exceed the diameter of the largest tool to be advanced and sufficiently allow for visual inspection of any obstructions encountered.

3.1 SUBSURFACE CLEARANCE PROCEDURES FOR TRENCHING/ EXCAVATION ACTIVITIES

For trenching and excavation activities, appropriate subsurface clearance methods should be conducted along the length and width of the excavation at a frequency sufficient to ensure adequate precautions have been applied to the entire work area. The frequency and density of investigations will be based on site knowledge, potential hazards, and risks of the work area to surrounding locations.

Whenever subsurface structures are exposed, EA will cease work and mark the area (e.g., flags, stakes, cross bracing) to ensure the integrity of these exposed structures is maintained during subsequent trenching/excavation/backfilling.

During ground disturbance activities, EA and its subcontractors should consider the use of spotters to monitor the excavation for signs of subsurface utilities (pipes, conduits, cables, bedding material, warning tape, tracing wire, soil material changes, etc.) to provide early warning in the event unknown subsurface utilities are encountered. The decision to use spotters should be based on the risk of encountering unknown subsurface utilities, utility hazards associated potential unknown utilities that could be encountered (electrical, natural gas, etc.), and the physical and environmental hazards to have a spotter in proximity to the excavation. Spotters, if used, should be briefed on the potential physical and utility hazards that may be present at the site and the signs of subsurface utilities that they should be monitoring for during ground disturbance activities.

Uniform color codes for marking of underground facilities are provided in Attachment C.

Attachment A

Subsurface Utility Clearance Checklist

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SUBSURFACE UTILITY CLEARANCE CHECKLIST

Site Identification: _____

Project Consultant/Contractor: _____

Section 1: Safety, Preparation Tasks, and Mark-Outs

Activity	Yes	No	N/A	Comments including Justification if Response Is No or Not Applicable
Health and Safety Plan is available and all contractors and subcontractors are familiar with it.				
All applicable local, state, and federal permits have been obtained.				
Site access/permission has been secured.				
Most recent as-built drawings and/or site plans (including underground storage tank, product, and vent lines) obtained.				
Reviewed site information to identify subsurface structures relevant to planned site activities (easements, rights-of-way, historical plot plans, fire insurance plans, tank dip charts, previous site investigations, soil surveys, boring logs, aerial photographs, etc.).				
Utility mark-outs have been performed by public utility company(s). Mark-outs clear/visible.				
Subsurface structure mark-outs performed by private mark-out company. Mark-outs clear/visible.				
Additional Activities: Were dig locations reviewed with site representative?				

Section 2: Initial Site Visit and Selecting Ground Disturbance Locations

Activity	Yes	No	N/A	Comments, including Justification if Response Is No or Not Applicable
Location of all aboveground indicators of subsurface utilities/services that may be leading to or from buildings within the planned work area has been identified.				
Location of utility mark-outs by all utility companies previously contacted has been identified within required time period.				
Location of all subsurface structure mark-outs by private mark-out company has been identified within required time period.				
Location of area lights/signs and associated subsurface lines identified.				
Location of all phones and associated subsurface lines identified.				
Location of all drains and associated interconnecting lines identified.				
Location of all electrical junction boxes and associated interconnecting lines identified				
Location of all natural gas meters or connections and all interconnecting lines identified				

Completed by: _____
Name

Signature: _____ _____
Company Date

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Attachment B

811 Utility Locate Brochure

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ALWAYS CALL BEFORE YOU DIG

One free, easy call gets your utility lines marked AND helps protect you from injury and expense.

Know what's below. Always call 811 before you dig. Visit call811.com for more information.

811
Know what's **below.**
Call before you dig.

INSERT CALL CENTER LOGO HERE

U.S. Department of Transportation

JOHN DEERE

TRAVELERS

Common Ground Alliance

Q: WHAT IS 811?

A: 811 is a new federally-mandated N-11 number designated by the FCC to consolidate all local "Call Before You Dig" numbers and help save lives by minimizing damages to underground utilities. One easy phone call to 811 quickly and easily begins the process of getting underground utility lines marked. Local One Call Center personnel will then notify affected utility companies, who will continue to mark underground lines for free.

Know what's **below.**
Call before you dig.

Q: WHY SHOULD I CALL 811 BEFORE EVERY DIG?

A: Calling 811 will help save lives and protect infrastructure. Knowing where underground utility lines are buried before each digging project begins helps protect you from injury, expense and penalties. The depth of utility lines varies and there may be multiple utility lines in the same area. Even simple digging projects can damage utility lines and can disrupt vital services to an entire neighborhood, harm diggers, and potentially result in expensive fines and repair costs. Marked lines show diggers the approximate location of underground lines and help prevent undesired consequences.

Q: I'M JUST A HOMEOWNER, NOT A CONTRACTOR—IS 811 FOR ME?

A: Calling 811 is for professional excavators and do-it-yourself homeowners. A recent national survey revealed that roughly half of Americans are "active diggers" who have done (or are planning to do) some type of digging project at home. Whether you are a professional excavator or an avid do-it-yourselfer, you need to call 811 before every dig every time.

Q: WHO IS PROMOTING AWARENESS OF 811?

A: The national 811 campaign is a project of The Common Ground Alliance (CGA), working with its 1,400 individual members, member organizations, sponsors and 811 campaign national launch partners. CGA is a member-driven association dedicated to ensuring public safety, environmental protection, and the integrity of services by promoting effective damage prevention practices. In recent years, the association has established itself as the leading organization in an effort to reduce damages to all underground facilities in North America through shared responsibility among all stakeholders.

Attachment C

Uniform Color Codes for Marking of Underground Facilities

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APWA UNIFORM COLOR CODE

WHITE - Proposed Excavation

PINK - Temporary Survey Markings

RED - Electric Power Lines, Cables, Conduit and Lighting Cables

YELLOW - Gas, Oil, Steam, Petroleum or Gaseous Materials

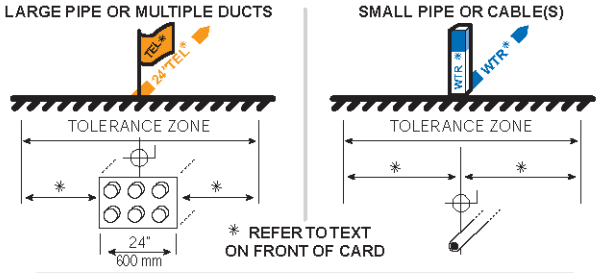
ORANGE - Communication, Alarm or Signal Lines, Cables or Conduit

BLUE - Potable Water

PURPLE - Reclaimed Water, Irrigation and Slurry Lines

GREEN - Sewers and Drain Lines

TYPICAL MARKING



Customize with your center's phone and address information

GUIDELINES FOR UNIFORM TEMPORARY MARKING OF UNDERGROUND FACILITIES

This marking guide provides for universal use and understanding of the temporary marking of subsurface facilities to prevent accidents and damage or service interruption by contractors, excavators, utility companies, municipalities or any others working on or near underground facilities.

ONE-CALL SYSTEMS
The One-Call damage prevention system shall be contacted prior to excavation.

PROPOSED EXCAVATION
Use white marks to show the location, route or boundary of proposed excavation. Surface marks on roadways do not exceed 1.5" by 18" (40 mm by 450 mm). The facility color and facility owner identity may be added to white flags or stakes.

USE OF TEMPORARY MARKING
Use color-coded surface marks (i.e., paint or chalk) to indicate the location or route of active and out-of-service buried lines. To increase visibility, color coded vertical markers (i.e., stakes or flags) should supplement surface marks. Marks and markers indicate the name, initials or logo of the company that owns or operates the line, and width of the facility if it is greater than 2" (50 mm). Marks placed by other than line owner/operator or its agent indicate the identity of the designating firm. Multiple lines in joint trench are marked in tandem. If the surface over the buried line is to be removed, supplementary offset markings are used. Offset markings are on a uniform alignment and clearly indicate the actual facility is a specific distance away.

TOLERANCE ZONE
Any excavation within the tolerance zone is performed with non-powered hand tools or non-invasive method until the marked facility is exposed. The width of the tolerance zone may be specified in law or code. If not, a tolerance zone including the width of the facility plus 18" (450 mm) measured horizontally from each side of the facility is recommended.

ADOPT UNIFORM COLOR CODE
The American Public Works Association encourages public agencies, utilities, contractors, other associations, manufacturers and all others involved in excavation to adopt the APWA Uniform Color Code, using ANSI standard Z535.1 Safety Colors for temporary marking and facility identification.

Rev. 4/99

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Standard Operating Procedure No. 004
for
Sample Packing and Shipping

Prepared by

EA Engineering, Science, and Technology, Inc., PBC
225 Schilling Circle, Suite 400
Hunt Valley, Maryland 21031

Revision 1
September 2018

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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are any client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**also check Box A**), or if this SOP is being used with no changes (**only check Box B**).

☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 004	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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DOCUMENT REVISION HISTORY

ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	25 September 2018	Systematic update and review	Cristina Radu, Amanda Kohn	Matthew Bowman

1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to delineate protocols for the packing and shipping of environmental samples to the laboratory for analysis. Additional requirements are applicable when shipping samples under the U.S. Environmental Protection Agency's Superfund Contract Laboratory Program.

NOTE: Samples collected from process wastewater streams, drums, bulk storage tanks, soil, sediment, or water samples from areas suspected of being highly contaminated could require shipment as dangerous goods; procedures for shipping of such samples are not covered in this SOP.

2. MATERIALS

The following materials may be required:

- Clear tape
- Custody seals
- Ice
- Packing material
- Plastic garbage bags
- Sample documentation
- Waterproof coolers (hard plastic)
- Zip-seal plastic bags.

3. PROCEDURE

Refer to SOP Numbers (Nos.) 001, 002, 016, and 039 as applicable.

Samples will be placed in clean, bubble-wrap lined sample coolers with double-bagged ice immediately after collection to ensure proper preservation. Most sample analyses require that the sample material is maintained at 2-6 degrees Celsius (°C). It is also important to ensure that sample containers are maintained at all times at the temperature required by the analytical method used to analyze the sample media; as such, samples should be retained in a chilled cooler during the inventory, quality control, and packaging process.

Check cap tightness and wipe down outside of each sample container. Verify that information on sample labels is correct and matches chain-of-custody forms. Ensure that both waterproof labels and indelible ink are used to label sample containers. Clear tape should be placed completely over the label. Wrap breakable sample containers in bubble wrap. Enclose each sample in a clear zip-seal plastic bag.

Prepare cooler for shipping. Empty any water that has accumulated in coolers from melting ice. Securely seal all valves and/or drain holes in the shipping container, both inside and out, with duct tape to prevent leakage in the event of sample container breakage or melting ice. Place several layers of bubble wrap on top of absorbent material and line the cooler sidewalls with bubble wrap. Line cooler with open garbage bag.

Prepare sample containers for shipping as follows:

- ***Glass Containers***—Wrap each glass sample container in bubble wrap or closed cell foam sheets. It is acceptable to package up to three 40-milliliter vials in one bubble wrap bag that is usually provided by the analytical laboratory. Enclose sample containers in a clear zip-seal plastic bag.

- ***Polyethylene Containers***—Place sample containers in clear zip-seal bags.

- ***Zip-Seal Bags***—Double-bag the samples to ensure that moisture will not reach the label.

Place all the sample containers upright inside garbage bag. Do not stack glass containers or lay them on their sides. Add additional bubble wrap between and around sample containers as needed to ensure containers do not shift during transport. If a second garbage bag was used, tie the (inner) garbage bag to isolate samples.

Double bag and seal loose, fresh ice to prevent melting ice from soaking the packing material. Fill gallon-size or larger zip-seal bags with fresh ice about two-thirds full and squeeze excess air out of the bags before sealing. Turn bag upside down and place in a second zip-seal bag, also removing excess air. Prepare sufficient bags to cover sample containers and ensure that the proper temperature (2-6° C) is maintained during transport.

Place ice on top of sample containers. Ensure that packing material does not insulate samples from ice. Do not use loose ice in sample coolers. Do not use bagged ice as packing material between or around sample bottles. Tie the garbage bag ensuring that the cooler lid will close securely.

Place a temperature blank into the cooler. The temperature blank consists of a plastic bottle containing either potable or deionized water. Temperature blanks are typically provided by the analytical laboratory. If temperature blanks are not provided, field staff must add a clean container filled with deionized water; ensure the cap is tight and container is labeled before placing in cooler.

If aqueous volatile organic analyte samples are being submitted, ensure a trip blank sample set is placed in each cooler containing volatile organic analyte samples. Trip blanks are used to check for contamination of volatile organic compound samples during handling, storage, and shipment from field to laboratory. The trip blanks consist of volatile organic analyte vials filled with deionized water and are typically provided by the analytical laboratory. Ensure that the trip blank samples and analyses are included on the chain-of-custody record.

Make copies of sample documentation (chain-of-custody forms or other field records) and retain in field files for record. Enclose the original field documentation forms in a waterproof plastic bag and tape the bag to the underside of the cooler lid. If more than one cooler is being used, each cooler will have its own documentation.

Seal coolers with signed and dated custody seals such that if the coolers were opened, the custody seals would be broken. Place clear tape over the custody seals to prevent damage to the seals.

Tape the cooler shut with packing tape over the hinges and custody seals. Tape should be wrapped around the cooler a minimum of five times. Ship all samples via overnight delivery on the same day they are collected if possible. Project-specific shipping requirements (e.g., Saturday delivery, communication with the receiving laboratory, etc.) should be discussed with the sample manager or project manager during project planning.

After samples are packaged within shipping containers, place shipping labels clearly on the outside of the container; clearly mark the number of containers in the shipment on the shipping label. Mark each cooler as "1 of 2," "2 of 2," etc.

4. MAINTENANCE

Not applicable.

5. PRECAUTIONS

The project manager and field team leader are responsible for determining if samples collected during a specific field investigation meet the definitions for dangerous goods. If a sample meets or is suspected to meet the definition of "dangerous goods" per the Dangerous Goods Regulation of the International Air Transport Association, then that sample must be handled according to the instructions given for that material. Dangerous goods must be prepared for shipping only by personnel trained and certified by International Air Transport Association in dangerous goods shipment.

6. REFERENCES

Not applicable.

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Standard Operating Procedure No. 005
for
Field Decontamination

Prepared by

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Revision 2
September 2018

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PROJECT-SPECIFIC VARIANCE FORM

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☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 005	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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DOCUMENT REVISION HISTORY

ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	25 September 2018	Systematic update and review	Cristina Radu, Amanda Kohn	Matthew Bowman

1. SCOPE AND APPLICATION

All personnel or equipment involved in intrusive sampling, or that enter a hazardous waste site, must be thoroughly decontaminated prior to leaving the site to minimize the spread of contamination and prevent adverse health effects. This Standard Operating Procedure (SOP) describes the normal decontamination of sampling equipment and site personnel. Specific projects and programs may have additional decontamination requirements. Refer to the planning document(s) for additional site-specific requirements.

As a good practice, sampling at a site should be conducted moving from least to most impacted locations to minimize the potential for cross-contamination. It is advisable to use disposable tools and personal protective equipment to the extent possible such that decontamination is not necessary. If disposable equipment cannot be used, all attempts will be made to minimize the need for decontamination by using dedicated equipment when practical.

1.1 MATERIALS

The following materials may be required:

0.01 normal (N) hydrochloric acid	Non-phosphate laboratory detergent (Liquinox)
0.10 N nitric acid	Plastic garbage bags
Aluminum foil or clean plastic sheeting	Plastic sheeting, buckets, etc. to collect washwater and rinsates
Approved water (deionized, potable, etc.)	Pressure sprayer, spray bottles, brushes, laboratory wipes, disposable cloth (shop towel or similar)
High performance liquid chromatography (HPLC)-grade water[a]	Reagent grade alcohol[b]

a. For the purpose of this SOP, HPLC-grade water is considered equivalent to "deionized ultra-filtered water," "reagent-grade distilled water," and "deionized organic-free water." The end product is water that is pure with no spurious ions or organics to contaminate the sample. The method of generation is left to the individual contractor.
b. For the purpose of this SOP, the term "reagent grade alcohol" refers to either pesticide grade isopropanol or reagent grade methanol.

1.2 PROCEDURE

All reusable (non-dedicated) equipment that contacts or could potentially contact environmental samples shall be decontaminated prior to use at a site, between sampling locations, and at the completion of sampling events before leaving the site. Decontamination procedures are conducted in the Contaminant Reduction Zone, which may or may not be contiguous to the Exclusion Zone. The Contaminant Reduction Zone should be located on a level, preferably paved surface, either in an area upwind of the investigation/sampling area or in an area believed to be free of surface contamination. Care must be employed when moving contaminated tools and equipment to the Contaminant Reduction Zone to prevent the spread of contamination.

Specially designated and properly built decontamination pads may be built at a centralized location to accommodate larger pieces of equipment. The pads are built such that any water produced during the decontamination process can be contained and pumped into

investigative-derived waste holding containers (i.e., frac tank, 55-gallon drum, etc.) for waste profiling and disposal.

For other field equipment, the Contaminant Reduction Zone may be a mobile decontamination station set up in the vicinity of the Exclusion Zone or sampling location. Plastic sheeting will be used to create a clean surface for the sampling and decontamination equipment to be placed upon.

1.2.1 Sample Bottles

At the completion of each sampling activity, the exterior surfaces of the sample bottles must be decontaminated as follows:

- Ensure the bottle lids are on tight.
- Wipe the outside of the bottle with a paper towel to remove gross contamination.

1.2.2 Personnel Decontamination

Review the Health and Safety Plan for the appropriate decontamination of site personnel and reusable personal protective equipment, such as protective suits used at highly contaminated sites, respirators, safety boots, safety glasses, etc. Decontamination will be conducted in a designated Contaminant Reduction Zone as per the Health and Safety Plan and the general decontamination procedures outlined further in this SOP.

1.2.3 Non-Dedicated Equipment

Reasonable attempts will be made to minimize the need for decontamination by using dedicated equipment when practical.

All reusable (non-dedicated) equipment that contacts or could potentially contact environmental samples shall be decontaminated prior to use at a site, between sampling locations, and at the completion of sampling events before leaving the site. Decontamination shall be conducted at a central decontamination station (i.e., decontamination pad) or at the sampling location.

Decontamination stations should be located on a level, preferably paved surface, either in an area upwind of the investigation area or in an area believed to be free of surface contamination. Plastic sheeting will be used to create a clean surface for the sampling and decontamination equipment to be placed upon.

Used decontamination solutions will be disposed of properly according to the site-specific Health and Safety Plan or applicable planning documents.

1.2.3.1 Field Monitoring and Testing Equipment

Water quality meters and temperature, pH, conductivity, redox, and dissolved oxygen probes will be cleaned per the manufacturer's instructions. If no such specifications exist, remove gross contamination and triple rinse probe with HPLC-grade water. If downhole probes are used, wipe the wetted portion of the cable with a clean laboratory wipe or disposable cloth (shop towel or similar) that has been soaked with non-phosphate laboratory detergent solution to remove gross contamination and rinse with approved water.

Electronic water level indicators, weighted tapes, measuring tapes transducers, level loggers, etc. will be decontaminated after each use as follows:

- Wipe the wetted or contaminated portion of the tape or cable and the probe with a clean laboratory wipe or disposable cloth (shop towel or similar) that has been soaked with non-phosphate laboratory detergent solution to remove gross contamination. Rinse cloth in the solution and continue wiping until tape or cable is clean.
- Wipe with a second wipe or cloth or rinse with HPLC-grade water to remove soap residue.
- Dry tape with a third cloth (or laboratory wipe) and rewind into case or on spool, or re-coil tape.

Other field monitoring or measuring equipment such as beakers and graduated cylinders used to measure flow rates; flow-through cells used for monitoring water quality parameters; piezometers used to determine water levels; packers, mechanical slug device, and downhole equipment used during aquifer (hydraulic) testing; etc. will be decontaminated by washing with a non-phosphate laboratory detergent solution, followed by approved water and HPLC-grade water rinse.

1.2.3.2 Bladder Pumps

Non-dedicated bladder pumps with disposable bladders will be decontaminated as follows:

- Disconnect tubing from pump.
- Completely disassemble the pump, being careful to note the initial position of and retain any springs and loose ball checks.
- Discard the pump bladder.
- Clean all parts in the same manner as provided in Section 1.2.3.1.
- Install a new Teflon® bladder and reassemble pump.

- Store pump in a clean, dedicated polyvinyl chloride, polytetrafluorethylene (PTFE), or low density polyethylene (for perfluorooctanesulfonic acid/per- and polyfluoroalkyl substances sampling) storage container.

1.2.3.3 Grundfos Redi-Flow® or Similar Submersible Pumps

Non-dedicated Grundfos Redi-Flow® and similar pumps will be disassembled and decontaminated per the manufacturer's instructions on an as-needed basis (i.e., where high concentrations and an elevated risk of cross-contamination exist). Due to the challenges associated with pump decontamination, if possible, consider designating one pump for sampling in highly contaminated areas and a second pump for sampling non-impacted areas or areas with lower contaminant concentrations. In most cases, the pumps will be decontaminated following the procedures below.

The pump and support cable/electrical wires that come in contact with water will be decontaminated via pumping as detailed below. To avoid electrical shock, always disconnect power from the pump when handling the pump body during decontamination procedures.

- Disconnect sample tubing from pump.
- Decontaminate the wetted portion of the cable/electrical wires by washing with non-phosphate laboratory detergent solution, followed by approved water and HPLC-grade water rinse. Coil cable/electrical wires on spools or clean plastic sheeting.
- Scrub the exterior of the pump to remove gross (visible) contamination, using appropriate brush(es), approved water, and non-phosphate detergent (steam cleaning may be substituted for detergent scrub).
- Transfer pump to rinse bucket filled with approved water. Rinse by pumping no less than nine volumes or a minimum of 5 minutes of approved water.
- Rinse pump exterior with reagent grade alcohol.
- Rinse pump exterior with HPLC-grade water.
- Rinse pump exterior with 0.10 N nitric acid solution
- Rinse pump exterior with HPLC-grade water.
- Allow pump to air dry.
- Wrap pump in aluminum foil or clean plastic sheeting, or store in a clean, dedicated polyvinyl chloride or PTFE storage container.
- Prior to reusing pump, rinse exterior again with HPLC-grade water.

1.2.3.4 Other Liquid Sampling Equipment

Other sampling equipment used to collect surface water, groundwater, non-aqueous phase liquid (NAPL), or other liquid samples includes but is not limited to PTFE double-check valve bailers, dip samplers (whether bucket, long-handled, or short-handled), discrete interval stainless-steel samplers, ball check valves and foot valves, and labware (i.e., beakers, graduated cylinders, vials, and other containers that are used to hold samples for field measurements/screening and water chemistry). This equipment will be decontaminated after each use as follows:

- Discard all ropes, tubing, etc. used in sampling in a properly marked sealable container, or as directed by the Health and Safety Plan. NOTE: No tubing is to be used in conjunction with a bailer in collecting samples.
- Wash sampling equipment with non-phosphate laboratory detergent and approved water solution using appropriate brush(es), laboratory wipes, or disposable cloth (shop towel or similar) to remove gross (visible) contamination.
- Rinse with approved water.
- Rinse with reagent grade alcohol.
- Rinse with HPLC-grade water.
- Rinse with 0.10 N nitric acid solution using a spray bottle. This rinse may be eliminated if inorganic compounds such as metals are not being sampled/are not a contaminant of concern.
- Rinse with HPLC-grade water.
- Allow equipment to air dry. If sampling equipment has just been used for purging and is being decontaminated prior to sampling, do not air dry. Double rinse with HPLC-grade water and proceed to collect samples.
- Wrap equipment in aluminum foil or clean plastic sheeting, or store in a clean, dedicated polyvinyl chloride or PTFE storage container.
- Rinse equipment with HPLC-grade water immediately prior to re-use.

1.2.3.5 Solid Materials Samplers

Solid materials samplers include soil and sediment sampling probes, augers, trowels, shovels, sludge samplers, and other sampling equipment (e.g., core tubes, grab samples, core catchers, core liners, scoops, spoons, etc.), which will be decontaminated as follows:

- Scrub the sampler to remove gross (visible) contamination, using appropriate brush(es), approved water, and non-phosphate laboratory detergent (steam cleaning may be substituted for detergent scrub).
- Rinse off detergent with approved water.
- Rinse sampler with reagent grade alcohol.
- Rinse sampler with HPLC-grade water.
- For non-metallic samplers only, rinse sampler with 0.10 N nitric acid solution.
- For non-metallic samplers only, rinse sampler with HPLC-grade water.
- Allow sampler to air dry.
- Wrap sampler in aluminum foil or clean plastic sheeting, or store in a new zip-seal bag (size permitting) or clean, dedicated polyvinyl chloride or PTFE storage container.
- Rinse sampler with HPLC-grade water immediately prior to re-use.

For larger sediment sampling equipment, if sediment can be collected from the interior of a sampling device and away from potentially contaminated surfaces of the sampler, a site water rinse may be sufficient between stations. A site water rinse may also be sufficient for vessel surfaces between sample locations. However, all tools and equipment coming into contact with the sample should be decontaminated in accordance with the procedures above. Washwater from decontamination activities should be collected and disposed of properly.

1.2.3.6 Other Sampling and Measurement Probes

Soil (or sediment) gas sampling probes will be decontaminated as solids sampling devices.

1.2.3.7 Drilling Rigs, Sediment Sampling Vessels, and Other Heavy Equipment

All drilling rigs, sediment sampling vessels, and associated equipment such as augers, drill casing, rods, samplers, tools, recirculation tank, and water tank (inside and out) will be decontaminated prior to site entry after over-the-road mobilization and immediately upon departure from a site after drilling a hole. Supplementary cleaning will be performed prior to site entry when there is a likelihood that contamination has accumulated on tires and as spatter or dust on the way from one site to the next.

- Place contaminated equipment in an enclosure (i.e., existing wash pad, decontamination pad, etc.) designed to contain all decontamination residues (water, sludge, etc.).

- Steam clean equipment until all dirt, mud, grease, asphaltic, bituminous, or other encrusting coating materials (with the exception of manufacturer-applied paint) have been removed.

- Water used will be taken from an approved source.

- Containerize decontamination fluids in 55-gallon drums; sample; characterize; and, based on sample results, dispose of all decontamination residues properly.

Other heavy equipment includes use of backhoes, excavators, skid steers, etc. If heavy equipment is utilized during field activities (i.e., a backhoe for test pitting), the bucket should not come in contact with soil to be sampled. If the bucket contacts the soil to be sampled, then it should be decontaminated between sample locations, following the same procedures as listed above for a drill rig.

1.2.3.8 Ice Chests and Reusable Shipping Containers

Scrub exterior/interior with approved brush and Liquinox detergent. Rinse off detergent with approved water. Let air dry and properly store until re-use.

NOTE: If container/ice chest is severely contaminated, clean as thoroughly as possible, render unusable, and properly dispose of.

2. PRECAUTIONS

Segregate all waste streams as specified in the sampling documents and store investigation-derived waste properly. Dispose of all washwater, rinse water, rinsates, and other sampling wastes (tubing, plastic sheeting, etc.) in properly marked, sealable containers, or as directed by the Health and Safety Plan or applicable planning documents.

Once a piece of equipment has been decontaminated, be careful to keep it in such condition until needed.

3. REFERENCES

Site-specific Health and Safety Plan and/or applicable planning documents.

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Standard Operating Procedure No. 007
for
Surface Water Sampling

Prepared by

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Revision: 1
December 2014

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to delineate protocols for sampling surface water. This procedure can be applied to the collection of surface water samples from marine and estuarine systems, streams, rivers, ditches, lakes, ponds, and lagoons. Surface water samples provide an indication of the amount of contaminant in the surface water. It is, therefore, important to collect a representative sample.

2. MATERIALS

The following materials may be required:

0.45-µ disposable filters	Sample bottles
Cooler with ice	Short-handled dip sampler (PTFE or stainless steel)
Long-handled dip sampler (polytetrafluoroethelyne [PTFE] or stainless steel)	Stainless steel or PTFE-lined bucket
Peristaltic pump with 0.45-µM filters and disposable Tygon tubing	Niskin bottle (or similar sampling device)

3. PROCEDURE

For all surface water samples, use a Global Positioning System to record sampling coordinates and mark the sampling locations on a site map. Photograph (if cameras are allowed onsite) and describe each location, place a numbered stake above the visible high water mark on the bank closest to the sampling location, and/or mark adjacent trees with surveyor's flagging. The photographs and descriptions must be adequate to allow the sampling station to be relocated at some future date by someone other than the original sampling crew. Use a long-handled dip sampler where access is poor or non-contact with water is suggested in the Health and Safety Plan.

Sampling should be performed deliberately and methodically to minimize disturbance of bottom sediments, yet as quickly as possible to ensure a representative sample. If wading in a stream, sample downstream of the sampling location to prevent disturbance of the bottom. To prevent contamination of the exterior of the sample container, and/or potential contamination of the surface water sample by laboratory contaminants on the exterior of the bottle, the sample container should never be dipped into the water, rather a decontaminated sampling device should be used to collect unfiltered samples.

Sampling with the PTFE or stainless steel sampler (long-handled or measuring cup-type):

- Remove the cap from the sample bottle.
- Dip a sample of surface water using the sampler.

- Tilt sample bottle and gently pour sample from sampler into the bottle. Allow the sample to trickle down the side of the bottle. Avoid aerating the sample.

- Add preservative as required by SOP No. 039. Replace cap, and place in cooler immediately.

Sampling with stainless steel or PTFE-lined bucket:

- Remove cap from sample bottle.

- Gently dip collection bucket in the water. Fill bucket and carefully lift from water body.

- Tilt sample bottle and gently pour sample from sampler into the bottle. Allow the sample to trickle down the side of the bottle. Avoid aerating the sample.

- Add preservative as specified by the project-specific Sampling and Analysis Plan. Replace cap, and place in cooler immediately.

– OR –

- Use smaller sampling cup to transfer sample from bucket to sample bottle as described above.

Sampling with a Niskin bottle (or similar device):

- Prepare the bottle for deployment by placing the ends of the bottle in the open position and lock the ends into the trigger mechanism.

- Lower the bottle to desired depth of sampling (on either a wire cable or rope).

- Place a messenger (triggering device) on the cable/rope and deploy by allowing free-fall down the cable/rope.

- Bring the bottle back to the surface and pour sample into a sample container.

Sampling with a peristaltic pump and Tygon tubing:

- Cut a length of Tygon tubing to the depth of sampling specified by the client or project-specific Sampling and Analysis Plan.

- Insert one end of the tubing into the intake hose on the peristaltic pump.

- Place a weight on the tubing and lower to the specified depth;

- Cut a length of tubing and insert into the output (out-flow) hose on the peristaltic pump.

- After applying power to the peristaltic pump, proceed to pump site water through the tubing apparatus. Approximately five times the hose volume should be pumped through the tubing before sampling.

- Fill the required sample containers.

- If filtering is required, obtain filtered sample by placing a 0.45-µM in-line filter on the end of the output tube and fill the required sample containers.

Both filtered and unfiltered samples may be required for metals analyses. Bulk samples for filtration will be collected using the stainless steel or PTFE-lined bucket method described above. Sample filtration must be performed immediately upon retrieval of the bulk sample as follows.

Filtration will be performed immediately after collecting sample. Set up filtration equipment prior to collecting sample. Filtration may be accomplished by gravity or, if necessary due to slow filtering, a peristaltic pump will be used to pressure filter the sample. Vacuum filtration will not be used due to the possibility of analyte volatilization.

Gravity filtration will be accomplished as follows:

- Using decontaminated forceps, place a 0.45-µM membrane in a decontaminated filter funnel.

- Slowly pour sample into the funnel and collect filtrate directly into appropriate sample container(s).

- Add preservative(s) as required by project-specific Sampling and Analysis Plan. Immediately cap container and place in cooler.

- Dispose of filter membrane.

Pressure filtration will be accomplished as follows:

- Using previously assembled disposable tubing, 45-µ in-line filter, and peristaltic pump, filter sample from collection bucket into appropriate container.

- Adjust pump rate to avoid aeration of sample.

- Fill container, preserve as indicated in SOP No. 039, immediately cap container, and place in cooler.

- Dispose of filter and tubing.

Refer to SOP Nos. 001, 002, 004, 005, 016, and 039.

4. MAINTENANCE

Refer to manufacturer's specifications for maintenance procedures on generators and pumps.

5. PRECAUTIONS

Avoid disturbing bottom sediments.

Consult the Health and Safety Plan prior to collecting any samples for personal protective equipment such as dermal and respiratory protection and personal flotation devices when sampling in or near deep water or from boats.

Always decontaminate the sampling and filtration equipment, and change gloves between sampling locations to minimize the risk of cross-contamination.

Always set up generators downwind of working area. Never service generators onsite.

6. REFERENCES

None.

Standard Operating Procedure No. 008
for
pH Measurement

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to delineate protocols for measuring the pH of all types of aqueous solutions, including drinking water, saline water, and industrial and domestic wastes. As a measure of the hydrogen ion content of a solution, pH gives a general indication of the acidity or alkalinity of a water sample.

Use of brand names in this SOP is not intended as endorsement or mandate that a given brand be used. Alternate equivalent brands of detectors, sensors, meters, etc. are acceptable. If alternate equipment is to be used, the contractor will provide applicable and comparable SOPs for the maintenance and calibration of same.

2. MATERIALS

The following materials may be required:

Φ ® 12 pH Meter
Automatic temperature compensator (ATC) probe
Beakers
Combination (pH) electrode
Commercial buffer solutions (standards) of pH 4.00, 7.00, and 10.00
HPLC-grade water
Laboratory wipes for blotting electrodes
Wash bottle

3. PROCEDURE

3.1 CALIBRATION CHECK

Calibration of the pH meter will be checked on a daily basis. A two-point calibration should be used as follows:

1. Prepare beakers of buffer solutions of pH 4.00, 7.00, and 10.00.
2. Calibration should closely bracket the expected pH range of the samples to be taken.
3. Turn on instrument, clear instrument.
4. Rinse the electrode with distilled water and blot excess.
5. Immerse probes in beaker of pH 4.00 or 7.00 standard, swirl gently.
6. Press pH key, then STD key.

7. Keep the probes in the sample until the reading stabilizes. The reading should be the pH of the standard.

8. Rinse the electrode with distilled water and blot excess.

9. Repeat the procedure with pH 7.00 and 10.00 standards.

10. Record the initial readings.

11. If the measured values vary from the expected value by greater than 0.2 pH units, recalibrate the instrument with fresh aliquots of buffer solution. If the discrepancy persists, alert the Field Operations Leader, who has the option of trying to fix the meter or obtaining a second pH meter.

12. Record all measurements in the field logbook.

13. Verify calibration by reading the pH of the third buffer solution.

14. Refer to SOP No. 016.

3.2 pH MEASUREMENTS

Measurements of pH will be taken using the two-point standardization method as follows:

1. Connect the ATC and pH electrodes to the appropriate inputs.

2. Turn on instrument, clear instrument.

3. Prepare two small beakers of standard buffer solutions. Ideally, the pH values of these standards will "bracket" the expected pH value of the sample and be as close as possible to the pH of the sample.

4. Rinse a small beaker with distilled water, then sample water. Fill the beaker with sample water.

5. Rinse the probes with distilled water. Blot excess.

6. Immerse electrode and ATC in first standard. Swirl gently. Press pH key and STD key. Wait for display to stop flashing.

7. Rinse the probes with distilled water. Blot excess.

8. Immerse electrode and ATC in second standard. Swirl gently. Press STD key. Wait for display to stop flashing.

9. Rinse the probes with distilled water. Blot excess.

10. Immerse the probes in the sample and swirl gently, keeping the probes in the sample until the display stops flashing.

11. Record the sample pH and temperature after stabilization. Note any problems such as meter drift.

12. Rinse the probes with distilled water. Blot excess.

13. Repeat Steps 9 through 12 for additional samples.

Decontaminate probe according to manufacturer's specifications.

Decontaminate beakers according to SOP No. 005, Section 3.3.1.4 (Labware).

4. MAINTENANCE

The following steps will be taken to maintain the pH meter:

1. Check the batteries each time the meter is used.

2. Keep the probe stored in a 0.1 M KCl solution adjusted to pH 4 when the meter is not in use. Alternatively, the electrode may be rinsed with deionized water and the protective cap put on, trapping any residual water inside it (do not blot the electrode dry prior to putting the cap on).

5. PRECAUTIONS

Remove coatings of oil material or particulate matter that can impair electrode response by gentle wiping or detergent washing, followed by distilled water rinsing.

As noted in Section 1, these procedures may not apply to alternate manufacturer's equipment.

Calibration is always performed using the pH 7.00 and one end point (pH4.00 or 11.00) standard. **Never** calibrate the instrument using two end points only.

6. REFERENCES

Beckman Instruments, Inc. Users Manual for Φ® 10 pH Meter, Φ® 11 pH meter, and Φ® 12 pH/ISE Meter.

Franston, M.H. et al. (eds). 1981. Standard Methods for the Examination of Water and Wastewater, 15th Edition. American Public Health Association, American Water Works Association and Water Pollution Control Federation.

U.S. Environmental Protection Agency. 1983. Methods for Chemical Analysis of Water and Wastes. March.

Standard Operating Procedure No. 009
for
Temperature Measurement

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to delineate protocols for measuring the temperature of a solid or liquid sample, in particular, for measuring water temperature. Groundwater temperature does not vary dramatically over the course of a year. Therefore, groundwater temperature can be used to help identify an aquifer, identify stream reaches where groundwater inflow is occurring, identify thermal gradients in lakes or ponds, and also indicate when sufficient water has been removed from a well during purging.

2. MATERIALS

The following materials may be required: digital reading thermocouple thermometer in combination meter or in a stick. Accuracy = ±0.5°C.

3. PROCEDURE

Rinse the probe with distilled water. Insert the probe into the sample, and leave it in the sample until the temperature stabilizes. Record the temperature reading, being sure to indicate °C or °F. Decontaminate the probe according to Section 3.3 of SOP No. 005 (Field Decontamination).

Refer to SOP Nos. 005 and 016.

NOTE: °C = (°F - 32) (5/9)
°F = ([9/5]°C) + 32.

4. MAINTENANCE

Not applicable.

5. PRECAUTIONS

None.

6. REFERENCES

U.S. Environmental Protection Agency. 1983. Methods for Chemical Analysis of Water and Wastes. March.

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Standard Operating Procedure No. 010
for
Water Level and Well Depth Measurements

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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are any client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**also check Box A**), or if this SOP is being used with no changes (**only check Box B**).

☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 010	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	25 September 2018	Systematic update and review	Cristina Radu, Amanda Kohn	Matthew Bowman

1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to present the protocols for measuring depth to groundwater, presence and thickness of non-aqueous phase liquid (NAPL), and well depth in groundwater wells. This procedure is applicable to the sampling of monitoring wells and must be performed prior to any activities that may disturb the water level (i.e., purging or aquifer testing).

2. MATERIALS

The following materials may be required:

- Electronic sounding device with calibrated cable or tape measured at 0.01-foot increments (i.e., water level meter or oil/water interface probe) OR transducer and datalogger
- Plastic sheeting
- Photoionization detector or intrinsically safe flame ionization detector
- Materials required for decontamination per SOP Number (No.) 005
- Well construction diagrams, well records, and/or survey information
- Field forms (i.e., well gauging forms, well assessment forms, purge logs) and/or field logbook.

3. PROCEDURE

3.1 PRELIMINARY STEPS

Compile well construction data/forms, survey information, and historical data, if available, prior to field mobilization. The type and length of electronic sounding device to be used will be based on the monitoring well diameter, well installation depth, and the presence/absence of NAPL. Oil/water interface probes will be used in all wells for the first round of sampling, regardless of site history.

When planning on measuring depth to water at a site where product may be present in wells, the wells should be segregated between potentially contaminated and not contaminated categories. The sequence of well gauging should be established to minimize the potential of cross contamination by generally gauging clean wells first.

Ensure that the electronic sounding device is working prior to mobilization by submerging the probe in a container of potable or deionized water. Keep the indicator probe in its protective case when not in use. Locate the well and verify its position on the site map. Record on the applicable field form(s) or in the field logbook whether positive identification was obtained, including the well number/identification and any identifying marks, codes, or tags contained on the well casing or protective casing.

3.2 WELL HEADSPACE SCREENING

Refer to the Health and Safety Plan or applicable planning documents to determine if well headspace screening is required. At a site where historical information is available, well headspace screening may be omitted.

Headspace screening will be conducted using an organic vapor meter (photoionization detector or flame ionization detector). All headspace screening should be performed at arm's length and from the upwind side of the well if possible. Refer to SOP Nos. 011, 023, or 024 as appropriate.

Screen the ambient air in the breathing area around the wellhead and record the reading on the applicable field form(s) and/or in the field logbook. Once the breathing area is deemed safe, unlock/open the well protective casing to get access to the wellhead. Re-screen the ambient air again to determine if organic vapors may have accumulated.

Screen the air in the wellhead (headspace) for gross organic vapors. This will indicate the presence of gross volatile contaminants as well as potential sampler exposure. Most well casings are covered with a cap, some are outfitted with pump assemblies, while some may not have a cap at all. If a cap is present, sample the air in the wellhead for gross organic vapors by lifting the well cap only high enough for the organic vapor meter probe to be entered into the well casing. If a pump assembly is present on top of the casing, locate the gauging port, remove the cap, and insert the probe to make the measurement. If a cap is not present, insert the probe in the well casing. Record the reading on the applicable field form(s) and/or in the field logbook.

If volatiles are detected, allow the well to vent for 60-90 seconds and re-screen and record the headspace readings. If the second reading is lower than the first, use the second reading to determine whether respiratory protection will be required during subsequent activities.

3.3 WELL ASSESSMENT

Once the breathing zone at the wellhead is deemed safe or applicable respiratory protection is donned if needed, conduct the well assessment. Record the well assessment information on applicable field forms (well assessment form) or in the field logbook.

Assess and record the condition of the well casing, well pad and bollards, well cover, and any equipment (pump assembly). Record any observations and remarks regarding the completion characteristics and well condition (i.e., evidence of cracked casing or surface seals, security of the well [locked cap], or evidence of tampering). Note if there are discrepancies between current

well condition/completion and well construction diagrams/records or well survey data (i.e., damage or modifications to the well including but not limited to frost heaving, broken or otherwise damaged casing, conversion to/from flush mount or stick-up, installation or removal of polyvinyl chloride collar or other material on inner casing, installation or removal of a pump assembly, etc.).

Next, locate the measurement reference point from where water, NAPL, and well depth measurements will be performed. This reference point should be scribed, notched, or otherwise noted and the elevation will be recorded in the well survey data. It is critical that the actual survey point is known and used consistently throughout monitoring events.

If no reference marks are present or if changes have been made to the well casing since the survey, measure depths based on highest point of the well casing. If there is no high point, measure depths to the northern side of either the well polyvinyl chloride casing or the pump assembly cover. Permanently mark the measurement location for future survey and/or measurement purposes. Determine the new reference point elevation by measuring the distance from a known surveyed point (surveyed elevation of the protective casing or ground surface). Record this difference on the applicable field form(s) or in the field logbook for use in groundwater elevation calculations.

3.4 LIQUID LEVEL AND WELL DEPTH MEASUREMENTS

Typically, a complete round of static liquid levels and monitoring well depths is conducted as one of the first steps during groundwater monitoring. However, if monitoring wells are to be sampled for polyfluorinated alkyl substances, gauging should be completed after groundwater sampling to mitigate the possibility of cross-contamination.

Equipment should be decontaminated prior to first use in the field and after each use. Refer to SOP No. 005 for decontamination procedures. Keep all equipment and supplies protected from gross contamination; use clean plastic sheeting and keep the electronic sounding device probe in its protective case when not in use.

Measure NAPL and water levels and well depths as detailed in the subsections below. When measuring depths, grasp the cable with the thumb and forefingers at the top of the casing and record the depth based on the measurement reference point detailed in Section 3.3.

Gauging information including dates/times, water depths, NAPL depths and thicknesses, and well depths will be recorded on applicable field forms (i.e., well gauging form, well assessment form, purge form, etc.) and/or in the field logbook.

3.4.1 Non-Aqueous Phase Liquid Level Measurements

Always perform NAPL checks for the following conditions:

- The first time a well is sampled
- In wells installed in or near areas with suspected or confirmed NAPL contamination
- If headspace test reveals presence of volatiles.

Use an oil/water interface probe to determine the presence and thickness of NAPL. An oil/water interface probe will have a different alarm tone (continuous or intermittent) for NAPL versus water. The air/liquid interface depth measurements will be more accurate if the probe is lowered into liquid. The NAPL/water depths will be more accurate if the probe is moved from water into NAPL. Always lower and raise the interface probe slowly to prevent undue mixing of media. Complete all measurements as follows:

- Upon removing the well cap as a part of headspace screening described in Section 3.2, ensure that enough time (a couple of minutes) has passed for the air pressure in the well to have equalized with atmospheric pressure.

- Turn the interface probe on and test the alarm and liquid indication light.

- Remove the indicator probe from the protective case. Slowly lower the probe and cable into the well, allowing the cable reel to unwind. Continue lowering until the alarm sounds and the liquid indication light comes on.

- If LNAPL is detected on top of the water column, record the depth of the initial level/first alarm (top of the product layer). Continue to slowly lower the probe until it passes into the water phase. Slowly retract the probe until the NAPL alarm sounds and record the product/water interface depth (base of the product layer). Calculate and record the LNAPL thickness.

- Continue to slowly lower the interface probe through the water column to check for the presence of dense non-aqueous phase liquid (DNAPL). If DNAPL is encountered, measure and record the product interface depths (top and base of the DNAPL layer[s]) and calculate and record the DNAPL thickness(es).

- Continue lowering the probe until the base of the well is encountered. Measure the depth of the well as detailed in Section 3.4.3.

- Slowly raise the interface probe, recording the depth to each interface as the probe is withdrawn. While raising the probe, wipe the wetted portion of the tape with a clean laboratory wipe or disposable cloth (shop towel or similar) that has been soaked with non-phosphate laboratory detergent solution to remove gross contamination. If there is a discrepancy in depths, clean the probe sensors and re-measure the depths.

- Decontaminate the measuring tape and probe between well locations as detailed in SOP No. 005 to minimize the potential of cross contamination.

3.4.2 Water Level Measurements

If a well has been sampled previously and no NAPLs were present, or if none of the preceding NAPL check conditions are met, the NAPL check may be omitted and an electronic water level detector can be used to measure water levels.

- Upon removing the well cap, ensure that enough time (a couple of minutes) has passed for the air pressure in the well to have equalized with atmospheric pressure.

- Turn the water level meter and test the alarm and liquid indication light. Adjust the sensitivity scale as needed.

- Remove the water level indicator probe from the case, and slowly lower the probe and cable into the well, allowing the cable reel to unwind. Continue lowering until the alarm sounds and the liquid indication light comes on. Very slowly, raise and lower the probe until the point is reached where the alarm just sounds. Record the depth to water.

- Slowly raise the probe and wipe the wetted portion of the tape (if any) with a clean laboratory wipe or disposable cloth (shop towel or similar) that has been soaked with non-phosphate laboratory detergent solution to remove gross contamination.

- Decontaminate the measuring tape and probe between well locations as detailed in SOP No. 005 to minimize the potential of cross contamination.

3.4.3 Well Depth Measurements

The depth of a well is a stable value established during well construction; changes in well depth are usually indicative of a potential problem with the well. Fluctuations in well depth may be caused by either settlement of fine-grained material (i.e., silt) at the bottom of the well or damage to the well casing or screen.

Do not attempt to measure the depth of a well when a dedicated pump is installed in the casing. The weighted tape or the electric water level indicator will likely get snagged onto the tubing and damage the pump assembly. The depth of the well should also not be measured in wells in which passive diffusion samplers have been deployed; tag the bottom of the well after the samplers have been removed and before their re-deployment for the next sampling round.

A weighted tape is the preferred tool for measuring well depths. For shallow wells, an electronic water level indicator probe may be employed. In deeper wells, a weight may be attached to the probe to aid in measuring the well depth. Well depths will be measured as follows:

- Lower the probe until it is resting on the bottom of the well. Slowly pull upward on the tape until a tug can be felt while lifting the probe off the well bottom.

- Record the depth of the well. If the tape distance markings on the electronic sounding device are not marked to the end of the probe (i.e., markings are referenced to an electrode in the middle of the probe), add the length of the probe beneath the electrode to the measured depth to obtain the true depth of the well.

- Compare the recorded depth to the installation depth in the well construction diagram/record and note any discrepancies. If discrepancies exist, re-measure the well depth. Note the presence of sediment at the base of the well (i.e., hard bottom versus soft bottom).

- Withdraw the probe and tape. While raising the probe, wipe the wetted portion of the tape with a clean laboratory wipe or disposable cloth (shop towel or similar) that has been soaked with non-phosphate laboratory detergent solution to remove gross contamination.

- Decontaminate the measuring tape and probe between well locations as detailed in SOP No. 005 to minimize the potential of cross contamination.

3.5 TRANSDUCERS AND DATALOGGERS

Transducers and dataloggers may be used for depth to water measurements in wells where water level fluctuations over time are to be measured, such as tidal fluctuation studies (SOP No. 045) and aquifer (hydraulic) tests (SOP No. 033). Note that transducers are inappropriate for measuring well depth.

No calibration is necessary before use. Depending upon the device used, correction factors may be required for some measurements. Check instrument batteries prior to each use. Exercise care not to break the seals at the top of the electric water level indicator probe.

3.5.1 Transducers Deployment

Attach the transducer umbilical leads to the datalogger. Turn datalogger on. Program the transducer following instructions provided in the instrument user manual. Refer to the planning document(s) for site-specific parameters and recording frequency.

Measure and record the depth to water and well depth using an electronic sounding device as detailed in Sections 3.4.2 and 3.4.3. Slowly lower the transducer into the well until it is below the lowest possible piezometric level (typically 2-3 feet below the water table). Attach the cable grip to the well protective casing and/or tape the cable to the casing to prevent the transducer from falling further.

Record the following information and computations in the field logbook during transducer deployment:

- Date and time of deployment
- Weather
- Casing elevation
- NAPL surface elevation = casing elevation – depth to NAPL
- NAPL thickness = depth to bottom of NAPL – depth to top of NAPL
- Water level elevation = casing elevation – depth to water
- Well bottom elevation = casing elevation – depth to bottom (or read directly from tape).
- Method of measurement.

With the transducer deployed and the umbilical secured to the protective casing, ensure that the transducer unit is programmed to start logging at a desired date and time, or manually start logging. Record the logging start time. View real-time readings using the data logger and download a series of data using the data logger to verify proper operation. If the transducer is logging as desired, allow the transducer to continue logging. If the data are not logging as required in the planning documents, stop data collection, re-program the transducer, and restart logging.

3.5.2 Transducer Data Recording and Manipulation

Periodically check and download data per the manufacturer's instructions at the frequency detailed in the planning document(s) using a datalogger or computer and instrument software to download the transducer. If data are downloaded onto a datalogger, upload the data to a computer upon returning to the office.

Use the transducer manufacturer's software and transducer deployment information to make the following updates to the transducer data as needed:

- Correct the raw water pressure data files from the submersible transducer(s) for barometric effects

- Convert the transducer-reported values to equivalent feet of water over the sensor

- Normalize the transducer water levels as depths to groundwater in feet below the water level measuring point.

3.5.3 Transducer Retrieval

Upon completion of data collection, withdraw the transducer and cable from the well. Decontaminate the transducer and cable as detailed in SOP No. 005.

4. SPECIAL CONSIDERATIONS

Measurement of depth to water in new wells should only be performed after the water elevation in the well has stabilized. This may take as long as 72 hours; however, if the formation in which the well was installed is tight, the well may take even longer to achieve steady state. Ensure that steady-state conditions have been reached before making measurements as determined by the project geologist.

Electronic sounding devices may sometimes give erroneous readings due to water droplets along the side of polyvinyl chloride casing or on sample/pump tubing within a well. To check for erroneous readings, raise the probe above the point where the first sound was noted; a continued buzzer alarm indicates that the water table has not been reached. Shake the tape to remove water adhered to the tape and continue lowering to the water table.

5. CALIBRATION

No calibration is required. However, the marked tapes of the instruments described in this SOP may stretch, especially when depth of the wells is great. If more than one instrument is used at a site during the same gauging event, consider comparing the markings of the tapes on all instruments by stretching them on clean plastic sheeting to the anticipated length to be used. If the delta is known between the tapes, corrections of the measurements can be done at the time data are processed.

6. PRECAUTIONS

Depending upon the device used, correction factors may be required for some measurements. Check instrument batteries prior to each use. Exercise care not to break the seals at the top of the electric water level indicator probe.

7. REFERENCES

Not applicable.

Standard Operating Procedure No. 011
for
Photoionization Detector

Prepared by

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Revision 0
December 2014

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to delineate protocols for field operations with the photoionization detector (MiniRae). The photoionization detector uses an ultraviolet emitting lamp designed to detect, measure, and display the total concentration of airborne ionizable gases and vapors. This information is used to determine control measures such as protection and action levels.

Use of brand names in this SOP is not intended as endorsement or mandate that a given brand be used. Alternate equivalent brands of detectors, sensors, meters, etc. are acceptable. If alternate equipment is to be used, the contractor will provide applicable and comparable SOPs for the maintenance and calibration of same.

2. MATERIALS

The following materials may be required:

Battery pack	Tedlar bag
Calibration gas (100 ppm isobutylene)	Tygon tubing
Microtip/MiniRae	Regulator

3. STARTUP/CALIBRATION PROCEDURE

Turn the instrument on by pressing the back of the power switch located on the handle of the instrument.

The message “Warming up now, please wait” will be displayed for up to 3 minutes. After normal display appears, the instrument is ready for calibration.

Fill a Tedlar bag with the desired calibration gas (usually 100 ppm Isobutylene).

Press SETUP button and select the desired Cal Memory using the arrow keys (normally set to 200 ppm). Press EXIT button to leave setup function.

Press CAL button and expose instrument to Zero Gas. (Usually clean outdoor air will be suitable. If any doubt exists as to the cleanliness of the background air a commercial source of zero gas should be used.)

The instrument then asks for the Span Gas concentration. Enter the known span gas concentration and then connect the Tedlar bag containing the Span Gas.

NOTE: The span gas concentration is dependent upon both the concentration of the span gas used and the rating of the UV lamp in the instrument at time of calibration. If using 100 ppm isobutylene and the standard 10.6 eV lamp, the span gas concentration will be 56 ppm.

Press enter and the instrument sets its sensitivity. Once the display reverts to normal, the instrument is calibrated and ready for use. Remove the Span Gas from the inlet probe. The instrument should be calibrated at least once a day.

4. BATTERY CHARGING

Ensure instrument is off. Set the voltage selector switch on the bottom of the battery charger to the appropriate AC line voltage. Press the release button on the bottom of the instrument and remove the battery pack by sliding it backwards. Plug charger into the battery pack and then into an AC outlet and allow the battery to charge for at least 8 hours. After charging, remove the charger, first from the outlet then from the battery pack, and slide the battery pack back onto the instrument.

5. PRECAUTIONS

Instrument does not carry an Intrinsic Safety Rating and must not be used in a hazardous location where flammable concentrations of gases or vapors are constantly present.

All calibration, maintenance, and servicing of this device, including battery charging, must be performed in a safe area away from hazardous locations.

Do not open or mutilate battery cells. Do not defeat proper polarity orientation between the battery pack and battery charger. Substitution of components may affect safety rating.

6. REFERENCES

Instrument User's Manual.

Standard Operating Procedure No. 012
for
Specific Conductance Measurements

Prepared by

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Revision 0
December 2014

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to delineate protocols for measuring the specific conductance of any aqueous solution, including drinking water, saline water, and industrial and domestic wastes. Conductivity is the ability of an aqueous solution to pass an electrical current. The current is primarily carried by dissolved inorganic ions such as chlorides, nitrates, sulfates, along with cations such as sodium, calcium, magnesium and others. Organic compounds do not carry current and, therefore, have almost no conductivity.

2. MATERIALS

The following materials may be required:

Conductivity meter with integral temperature compensation; accuracy = ±2 percent at 25°C (77°F)
Conductivity cell
Appropriate conductivity reference solution
High performance liquid chromatography (HPLC)-grade water (see SOP No. 005, Footnote 2)
Thermometer (optional, Section 5)

3. PROCEDURE

3.1 CALIBRATION

The specific conductivity meter should be calibrated at the beginning of each day[1] as follows:

1. Thoroughly rinse the probe with appropriate conductivity reference solution.

2. Zero meter if appropriate.

3. Measure the specific conductance of fresh appropriate conductivity reference solution record it in the field notebook, and adjust the calibration knob until the meter reads properly.

4. Rinse probe with HPLC-grade water.

5. Measure the specific conductance of HPLC-grade water and record in the field logbook. If specific conductivity of HPLC-grade water is not 0 (±2 percent) recalibrate instrument.

1. The meter should be recalibrated any time the readings are suspect (e.g., out of expected range).

3.2 OPERATION

The specific conductivity meter will be operated as follows:

1. Thoroughly rinse the probe and sample beaker with sample water.

2. Measure the temperature of the sample water. Convert Fahrenheit temperature readings to Celsius using C = 5/9(F - 32) if Celsius temperature is not obtained directly.

3. Place the probe in the sample beaker with sufficient sample to completely submerge the probe. Swirl the probe to remove any air bubbles trapped in the probe.

4. Select the highest multiplier scale on the meter and turn the instrument on. Progressively use lower multiplier scales until a mid-scale deflection is obtained.

5. If appropriate, check probe accuracy by pressing cell test button. If value change is >10 percent check probe.

6. Record the temperature and conductivity values.

7. Specific conductivity values are corrected for temperature using:

   K^25^oC = {*K measured*} over {1+ 0.0191 (t-25)}

   where

   K = Conductivity in µmhos
   t = Temperature, °C

8. Decontaminate the probe (see SOP No. 005, Section 3.3.3).

Refer to SOP Nos. 005 and 016.

4. MAINTENANCE

The following steps will be taken to properly maintain the conductivity meter:

1. Check the batteries each time the instrument is used.

2. Inspect the probe on a daily basis for damage or loss of platinum black plating from the electrode. If the platinum is damaged, alert the Field Team Leader and arrange to get a new cell.

3. Follow manufacturer's specifications regarding storage of probe between uses.

5. PRECAUTIONS

Be certain there is no air in the cell before taking a reading. If conductivity meter does not have integral temperature compensation, use a thermometer to determine temperature of the sample.

6. REFERENCES

Manufacturer's Manual.

U.S. Environmental Protection Agency. 1983. Methods for Chemical Analysis of Water and Wastes. March.

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Standard Operating Procedure No. 013
for
Collection of Monitoring Well Samples

Prepared by

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January 2019

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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are any client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**also check Box A**), or if this SOP is being used with no changes (**only check Box B**).

☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 013	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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DOCUMENT REVISION HISTORY

ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	1/23/2019	Systematic update and review	Jason Stroup, Scott Dobson	Matthew Bowman

1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to delineate protocols for the collection of groundwater samples from monitoring wells.

2. MATERIALS

The following materials may be required:

0.45-µM filters	Polyvinyl chloride bailer (for purging only)
Bladder pump (dedicated to one well only)	Sample bottles and labels
Conductivity meter	Stainless steel bailer (for purging and sampling)
Dissolved oxygen meter	Submersible pump and hose (for purging only)
Generator	Thermometer (optional)[1]
Logbook or book of field parameter forms	Transparent bailer with a double check valve
Peristaltic pump with tubing for filtering samples	Turbidity meter
pH meter with oxidation-reduction potential probe	Poly or Teflon® and/or Teflon® lined tubing **(PTFE or Teflon® should not be used when sampling for PFCs/PFAS)**
Photoionization detector organic vapor analyzer.	Variable speed, low flow submersible pump (e.g., Grundfos MP1 groundwater sampling pump) (for purging and sampling)
Variable speed peristaltic pump	Peristaltic head tubing
Plastic sheeting	Water level indicator
Polypropylene rope	Interface probe

NOTES: µM = Micrometer(s).
L = Liter.
mL = Millimeter.
PFAS = Per- and polyfluoroalkyl substances.
PFC = Perfluorinated compound.
PTFE = Polytetrafluoroethelyne.
VOC = Volatile organic compound.
PTFE bailer with PTFE-coated stainless steel cable, double check valve top, and controlled flow bottom discharge attachment[2] for VOC sampling (40-mL vials), and top discharge attachment for collecting larger samples (1-L bottles) (for purging and sampling)

3. PROCEDURE

3.1 GENERAL

Groundwater sampling will follow these general steps:

1. Temperature compensation and measurement capabilities are generally available as integral functions of pH meters and conductivity meters. If this is the case, a separate thermometer is not required.
2. Although use of a controlled flow bottom discharge valve is historically preferred, use of such a device can cause aeration of the sample.

- Arrive onsite
- Set up apparatus (generators, pumps, etc.)
- Glove
- Organic vapor check, water level, and well depth measurements
- Sample non-aqueous phase liquids (NAPLs) (as required)
- Begin purge procedure
  - If using bailer to purge and sample, see Section 3.6
  - If using pump to purge and bailer to sample, see Section 3.7
  - If using bladder or low-flow pump to purge and sample, see Section 3.8
- Decontaminate/re-glove
- Take samples
  - If with bailer, see Section 3.6
  - If with bladder or low flow pumps, see Section 3.8
- Decontaminate/dispose of wastes, move equipment to next site.

NOTE: Sampling monitoring wells that contain PFAS have specific requirements that must be followed. Review SOP No. 073 prior to planning or conducting any sampling for PFAS.

3.2 GENERAL RULES FOR GROUNDWATER FIELD PARAMETER LOGBOOK

Use only one site or installation per logbook, and only one sampling location per page or form (if using pre-printed forms). The same logbook may be used for more than one sampling event. The first five pages will be reserved for index, general notes, etc. Sign and date each entry. The last five pages will be reserved for recording calibration data for the pH, temperature, turbidity, oxidation-reduction potential, dissolved oxygen, and conductivity meters. Use the page number or a separately recorded "Cal Reference Number" to refer to each calibration.

As appropriate, insert the cardboard flap under the form being filled out so that writing does not go through to the pages below. As appropriate, fill in the forms from front to back of the logbook, tearing out the white copy for each sample when the sample has been collected. This copy goes in the cooler with the sample, directly to the laboratory. The original copy must be torn out before you write on the back of the duplicate form. As appropriate, duplicate copies, index pages, and calibration sheets remain intact.

Reference SOP No. 016 for additional procedures and requirements for the use and maintenance of field logbooks for sampling.

3.3 GROUNDWATER SAMPLING GENERAL RULES

Groundwater samples will be collected from the least contaminated wells first, progressing to the most contaminated[3]. Upon arrival at the well site, immediately set up and organize the purging, sampling, and filtration equipment. If needed, due to muddy or contaminated ground, remoteness from sampling vehicle, and/or for placement of hose(s) and/or power cord if a pump is used, place clean plastic sheeting at, or around the well, to serve as a clean staging area for purging and sampling equipment, as conditions warrant. Care must be exercised not to step on plastic sheeting. If the well is remote from the sampling vehicle, set up the filtration equipment and place rope, wrapped bailer, and pre-labeled sample containers on the plastic sheet from the well. When a pump is to be used, situate the portable generator on level ground approximately 15 feet (ft) away from and downwind from the well. All generator maintenance (oil and fueling) is to be performed offsite. If the hose(s) and/or power cord of the pump are not on a reel, place the pump with its hose and power cord on the plastic sheeting downhill from the well.

Check well headspace for organic vapor, which may pose a health and safety hazard and indicate the presence of NAPL. Measure depth(s) to and thickness(es) of NAPL(s) as appropriate. Measure the depth to water and depth of well. From the water depth, well diameter, sand pack length, etc., calculate the equivalent volume (1 EV) of water in the well.

$$1\ EV = \text{volume in casing} + \text{volume in saturated sand pack}$$

Therefore, if the water table lies below the top of the sandpack, use the following equation:

$$1\ EV = (\pi R_w^2 h_w) + (0.30\pi(R_s^2 - R_w^2)h_w) * (0.0043)$$

If the water table lies above the top of the sandpack use this equation:

$$1\ EV = [(\pi R_w^2 h_w) + (0.30\pi(R_s^2 - R_w^2)h_s)] * (0.0043)$$

where

R_s = Radius of sandpack in inches
R_w = Radius of well casing in inches
h_s = Height of sandpack in inches
h_w = Water depth in inches
0.0043 gallons (gal)/inch (in.)^3
Assumed filter pack porosity = 30 percent.

3. First round samples are to be collected from upgradient wells first, moving to downgradient wells under the assumption that upgradient wells will be less contaminated than downgradient wells. Results of first round analysis may mandate a change in sampling sequence.

Samples will always be collected in order of decreasing volatility (i.e., the samples to be analyzed for the volatile constituents should be collected first). Deliver the VOC sample to the vial by allowing the water to trickle down the inside wall of the vial at a rate no greater than approximately 100 mL/minute. Other samples may be delivered at a faster rate. Sampling rates will at no time exceed 1 L/minute. Procedures for each class of samples are contained in the site-specific Quality Assurance Project Plan.

When collecting samples for volatile analysis, care should be taken to prevent analyte loss by volatilization. The following procedures should be adhered to when collecting these samples:

- Avoid excessive aeration and agitation of sample.
- Fill vial so that a reverse meniscus is present by adjusting the flow rate from the sampling device.
- Place septum on vial so that the PTFE side is in contact with the sample. After the cap is on the bottle, check for air bubbles in the sample. If air bubbles are present, properly dispose of that sample and recollect the sample in the same vial or a new vial if prepreserved.
- Make sure vial is labeled and immediately transfer the vial to the cooler with ice.

Filtered and unfiltered samples will be taken for inorganics (metals) analyses, as appropriate. The samples will be filtered through an in-line 0.45-µM filter (preferred method), or by gravity through a 0.45-µM membrane placed in a filter funnel. Use forceps to place the membrane into the funnel and pour sample through funnel until appropriate volumes have been filtered.

If necessary, due to slow filtering, a peristaltic pump may be used to filter the sample through an in-line filter. Connect the pump to the generator, and attach tygon tubing to the bottom discharge valve on the bailer. Start pump and collect sample from the end of the in-line filter directly into the proper container, preserved, and placed in the cooler. Filtered samples will be preserved in the field with acid to a pH of less than 2. Make sure sample bottle is labeled and the cap is on tightly. Then place in cooler with ice immediately.

— OR —

If a low flow pump is used collect the samples, filtered samples will be taken by installing a 0.45-µM filter in-line and pumping the water through the filter. Collect sample from the end of the in-line filter directly into the proper container, preserved, and placed in the cooler. If a flow-through cell is used to measure water quality parameters, collect samples before flow-through cell. Filtered samples will be preserved in the field with acid to a pH of less than 2. Make sure sample bottle is labeled and the cap is on tightly. Then place in cooler with ice immediately.

Unfiltered samples will be collected by slowly pouring the sample water into the appropriate sample container, being careful not to agitate or cause bubbles to form. Do not overfill bottles. Make sure sample bottle is labeled and the cap is on tightly, then place the sample in cooler with ice immediately.

All samples will be delivered to the laboratory as soon as possible. If possible, samples will be shipped on the same day as they are collected. If samples must be retained due to weekend sampling (Friday through Sunday), the laboratory will be notified as to the time sensitive nature of the samples.

3.4 SAMPLING OF NON-AQUEOUS PHASE LIQUIDS

If NAPLs are detected in the well, a sample from all layers must be collected prior to any purging activities. NAPLs may be indicated by the presence of volatiles in the well headspace, and confirmed by the oil/water interface probe.

Collecting light non-aqueous phase liquid (LNAPL) will be accomplished using a transparent bailer with a double check valve. This bailer will be slowly lowered until the bottom of the bailer is 1-2 in. below the LNAPL-water interface, then slowly withdrawn. Verify that the interface was sampled by visual inspection of the bailer contents through the side of the bailer. Measure the thickness of the LNAPL in the bailer and note in the Field Logbook. Sample for laboratory analysis. An additional field verification may be performed by decanting the remainder of the contents of the bailer into a glass jar, adding a hydrophobic dye such as Sudan IV, or Redoil, shaking the sample and looking for coloration of NAPL. Alternate field tests are: examine the sample under ultraviolet light (many fluoresce), or allow the sample to stand overnight, and examine for interface and/or volatiles in the headspace the following day. Refer to the following sections on purging and sample collection for setup and general operation.

Collecting dense non-aqueous phase liquids (DNAPLs) will be accomplished using a transparent bailer with a double check valve. The bailer must be lowered very slowly to the bottom of the well and raised slowly out of the well in a controlled fashion. Sample for analysis as above. The same field check described above may be employed for DNAPL. Refer to the following sections on purging and sample collection for set up and general operation.

If NAPLs are present in the well, **and** a low-flow pump is to be used for purging and sampling, the well will be allowed to re-equilibrate prior to purging and sampling. This will be accomplished by allowing the well to stand undisturbed for at least 8 hours prior to purging and sample collection.

3.5 WELL PURGING GENERAL RULES

Water within the casing of a well will stagnate, de-gas, lose volatiles, possibly precipitate metals due to changes in redox potential, and may react with the screen and/or casing material. It is, therefore, necessary to purge a sufficient volume of this stagnant water from the well and/or casing to ensure that a representative sample of formation water can be obtained. Traditionally,

the volume of water to be purged was arbitrarily set at 3-5 equivalent volumes. Recent advances in sampling technologies have caused a re-thinking of such arbitrary purge volumes. It is, for this reason, that monitoring of select chemical and physical properties of the sample medium will be used instead of strict volumes to determine when a representative sample may be taken from a well.

Acceptable purge/sampling devices include: bailers, high-discharge submersible pumps (purge only), and variable speed, low-flow pumps that include both submersible pumps (purge and sample) and dedicated bladder pumps (purge and sampling). It is recommended to purge and sample at similar rates with one type device per well. An acceptable exception to this general rule is to use a high-discharge submersible pump to purge a deep, fast-recharging well, and a bailer to sample the same well.

Peristaltic, gas-lift, and centrifugal pumps can cause volatilization, produce high pressure differentials, and result in variability in the analysis of some analytes of interest. For this reason, these pumps should be used with caution and flow rate slowed to minimize volatilization.

To prevent groundwater from cascading down the sides of the screen into an open hole, thereby aerating the sample, purge rates will closely match recharge rates. If the static water level is within the casing, the initial purge rates may be set high enough to lower the water level to the top of the screen, then reduced to maintain that level and identify the well's recharge rate.

Purging will be accomplished with either a submersible pump, a low-flow (submersible or bladder) pump, or bailer. The choice of bailer or pump will be based on depth to water table, volume to be purged, and permeability of the aquifer. If the well recharges rapidly and/or has greater than 20 gal (estimated EV) to be purged, water may be removed with a submersible pump or a low-flow pump. If the well recharges slowly and/or has less than 20 gal to be purged, water will be removed with a bailer or a low-flow pump.

Purging will be accomplished with as minimal disturbance to the surrounding formation as possible.

Purge water will be containerized onsite until analysis of samples is completed. Based on sample results, accumulated purge water will be properly disposed of.

If the water level is within the screened interval and the well recharge rate is less than 0.1 L/minute, purge the well using a low-flow pump as follows:

1. Draw the water down to within 1 ft of the top of the pump.

2. Allow the well to recover.

3. Check and record field parameters.

4. Repeat Steps 1 through 3 then collect samples for metals analysis only[4].

5. Note the event in the Field Logbook, and report the problem to the Project Manager. If this extremely low recharge problem consistently occurs in a given well, the well may be considered for re-development and/or replacement.

6. If adjacent wells have elevated VOC levels, additional soil gas surveys will be considered in the vicinity of the low recharge well to help determine the need for replacement.

3.6 PURGING AND SAMPLING WITH BAILERS

Bailers may be used for both purging and sampling wells if: (1) the well recharge rate is less than 4 L/minute, (2) depth to the water table is less than 50 ft, and (4) less than 20 gal are to be purged (5 EV < 20 gal)[5].

When purging with a bailer, either a polyvinyl chloride, PTFE, or stainless steel bailer may be used. The bailer will be attached to either a spool of PTFE-coated stainless steel cable or polypropylene rope. If using cable, attach it to the bailer using stainless steel cable clamps. Thoroughly decontaminate the cable after each use, prior to rewinding cable onto spool. Cable clamps and raw cable ends may serve to trap contamination. Exercise particular caution in decontaminating these areas. If using rope, attach the rope to the bailer using a bowline knot, dispense the needed length (a few feet more than the well depth), and cut the remainder away; then, at the end opposite the bailer, make a slip knot and place it around the well casing or protective posts to prevent losing the bailer and rope down the well. The polypropylene rope will be not reused; it will be properly disposed of. Either type of bailer will be repeatedly lowered gently into the well until it fills with water, is removed, and the water discharged into an appropriate container until purging is complete. Care must be taken not to unduly agitate the water, as this tends to aerate the sample, increase turbidity, makes stabilization of required parameters difficult to achieve, and generally prolongs purging.

After purging 2 EV, obtain a sample of groundwater and measure the following stabilization parameters: temperature, conductivity, pH, turbidity, redox potential (Eh), and dissolved oxygen level at each successive half-well volume. When three of these stabilization parameters are in agreement within approximately 10 percent in three consecutive half-well volume samples, sufficient water has been purged from the well. The results of these tests should be recorded in the sampling logbook. Should these parameters not reach agreement, no more than five well volumes will be purged.

4. Analyte losses due to volatilization in a drained well are too high for valid VOC sampling (McAlary and Barker 1987).
5. These numbers are based on the following assumptions: (1) In purging, it is preferable to remove water at approximately the recharge rate; (2) 4 L/minute is estimated as the approximate maximum rate at which water can be removed with a bailer from depths of 20-50 ft; and (3) 20 gal is estimated to be at the limit of the sampler's endurance, at which point fatigue and sloppiness of technique begin.

Immediately upon completion of purging, collect samples for laboratory analysis using a PTFE bailer on a PTFE-coated stainless steel cable. The bailer will be equipped with double check valve top and controlled flow bottom discharge attachments for VOC sampling (40-mL vials), and top discharge attachment for collecting larger samples (1-L bottles).

Slowly, so as not to agitate the water, lower the bailer into the well, using a spool of PTFE-coated cable. Allow bailer to fill, withdraw smoothly. Refill bailer as needed.

If the controlled flow bottom discharge attachment is used for VOC sampling, attach it to the bottom of the bailer. Using the stopcock valve on the bailer to control the flow, and fill sample vials as described above in Section 3.3.

Remove check valve top and pour unfiltered sample into inorganics sample bottles.

Collect filtered samples as described in Section 3.3. Decontaminate bailer and cable.

3.7 PURGING WITH PUMP, SAMPLING WITH BAILER

If the recharge rate of the well is greater than 30 L/minute, or the water level is deeper than 50 ft, or more than 20 gal of purge water will be generated (5 EV > 20 gal), then purging and sampling may be accomplished using a submersible pump/bailer combination.

When purging with a pump, gradually lower the intake until it is submerged within the screened interval. Lower an electronic water level probe to the top of the screen (as determined from completion records) to the monitor water level, start pump, and slowly lower the pump as the water level continues to fall. Care should be exercised to lower the water column to the top of the screened interval (water level probe will stop beeping) but not below the top of the screen if possible. This will ensure that the stagnant layer has been removed, but should minimize the detrimental effects of over pumping the well. Secure hose(s) and/or power cord to casing and place discharge hose into the proper container, downhill and as far away from the well as possible. Determine and record the discharge rate.

Discharge rate = volume of container/time to fill container

The discharge rate will be established at approximately equal to or just greater than the well's recharge rate (determined from well development). If well development records are incomplete, recharge rate can be determined by monitoring the rise/fall of the water level within the casing as one purges the well. If the water level is static at a given pumping rate, but fluctuates up or down as pumping rate is decreased or increased, the pumping rate at which the water level is static is the recharge rate.

After purging 2 EV, obtain a sample of groundwater and measure the following stabilization parameters: temperature, conductivity, pH, turbidity, redox potential (Eh), and dissolved oxygen level at each successive half-well volume. When three of these stabilization parameters are in agreement within approximately 10 percent in three consecutive half-well volume samples,

sufficient water has been purged from the well. The results of these tests should be recorded in the sampling logbook. Should these parameters not reach agreement, no more than five well volumes will be purged.

Immediately upon completion of purging, collect samples for laboratory analysis using a PTFE bailer on a PTFE-coated stainless steel cable. The bailer will be equipped with a double check valve top and controlled flow bottom discharge attachments for VOC sampling (40-mL vials), and top discharge attachment for collecting larger samples (1-L bottles). Filtration of metals samples will be accomplished using either an in-line filter attached to the bottom of the bailer, or a funnel and appropriate filter (Section 3.3).

Slowly, so as not to agitate the water, lower the bailer into the well, using a spool of PTFE-coated cable. Allow bailer to fill, withdraw smoothly, and fill sample containers as described in Section 3.6. Decontaminate bailer and cable in and decontaminate pump.

3.8 PURGING AND SAMPLING WITH LOW-FLOW PUMP

To obtain representative samples, subsurface disturbances should be kept to a minimum, thereby preventing sample alteration due to sampling actions. The reasoning behind the use of low-flow pumps to purge and sample monitoring wells is that these pumps minimize physical disturbance (turbulence) at the sampling point and chemical changes (aeration) in the medium. For these reasons, the low-flow pump is the preferred method for both purging and sampling in most cases. For the purposes of this SOP, “low-flow pumps” are defined as either dedicated bladder pumps or variable speed submersible pumps. Practical operational flow rates for these sampling devices range from 0.1 to 30 L/minute.

Low-flow pumps may be used for purging and sampling any well having recharge greater than 0.1 L/minute, which is the practical lower limit of pump performance. Below that pumping rate, pump inefficiencies and/or overheating may alter the physical and chemical properties of the sample. If the pump is continuously operated at sampling rates higher than the well recharge rate, the water level will be lowered in the well, possibly allowing aeration of the sample that is unacceptable sampling procedure. Low-flow pumps are suitable for sampling wells with recharge rates lower than 0.1 L/minute if precautions are taken to avoid aeration of the sample.

Low flow submersible pumps will be used as follows:

- Lower the pump into the well, slowly so as not to agitate the water, until the pump is at the mid-point of the screened interval or the mid-point of the water column if the static water table lies below the top of the screen.[6]

- Attach the pump's umbilical cord (which will consist of power cord and sampling tubing) to the protective casing, or lock the cord spool so that the pump cannot move vertically in the well during sampling.

- Lower the water level probe into the well behind the pump until it just touches water. This will allow the sampler to monitor the water level while purging and sampling, and prevent the inadvertent drying of the well.

- Begin purging at the pump's lowest setting, then gradually increase rate[7] until the pumping rate matches the aquifer recharge rate. **If the water level is above the top of the screen**, the pumping rate may be allowed to slightly exceed recharge rate, lowering the water level to no less than 1 ft above the screen, then reduced until it matches recharge rate and purging continued. **If the water level is below the top of the screen**, always keep the purge rate lower than well's recharge rate.

- Monitor stabilization parameters listed in Section 3.6 beginning immediately, using an in-line monitoring system. Record parameters regularly, at a rate of one set of parameters per each 1-3 liters of water removed from the well. When these parameters stabilize to within 10 percent over three consecutive readings, reduce[8] flow rate to 0.1 L/minute (if needed) and begin collecting VOC samples directly from the discharge line.

- If the well recharges at a rate less than 0.1 L/minute, purge until the water level is even with the top of the screen, allow the well to recover, and sample immediately.

- Remove and decontaminate water level probe and pump.

6. This assumes a 10-ft screened interval. If the screened interval is greater than 10 ft, multiple samples should be taken as follows:
   - If the screen is 10-12 ft, sample the canter of the water column, as outlined above.
   - If the screen is longer than 12 ft, and the water column is 10 ft or less, sample the center of the water column.
   - If the screen is longer than 12 ft, and the water column fills the screen, or extends above the screen, sample at 1/3 and 2/3 the height of the water column, or about every 6 ft.
7. Some sources indicate that the pumping rate should not exceed 1 L/minute, with 0.5 L/minute being preferable. The optimal purge rate is highly aquifer dependent, and may range from less than 0.5 L/minute to greater than 10 L/minute. The purge rate for a given well will, therefore, be a field decision, based on well development, purge, and sampling records rather than SOP mandate.
8. Sampling should occur at the same rate as purging as long as aeration of sample does not occur.

4. MAINTENANCE

Refer to manufacturer's requirements for maintenance of pumps and generators.

5. PRECAUTIONS

Refer to the site-specific Health and Safety Plan for appropriate personal protective equipment.

6. REFERENCES

McAlary, T.A. and J.F. Barker. 1987. Volatilization Losses of Organics During Groundwater Sampling From Low Permeability Materials, in Groundwater Monitoring Review. Fall.

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Standard Operating Procedure No. 016
for
Field Logbooks and Surface Water, Groundwater, and Soil/Sediment Field Checklists

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Revision 1
July 2019

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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are any client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**also check Box A**), or if this SOP is being used with no changes (**only check Box B**).

☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 016	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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DOCUMENT REVISION HISTORY

ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	27 June 2019	Combine SOP 059 with 016. Reviewed and updated content as appropriate.	Dan Hinckley and Jesse Drummond	Matthew Bowman

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to delineate protocols for completion of field logbooks and completion of field forms used to record surface water, groundwater, soil/sediment sampling information, instrument calibration data, and data from hydrologic testing. Acceptable field logbooks are bound, unprinted books such as a surveyor's field logbook, or a Federal Supply Service Number (No.) 7530-00-222-3525 record book (or equivalent); or they may be company-proprietary, pre-printed forms bound into a field logbook. Example forms are provided herein. Alternate, equivalent forms are acceptable.

2. MATERIALS

The following material may be required: field logbook, indelible ink pen, and field checklists documented in Sections 3.1 through 3.7.

3. PROCEDURE

All information pertinent to a field survey or sampling effort will be recorded in a bound logbook. Each page/form will be consecutively numbered, dated, and signed. All entries will be made in indelible ink, and all corrections will consist of line-out deletions that are initialed and dated. The person making the correction will provide a brief explanation for the change. Entries are factual only. No personal opinions should be entered.

There should be no blank lines on a page. A single blank line or a partial blank line (i.e., at the end of a paragraph) should be lined to the end of the page. If only part of a page is used, the remainder of the page should have an "X" drawn across it. The bottom of each page must be signed and dated by the field personnel entering the information.

At a minimum, entries in the field logbook will include but not be limited to the following:

- Date.
- Project number and project name.
- Name and address of field contact.
- Identification of sample crew members.
- Documentation should include model numbers of equipment used (e.g., data loggers, drilling rigs) and calibration (if applicable). Each day's entry should begin with time onsite, who is onsite (including observers other than the sampling crew), brief description of what work will be performed that day and how, and the weather.

- If samples are being taken in or near tidal waters, the time of high and low tide for the site should be determined from local gauges or tables and recorded.

- References such as maps of the sampling site.

- Times of key daily milestones should be entered (e.g., time borings began, times personnel arrived and left site, times subcontractors arrived and left site, etc.). Time should be recorded in the left-hand margin on the page in military time.

- Sample-specific information:

  — Unique, sequential field sample number

  — Purpose of sampling

  — Location, description, and log of photographs of each sampling point

  — Details of the sample site (e.g., elevation of the casing, casing diameter and depth, integrity of the casing, etc.)

  — Documentation of procedures for preparation of reagents or supplies that become an integral part of the sample (e.g., filters and absorbing reagents)

  — Type of media of sample (e.g., groundwater, surface water, soil, sediment, and product)

  — Suspected waste composition

  — Number and volume of sample taken

  — Sampling methodology, including distinction between grab and composite sample

  — Sample preservation

  — Date and time of collection

  — Collector's sample identification number(s)

  — Sample shipment (e.g., name of the laboratory and cartage agent: Federal Express, United Parcel Service, etc.)

  — Field observations (e.g., oily sheen on groundwater sample, incidental odors, soil color, grain size, plasticity, moisture content, layering, Unified Soil Classification System classification, etc.)

— Any field measurements made (e.g., pH, conductivity, explosivity, water depth, organic vapor analyzer readings, etc.)

— Signature and date by the personnel responsible for observations

— Decontamination procedures.

Sampling situations vary widely. No general rules can specify the extent of information that must be entered in a field logbook. However, records should contain sufficient information so that someone can reconstruct the sampling activity without relying on the sampler's memory. Further, the project work plan or field sampling plan should be reviewed to identify additional specific information or requirements that should be included in the field logbook.

The Project Manager will keep a master list of all field logbooks assigned to the Sampling Team Leaders. One field logbook kept by the Project Manager will be a master site log of daily activities and will contain the list of field logbooks assigned to Sampling Team Leaders.

Project name and number should be clearly marked on the outside cover using indelible ink. If more than one field logbook exists for the project, then the number of the field logbook should also be clearly marked on the outside cover.

Field checklists associated with the collection of soil, sediment, surface water, and groundwater are shown in Figures SOP016-1 through SOP016-9 and described in Sections 3.1 through 3.7. The details described above for completion of the field logbook should be completed even though these field checklists have been completed, and the field checklists noted in the field logbook. While the importance of the use of field logbooks is emphasized in this SOP, it is acknowledged that alternate documentation approaches may be necessary (e.g., higher reliance on documentation forms, use of electronic tablets) for a variety of client and project-specific reasons. It is essential the team establish clear expectations for the use of field logbooks during project planning and document any differences from this SOP in the project-specific variance form.

3.1 SOIL/SEDIMENT FIELD CHECKLISTS (REQUIRES FIGURES SOP016-1 AND SOP016-3)

3.1.1 Field Parameter Form (Items on Figures SOP016-1 and SOP016-2)

1. HIGH CONCENTRATION EXPECTED?: Answer "Yes" or "No."

2. HIGH HAZARD?: Answer "Yes" or "No."

3. SITE: Record the complete name of the site.

4. AREA: Record the area designation of the sample site.

5. INST CODE: Record the 2-letter installation code appropriate for the installation or site. Correct abbreviations can be found on Pages 3-6 of the Installation Restoration Data Management System (IRDMS) User's Guide for chemical data entry.

6. FILE NAME: Record "CSO" for a soil sample or "CSE" for a sediment sample.

7. SITE TYPE: Record the abbreviation appropriate for where the sample was taken. Correct abbreviations can be found on Pages 18-21 of the IRDMS User's Guide for chemical data entry. This entry must match the Site Type on the map file form.

8. SITE ID: Record a code up to 10 characters or numbers that is unique to the site.

9. FIELD SAMPLE NUMBER: Record a code specific for the sample.

10. DATE: Enter the date the sample was taken.

11. TIME: Enter the time (12-hour or 24-hour clock acceptable as long as internally consistent) the sample was taken.

12. AM PM: Circle "AM" or "PM" to designate morning or afternoon (12-hour clock).

13. SAMPLE PROG: Record "GQA" (Groundwater Quality Assessment) or other appropriate sample program.

14. DEPTH (TOP): Record the total depth sampled.

15. DEPTH INTERVAL: Record the intervals at which the plug will be sampled.

16. UNITS: Record the units of depth (feet, meters)

17. SAMPLE MEASUREMENTS: Check the appropriate sampling method.

18. CHK: Check off each container released to a laboratory.

19. ANALYSIS: Record the type of analysis to be performed on each sample container.

20. SAMPLE CONTAINER: Record the sample container type and size.

21. NO.: Record the number of containers.

22. REMARKS: Record any remarks about the sample

23. TOTAL NUMBER OF CONTAINERS FOR SAMPLE: Record the total number of containers.

24. SITE DESCRIPTION: Describe the location where the sample was collected.

25. SAMPLE FORM: Record the form of the sample (i.e., clay, loam, etc.) using The Unified Soil Classification System.

26. COLOR: Record the color of the sample as determined from standard Munsell Color Charts.

27. ODOR: Record the odor of the sample or "none." See SOP No. 001 Section 5.

28. PID (HNu): Record the measured photoionization detector (PID) (HNu) values.

29. UNUSUAL FEATURES: Record anything unusual about the site or sample.

30. WEATHER/TEMPERATURE: Record the weather and temperature.

31. SAMPLER: Record your name.

3.1.2 Map File Form (Figure SOP016-3)

1. The map file logbook form will be located on the reverse of the field parameter logbook form, or on an adjoining page of the field logbook (if level book is used).

2. SITE ID: Record the Site ID from the field parameter form.

3. POINTER: Record the field sample number for the sample being pointed to.

4. DESCRIPTION/MEASUREMENTS: Describe the location where the sample was taken, along with distances to landmarks.

5. SKETCH/DIMENSIONS: Diagram the surroundings and record the distances to landmarks.

6. MAP REFERENCE: Record which U.S. Geological Survey Quad Map references the site.

7. COORDINATE DEFINITION: Write the compass directions the X- and Y-Coordinates of the map run.

8. COORDINATE SYSTEM: Write "UTM" (Universal Transverse Mercator).

9. SOURCE: Record the 1-digit code representing the Map Reference.

10. ACCURACY: Give units (e.g., write "1-M" for 1 meter).

11. X-COORDINATE: Record the X-Coordinate of the sample site location.

12. Y-COORDINATE: Record the Y-Coordinate of the sample site location.

13. UNITS: Record the unit's map sections are measured in.

14. ELEVATION REFERENCE: Record whether topography was determined from a map or a topographical survey.

15. ELEVATION SOURCE: Record the 1-digit code representing the elevation reference.

16. ACCURACY: Record the accuracy of the map or survey providing the topographical information.

17. ELEVATION: Record the elevation of the sampling site.

18. UNITS: Write the units in which the elevation is recorded.

19. SAMPLER: Write your name.

3.2 SURFACE WATER FIELD CHECKLISTS (REQUIRES FIGURES SOP016-2 AND SOP016-3)

3.2.1 Field Parameter Form (Items Unique to Figure SOP016-3)

1. CAL REF: Record the calibration reference for the pH meter.

2. pH: Record the pH of the sample.

3. TEMP: Record the temperature of the sample in degrees Celsius.

4. COND: Record the conductivity of the water.

5. For all other sections, see Section 3.2.1.

3.3 GROUNDWATER SAMPLING FIELD CHECKLISTS (REQUIRES FIGURES SOP016-2, SOP016-3, AND SOP016-4)

3.3.1 Field Parameter Form (Items on Figure SOP016-4)

1. WELL NO. OR ID: Record the abbreviation appropriate for where the sample was taken. Correct abbreviations can be found on Pages 18-21 of the IRDMS User's Guide for chemical data entry.

2. SAMPLE NO.: Record the reference number of the sample.

3. WELL/SITE DESCRIPTION: Describe the location where the sample was taken, along with distances to landmarks.

4. X-COORD and Y-COORD: Record the survey coordinates for the sampling site.

5. ELEV: Record the elevation where the sample was taken.

6. UNITS: Record the units the elevation was recorded in.

7. DATE: Record the date in the form MM/DD/YY.

8. TIME: Record the time, including a designation of AM or PM.

9. AIR TEMP.: Record the air temperature, including a designation of C or F (Celsius or Fahrenheit).

10. WELL DEPTH: Record the depth of the well in feet and inches.

11. CASING HT.: Record the height of the casing in feet and inches.

12. WATER DEPTH: Record the depth (underground) of the water in feet and inches.

13. WELL DIAMETER: Record the diameter of the well in inches.

14. WATER COLUMN HEIGHT: Record the height of the water column in feet and inches.

15. SANDPACK DIAM.: Record the diameter of the sandpack. Generally, this will be the same as the bore diameter.

16. EQUIVALENT VOLUME OF STANDING WATER: Use one of the following equations, to determine one equivalent volume (EV):

    1 EV = Volume in casing + volume in saturated sand pack. Or to restate:

    $1\ EV = (BR_w^2h_w + 0.30B(R_s^2-R_w^2)h_s) * (0.0043)$

    where

    R_s = Radius of sandpack in inches
    R_w = Radius of well casing in inches
    h_s = Height of sandpack in inches
    h_w = Water depth in inches

    $0.0043 = gal/in.^3$
    and filter pack porosity is assumed as 30 percent

— OR —

Volume in casing = $(0.0043 \text{ gal/in.}^3)(B)(12 \text{ in./ft})(R_c^2)(W_h)$

where

R_c = Radius of casing in inches
W_h = Water column height in feet

Vol. in sandpack = $(0.0043 \text{ gal/in.}^3)(B)(12 \text{ in./ft})(R_b^2 - R_c^2)(W_h)(0.30)$

(if W_h is less than the length of the sandpack),

— PLUS —

Vol. in sandpack = $(0.0043 \text{ gal/in.}^3)(B)(12 \text{ in./ft})(R_b^2 - R_c^2)(S_h)(0.30)$

(if W_h is greater than the length of the sandpack).

where

R_b = Radius of the borehole
S_h = Length of the sandpack.

Show this calculation in the comments section.

17. VOLUME OF BAILER OR PUMP RATE: Record bailer volume or pump rate.

18. TOTAL NUMBER OF BAILERS OR PUMP TIME: Record the number of bailers required to remove 3 equivalent volumes (EV) of water from the well or the total purge time and volume as applicable.

19. WELL WENT DRY? Write “YES” OR “NO.”

20. NUMBER OF BAILERS OR PUMP TIME: Record the number of bailers or pump time which made the well go dry.

21. VOLUME REMOVED: Record the volume of water (gal) removed before the well went dry.

22. RECOVERY TIME: Record the time required for the well to refill.

23. PURGE AGAIN?: Answer “YES” or “NO.”

24. TOTAL VOL. REMOVED: Record the total volume of water (in gal) removed from the well.

25. CAL REF.: Record the calibration reference for the pH meter.

26. TIME: Record time started (INITIAL T[0]), 2 times DURING the sampling and the time sampling ended (FINAL).

27. pH: Record the pH at start of sampling (INITIAL), twice DURING the sampling and at the end of sampling (FINAL).

28. TEMP: Record the water temperature (Celsius) at the start of sampling, twice DURING the sampling, and at the end of sampling (FINAL).

29. COND: Record the conductivity of the water at the start of sampling, twice DURING the sampling, and at the end of sampling (FINAL).

30. D.O.: Record the dissolved oxygen level in the water at the start of sampling, twice DURING the sampling, and at the end of sampling (FINAL).

31. TURBIDITY: Record the readings from the turbidity meter (nephelometer) and units at the start of sampling, twice DURING the sampling, and at the end of sampling (FINAL).

32. ORD: Record the oxidation/reduction (RedOx) potential of the water sample at the start of sampling, twice DURING the sampling, and at the end of sampling (FINAL).

33. HEAD SPACE: Record any positive readings from organic vapor meter reading taken in well headspace prior to sampling.

34. NAPL: Record the presence and thickness of any non-aqueous phase liquids (light or dense)

35. COMMENTS: Record any pertinent information not already covered in the form.

36. SIGNATURE: Sign the form.

3.4 FIELD CALIBRATION FORMS (MAINTAINED AS A SEPARATE LOGBOOK, OR INCORPORATED INTO SAMPLING LOGBOOKS)

3.4.1 Items on Figure SOP016-5

1. Record time and date of calibration. Note whether 12- or 24-hour clock was used.

2. Record calibration standard reference number.

3. Record meter I.D. number

4. Record initial instrument reading, recalibration reading (if necessary), and final calibration reading on appropriate line.

5. Record value of reference standard (as required).

6. COMMENTS: Record any pertinent information not already covered on form.

7. SIGNATURE: Sign form.

3.5 GROUNDWATER HYDROLOGY TESTS CHECKLISTS (MUST INCLUDE FIGURES SOP016-6 AND SOP016-7 AND/OR SOP016-8 OR SOP016-9)

3.5.1 Field Permeability Test Data Sheet (Items on Figures SOP016-6)

1. CONTRACTOR: Organization performing the test.

2. SEQ. #: Enter page number of this set of forms (page # of #).

3. PROJECT NAME: Record the name assigned by the contractor's organization to the project.

4. PROJECT NO.: Record the contractor assigned project number or the contract number.

5. LOCATION: Specific location

6. CLIENT: Agency or company with the contract under which the work is being performed.

7. FIELD PARTY CHIEF: Printed name of the person responsible for this particular field test.

8. WELL #: Record the well number as it appears on the well completion tag, affixed to the protector casing or well completion records.

9. TEST TYPE: Short description of the type of test to be performed.

10. RISING/FALLING HEAD WITH SLUG: Check if the test involved the insertion/removal of and inert object.

11. RISING/FALLING HEAD WITHOUT SLUG: Check if the test involved the addition/removal of a quantity of water.

12. START DATE: Date on which the test was begun.

13. CLOCK TIME: Time each datum (depth to groundwater level) is collected. Note whether 12- or 24-hour clock was used.

14. ELAPSED TIME: Time since the last datum was collected.

15. DEPTH TO GWL (ft): Depth to the top of the groundwater table (Groundwater Level) as measured by manual methods.

16. REC. (ft): Water level as reported by transducer/datalogger (this is the depth of water above the transducer.

17. TIME: Time the discharge rate check was begun (addition or removal of water method). Note whether 12- or 24-hour clock was used.

18. FLOW METER (Addition or removal of water method): The amount of water added or removed as registered by the flowmeter, in gal of liters.

19. DISCHARGE RATE: Flowmeter reading divided by time interval (gal/min or liters/min).

20. SIGNATURE: The person completing this form must sign the form at the end of the test.

21. DATE: Date the form was signed.

3.5.2 Groundwater Levels – Single Well (Items on Figure SOP016-7)

1. CONTRACTOR: Organization performing the test.

2. SEQ. #: Enter page number of this set of forms (page # of #).

3. PROJECT NO.: Record the contractor assigned project number or the contract number.

4. WELL #: Record the well number as it appears on the well completion tag, affixed to the protector casing or well completion records.

5. PROJECT NAME: Record the name assigned by the contractor's organization to the project.

6. LOCATION: Specific location.

7. FIELD PARTY CHIEF: Printed name of the person responsible for this particular field test.

8. CLIENT: Agency with the contract under which the work is being performed.

Well Data

9. STICKUP: Enter the length of well casing extending above the average ground surface at the base of the protective casing.

10. MEASURED UP(+)/DOWN(-) FROM: Describe the starting point for the previous measurement.

11. MP ELEVATION: Enter the elevation of the measuring point here. NOTE: This datum may require reference to tables and/or maps and may be added after completing the day's fieldwork.

12. DATUM = MSL OR: Is the datum for the previous elevation Mean Sea Level? If not, what? Also tell whether it was derived from a map elevation (write "MAP") or survey data (write "SURVEY").

13. MEASURING POINT DESCRIPTION: Describe the point used as the origin for all down-hole (water table) measurements. NOTE: Remedial investigation wells are required to have a permanently marked reference (measuring) point (refer to SOP No. 019).

14. REMARKS: Record any pertinent observations about the site/well conditions not specifically required in the preceding.

15. DATE: Date of each water level reading

16. TIME: Time of each water level reading. Note whether 12- or 24-hour clock was used.

17. ELAPSED TIME: Time since test was begun.

18. DEPTH TO WATER: Measured depth to the groundwater table.

19. WATER ELEVATION: Elevation of the top of the groundwater table (use datum listed above).

20. MEAS. METH.: Method used to measure the water level in the well (see abbreviation key at the bottom of the data sheet).

21. TAPE NO.: The unique identification number of the traceable standard tape used to calibrate the measuring device.

22. WELL STATUS: Condition of the well at the time of measuring (see abbreviation key at the bottom of the data sheet).

23. REMARKS: Any additional pertinent comments not specifically required above.

24. INITIALS: Initials of person completing this data entry.

25. ABBREVIATION KEYS: Self-explanatory.

26. SIGNATURE: The person completing this form must sign the form at the end of the test.

27. DATE: Date the form was signed.

3.5.3 Groundwater Levels – Single Well (Items on Figure SOP016-8)

1. CONTRACTOR: Organization performing the test.

2. SEQ. #: Enter page number of this set of forms (page # of #).

3. PROJECT NO.: Record the contractor assigned project number or the contract number.

4. WELL #: Record the well number as it appears on the well completion tag, affixed to the protector casing or well completion records.

5. PROJECT NAME: Record the name assigned by the contractor's organization to the project.

6. LOCATION: Specific location.

7. FIELD PARTY CHIEF: Printed name of the person responsible for this particular field test.

8. CLIENT: Agency with the contract under which the work is being performed.

Well Data

9. STICKUP: Enter the length of well casing extending above the average ground surface at the base of the protective casing.

10. MEASURED UP(+)/DOWN(-) FROM: Describe the starting point for the previous measurement.

11. MP ELEVATION: Enter the elevation of the measuring point here. NOTE: This datum may require reference to tables and/or maps and may be added after completing the day's fieldwork.

12. DATUM = MSL OR: Is the datum for the previous elevation Mean Sea Level? If not, what? Also tell whether it was derived from a map elevation (write "MAP") or survey data (write "SURVEY").

13. MEASURING POINT DESCRIPTION: Describe the point used as the origin for all down-hole (water table) measurements. NOTE: All Rhode Island wells are required to have a permanently marked reference (measuring) point (refer to SOP No. 019).

14. REMARKS: Record any pertinent observations about the site/well conditions not specifically required in the preceding.

15. DATALOGGER: This section is record of pertinent datalogger information.

16. MANUFACTURER: Record the manufacturer/brand name as stated on the datalogger.

17. MODEL: Enter the model number of the datalogger.

18. S/N: Enter the serial number of this datalogger.

19. TAG PROGRAMMED IN LOGGER: What is the identifier used in the datalogger's program to indicate that this unit was used to record a given data set?

20. TRANSDUCER: This section is a listing of pertinent information about the transducer used.

21. MANUFACTURER: Record the manufacturer/brand name as stated on the transducer.

22. MODEL: Enter the model number of the transducer.

23. S/N: Enter the serial number of this transducer.

24. INPUT/UNITS: What are the units this transducer uses?

25. RANGE: Record the pressure or depth range over which this transducer is certified.

Calibration

26. PRESSURE RATING: This is taken from the manufacturer's specifications for a given transducer. (Usually in psi, or kpa).

27. "SUBMERGENCE = ___ (V) / (MV)": Record the voltage returned by the transducer at a given depth of submergence. Indicate whether the reading is in volts (v), or millivolts (mv).

28. VOLUME WATER ADDED/REMOVED: (Applicable if inert object insertion/removal method was not employed.) Record the volume of water added to or removed from the well.

29. DISCHARGE RATE: If z (above) is filled, enter the rate at which this water was added or removed.

30. INITIAL WATER LEVEL (ft): Enter the water level in the well at the beginning of the test.

31. PRESSURE TRANSDUCER SUBMERGENCE: Record the depth to which the transducer is submerged at the beginning of the test and the depth to the transducer at the end if the test. All depths will be recorded to the nearest 0.01 ft.

32. TIME: Record the time the test is begun and ended. Note whether 12- or 24-hour clock was used.

33. OBSERVED CHANGES IN ADJACENT WELLS: Note any changes in water levels in nearby wells.

34. RESULTS RECORDED ON DISKETTE #: Tracking number of the diskette on which these data are archived.

35. DISKETTE FILE NAME: Name of the file(s).

36. SIGNATURE: The person completing this form must sign the form at the end of the test

37. DATE: Date the form was signed.

3.6 GROUNDWATER LEVELS – MULTIPLE WELLS (ITEMS ON FIGURE SOP016-9)

1. CONTRACTOR: Organization performing the test.

2. SEQ. #: Enter page number of this set of forms (page # of #).

3. PROJECT NO.: Record the contractor assigned project number or the contract number.

4. PROJECT NAME: Record the name assigned by the contractor's organization to the project.

5. LOCATION: Specific location.

6. FIELD PARTY CHIEF: Printed name of the person responsible for this particular field test.

7. CLIENT: Agency with the contract under which the work is being performed.

8. REMARKS: Any pertinent observations not specifically required above.

9. WELL: Record the well number as it appears on the well completion tag, affixed to the protector casing or well completion records.

10. DATE: Date this measurement was made.

11. TIME: Time this measurement was made. Note whether 12- or 24-hour clock was used.

12. DEPTH TO WATER: Depth from MP to top of groundwater table.

13. STICKUP: Enter the length of well casing extending above the average ground surface at the base of the protective casing.

14. MP ELEV.: Enter the elevation of the measuring point here. NOTE: This datum may require reference to tables and/or maps and may be added after completing the day's fieldwork.

15. MEAS. METH.: Method used to measure the water level in the well (see abbreviation key at the bottom of the data sheet).

16. REMARKS/MP: Describe the location and nature of the measuring point.

17. INITIALS: Initials of the person completing this form.

18. ABBREVIATION KEYS: Self-explanatory.

19. SIGNATURE: The person completing this form must sign the form at the end of the test.

20. DATE: Date the form was signed.

3.7 GROUNDWATER LEVELS – DATALOGGERS

1. CONTRACTOR: Organization performing the test.

2. SEQ. #: Enter page number of this set of forms (page # of #).

3. PROJECT NO.: Record the contractor assigned project number or the contract number.

4. WELL #: Record the well number as it appears on the well completion tag, affixed to the protector casing or well completion records.

5. PROJECT NAME: Record the name assigned by the contractor's organization to the project.

6. LOCATION: Specific location.

7. FIELD PARTY CHIEF: Printed name of the person responsible for this particular field test.

8. CLIENT: Agency with the contract under which the work is being performed.

Well Data

9. STICKUP: Enter the length of well casing extending above the average ground surface at the base of the protective casing.

10. MEASURED UP(+)/DOWN(-) FROM: Describe the starting point for the previous measurement.

11. MP ELEVATION: Enter the elevation of the measuring point here. NOTE: This datum may require reference to tables and/or maps and may be added after completing the day's fieldwork.

12. DATUM = MSL OR: Is the datum for the previous elevation Mean Sea Level? If not, what? Also tell whether it was derived from a map elevation (write "MAP") or survey data (write "SURVEY").

13. MEASURING POINT DESCRIPTION: Describe the point used as the origin for all down-hole (water table) measurements. NOTE: All Rhode Island wells are required to have a permanently marked reference (measuring) point (refer to SOP No. 019, Section 3.4).

14. REMARKS: Record any pertinent observations about the site/well conditions not specifically required in the preceding.

Datalogger (This section is a record of pertinent datalogger information)

15. MANUFACTURER: Record the manufacturer/brand name as stated on the datalogger.

16. MODEL: Enter the model number of the datalogger.

17. S/N: Enter the serial number of this datalogger.

18. TAG PROGRAMMED IN LOGGER: What is the identifier used in the datalogger's program to indicate that this unit was used to record a given data set?

Transducer (This section is a listing of pertinent information about the transducer used)

19. MANUFACTURER: Record the manufacturer/brand name as stated on the transducer.

20. MODEL: Enter the model number of the transducer.

21. S/N: Enter the serial number of this transducer.

22. INPUT/UNITS: What are the units this transducer uses?

23. RANGE: Record the pressure or depth range over which this transducer is certified.

Calibration

24. PRESSURE RATING: This is taken from the manufacturer's specifications for a given transducer (usually in psi, or kpa).

25. "SUBMERGENCE = ___ (V) / (MV)": Record the voltage returned by the transducer at a given depth of submergence. Indicate whether the reading is in volts (v), or millivolts (mv).

26. DATE: Date of each water level reading

27. TIME: Time of each water level reading. Note whether 12- or 24-hour clock was used.

28. LOGGING TIME INTERVAL: Time since test was begun.

29. WL FEET BELOW MP: Measured depth to the groundwater table from measuring point.

30. SUBMERGENCE: Depth of water above the transducer.

31. MEAS.METHOD: What device/method was used to measure the water level.

32. TAPE NO.: Record the tape identification number.

33. TRANSDUCER MOVED?: Was the transducer moved since the last water level reading?

34. REMARKS: Any pertinent remarks not otherwise specified.

35. INITIALS:

Data Transfer to Diskette

36. DATE: Date data were archived onto diskette.

37. TIME: Time stamp the computer assigns the data file.

38. FILE NAME: Name assigned the data file.

39. SOFTWARE USED FOR TRANSFER: Any special software, or computer operating system used to write the files to diskette. NOTE: If a "shareware" archiver which compresses files was used, and the archived file is not self-extracting, a copy of the unarchive program should be copied onto the diskette also.

40. OUTPUT FORMAT: What is the format of the output file? (DOS, UNIX, Binary, Compressed?)

41. INITIALS: Initials of the person who copied the data to diskette.

42. ABBREVIATION KEY: Self-explanatory.

4. MAINTENANCE

Not applicable.

5. PRECAUTIONS

None.

6. REFERENCES

None.

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Figures

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FIGURE SOP016-1
FIELD PARAMETER LOGBOOK
SOIL AND SEDIMENT SAMPLES

HIGH CONCENTRATION EXPECTED? HIGH HAZARD?

INSTALLATION/SITE _____ AREA _____

INST CODE FILE NAME _____

SITE TYPE SITE ID
FIELD SAMPLE NUMBER

DATE (MM/DD/YY) / / TIME AM PM SAMPLE PROG.

DEPTH (TOP) DEPTH INTERVAL UNIT _____

SAMPLING METHOD:

SPLIT SPOON AUGER SHELBY TUBE SCOOP OTHER

CHK	ANALYSIS	SAMPLE CONTAINER	NO.	REMARKS

TOTAL NUMBER OF CONTAINERS FOR SAMPLE

DESCRIPTION OF SITE AND SAMPLE CONDITIONS
SITE DESCRIPTION:_____
SAMPLE FORM _____ COLOR _____ ODOR _____
PID (HNu) _____ UNUSUAL FEATURES _____
_____
WEATHER/TEMPERATURE
SAMPLER

HIGH CONCENTRATION EXPECTED? HIGH HAZARD?

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FIGURE SOP016-2
FIELD PARAMETER LOGBOOK
GROUNDWATER AND SURFACE WATER SAMPLES

INSTALLATION/SITE AREA
INST CODE FILE NAME SITE TYPE
SITE ID FIELD SAMPLE NUMBER
DATE (MM/DD/YY) / / TIME AM PM SAMPLE PROG.
DEPTH (TOP) DEPTH INTERVAL UNITS

SAMPLING MEASUREMENTS
CAL REF. pH TEMPERATURE C CONDUCTIVITY OTHER

CHK	ANALYSIS	SAMPLE CONTAINER	NO.	REMARKS

TOTAL NUMBER OF CONTAINERS FOR SAMPLE

DESCRIPTION OF SITE AND SAMPLE CONDITIONS
SITE DESCRIPTION
SAMPLING METHOD
SAMPLE FORM COLOR ODOR
PID (HNu)
UNUSUAL FEATURES
WEATHER/TEMPERATURE _____ SAMPLER _____

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FIGURE SOP016-3
MAP FILE LOGBOOK

SITE ID POINTER _____
DESCRIPTION/MEASUREMENTS
SKETCH/DIMENSIONS:

MAP REFERENCE
COORDINATE DEFINITION (X is Y is)
COORDINATE SYSTEM SOURCE ACCURACY
X-COORDINATE Y-COORDINATE UNITS
ELEVATION REFERENCE
ELEVATION SOURCE ACCURACY ELEVATION
UNITS

SAMPLER

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FIGURE SOP016-4
MAP FILE AND PURGING LOGBOOK
GROUNDWATER SAMPLES

WELL COORD. OR ID SAMPLE NO._____
WELL/SITE
DESCRIPTION_____
_____
X-COORD. Y-COORD. _____ ELEV. UNITS
DATE ____/____/____ TIME AIR TEMP.

WELL DEPTH _____ ft _____ in. CASING HT. _____ ft _____ in.
WATER DEPTH _____ ft _____ in. WELL DIAMETER _____ in.
WATER COLUMN HEIGHT _____ ft _____ in. SANDPACK DIAM. _____ in.
EQUIVALENT VOLUME OF STANDING WATER _____ (gal) (L)
VOLUME OF BAILER _____ (gal) (L) or PUMP RATE _____ (gpm) (lpm)
TOTAL NO. OF BAILERS (5 EV)_____ or PUMP TIME _____ MIN.
WELL WENT DRY? [Yes] [No] NUM. OF BAILERS _____ or PUMP TIME_____MIN
VOL. REMOVED _____ (gal) (L) RECOVERY TIME _____ MIN
PURGE AGAIN? [Yes] [No] TOTAL VOL. REMOVED _____ (gal) (L)

Date and Time	Quantity Removed	Time Required	pH	Cond	Temp	ORD	Turb	DO	Character of water (color/ clarity/odor/partic.)
(before)									
(during)									
(during)									
(during									
(after)									

COMMENTS:_____
_____
_____
_____

_____
SIGNATURE

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FIGURE SOP016-5
FIELD CALIBRATION: pH, CONDUCTIVITY, TEMPERATURE, TURBIDITY, OXIDATION-REDUCTION POTENTIAL, AND DISSOLVED OXYGEN METERS

INITIAL CALIBRATION	FINAL CALIBRATION
DATE:	DATE:
TIME:	TIME:

pH METER CALIBRATION

CALIBRATION STANDARD REFERENCE NO: _____

METER ID _____

pH STANDARD	INITIAL READING	RECALIB. READING	FINAL READING
7.0			
10.0			
4.0			

CONDUCTIVITY METER CALIBRATION

CALIBRATION STANDARD REFERENCE NO: _____

METER ID _____

COND. STANDARD	INITIAL READING	RECALIB. READING	FINAL READING

TEMPERATURE METER CALIBRATION

METER ID _____

TEMP. STANDARD	INITIAL READING	RECALIB. READING	FINAL READING
ICE WATER			
BOILING WATER			
OTHER			

FIGURE SOP016-5 *(continued)*

TURBIDITY METER CALIBRATION

CALIBRATION STANDARD REFERENCE NO: _____

METER ID _____

STANDARD	INITIAL READING	RECALIB. READING	FINAL READING

ORD METER CALIBRATION

CALIBRATION STANDARD REFERENCE NO: _____

METER ID _____

STANDARD	INITIAL READING	RECALIB. READING	FINAL READING

DISSOLVED OXYGEN METER CALIBRATION

CALIBRATION STANDARD REFERENCE NO: _____

METER ID _____

STANDARD	INITIAL READING	RECALIB. READING	FINAL READING

COMMENTS:_____

_____

_____

_____

_____

SIGNATURE

FIGURE SOP016-6
FIELD PERMEABILITY TEST DATA SHEET

Contractor: **Seq. #** /

Project Name:	Project #:
Location:	Client:
Party Chief:	Contractor:
Observation Well:	
Test Type: Rising/Falling Head w/Slug	Rising/Falling Head w/out Slug
Start Date:	Discharge Rate

Clock Time	Elapsed Time (min)	Depth to GWL (ft)	Rec (ft)	Clock Time	Elapsed Time	Depth to GWL (ft)	Rec (ft)	Time	Flow Meter	Discharge Rate

Signature: _____ **Date:** _____

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FIGURE SOP016-7
GROUNDWATER LEVELS – SINGLE WELL

Contractor: **Seq. #** /

Project No.:
Project Name:
Field Party Chief:

WELL DATA:

Stickup: (ft)
MP Elevation:

Well No.: Site: Area:

up (+)/down (-) from: Datum = MSL or:

Measuring Point Description:

Datalogger:
Manufacturer: Model: S/N:
Tag No. Programmed in Logger:

Transducer: Manufacturer: Model: S/N:
Input/Units: Range:

Calibration:
Pressure Rating:
0 ft submergence = (v) / (mv) ft submergence = (v) / (mv)

Volume Water Added/Removed:
Discharge Rate:
Initial Water Level (ft):

Pressure Transducer Submergence
Initial (ft): Final(ft): Time:Start: End:
Observed Changes in Adjacent Wells:

Results Recorded on Diskette #:
Diskette File Name:

Signature: _____ **Date:** _____

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FIGURE SOP016-8
GROUNDWATER LEVELS – MULTIPLE WELLS

Contractor: **Seq. #** /

Project No.:
Project Name:
Field Party Chief:

WELL DATA:

Stickup: (ft)
MP Elevation:
Measuring Point Description:
Remarks:
Well No.:
Site: Area: up (+)/down (-) from:
Datum = MSL or:

Date	Time	Elapsed Time	Depth to Water	Water Elevation	Meas. Meth.	Tape No.	Well Status	Remarks	Initials

Measurement Method:
A = Airline
C = Chalk and tape
E = Electric tape
T = Tape with popper
X = Other (describe in remarks)

Well Status:
D = Dry
F = Flowing
P = Pumping
RP = Recently pumped
NP = Nearby well pumping
NRP = Nearby well recently
X = Obstructed

Signature: _____ **Date:** _____

FIGURE SOP016-8 *(continued)*

Contractor: **Seq. #** /

Project No.:
Project Name: Location:
Field Party Chief: Client:

Well	Date	Time	Depth to Water	Stickup	MP Elev.	Meas. Meth.	Tape No.	Remarks/MP	Initials

Measurement Method:
A = Airline
C = Chalk and tape
E = Electric tape
T = Tape with popper
X = Other (describe in remarks)

Well Status:
D = Dry
F = Flowing
P = Pumping
RP = Recently pumped
NP = Nearby well pumping
NRP = Nearby well recently
X = Obstructed

FIGURE SOP016-9
GROUNDWATER LEVELS DATALOGGERS

Contractor
Project No.: **Well No.:**
Project Name: **Site:**
Field Party Chief: **Area:**

WELL DATA: Stickup: **(ft)** **up (+)/down (-) from:**
MP Elevation: **Datum = MSL or:**

Measuring Point Description:
Remarks:

Datalogger:
Manufacturer: Model: S/N:
Tag No. Programmed in Logger:
Transducer: Manufacturer: Model: S/N:
Input/Units: Range:
Calibration: Pressure Rating:
0 ft submergence = (v) / (mv) ft submergence = (v)

Logging	Date	Time	Logging Time Interval	WL, ft Below MP	Submergence (logger reading)	Meas. Method	Tape No.	Well Status	Transducer Moved	Remarks	Initials
Start											
Stop											
Start											
Stop											

Data Transfer to Disk

Date	Time	File Name	Software Used for Transfer	Output Format	Initials

Measurement Method:
A = Airline
C = Chalk and tape
E = Electric tape
T = Tape with popper
X = Other (describe in remarks)

Well Status:
D = Dry
F = Flowing
P = Pumping
RP = Recently
NP = Nearby well pumping
NRP = Nearby well recently pumped
X = Obstructed

Signature **Date**

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Standard Operating Procedure No. 017
for
Ground Penetrating Radar Survey

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December 2014

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide a guideline and description of principles for the operation, instrumentation, applicability, and implementation of ground penetrating radar (GPR) geophysical surveys. GPR surveys can be used to: map subsurface stratigraphy; rapidly locate buried metallic objects, i.e., pipes, drums, ordnance, and tanks; locate buried waste disposal structures; locate voids within the subsurface; and, in some cases, directly detect contaminants.

2. DEFINITIONS

Dielectric Constant—The measure of the ability of a material to store a charge when an electromagnetic field is applied. This is the measure of the property which determines the reflection, adsorption, and transmission characteristics of the radar signal in the subsurface. Dielectric constants for common materials are listed in Table SOP017-1.

Ground Penetrating Radar Survey—A geophysical survey technique where an electromagnetic radar pulse is transmitted into the subsurface and the reflected pulse is measured and recorded.

Penetration or Exploration Depth—The maximum depth at which an object of interest can be detected using a given GPR configuration. The penetration depth is a function of the electrical properties of the subsurface materials and of the GPR signal strength and antenna design.

Radar Trace—The display of reflected signal strength on a graph of lateral distance along the ground versus travel time.

Transceiver—Antenna design consisting of a transmitter mounted on or within the antenna - also known as a monostatic configuration. A bistatic antenna configuration consists of the transmitter in a separate housing from the antenna.

Travel Time—The time required for a radar signal to travel from the antenna to a target, reflect, and return to the antenna. Travel time is a function of the depth of the target and the electromagnetic characteristics of the subsurface.

3. INSTRUMENTATION

The standard array of GPR instrumentation consists of the following:

- Transmitter/antenna unit(s)
- A DC power supply
- Control unit and the signal processing circuitry connected to the antenna by a cable

- An oscillograph or video display unit
- A plotter or an analog or digital recording device.

The field equipment may be vehicle mounted but is small enough that it may be hand carried into areas not having vehicle access. Examples of GPR units are Geophysical Survey Systems, Incorporated's (GSSI) SIR System 8 and System 10 GPR systems. Both GSSI systems utilize impulse radar technology to sense and record continuous, high resolution profiles of subsurface materials.

The primary variable in GPR instruments is the antenna configuration. Antennas are currently available in both monostatic (one-piece) and bistatic (two-piece) configurations and are generally designed to detect radar signals ranging from approximately 80 to 1000 MHz.

4. FIELD PROCEDURES

4.1 PLANNING

The planning phase of a GPR survey requires the development of information pertaining to the geophysical characteristics of the site and how they might vary across the area to be surveyed. The type and structure of soils, geologic formations, and the approximate elevation of the water table are critical factors that should be established. In addition to developing information about the characteristics of earth materials that are present at the site, the geophysicist needs to develop information about the targets of interest and factors that may interfere with execution of the survey or cause excessive noise in the acquired data. If possible, it is useful to know the depth, size and shape, and type of potential targets to be detected. The depth and size of the objects are very important such that the appropriate antenna configuration and spacing between survey lines may be selected. Surveys over known objects onsite are useful to cross-check the survey detection limit and depth calculations; however, they are not absolutely necessary. Other specifications include accuracy of locational resolution desired, probable weather conditions during site activities, and the type and sophistication of data processing required for data interpretation and presentation.

The time and effort required to perform GPR field surveys depends on several factors including the sophistication of the equipment used, type of target, and logistical considerations. Additional time and effort are required to process and interpret data. Sophisticated data processing, detailed interpretations, and high quality displays require considerable computer usage and may require more time to complete than the actual field survey.

4.2 SITE LAYOUT

GPR surveys are performed by establishing a grid of parallel survey lines across the site and moving the radar antenna along each of these lines. The spacing between the lines is dependent upon the size and depth of the targets of interest and the objectives of the survey (i.e., reconnaissance or detailed survey). GSSI systems employ an electronic marking device

that records a mark on direct field graphic records or within digital radar files. Generally, double marks or clicks are made at the beginning and end of the survey lines and single clicks are recorded as the antenna passes over predetermined distance intervals. Following acquisition of data in the field, the data are downloaded from digital tape to computer storage for subsequent processing and analysis in the office.

4.3 DEPTH DETERMINATION

To determine the depth of anomalies noted on radar profiles, it is necessary to convert the data from recorded travel times to depths. This is done by determining the transmission velocity(ies) associated with the earth materials. The velocity of electromagnetic waves within the subsurface at the site may be determined through excavation of observed targets to determine their depth of burial. Several excavations may be made and an average or range of transmission velocities for materials at a given site may be determined. Once velocity values are determined, interpretations or determinations concerning the depths of other signatures or anomalies may be made. Two other simpler methods, discussed in the following section, provide a simple means of determining the radar-wave velocities through subsurface materials and, therefore, a means for converting travel times to depths. These are two graphical approaches, one involving examination of hyperbolic signatures and the other involving the examination of changes in the travel time within a given subsurface section as the transmitter and receiver antenna (bistatic configuration) are moved away from each other. The latter is referred to as wide angle radar reflection (WARR) measurements.

4.4 GROUND PENETRATING RADAR SURVEY MEASUREMENTS

Once an optimal GPR survey configuration has been decided upon, the survey itself is straightforward, barring changes in the subsurface electrical characteristics. The unit is activated and the antenna is towed along one of the prearranged grid lines. An electronic mark is placed on the data at the beginning and end of each survey line, and every 10 or 20 ft along the line, so that the position of the data and anomalies on each radar line is readily apparent. The locations of surface metal, utilities, walkways, etc. should be noted on the field logs during the survey.

5. DATA ACQUISITION

Although much of the data obtained in GPR surveys are automatically recorded by the instrumentation, additional information to unambiguously identify and interpret each trace should be recorded in the field logbook. At a minimum, the field logbook should contain the following information:

- Project name, number, and location
- Company or organization
- Date and time of day

- Operator's name
- Line and trace designation (also recorded directly on the signal recording medium)
- Equipment serial numbers
- Antenna frequency
- Direction and speed of antenna movement
- Weather and temperature
- Site map coordinates at the beginning and end of the trace

  — Other pertinent notes, remarks or comments
  — Electromagnetic velocity in the subsurface medium at the nearest calibration point.

- Map of grid and survey lines referenced to permanent features (wells, buildings, etc.)
- Data acquisition parameters (gain, range, filters used).

6. DATA PROCESSING AND INTERPRETATION

6.1 GENERAL

Reflected radar signals are electronically processed and displayed as an intensity-modulated time spectrum, where the time corresponds to target depth as described above. The series of signals corresponding to the reflected pulses as the antenna moves along a path forms a three-dimensional data set containing distance of traverse, depth, and intensity information.

Typically, the data are recorded on magnetic tape and/or displayed on a graphic recorder with distance displayed along the X-axis, time (i.e., depth) displayed along the Y-axis, and the intensity given by the degree of darkness of the trace. In a typical survey, a series of parallel traverses are made with the GPR, and the series of graphical traces provide X-Y-Z locational, as well as intensity of reflection information for targets of interest. Interpretation of anomalies in GPR traces requires considerable subjective evaluation by a trained geophysicist. Extensive experience is essential to distinguishing target reflections from inherent system noise and interferences. In many cases, the anomalies due to targets of interest are small compared to varying reflections from the antenna system, the ground surface, geologic perturbations, and other interferences. Similarly, an acceptable interpretation of target depth from travel time data requires knowledge of the varying geophysical characteristics across the site area surveyed.

A radar antenna transmits a "cone" rather than a thin beam of electromagnetic energy. The result is that reflections are obtained from objects not directly below the antenna. As the antenna moves across the plane of an object, reflections are obtained for a considerable distance along the antenna path. The radar reflections will generate a hyperbolic signature pattern. The size and shape of this hyperbolic signature varies as a function of the wave velocity within the subsurface materials, the size and the orientation of the object relative to the radar wave pulse, and the rate (t) at which the antenna configuration is moved along the surveyed line. The signal travel times will vary corresponding to the distance between the antenna and the object.

6.2 HYPERBOLIC REFLECTORS

A discrete spherical target, therefore, will generate a hyperbolic reflection pattern with the apex of the hyperbola corresponding to the location and depth of the object. Multiple or odd-shaped targets or targets of considerable size in comparison to the radar wavelength will generate complex reflection patterns consisting of overlapping hyperbolas. Thus, a true "picture" of subsurface objects is not obtained, and experience is necessary to translate the complex tracings into information concerning target depths, size, or shape.

6.3 DEPTH DETERMINATION

The calculation of the depth of exploration for a particular GPR configuration may be accomplished by knowing the dielectric constant of the earth materials or the depth to a particular reflector that is clearly visible on the radar record. In addition, the depth may be calculated through identification and graphical measurement of hyperbolic signatures or through the development WARR data. The values for resistivity (inverse of conductivity), dielectric constant, and wave velocity in Table SOP017-1 are typical values; however, the real values for subsurface materials may change significantly over short lateral distances. The use of the published values exclusively may not yield depth calculations of sufficient precision.

6.3.1 Wide Angle Radar Reflection Method

The WARR measurement requires the use of actual data from the surveys conducted at each of the areas, which are used to determine the velocities of the pulse, depth to significant reflectors, and total depth of penetration. WARR measurements are performed with a bistatic (separate transmitter and receiver) antenna configuration. The two antennae are moved away from each other at a constant rate as a record is developed. By knowing the distance between the transmitter and receiver at a given time during the development of the record, the geophysicist may calculate the electromagnetic wave velocity(ies) using a t^2-x^2 plot. The recorded reflections are graphically plotted with the square of the distance between transmitter and receiver on the x-axis and the square of the time period on the y-axis. The inverse of the slope of the line of the reflection is the velocity of propagation. A simple calculation relating distance versus time will yield a velocity of the propagated pulse. Once the transmission velocity is known, depths to reflectors may be determined. The WARR measurements require the presence of good horizontal reflectors.

6.3.2 Hyperbola Geometry Method

The second method, the identification and measurement of hyperbolas, also provides good estimates of GPR penetration depth. The shape and position of the hyperbolic signatures, caused by cylindrical objects (e.g., pipes or drums), is a function of the wave velocity within the subsurface, the size of the object, and the rate at which the antenna is moved. This type of calculation is possible because the GPR pulse has a broad cone-shaped radiation pattern and cylindrical objects have numerous surfaces that are normal to the pulse as the antenna is moved along a survey line: first approaching, directly over, and then away from the buried object.

The cone-shaped radiation pattern has an included angle of approximately 90 degrees. For flat or horizontal reflectors, only the vertical component of the pulse is reflected back to the receiver and the other sub-vertical components of the pulse are reflected or refracted away from the antenna not producing a record. Therefore, the two-way reflection sensitivity, or field of view, for flat surfaces is small. For cylindrical objects in the subsurface, the sub-vertical components of the pulse may also be reflected back to the receiver as the antenna approaches the object. Because the round trip travel time for the reflected pulse decreases as the antenna approaches the object, reaches a minimum directly over the object, and then increases again as the antenna moves away from the object, the record that is produced has a hyperbolic (inverted horseshoe) signature or pattern. The hyperbolic pattern generated on a radar record, distance (x) versus time (y), is a representation of the maximum round trip travel for the pulse when it first intersects the pipe, decreasing as the antenna approaches the axis of the pipe, and then increasing to a maximum again as it moves away from the pipe. Therefore, the position and shape of the hyperbola in the radar record are directly related to the wave transmission characteristics of the subsurface materials. Utilizing this simple geometric relationship, the geophysicist may calculate transmission velocities for the various areas and depths of penetration for the pulse and the depth to significant anomalies. Essentially, this results in a conversion of time on the y-axis of the GPR records to depth.

(Tz) represents the time of travel (or distance once velocity is known) for the “first” or “last” reflection that is produced when the center axis of the antenna is 45 degrees from the curved object (e.g., pipe). This reflection is recorded in the GPR record as the ends of the limbs of the hyperbola. This value is also referred to as the slant range or distance between the target and the antenna. The distance represented by (Tz) is greater than the actual depth of the target. As the antenna approaches the object, the radar signature (top of the hyperbola) approaches the actual depth of the object. (Ty) represents the time of travel (or distance once the velocity is known) when the antenna is directly over the reflector.

If it is assumed that the subsurface materials over path distance (Z) have on average the same electrical properties as those for path distance (Y) and the dimensions of the pipe are considered insignificant relative to the other dimensions, then the following geometric relations are true:

$$X2 + Y2 = Z2$$

and

$$T_y = \underline{Y}$$
$$T_z = Z.$$

Combining these equations and solving for Y (the actual depth of the pipe), the following equation may be derived:

$$Y = X * (1/[T_z/T_y^2 - 1]0.5)$$

where

X = Distance along the ground in any convenient unit
Y = Depth of pipe in distance units
T_z = Travel time or "slant range" to pipe in any units
T_y = Travel time when the antenna is directly over the pipe.

The distance along the surface and lengths of the Tz and Ty scaled directly from the record are all that are needed to calculate the depth to the object causing the hyperbola. While these graphical measurements and calculations are relatively simple, they may become tedious when performed on all of the hyperbolae. This process has been automated with RADAN software available from GSSI.

7. SURVEY DESIGN

7.1 PREREQUISITES

Appropriate planning of GPR surveys requires a basic understanding of the site subsurface and hydrogeologic features, including the probable lateral variability. A statement of work should be generated that describes, in as much detail as possible, the known site conditions that may affect the subsurface electrical properties and the objectives of the proposed survey efforts, and allows for changing the survey parameters if the subsurface conditions change or are not found to be as described. The type and degree of data interpretation and the desired format for data presentation should also be specified if possible.

7.2 INSTRUMENT SELECTION

The important instrument selection decision for the survey lies in the determination of the optimal antenna. Generally, the higher the antenna frequency, the smaller the object that it can resolve, and the smaller its depth of penetration. The optimal antenna is the one with the highest resolution that will have sufficient depth of exploration. However, the depth of penetration for a given antenna will vary widely between sites, primarily due to soil moisture content and the

amount of clay/sand ratio of the soils. Overnight rainfall can often elevate the soil moisture content such that an antennas depth of penetration can be degraded by 30 percent in a few hours. No one antenna configuration is suitable for all cases, even at the same site. Ideally, the survey crew should carry multiple antennas to the site for the survey so that an optimal configuration will always be available.

7.3 GRID DESIGN

The survey grid should be designed such that the GPR measurements are spaced to adequately define the distribution and extent of the exploration targets. For convenience, an orthogonal survey grid, located relative to a known location, is usually established over the survey area and the GPR measurements and anomalies are located by their grid coordinates (x,y). This is a convenient method for recording the data in an organized manner, for graphically displaying the data, and for ease of locating the anomalies detected. For determination of geologic features or to detect large targets, reconnaissance-type, low-resolution surveys are typically performed with a track spacing of 5-20 ft. Surveys to detect small discrete targets or to resolve target details require a track spacing of 1-5 ft.

8. QUALITY CONTROL

The application of quality control principles to GPR surveys involves the following.

8.1 GENERAL

- Requiring that trained geophysicists be utilized in all aspects of the survey including the preparation of the project work plans and survey designs, conduct of the survey, interpretation of the data, and presentation of the results. Work plans need to be written such that some degree of latitude is given to the survey team so that they may adjust to site conditions.

- Clearly defining the objectives of the survey in terms of the: (a) degree of detail needed and size of the area to be surveyed; (b) type, depth, size, and composition of targets of interest (if known); (c) resolution required; (d) schedule limitations; (e) degree of sophistication required for data presentation and interpretation; and (f) specific deliverables required.

- Defining specific field quality control procedures.

- Justifying rejection of any data from a data set. Field data sheets should contain all observed data and the conditions that could impact data validation.

- Recording all field data in permanent ink in a bound logbook and tape logs with each page signed and dated by the survey team leader.

- Properly calibrating the GPR unit. In general, the objectives of most geophysical surveys may be achieved by obtaining relative measurements across the area surveyed. Absolute calibration is, therefore, of lesser importance. However, a properly calibrated instrument provides an added measure of data validity.

- Evaluating all sources of noise, interference, and obstructions at a site and noting their potential effects on certain measurements made along a surveyed line. These real-time field observations later allow for correcting the data results for noise, validating suspected external sources, and in detecting problems that may jeopardize the objectives of the survey.

8.2 CALIBRATION

Calibration of the radar traces for depth determinations is performed as follows:

- For reconnaissance surveys or surveys where lateral resolution is more important than depth, the traces may be roughly calibrated by estimating the velocity of electromagnetic waves in the media at the site from published values for similar materials. The crudeness of the calibration is evidenced by considering that the velocity may vary by more than an order of magnitude, depending on the soil/rock properties and moisture content.

- For surveys requiring reasonable resolution of target depth, the travel time to targets of known depths must be determined at each site. As the radar trace is made over the known targets, the reflection patterns provide direct depth-calibration points on the trace. Sites with uniform lithology may require only a few depth calibrations, however, generally, it is necessary to perform these calibrations at several locations and at several depths throughout the area of interest. Each radar trace should be referenced to the calibration most representative of the trace coordinates at the site. The preferred method is to use buried objects of known depth as calibration targets, or to excavate to detected objects and measure their depth below ground surface. A less desirable (but often necessary) procedure is to bury standard targets at various depths within the area of interest.

- In addition, WARR measurements may be conducted at several locations over the entire area of the site to determine how the transmission velocities change. If necessary, specific transmission velocities may be determined for each subarea within the surveyed area.

8.3 DAILY QUALITY CONTROL

Radar traces and interpreted data sets should be accompanied by quality control data that indicate the level of quality of the data. Periodic replicate measurements should be made so that measurement precision may be established. Time and/or depth calibrations should be performed on a daily basis.

A calibration that yields significant changes in instrument parameters or travel time may indicate the need for repetition of data or increased density of travel time calibrations in the area of interest. Graphical data should be reviewed during the field activities to determine that data quality is adequate, and whether the survey results appear to be consistent with conceptual models.

9. POTENTIAL PROBLEMS

GPR surveys are subject to a wide variety of potential problems that may impact conduct of the survey and/or proper interpretation of the survey results. The most significant problems include:

- ***Noise and Interferences***—GPR measurements may be affected severely both by natural and by man-made sources of electromagnetic interference. Sources of system noise that degrade the quality of radar traces include improper spacing of antennas above ground, improper cable placement, location of antennas too close to other system components, and facility instrument operation. Because reflections are obtained from any object with a dielectric constant differing from the surroundings, large masses or a high density of buried or surface rocks, metal, debris, wet soil, or structures can mask targets of interest. Some antennas are not shielded on their top surface and, as a result, are subject to interfering reflections obtained from overhead objects such as trees, power lines, and buildings. Topographic and geologic features can also interfere with acquisition of high quality target detection data. Small depressions in the ground surface, presence of boulders, clay lenses, and moist soil zones affect both the capability to detect the target and determine its depth. Sources of electromagnetic energy in the vicinity, i.e., radio or television transmitters, or navigational radar antennas may result in spurious signals in the radar traces. In some cases, these problems may be minimized by judicious selection of radar and/or data communications frequency, and by scheduling the surveys during period of transmission inactivity.

- ***Rebar***—The presence of steel reinforcing mesh or concrete rods in concrete(rebar) is a common problem for GPR surveys. The rebar generates regularly spaced hyperbolas in the data. If the rebar is thick and closely spaced, the reflections from the rebar can completely obscure the underlying material.

- ***Weather Conditions***—Because water absorbs radar signals, wet weather has a very serious effect on the ability to perform GPR surveys. Physical difficulties in executing a survey over wet terrain may also be expected. Therefore, survey activities should be planned, if at all possible, during periods when dry weather can be expected. The survey schedule should also account for moist soil conditions and changes in these conditions.

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TABLE SOP017-1 DIELECTRIC CONSTANTS FOR COMMON MATERIALS

	Resistivity (ohm/meter)	Relative Dielectric Constant	Electromagnetic Wave Velocity (cm/ns)
Air	---	1	30
Asphalt	Approximately 10	2.5-3.5	16-19
Concrete	Approximately 10	3-9	10-17
Conglomeratic soil	100-1,000	9-14	8-10
Sandy soil	50-400	11-18	7-9
Silty soil	20-200	14-36	5-8
Clayey soil	1-30	25-56	4-6
Sandstone	200-1,000	9-14	8-10
Limestone	2,000-10,000	6-11	9-12
Ice	---	3.2	17
Water	---	81	3.3
Sea water	5×10^{-2}	81	3.3
SOURCE: OYO Corporation. 1987. Operation Manual, Model 2441 GeoRadar-I.			

Standard Operating Procedure No. 019
for
Monitoring Well Installation

Prepared by

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Revision 1
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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are any client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**also check Box A**), or if this SOP is being used with no changes (**only check Box B**).

☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 019	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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ATTACHMENT A: WELL CONSTRUCTION LOG FORM
ATTACHMENT B: FIELD RECORD OF WELL DEVELOPMENT FORM

DOCUMENT REVISION HISTORY

ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	14 October /2019	Updated various items associated with current practice and deeper (>100 feet) monitoring wells	Kevin Sharpe, Ryan Guth	Matthew Bowman

1. SCOPE AND APPLICATION

The installation approach and details for monitoring wells are driven by the existing conditions at the project site and state and local regulatory requirements. The project team should carefully address these considerations as they may require some deviations for procedures described in this Standard Operating Procedure (SOP). State and local regulatory requirements supersede the guidance prescribed herein. The purpose of this SOP is to delineate the quality control measures required to ensure the accurate installation of monitoring wells. The applicable site-specific Work Plan should be consulted for specific installation instructions. The term "monitoring wells," as used herein, is defined to denote any environmental sampling well. An example Well Construction Log Form is provided in Attachment A. Alternate, equivalent forms are acceptable.

2. MATERIALS

2.1 DRILLING EQUIPMENT

The following drilling equipment may be required:

- Appropriately sized drill adequately equipped with augers, bits, drill stem, etc.
- Source of approved water
- Water level indicator
- Weighted steel tape measure
- Photoionization detector: RAE® Systems MiniRAE 3000 (or equivalent)
- Lower explosive limit – oxygen monitor
- Steel drums for intrusion-derived wastes (drill cuttings, contaminated personal protective equipment, decontamination solutions, etc.)
- Heavy plastic sheeting
- High temperature, high pressure sprayer and water obtained from approved source for decontaminating drilling equipment
- Sorbent pads and/or log.

2.2 WELL INSTALLATION MATERIALS[1]

The following well installation materials may be required:

- Well screen:[2]
  - — Polyvinyl chloride (PVC): Johnson (or equivalent); PVC 0.010 slot; Schedule 40; flush-threaded (leak-proof) joints; PVC complies with ASTM International (ASTM) D2665, D1784, and F480; free of ink markings; and cleaned and prepackaged by manufacturer.
  - — Stainless steel: Johnson (or equivalent); stainless steel 0.010 slot; 304 stainless steel[3]; ASTM F480 flush threads; cleaned, wrapped, and heat sealed by manufacturer.
- Riser pipe:
  - — PVC: Johnson (or equivalent); STD; PVC; Schedule 40; flush-threaded (leak-proof) joints; PVC complies with ASTM, D1784, and F480; free of ink markings; and cleaned and prepackaged by manufacturer.
  - — Stainless steel: Johnson (or equivalent); Schedule 5; 304 stainless steel; ASTM Type A312 material; 4-inch (in.) diameter; cleaned, wrapped, and heat sealed by manufacturer.
- Plugs/caps: Johnson (or equivalent); standard PVC or stainless steel.
- Filter pack: Morie, 100 well gravel (or equivalent). NOTE: Final gradation may vary as a function of the gradation of the formation.[2]
- Fine Silica or Ottawa sand (or equivalent).
- Bentonite seal: BAROID, bentonite pellets (3/8-in. diameter).
- Cement: Type II Portland cement (table below).

1. Technical information on all installed materials (screens, riser pipe, filter pack, bentonite, cement, etc.) and representative samples of the proposed filter pack, bentonite powder, and bentonite pellets will be supplied to the Project Manager.
2. Well screen slot size and filter pack gradation will be determined from sieve analysis of aquifer materials. Screen and casing material type will be determined based on field tests of groundwater chemistry and contaminants.
3. Unless the sum of Cl-, F-, and Br- is >1,000 parts per million (ppm), in which case Type 316 should be used.

Cement Type	Special Characteristics	Recommended Usage
I	No special properties	General use as grout mix or cement plug (if sulfates <250 ppm), surface pad.
IA	Air-entraining Type I (Note that air entrainment properties can be achieved by chemical admixtures)	Air entrainment gives cement greater freeze-thaw resistance. Recommended for surface pads.
II	Moderate sulfate resistance, low heat of hydration	General use as grout mix or cement plug where groundwater sulfate >250 ppm and <1,500 ppm, surface pad.
IIA	Air-entraining Type II	See Type IA.
III	High early strength, high heat of hydration	Elevated temperature can damage well casing and fracture grout/cement plugs. NOT RECOMMENDED.
IIIA	Air-entraining Type III	NOT RECOMMENDED.
IV	Low heat of hydration	General use as grout mix or cement plug preferred type for well abandonment to ensure intact grout/cement plug.
V	High sulfate resistance	Use when groundwater sulfate levels >1,500 ppm.
NOTE: ppm = Part per million.		

- Bentonite powder: Baroid, Aquagel Gold Seal.
- Steel protective casing: Brainard-Kilman (or equivalent) zinc-plated steel, lockable, painted.[4]
- Geotextile: Milrafi (or equivalent); GTF 130; non-woven; 4 ounces.
- Coarse (blanket) gravel: Crushed stone aggregate.
- Containers for purged water, as required.
- Submersible pump or bailer of appropriate capacity, and surge block sized to fit well.
- Hach DREL 2000 portable laboratory (or equivalent).
- Conductivity, pH, oxidation-reduction potential (ORP), turbidity, dissolved oxygen, and temperature meters.
- Water level meter or interface probe
- Protective steel covers.

4. All painted components (protector casing, steel bollards/pickets) will be painted high-visibility orange and allowed to dry completely prior to being brought onsite.

- Portland Type IA cement (see previous table) alone, or as part of concrete mix for surface pad.

- Steel posts (bollards/pickets), painted (see footnote).

2.3 DOCUMENTATION

The following documents may be required by field staff supervising the installation of monitoring wells:

- Copy of appropriate Work Plan
- Copy of approved Health and Safety Plan
- Copies of well and excavation permits
- Boring log forms
- Well completion diagram form
- Well development form.

2.4 GEOLOGIST'S PERSONAL EQUIPMENT

The following equipment may be required for the geologist:

- 10 times magnifying hand lens
- Unified Soil Classification System chart
- Munsell soil color chart
- Sieve set (Keck model SS-81 or equivalent)
- Personal protective equipment as required by the Health and Safety Plan.

3. PROCEDURE

3.1 MATERIALS APPROVAL

Water sources for drilling, grouting, sealing, filter placement, well installation, and equipment decontamination must be approved by the Project Manager prior to arrival of the drilling equipment. Information required for the water source includes: water source, manufacturer/ owner, address and telephone number, type of treatment and filtration prior to tap, time of access, cost per gallon (if applicable), dates and results associated with all available chemical analyses over the past 2 years, and name and address of the analytical laboratory (if applicable).

Pure sodium bentonite with no additives (bentonite) will be the only drilling fluid additive allowed, and its use must be approved by the Project Manager prior to the arrival of the drilling equipment. The information required for evaluation includes: brand name, manufacturer, manufacturer's address and telephone number, product description, and intended use for the product.

Granular filter pack material must be approved by the Project Manager prior to drilling. A 1-pint representative sample must be supplied to the Project Manager. Information required includes: lithology, grain size distribution, brand name, source, processing method, and slot size of intended screen.

Screen and casing materials must be approved by the Project Manager prior to drilling. Materials for deep wells must have adequate strength to prevent collapse or damage. A collapsed well is an expensive and time-consuming mistake.

Portland Type II cement will be used for grout (see previous table).

3.2 DRILLING

The objective of the selected drilling technique is to ensure that the drilling method provides representative data while minimizing: (1) subsurface contamination, (2) cross-contamination of aquifers, and (3) drilling costs. The preferred drilling method for shallow (<100 feet [ft]) well installation is hollow-stem auger, although direct-push and sonic methods can also be considered, and other methods can be approved as conditions warrant. The method used at a specific site will be proposed in the work plan and evaluated by the Project Manager.

If the design depth of the well is >100 ft, other rotary drilling methods (mud rotary, air rotary, air rotary with downhole hammer, dual-tube reverse rotary, etc.) may be used to install wells. The following drilling fluids and methods are approved in the order listed: (1) rotary drilling with water from an approved source as drilling fluid (clays from the formations will tend to thicken the fluid and coat the walls of the borehole and this is acceptable); (2) rotary drilling with water as a fluid, advancing a temporary casing with the bit to maintain an open hole; and (3) mud rotary using water with additives as drill fluid. Due to the potential for aquifer contamination and plugging, mud rotary drilling is not recommended for monitoring wells. If, however, "running sands" are encountered and the aquifer is expected to have a relatively high flow rate, then mud rotary is considered an approved method. Pure sodium bentonite is the only approved additive. Mud rotary drilling must be halted at the last aquitard above the target aquifer. Casing must be set, all bentonite-bearing fluids flushed from the hole and drill rig, and drilling may be resumed using water only as the drill fluid until the target depth is reached. Rotary drilling with air is useful and efficient in bedrock drilling and is typically done with no additions to the air stream; however, additives (e.g., foam) can be considered if conditions warrant.

A site geologist will be present during all well drilling and installation activities and will fully characterize all tasks performed in support of these activities into the monitoring well logbook. The site geologist will be responsible at only one operating rig for: (1) logging of samples, (2) monitoring of drilling operations, (3) recording of water losses/gains and groundwater data, (4) preparing the boring logs and well diagrams, and (5) recording the well installation procedures of the rig. The site geologist will have onsite sufficient equipment in operable condition to perform efficiently his/her duties as outlined in the contractual documents. Items in the possession of each site geologist will include: (1) the approved Health and Safety Plan; (2) this SOP; (3) a hand lens (10 times); (4) a standard color chart; (5) grain-size chart;

(6) a weighted (with steel or iron) steel tape long enough to measure the deepest well, heavy enough to reach that depth, and small enough to fit readily within the annulus between the well and drill casing; and (7) a water level measuring device, preferably electrical.

Only anti-seizing compounds that are environmentally safe (i.e., commercial products for environmental drilling projects or solid vegetable shortening [e.g., Crisco®]) may be used on downhole drilling equipment. Compounds containing either lead or copper will not be allowed. In addition, polychlorinated biphenyls will not be permitted in hydraulic fluids or other fluids used in the drilling rig, pumps, and field equipment/vehicles.

Surface runoff or other fluids will not be allowed to enter any boring or well during or after drilling/construction. Steps in the form of grading or sandbagging can be taken to ensure that runoff is directed away from the borehole.

Antifreeze used to keep equipment from freezing will not contain rust inhibitors and sealants. Antifreeze is prohibited in areas in contact with drilling fluid. The ground surface at the well site will be protected from possible coolant, fuel, and hydraulic fluid spills and/or leakage by placement of plastic sheeting with raised edges; and draining into a lined catch basin large enough to contain spills and/or leakage from motors, radiators, or vehicle tanks. Sorbent pillows will be placed to catch obvious leaks from the drill rig. Sorbent logs may be used instead of, or in conjunction with, a lined catch basin to contain spills.

An accurate measurement of the water level will be made upon encountering water in the borehole and later upon stabilization (levels will have less usefulness during mud rotary drilling). Levels will be periodically checked throughout the course of drilling. Any unusual change in the water level in the hole (i.e., a sudden rise of a few inches may indicate artesian pressure in a confined aquifer) will be the basis for cessation of drilling. The geologist will immediately contact the Project Manager[5]. Particular attention for such water level changes will be given after penetrating any clay or silt bed, regardless of thickness, which has the potential to act as a confining layer.

Anticipated depths of wells are given in well-specific work plans. In case the previously defined criteria have not been met before the depth range for a given hole is reached, the geologist will stop the drilling and confer with the Project Manager. The current boring conditions (depth, nature of the stratigraphic unit, and water table depth) will be compared to those of other wells nearby to decide to continue drilling or terminate and complete the well.

If the well is to be installed in the surficial aquifer, drilling will be terminated before penetrating the basal aquitard. The basal aquitard is defined as the first 2 ft-thick clay below the water table, or below 5 ft in the case of a shallow aquifer.

If the well is to be installed in a lower, confined aquifer:

5. The contract technical oversight will also be contacted for guidance.

- Penetrations of aquifers located lower than the water table aquifer will be limited to avoid cross-contamination.

- Placement of new upper confined aquifer wells will be initially limited to those areas where contamination has been confirmed.

- The location of upper confined aquifer wells will be based upon the findings of the water table aquifer investigation. Areas of known contamination will be targeted for installing upper confined aquifer wells for the purposes of delineating vertical contamination.

- Where possible, upper-confined aquifer wells will be located such that they afford triangulation with other wells within the same aquifer to allow for a determination of groundwater flow direction.

- Some upper-confined aquifer wells will be installed approximately 10-15 ft from water table wells to enable the accurate assessment of vertical hydraulic gradients. If the direction of groundwater flow is known, wells within a group will be located sidegradient of each other.

- The boring will be advanced until the base of the surficial aquifer is reached (Section 3.2).

- An outer surface casing will be set 2-5 ft into the confining layer to minimize the potential for cross-contamination from the unconfined aquifer during drilling activities.

- The surface casing will be driven into the confining bed and grouted into place. Grout will be tremied into the annulus around the outside of the casing to within 5 ft of the ground surface. A grout plug at least 2 ft thick will be tremied into the bottom of the surface casing. The grout will be permitted to cure for 24 hours. All drilling fluids within the surface casing will then be removed, and the casing will be flushed with clean potable water.

- The drilling equipment will be decontaminated, a smaller bit or auger selected, and the hole will be continued through the grout plug into the confined aquifer.

- If deeper aquifers are to be screened, repeat preceding steps until total depth is reached.

If dense non-aqueous phase liquid (DNAPL) contamination is detected during drilling, the well will be terminated and completed at the base of the aquifer as described in Section 3.4. Drilling will not continue through the confining unit.

3.3 LOGGING

All borings for monitoring wells will be logged by a geologist. Logs will be recorded in a field logbook and/or a boring log. If the information is recorded in a logbook, it will be transferred to boring log forms on a daily basis. Field notes are to include, at a minimum:

- Boring number
- Material description (as discussed below)
- Weather conditions
- Evidence of contamination
- Water conditions (including measured water levels)
- Daily drilling footage and quantities (for billing purposes)
- Notations on man-placed materials
- Drilling method and borehole diameter
- Any deviations from established field plans
- Blow counts for standard penetration tests
- Core and split-spoon recoveries.

Material description for soil samples must include:

- Classification
- Unified Soil Classification System symbol
- Secondary components and estimated percentages
- Color
- Plasticity
- Consistency
- Density
- Moisture content
- Texture/fabric/bedding and orientation
- Grain angularity
- Depositional environment and formation
- Incidental odors
- Photoionization detector reading(s)
- Staining.

A typical boring log entry will include: (1) Munsell color, (2) moisture content, (3) primary components, (4) secondary components, (5) Unified Soil Classification System symbol, and (6) other attributes (density, consistency, and others from the list above). The relative proportions of secondary components will be described with descriptive terms: trace (less than 5 percent), few (6-15 percent), little (16-30 percent), some (31-49 percent), and (36-50 percent).

Material description for rock samples must include:

- Classification
- Lithologic characteristics

- Bedding/banding characteristics
- Color
- Hardness
- Degree of cementation
- Texture
- Structure and orientation
- Degree of weathering
- Solution or void conditions
- Primary and secondary permeability
- Sample recovery
- Incidental odors
- Photoionization detector reading(s)
- Staining.

3.4 WELL CONSTRUCTION AND INSTALLATION

3.4.1 General

After the borehole is drilled and logged, the hole will be backfilled as required for proper screen placement. The integrity of the aquitard will be restored by placing a bentonite plug of an appropriate thickness, either to the top of the aquitard (normal well installation) or to within 0.3 ft of the top of the aquitard (DNAPL well). Aquifer fill will be clean filter pack.

The installation of monitoring wells in uncased or partially cased holes will begin within 12 hours of completion of drilling or, if the hole is to be logged, within 12 hours of well logging, and within 48 hours for holes fully cased with temporary drill casings. Once installation has begun, work will continue until the well has been grouted and the drill casing has been removed.

The construction of each well will be depicted as built in a well construction diagram. The diagram will be attached to the boring log and will graphically denote:

- Borehole depth
- Screen location and length
- Joint location
- Granular filter pack
- Seal
- Grout
- Cave-in
- Centralizers
- Height of riser
- Protective casing detail.
- Water level on the construction date

3.4.2 Well Casing and Screen Installation

Assemble appropriate decontaminated lengths of pipe and screen. Make sure these are clean and free of grease, soil, and residue. Lower each section of pipe and screen into the borehole, one at a time, screwing each section securely into the section below it. No grease, lubricant, polytetrafluoroethelyne tape, or glue may be used in joining the pipe and screen sections. If a well extends below 50 ft, centralizers will be installed at 50 ft and every 50 ft thereafter except within screened interval and bentonite seal. Centralizer material will be PVC, polytetrafluoroethelyne, or stainless steel. Determination of centralizer material will be based on the same criteria as screen and casing selection.

Normal screen placement for the water table (surficial) aquifer will extend from 2 ft above the static water level to no more than 6 in. from the bottom of the hole or backfill material, whichever is applicable. The bottom of the screen will rest no more than 6 in. from the bottom of the hole or backfill material, whichever is applicable.

NOTE: The end cap in DNAPL wells will rest on the bottom of the hole, or bentonite backfill if applicable (Section 3.2).

Screen placement for a confined aquifer well will normally be at the top of the confined aquifer.

Screen lengths will not normally exceed 10 ft. If it appears advantageous in a given situation (e.g., to screen an entire aquifer that is thicker than 10 ft), approval must be sought on a case-by-case basis from the appropriate regulatory agency. Otherwise, wells will be screened as follows:

Thickness of Aquifer	Action
<10 ft	Screen entire aquifer
>10 ft <30 ft	Screen top 10 ft; consider vertically nested well cluster
>30 ft	Install vertically nested well cluster

Plastic well screens, casings, and fittings will conform to National Sanitation Foundation Standard 14 or ASTM equivalent for potable water usage. These materials will bear the appropriate rating logo. If the logos are not present, a written statement from the manufacturer/supplier stating that the materials contain the appropriate rating must be obtained. Material used will be new and essentially chemically inert to the site environment.

Well screen and casing should be inert with respect to the groundwater; therefore, the selection of screen and casing material will be based on select field tests of aquifer chemistry and potential contaminants. The screen will be capped without sediment trap or DNAPL sampling cup, and lowered into the hole. The well casing will be pre-cut to extend 2-2.5 ft above ground surface. Prior to placement of the last piece of well casing, a notch or other permanent reference point will be cut, filed, or scribed into the top edge of the casing.

Screen slot size will be appropriately sized to retain 90-100 percent of the filter pack material, the size of which will be determined by sieve analysis of formational material.

Stainless steel screens will be used in DNAPL wells. The formation grain size will be multiplied by the higher factor (6) to determine filter pack grain size. This will ensure that the filter pack is sufficiently coarse to permit DNAPL to pass freely from the formation into the coarser filter pack, then into the open well (Cohen and Mercer 1993).

DNAPL sampling cups are prohibited. The well screen will be capped and set 0.3 ft (0.5 ft maximum) into the top of the confining bed and rest on the bottom of the hole or bentonite backfill (if used). No sand will be placed below the screen.

3.4.3 Filter Sand Installation

Place the appropriate filter pack. Monitor the rise within the annulus with a weighted tape to assure that bridging is not occurring. After the filter pack is in place, wait 3-5 minutes for the material to settle, tamp and level with a capped PVC pipe, and check its depth with a weighted steel tape.

Filter pack material will be placed, lightly tamped, and leveled. Filter pack will extend from the bottom of the hole to a height of 1-2 ft above the top of the screen. The filter pack will be capped with a minimum of 1 ft of fine (e.g., Ottawa-type) sand to prevent the bentonite seal (placed as pellets) from infiltrating the filter pack. If the bentonite seal is placed as a slurry, a minimum of 2 ft of fine sand will be required.

If the hole is less than 20 ft deep, the filter pack may be poured into the annulus directly. If the hole is deeper than 20 ft, the filter pack must be tremied into place.

Granular filter packs will be chemically and texturally clean, inert, and siliceous.

Filter pack grain size will be based on formation grain size analysis. The D30 (70 percent retained) sieve size multiplied by a factor of not less than 3 nor greater than 6 will be used to determine the appropriate grain size.

Calculations regarding filter pack volumes will be entered into the field logbook along with any discrepancies between calculated and actual volumes used. If a discrepancy of greater than 10 percent exists between calculated and actual volumes exists, an explanation for the discrepancy will also be entered in the field logbook.

3.4.4 Bentonite Installation

Install the bentonite seal (2- to 5-ft thick) by placing bentonite pellets into the hole gradually. If the well is deeper than 20 ft, a tremie pipe will be used to place either bentonite pellets or slurry. Tamp and level pellets. If the well is within 20 ft deep, tamp with a capped PVC pipe; if >20 ft,

tamping may be accomplished with the weighted end of the tape. In either case, check the depth to the top of the seal with a weighted tape as above.

If the bentonite pellets are of poor quality, they may have a tendency to hydrate and swell inside the tremie pipe and bridge. This situation may be solved by the following procedure:

1. Use a different brand of pellets. Different brands may have longer hydration times.

2. Freeze the pellets[6]. Note that this will require a longer wait time to allow proper hydration after the pellets thaw.

3. Place the bentonite seal as a slurry using a side-discharge tremie pipe as though installing grout. Note (Section 3.4) this will require that a minimum of 2 ft of fine sand be placed as a cap on top of the filter pack material.

Wait for the pellets to hydrate and swell. Hydration times will be determined by field test or by manufacturer's instructions. Normally this will be 30-60 minutes. Document the hydration time in the field notebook. If the pellets are above the water level in the hole, add several buckets of clean water to the boring. Document the amount of water added to the hole.

The final depth to the top of the bentonite seal will be measured and recorded.

3.4.5 Grout Installation

Mix an appropriate cement-bentonite grout (described below). Be sure the mixture is thoroughly mixed and as thick as is practicable.

Lower a side discharge tremie pipe into the annulus to the level of the pellet seal.

Pump the grout slurry into the annulus while withdrawing the tremie pipe and temporary casing. Stop the grout fill at 5 ft below the ground surface. Allow to cure for not less than 12 hours. If grout settles more than 6 in., add grout to bring level back up to within 5 ft of ground surface. Place approximately 2 ft of bentonite pellets (minimum 0.5 ft) in annulus. Seat the protective casing in the bentonite seal, allowing no more than 0.2 ft between the top of the well casing and the bottom of the protective casing cap. Fill inner annulus (between well casing and protective casing) with bentonite pellets to the level of the ground surface. Cover bentonite pellets with 1 ft of clean granular material (coarse sand or pea gravel filter pack). Fill the outer annulus (between the protective casing and the borehole) with neat cement. Allow the cement to mound above ground level and finish to slope away from the casing. Lock the cap.

6. Bentonite pellets may be "flash-frozen" by brief immersion in liquid nitrogen (LN2). This can be accomplished by pouring LN2 over a small quantity (0.25-0.5 bucket) of pellets, allowing the LN2 to boil off, then pouring the pellets into the tremie pipe. NOTE: Use of LN2 is an additional jobsite hazard and must be addressed in the contractor's Health and Safety Plan. This contingency must be covered before drilling starts in order to avoid delays in well installation.

– OR –

Continue the grout fill to the ground surface. Seat the protective casing in the grout, allowing no more than 0.2 ft between the top of the well casing and the bottom of the protective casing cap. Lock the cap.

– AND –

Allow the grout slurry to set overnight.

Fill the outer annulus (between the casing and the borehole) with neat cement. Allow the cement to mound above ground level and finish to slope away from the casing.

Grout used in construction will be composed by weight of:

- 20 parts cement (Portland cement, Type II) (see previous table)
- 0.4-1 part (maximum) (2-5 percent) bentonite
- 8 gallons (maximum) of approved water per 94-pound bag of cement.

Neither additives nor borehole cuttings will be mixed with the grout. Bentonite will be added after the required amount of cement is mixed with the water.

All grout material will be combined in an aboveground container and mechanically blended to produce a thick, lump-free mixture. The mixed grout will be recirculated through the grout pump prior to placement. Grout placement will be performed using a commercially available grout pump and a rigid, side discharge tremie pipe.

The following will be noted in the field logbook: (1) calculations of predicted grout volumes; (2) exact amounts of cement, bentonite, and water used in mixing grout; (3) actual volume of grout placed in the hole; and (4) any discrepancies between calculated and actual volumes used. If a discrepancy of greater than 10 percent exists between calculated and actual volumes exists, an explanation for the discrepancy will also be entered in the field logbook.

Well protective casings will be installed around all monitoring wells on the following day as the initial grout placement around the well. Any annulus formed between the outside of the protective casing and the borehole will be filled to ground surface with cement.

3.4.6 Surface Completion

Cut the riser with a pipe cutter approximately 2-2.5 ft above grade. All pipe cuts MUST be square to ensure that the elevation between the highest and lowest point of the well casing is less than or equal to 0.02 ft. Notch, file, or otherwise permanently scribe a permanent reference point on the top of the casing.

Torches and saws may not be used to cut the riser. Care must be taken that all filings or trimmings cut from the reference point fall outside the riser rather than into the well. **Under no circumstances will a permanent marker or paint pencil be used to mark the reference point**.

The tops of all well casings will be capped with covers composed of materials compatible with the products used in the well installation. Caps may either be vented, or a telescopic fit, constructed to preclude binding to the well casing caused by tightness of fit, unclean surfaces, or weather conditions. In either case, it should be secure enough to preclude the introduction of foreign material into the well yet allow pressure equalization between the well and the atmosphere (e.g., avoid the use of unvented well plugs).

In some locations, safety requirements may mandate that a well be flush-mounted with no stickup. If a flush-mounted well is required at a given location, an internal pressure cap must be used instead of a vented cap to ensure that rainwater cannot pool around the wellhead and enter the well through the cap.

Slope the ground surface away from the casing for a distance of 2 ft, at a rate of no less than 1 in. in 2 ft. Surface this sloping pad with a geotextile mat covered by 6 in. of coarse gravel.

– OR –

Frame and pour a 4-ft square × 6-in. thick (4 ft × 4 ft × 6 in.) concrete pad centered around the protective casing.

– AND –

Set pre-painted protective steel pickets (3 or 4) evenly around and 4 ft out from the well. These pickets will be set into 2 ft deep holes, the holes will then be filled with concrete; and, if the pickets are not capped, they will also be filled with concrete.

3.5 WELL DEVELOPMENT

Well development is the process by which drilling fluids, solids, and other mobile particulates within the vicinity of the newly installed monitoring well have been removed while restoring the aquifer hydraulic conductivity. Development corrects any damage to or clogging of the aquifer caused by drilling, increases the permeability of the aquifer in the vicinity of the well, and stabilizes the formation and filter pack sands around the well screen.

Well development will be initiated after 48 consecutive hours but no longer than 7 calendar days following grouting and/or placement of surface protection.

Two well development techniques, over pumping and surging, will be employed in tandem. Over pumping is simply pumping the well at a rate higher than recharge. Surging is the

operation of a plunger-like device (e.g. surge block) up and down within the well casing similar to a piston in a cylinder.

3.5.1 Materials Required

The following materials will be required for well development:

- Well Development Form
- Boring Log and Well Completion Diagram for the well
- Submersible pump or bailer of appropriate capacity, and surge block
- Conductivity, pH, ORP, turbidity, dissolved oxygen, and temperature meters
- Water-level meter or interface probe, as appropriate
- Containers for purged water, if required.

3.5.2 Summary of Procedures and Data Requirements

Pump or bail the well to ensure that water flows into it, and to remove some of the fine materials from the well. Removal of a minimum of one equivalent volume is recommended at this point. The rate of removal should be high enough to stress the well by lowering the water level to approximately half its original level. If well recharge exceeds 15 gallons per minute, the requirement to lower the head will be waived.

Slowly lower a close-fitting surge block into the well until it rests below the static water level, but above the screened interval. (NOTE: This latter is not required in the case of a light non-aqueous phase liquid well.)

Begin a gentle surging motion that will allow any material blocking the screen to break up, go into suspension, and move into the well. Continue surging for 5-10 minutes, remove surge block, and pump or bail the well, rapidly removing at least one equivalent volume.

Repeat previous step at successively lower levels within the well screen until the bottom of the well is reached. Note that development should always begin above, or at the top of, the screen and move progressively downward to prevent the surge block from becoming sand locked in the well casing. As development progresses, successive surging can be more vigorous and of longer duration as long as the amount of sediment in the screen is kept to a minimum.

Development is expected to take at least 2 hours in a small well installed in a clean sand, and may last several days in large wells, or in wells set in silts with low permeabilities.

Development will continue until little or no sediment can be pulled into the well, and target values for parameters listed below are met.

At a minimum, development will remove 3-5 well volumes of water. One development volume is defined as (1) equivalent volume, plus (2) the amount of fluid lost during drilling, plus (3) the volume of water used in filter pack placement.

1. Monitor water quality parameters (turbidity, pH, conductivity, ORP, dissolved oxygen, and temperature) before beginning development procedures, and after removing 2, 2.5, and 3 well volumes of water.

2. If these parameters have stabilized over the three readings, the well will be considered developed.

3. If the parameters have not stabilized after these three readings, continue pumping the well to develop, but stop surging. Monitor the stabilization parameters every half development volume.

4. When the parameters have stabilized over three consecutive readings at half development volume intervals, the well will be considered developed.

All water removed must be disposed of as directed by the Work Plan.

Record all data as required on a Field Record of Well Development Form (Attachment B), which is made a part of the complete well record. These data include:

- Depths and dimensions of the well, casing, and screen obtained from the well diagram.
- Water losses and uses during drilling, obtained from the boring log for the well.
- Depth-to-water measurements.
- Measurements of the following indicator parameters: turbidity, pH, conductivity, ORP, dissolved oxygen, and temperature.
- Target values for the indicator parameters listed above are as follows: pH – stabilize, conductivity – stabilize, ORP – stabilize, dissolved oxygen –- stabilize, temperature – stabilize, and turbidity – 5 nephelometric turbidity units or stabilize. A value is considered to have stabilized when three consecutive readings taken at half development volume intervals are within 10 percent of each other.
- Notes on characteristics of the development water.
- Data on the equipment and technique used for development.
- Estimated recharge rate and rate/quantity of water removal during development.

3.6 TEMPORARY WELLS

Temporary wells typically differ from permanent installations in the following ways: (1) the wells are typically shallow and have small diameters; (2) installation methods tend to be driving,

direct-push, but could be any of the rotary methods or sonic; and (3) the wells tend to have limited surface completions with no protective casing, concrete pad, or bollard posts. Keep in mind that temporary wells may still require well permits and perhaps reporting on abandonment. The installation should follow steps to allow for expedited abandonment after a limited timeframe, meaning: (1) the casing should be amenable to pulling or ripping, (2) the borehole should be limited in diameter to expedite filling, and (3) surface disturbance should be minimized to allow for quick site restoration and possible reseeding.

3.7 WELL SURVEY

Newly installed monitoring wells will typically be surveyed by a state-registered surveyor to determine the geographical coordinates and elevations. Typical standards for the survey are surveying the well to vertical accuracy of 0.010 U.S. survey ft using the 1988 North American Vertical Datum and a horizontal accuracy to within 0.10 ft tied to site datum (World Geodetic System 1984 Universal Transverse Mercator Zone 11 North). The elevations for the natural ground surface (not the top of the grout collar) and the highest point on the riser casing rim of the uncapped well casing, and the protective casing for each well will be surveyed. A survey mark will be indicated by a small groove or other permanent marking in the well riser casing.

4. MAINTENANCE

Not applicable.

5. PRECAUTIONS

Refer to the site-specific Health and Safety Plan for discussion of physical and chemical hazards and preventive measures to be used during well installation and development activities.

6. REFERENCES

Cohen, R.M. and J.W. Mercer. 1993. DNAPL Site Evaluation, CRC Press, Inc.

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Attachment A

Well Construction Log Form

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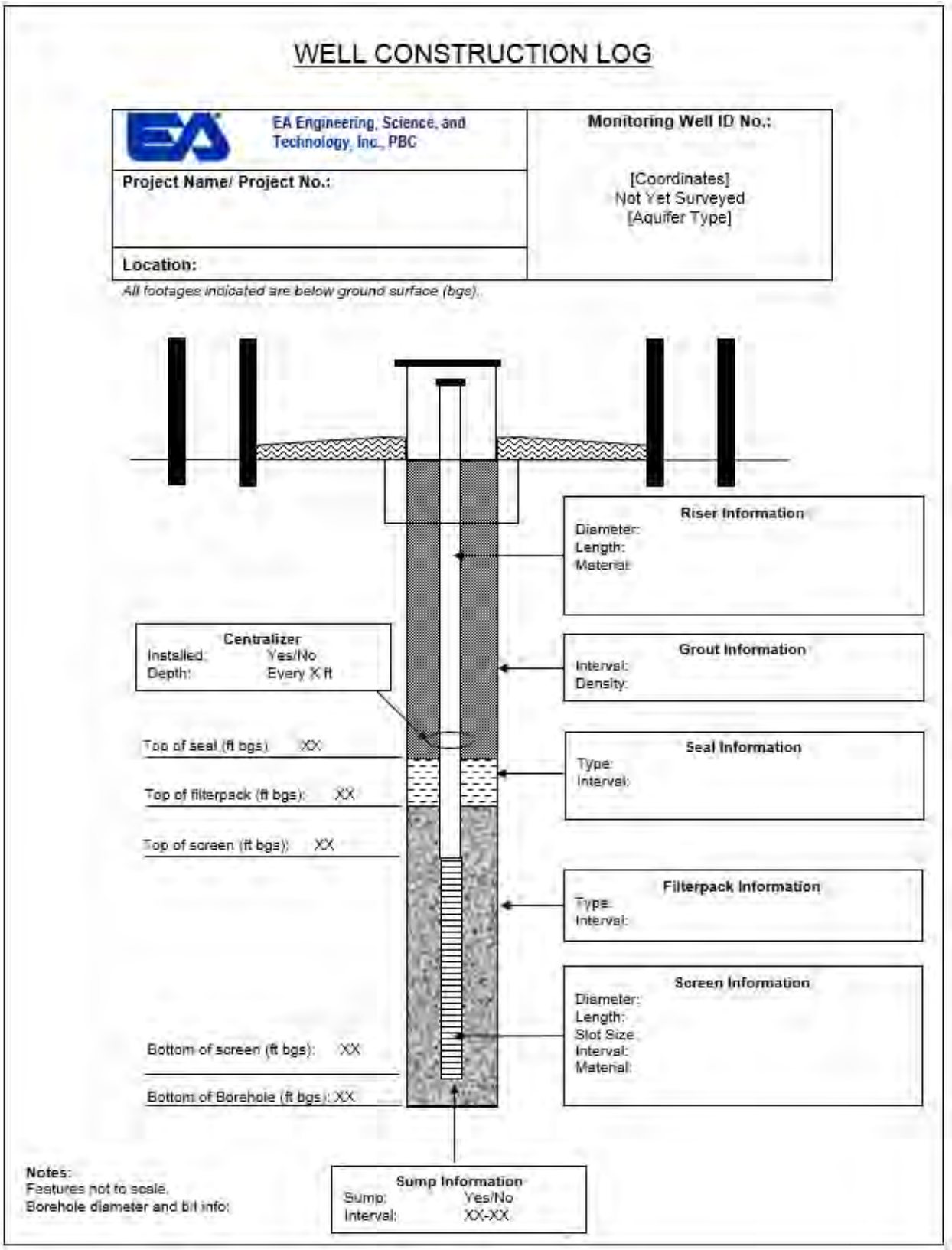
WELL CONSTRUCTION LOG
EA Engineering, Science, and Technology, Inc., PBC
Monitoring Well ID No.:
[Coordinates]
Not Yet Surveyed
[Aquifer Type]
Project Name/ Project No.:
Location:
All footages indicated are below ground surface (bgs).
Riser Information
Diameter:
Length:
Material:
Centralizer
Installed: Yes/No
Depth: Every X ft
Grout Information
Interval:
Density:
Top of seal (ft bgs) XX
Seal Information
Type:
Interval:
Top of filterpack (ft bgs): XX
Top of screen (ft bgs): XX
Filterpack Information
Type:
Interval:
Screen Information
Diameter:
Length:
Slot Size:
Interval:
Material:
Bottom of screen (ft bgs): XX
Bottom of Borehole (ft bgs): XX
Notes:
Features not to scale.
Borehole diameter and bit info:
Sump Information
Sump: Yes/No
Interval: XX-XX

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Attachment B

Field Record of Well Development Form

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FIELD RECORD OF WELL DEVELOPMENT

Project Name:	Project No:	Date:
EA Personnel:	Development Method:	
Weather/Temperature/Barometric Pressure:		Time:

Well No.:	Well Condition:
Well Diameter:	Measurement Reference:
Well Volume Calculations	
A. Depth To Water (ft):	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal)[C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min)						
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH						
Temperature (°F)						
Conductivity (µmhos/cm)						
Dissolved Oxygen						
Turbidity (NTU)						
ORP (mV)						

Parameter	6 Volumes	7 Volumes	8 Volumes	9 Volumes	10 Volumes	End
Time (min)						
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH						
Temperature (°F)						
Conductivity (µmhos/cm)						
Dissolved Oxygen						
Turbidity (NTU)						
ORP (mV)						

NOTE: NTU = Nephelometric turbidity unit.
ORP = Oxidation-reduction potential.

COMMENTS AND OBSERVATIONS: _____

_____

_____

_____

EA Engineering, Science, and Technology, Inc., PBC

FIELD RECORD OF WELL DEVELOPMENT

Project Name:	Project No:	Date:
EA Personnel:	Development Method:	
Weather/Temperature/Barometric Pressure:		Time:

Well No.:	Well Condition:
Well Diameter:	Measurement Reference:

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min)						
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH						
Temperature (°F)						
Conductivity (µmhos/cm)						
Dissolved Oxygen						
Turbidity (NTU)						
ORP (mV)						

Parameter	6 Volumes	7 Volumes	8 Volumes	9 Volumes	10 Volumes	End
Time (min)						
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH						
Temperature (°F)						
Conductivity (µmhos/cm)						
Dissolved Oxygen						
Turbidity (NTU)						
ORP (mV)						

Standard Operating Procedure No. 020
for
Active Soil Gas Sampling

Prepared by

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Revision 1
February 2019

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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are any client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**also check Box A**), or if this SOP is being used with no changes (**only check Box B**).

☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 020	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	18 February 2019	Systematic update and review	Jason Stroup, Geoffrey Little Robert Owens	Matthew Bowman

1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide guidelines for soil gas sampling. A soil gas survey is an effective screening tool in locating areas contaminated with volatile organic compounds.

2. MATERIALS

The following materials may be required:

1-L Tedlar bags	Probe set, including probe jack
3/16-inch (in.) outer diameter polyethylene tubing	Rotary hammer with 1 × 36-in. drill bit
Clean sand	Sample labels
Disposable shield points	Tools: vise grips, 0.75-in. wrench, scissors
Extension cord	Two measuring cups
Portable generator or other power source	Tubing for vacuum box
Granular bentonite	Vacuum box and vacuum pump
Teflon and/or Teflon-lined tubing	Summa canister

3. PROCEDURES

3.1 SOIL GAS POINT INSTALLATION

Installation of soil gas points includes the following steps:

1. Assemble clean probe sections to the desired sampling depth.

2. Cut polyethylene tubing to at least 1 foot (ft) longer than the depth of the hole.

3. Insert one end of the tubing approximately 0.25 in. inside of aluminum shield point. Crimp the shield point tightly around the tubing with vise grips and insert the tube and shield point inside of the clean probe.

4. Soil gas points should be installed using a rotary drill, Geoprobe® direct-push, or Macro-Core.

5. Using a rotary drill and 36-in. drill bit, bore down 30 in. at the desired depth for sampling. Be sure to clear the hole well so that soil does not fall back into the hole.

6. Drive stainless steel probe and attached shield point and polyethylene tubing down the hole with a rotary hammer to approximately 5 ft, or above the saturation zone. (It is desired to obtain a sample of the soil gas, not the groundwater.) If samples are needed

from greater than 5 ft, drive the steel probe with a solid tip to the desired depth, extract, and insert a probe fitted with a disposable shield point and tubing.

7. Use Geoprobe® direct-push or Macro-Core technologies to install stainless steel drive points to approximately 5 ft below ground surface (assuming no homes in the area have basements). If basements are identified, the steel drive points will be installed to the approximate depth of the basement floor.

   Once the sampling depth is reached, the 6-in. stainless steel sampling screen attached to a dedicated section of 0.25-in. diameter Teflon or Teflon-lined tubing (identified as laboratory or food grade) will be installed and used to collect the soil gas samples.

8. The borehole will then be backfilled with sand/glass beads to a minimum of 6 in. above the screened interval. Granular bentonite pellets will then be placed from approximately 6 in. above the screen to the ground surface hydrating concurrently with placement. Sufficient time will then be provided for the bentonite to set (approximately 24 hours). Pour 0.5 cup bentonite down sampling hole, add 0.25 cup distilled water, add another 0.5 cup bentonite down hole, and another 0.25 cup water. Continue until bentonite seal reaches the surface.

9. Collect sample (Section 3.2).

10. Remove probe and backfill hole with bentonite.

3.2 SOIL GAS SAMPLE COLLECTION USING TEDLAR BAGS[1]

The following steps summarize the collection of a soil gas sample using Tedlar bags:

1. Cut at least 1 in. off the end of the tubing to ensure a clean sample.

2. Attach tubing to the vacuum box and pump.

3. Open valve on a clean, dry Tedlar bag, and attach inside the vacuum box.

4. Close the vacuum box, close stopcock (3-way valve) between vacuum box and pump, and then turn the pump on.

5. Allow Tedlar bag to fill 90 percent (do not overfill bag), shut off, crimp Tygon tubing (to prevent release of sample back down hole), open stopcock, and remove Tedlar bag from box.

1. Summa canisters are also acceptable and are generally used for projects requiring analytical data with a lower detection limit. An equivalent SOP for Summa canisters (SOP No. 006) and offsite analysis will be submitted prior to sampling.

— If the bag is filled with air only, squeeze the air out completely to purge air that was in the tubing and sand and reattach inside the box. Repeat Bullets 4 and 5. Close the valve on the Tedlar bag upon removal; label it accordingly; and put it in a cool, dark area. NOTE: Not so cool as to cause condensation.

— If Tedlar bag is filled with water and air, be sure to close valve on Tedlar bag before removing it; label the bag accordingly; and put it in a cool, dark area. NOTE: Not so cool as to cause condensation.

— If water is pulled into the Tedlar bag, Tygon tubing inside the vacuum box must be replaced.

6. Remove and decontaminate probes.

7. Repeat the above procedures for each additional soil gas point.

When soil gas samples are collected, the following actions will be taken to document local conditions during sampling that may influence interpretation of the results:

- Sample location will be noted, including the site, area streets, neighboring commercial or industrial facilities (with estimated distance to the site), outdoor ambient air sample locations (if applicable), and compass orientation (north).

- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed, and direction) will be noted for the past 24-48 hours.

- Any pertinent observations will be recorded, such as odors and readings from field instrumentation.

The field sampling team will maintain a soil gas sample log sheet summarizing the following:

- Sample identification
- Date and time of sample collection
- Sampling depth
- Identity of samplers
- Sampling methods and devices
- Purge volumes
- Volume of soil vapor extracted
- Apparent moisture content (dry, moist, saturated, etc.) of the sampling zone
- Chain-of-custody protocols and records used to track samples.

3.3 SOIL GAS SAMPLE COLLECTION USING SUMMA CANISTERS

Soil gas samples will be collected in the same manner at all locations to minimize possible discrepancies. The following procedures should be followed when sampling soil gas:

1. At least 24 hours after the installation of the temporary soil gas points, 2-3 implant volumes (i.e., the volume of the sample probe and tube) will be purged prior to collecting the samples to ensure that representative samples are collected.

2. Flow rates for both purging and collecting will not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling.

3. Samples will be collected using conventional sampling methods and appropriate containers, which meet project data quality objectives (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation), and meet the requirements of the sampling and analytical methods (e.g., low flow rate; Summa® canisters, which are certified clean by the laboratory, using an appropriate U.S. Environmental Protection Agency Method). The sample duration for these samples normally will be 2 hours.

4. A tracer gas (e.g., helium, butane, or sulfur hexafluoride) will be used at each location before collecting soil gas samples to verify that adequate sampling techniques are being implemented (i.e., to verify infiltration of outdoor air is not occurring). Once verified, continued use of the tracer gas may be reconsidered.

When soil gas samples are collected, the following actions will be taken to document local conditions during sampling that may influence interpretation of the results:

- Sample location will be noted, including the site, area streets, neighboring commercial or industrial facilities (with estimated distance to the site), outdoor ambient air sample locations (if applicable), and compass orientation (north).

- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed, and direction) will be noted for the past 24-48 hours.

- Any pertinent observations will be recorded, such as odors and readings from field instrumentation.

The field sampling team will maintain a soil gas sample log sheet summarizing the following:

- Sample identification
- Date and time of sample collection
- Sampling depth
- Identity of samplers

- Sampling methods and devices
- Purge volumes
- Volume of soil vapor extracted
- Canister and associated regulator identification
- Helium leak test results
- Vacuum before and after samples collected
- Apparent moisture content (dry, moist, saturated, etc.) of the sampling zone
- Chain-of-custody protocols and records used to track samples.

After the sample collection period, the Summa® canisters will be sent for subsequent laboratory analysis. The soil gas samples will then be analyzed for target constituents at an approved laboratory in accordance with the Sampling and Analysis Plan.

Upon completion of the sampling, the sample tubing will be removed and the temporary soil vapor point location will be backfilled with bentonite and marked with a stake/flag that will be labeled with the proper sample identification and illustrated on the site map so it can be located by the site surveyor or Global Positioning System operator. Borings performed in paved or concrete areas will be backfilled and refinished at the ground surface with concrete or cold patch.

4. MAINTENANCE

No maintenance is required.

5. FIELD QUALITY CONTROL MEASURES

To ensure that the equipment is free of volatile contaminants, collect at least two quality control samples per day by drawing uncontaminated air through an unused representative sampling apparatus (assembled shield point and tubing). One sample should be taken at the beginning of the day, prior to collecting any samples, and the other at the end of the day, after decontaminating the equipment. Ambient air may usually be assumed to be uncontaminated. If site ambient air is assumed to be contaminated, it should be sampled for contaminant levels.

To ensure that the analyzed samples are representative of the collected samples, and that the Tedlar bags are not losing volatile samples, spiked samples of known volatile concentration will be prepared. These samples will be stored and handled in the same manner as other field samples. Spiked samples will be the first collected and last analyzed. Selected low level samples should also be duplicated at a different time and analyzed immediately to verify that analyte loss is not occurring. Alternatively, samples may be analyzed in the field, using either Tedlar bags or syringe samplers to collect and transport the samples to the gas chromatograph.

Note sampling times for each sample in a field logbook and on the sample bag (if bags are used). No more than 4 hours should elapse between sampling and analysis; 15 minutes is preferable.

6. REFERENCES

Not applicable.

Standard Operating Procedure No. 021
for
Sediment Sampling

Prepared by

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Revision: 2
March 2019

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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are any client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**also check Box A**), or if this SOP is being used with no changes (**only check Box B**).

☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 021	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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DOCUMENT REVISION HISTORY

ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
2	28 March 2019	Systematic review and update	Caryn Kiehl-Simpson Peggy Derrick	Matthew Bowman

1. SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) delineates protocols for sampling sediments from streams, rivers, ditches, lakes, ponds, lagoons, and marine and estuarine systems.

EA recognizes that other protocols have been developed that meet the criteria of quality and reproducibility. Clients may have their own sediment sampling protocols, which may contain methodologies and procedures that address unique or unusual site-specific conditions or may be in response to local regulatory agency requirements. In such cases, EA will compare its and the client's protocols. The goal is to provide the client with the most quality; therefore, if the client's protocols provide as much or more quality assurance than EA's protocols for the particular site or project, EA will adopt those particular protocols and this SOP will be superseded in those respects. If EA is required to implement the client's protocols in lieu of EA's protocols, EA will make the client formally aware of any concerns regarding differences in protocols that might affect data quality and will document such concerns in the project file.

2. PROCEDURES

The water content of sediment varies. Sediments range from soft to dense and fine to rocky. A variety of equipment may be necessary to obtain representative samples, even at a single site. Factors to consider in selecting the appropriate sampling equipment include sample location (edge or middle of the waterbody), depth of water and sediment, grain size, water velocity, and analytes of interest.

3. GENERAL PROCEDURES

1. All samples must be handled in a manner that satisfies the project Quality Assurance Project Plan, SOPs, and data quality objectives. Prior to a field effort, verify general sample requirements such as sample numbers, volume requirements, holding times, sample preservation requirements, and duplicate and other quality assurance/quality control sample requirements. Verify general sampling logistics such as site access, access to temporary and secure field storage, designated sample transport procedures, laboratory shipping address(es), and points of contact.

2. Comply with the Health and Safety Plan specifications for proper personal protective equipment (steel-toed boots, safety glasses, hard hats, splash shields, and Tyvek as appropriate and designated in the site-specific Health and Safety Plan). Wear chemically-protective gloves when collecting samples appropriate for the potential constituents to be sampled. Complete review of emergency plans and equipment. If sampling from a boat or near waterbodies with depths of 4 feet or more, the sampling team will wear life jackets. Review and comply with SOP Number (No.) 035 Small Boat Operations, if applicable.

3. Verify local One Call service has been contacted prior to sampling activities and proper utility clearance has been obtained. Verify site access, dockage, other required communications (e.g., U.S. Coast Guard, local authorities, etc.) have been secured.

4. Review specific responsibilities of each field team member and conduct daily safety briefings as specified by the site-specific Safety and Health Plan.

5. Confirm sampling equipment and supplies are adequate for the field effort. In addition to the sampling equipment and vessel requirements, verify that support equipment including, but not limited to, spatulas, scoops, spoons, pans, buckets, bowls, gloves, measuring implements, plastic sheeting, data forms, and logbooks are available. Appropriate sample storage and transport equipment may include a refrigeration unit, ice chests, dry ice or ice, insulation or other stabilization material to protect sample containers, custody seals, sampling containers, and shipping paperwork. Confirm decontamination supplies and equipment are sufficient for the duration of the field effort.

6. Collect samples first from areas suspected of being the least contaminated to minimize the risk of cross-contamination.

7. If surface water and sediment samples are to be collected at the same location or co-located (if both are required in the project-specific Sampling and Analysis Plan), collect the surface water sample first (refer to SOP No. 007 for surface water sampling). Sediment sampling usually results in disturbance of the sediments, which may influence the analytical results of the surface water samples.

8. Water quality measurements may be required at the same locations as the surface water and/or sediment sample locations. Collect the water quality measurements before the collection of surface water or sediment samples (refer to SOP No. 043 for water quality measurement collection).

9. Minimize the potential for sediment disturbance prior to sampling. Care should be taken when wading into a waterbody and/or during vessel operations prior to sampling. These activities can disturb the sediment. Move slowly and cautiously, approach the sample location from downstream. If flow is not strong enough to move entrained particles away from the sample location, wait for the sediment to resettle before sampling.

10. Collecting samples directly into sample containers is not recommended. Sediment samples should be placed in Teflon®, stainless steel, or glass trays, pans, or bowls for sample preparation and processing.

11. Use the proper equipment and material construction for the analytes of interest. For example, for volatile organic compound analysis, the sampling material in direct contact with the sediment or surface water must consist of Teflon, polyethylene, or stainless steel.

12. Refer to EA SOP No. 005 (Field Decontamination) for proper decontamination methods before and after sampling and between samples.

13. Collect samples for volatile organic compound analysis and acid volatile sulfide analysis first. Do not mix such samples before placing them in the sample containers. For composite volatile organic compound and acid volatile sulfide samples, place equal aliquots of each subsample in the sample container with no headspace. To maintain sample integrity, exposure to oxygen/air should be limited to the extent possible.

14. Sediment that will be analyzed for other constituents should be prepared as follows:

    - Place the sediment in a mixing container.
    - Divide the sediment into equal quarters by volume.
    - Mix each quarter separately and thoroughly.
    - Combine the quarters and mix thoroughly.
    - For composite samples, mix each subsample as described above. Place equal aliquots of each subsample in a mixing container and follow the procedure described above.
    - Sediment preparation activities should be performed where the potential of contamination from external sources (e.g., running engines) can be minimized or eliminated.

15. Mark the sampling location on a site map. Record sampling location coordinates with a Global Positioning System unit, photograph (optional, recommended), describe each location, and place a numbered stake above the visible high water mark on the bank closest to the sampling location (if appropriate). The photographs and description must be adequate to allow the sampling station to be relocated at a future date.

16. Dispose of investigation-derived wastes according to applicable rules and regulations.

4. CORERS

A corer provides a vertical profile of the sediment that may be useful in tracing historical contaminant trends, geological characterization and dating, and characterizing the depth of impacts at a site. Because displacement is minimal, a corer is particularly useful for maintaining the integrity of the vertical sediment profile. Core samplers are also useful when it is important to maintain an oxygen-free environment as they limit oxygen exchange with the air more effectively than grab samplers. Corers can be constructed out of a variety of materials.

4.1 EQUIPMENT

The following list of equipment may be needed during the collection of sediment core samples. Depending upon the actual collection method used and the analyses that will be conducted in the samples, not all equipment on the list may be used.

- Probing equipment for pre-sampling testing for utilities
- Sampling vessel, floating platform (properly equipped and sized barge or boat), and waders and plan for collecting samples by hand (may significantly limit sample depth)
- Winch
- Crane, boom arm or A-frame
- Sediment core sampler (Vibracore, piston tube, Wildco tube sampler, etc.)
- Core liners, core catchers, liner caps, etc.
- Saw, knife, and cutters to open or split core liners
- Sampling vessel
- Propulsion method for sampling vessel or floating platform
- Containers, buckets, and tubs
- Small trays
- Calibration bucket
- Wash box
- Glassware
- Logbook
- Labels
- Coolers
- Spoons
- Water filters
- Gloves for sampling
- Gloves for other sampling activities such as cutting, equipment handling, etc.

- Measuring device
- Decontamination chemicals and de-ionized water.

4.2 PROCEDURE

4.2.1 Manual Sampling

When sampling manually, a polyvinyl chloride pipe (commonly 2-inch in diameter) with a Teflon or polyethylene liner (as an example) can be lowered into the sediment; a well cap can be used to form an airtight seal and negative pressure as the pipe is withdrawn.

1. Ensure that the corer and (optional) liner and other sampling equipment are properly cleaned.
2. Position downstream of the sample location.
3. Force the corer into the sediment with a smooth continuous motion. Rotate (not rock) the corer if necessary to penetrate the sediment.
4. Twist the corer to detach the sample; then withdraw the corer in a single smooth motion. If the corer does not have a nosepiece, place a cap on the bottom to keep the sediment in place.
5. Remove the top of the corer and decant the water in a slow controlled manner (into appropriate sample containers for surface water analysis, if required).
6. Remove the nosepiece or cap and begin sample description, logging, and processing per the work planning documents.
7. Decontaminate the sediment coring apparatus as described in SOP No. 005 or work planning documents.
8. Repeat the process at an offset location until sufficient sample quantity has been recovered. Additional cores may need to be obtained if the core recovery is insufficient to achieve the required volume. Verify recovery limits are in accordance with work planning documents and data quality objectives.
9. Process the core samples as described in work planning documents.

4.2.2 Sampling from a Vessel

1. Select a sediment core sampler (Vibracore, piston tube, Wildco tube sampler, etc.) suitable for the bottom conditions, water depth expected, water velocity, the volume of material needed, and the planned/targeted depth of sampling.

2. Select sediment coring tools of sufficient diameter and length to obtain the needed sample volume and depth of penetration. Depending on the volume of sediment needed, multiple sediment cores may be required. To the extent possible, predetermine the number of cores required to avoid having to return to a location for additional cores/sample volume.

3. Set up the sediment coring tool and install the core liner tube, drive head, drive shoe, and/or core catcher, piston, and piston line, as appropriate for the specific sampler chosen and the proposed depth of sample/penetration.

4. Securely attach the core sampler to a winch with cable or line of sufficient length and strength to accommodate the weight of the sampler and sample (Vibracore) or other sampler (piston tube or Wildco tube sampler) to sufficient pipe to reach the maximum proposed sample depth.

5. A measurement system should be in place capable of documenting the depth to the sediment surface, depth of penetration, and depth of recovery. Location coordinates should be collected at each sample location (if a vessel navigation system will be used to collect the location coordinates, an offset may be required between the antenna and the sampler deployment location).

6. Slowly lower the sampler through the moon pool or over the side until the sampler reaches the water/sediment interface. The sampler may be lowered using a crane or on a winch cable and A-frame or other mechanical mechanism capable of carry/control the weight of the sampler. The crane, A-frame, or boom arm must have enough clearance to accommodate the length of the sample and sampling apparatus and enough strength to safely accommodate the weight of the sample and sampling apparatus. Note the depth to the top of sediment.

7. Advance the sediment core sampler into the sediment to the proposed depth or refusal, whichever comes first. Vibracore samplers will be advanced by the vibrating head. Vibracore samplers will continue to be attached to the winch line and the rate of descent will be controlled during penetration into the sediment. Piston tube or Wildco tube samplers will be advanced manually. If necessary, a piston tube or Wildco tube sampler may be advanced by tapping the top of the pipe with a rubber mallet. These samplers are intended for soft sediment and will not tolerate heavy abuse from pounding in an attempt to penetrate through debris, shell beds, or consolidated material.

8. Slowly retrieve the sediment coring tool. As soon as possible, cap the bottom of the sample tube to prevent loss of sample. Secure the sampling apparatus.

9. Remove the sediment core liner from the sampling apparatus.

10. Allow the core to drain or siphon water, taking care not to disturb the surface of the sediment. At the first sign of sediment in the drained water sample, cease draining and tie or cap the sample liner to ensure that the surficial layer remains intact in the sample.

11. Cut off any empty core liner to eliminate headspace. Measure core recovery. Acceptable core recoveries may be specified in the work planning documents. Typically, recoveries of 70 or 80 percent are favorable for results interpretation and data evaluations. Lesser recoveries may not sufficiently represent the sediment column. The data quality objectives of a specific project will dictate the selected recoveries. If the sampler meets refusal above the proposed depth, offset the initial location and make up to the required number of attempts. Work planning documents should specify the maximum number of attempts to be made to obtain a core with sufficient recovery. If sufficient recovery cannot be obtained, other drilling and sampling methods and/or location abandonment may be appropriate.

12. If sufficient recovery was obtained in the interval penetrated, process the core and obtain samples from that interval.

13. Write the location identification and orientation (up arrow) on the outside of the core tube with a permanent marker. Write the location identification, date, and time of collection on the core tube cap.

14. The location (Global Positioning System coordinates), collection date and time, penetration depth, recovery depth, and identification for each core should be recorded in the field logbook.

15. Transport sediment cores to the onshore processing area throughout the day, if possible. Data quality objectives and work planning documents may require that core tubes be maintained in a vertical orientation. When possible, transport sediment cores to shore after each location or at an interval that will maintain the integrity of the samples. Cores should be stored under refrigeration or iced on the sampling vessel to maintain sample integrity.

16. Decontaminate the sediment coring apparatus as described in SOP No. 005 or work planning documents.

17. Repeat the process at an offset location until sufficient sample quantity has been recovered. Additional cores may be needed if the core recovery is insufficient to achieve the required volume. Debris and obstructions are possible that may prevent the full penetration and recovery of all of the advanced cores. Observation of debris, obstructions, or hard bottom conditions that preclude advancement of the sampler should be documented in the field logbook.

18. Water quality measurements may be required at each coring location or locations specified in the project work plan. The measurements should be conducted on the same day as the core collection, and prior to the core collection, if possible.

19. Verify that all field measurements and documentation are complete prior to moving off location.

20. Process the core samples as described in work planning documents.

5. SCOOPS AND SPOONS

When sampling at the margins of a waterbody or in shallow water, scoops and spoons may be the most appropriate sampling equipment. For sample collection several feet from shore or in deeper water, the scoop or spoon may be attached to a pole or conduit. Equipment will be a subset of that described above in Section 4.1.

- Stand downstream of the sample location.
- Collect the sample slowly and gradually to minimize disturbing the fine particles.
- Decant the water slowly to minimize the loss of fine particles.
- Transfer the sediment to sample containers or mixing trays, as appropriate.
- Process the samples as indicated by the project work plan.
- Verify that all field measurements and documentation are complete prior to moving off location.

6. DREDGES

Three types of dredges are most frequently used: Peterson, Ponar, and Eckman. Many other dredge types are available; their applicability will depend upon site-specific factors. Equipment will be a subset of that described above in Section 4.1.

6.1 PETERSON, VAN VEEN, AND PONAR DREDGES

These dredges are suitable for hard, rocky substrates, deep waterbodies, and streams with fast currents. Ponars have top screens and side plates to prevent sample loss during retrieval.

- Open the jaws and place the cross bar into the proper notch.
- Lower the dredge to the bottom in a controlled manner, making sure it settles flat.
- When tension is removed from the line, the cross bar will drop, enabling the dredge to close as the line is pulled upward during retrieval.

- Pull the dredge to the surface. Make sure the jaws are closed and that no sample was lost during retrieval through incomplete closure due to rocks, shells, or other debris; penetration at an angle; or tilting during retrieval. The sampler should not be overfilled such that the sediment surface is touching the top of the sampler. Overlying water should be present indicating minimal leakage; this water should be siphoned off, not decanted, prior to sample processing. The sediment water interface should be intact with no signs of washout or channeling.

- Open the jaws and transfer the sediment to sample containers or to a mixing tray.

- Verify that all field measurements and documentation are complete prior to moving off location.

6.2 ECKMAN DREDGE

The Eckman dredge works best in soft substrates in waterbodies with slow or no flow.

- Open the spring-loaded jaws and attach the chains to the pegs at the top of the sampler.

- Lower the dredge to the bottom in a controlled manner, making sure it settles flat.

- Holding the line taut, send down the message to close the jaws.

- Pull the dredge to the surface. Make sure the jaws are closed and that no sample was lost during retrieval through incomplete closure due to rocks, shells, or other debris; penetration at an angle; or tilting during retrieval. The sampler should not be overfilled such that the sediment surface is touching the top of the sampler. Overlying water should be present indicating minimal leakage; this water should be siphoned off, not decanted, prior to sample processing. The sediment water interface should be intact with no signs of washout or channeling.

- Open the jaws and transfer the sediment to sample containers or to a mixing tray.

- Verify that all field measurements and documentation are complete prior to moving off location.

7. REFERENCES

Not applicable.

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Standard Operating Procedure No. 022
for
Sediment and Benthic Macroinvertebrate Sampling with Eckman Grab

Prepared by

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December 2014

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1. SCOPE AND APPLICATION

This Standard Operating Procedure covers the protocol for obtaining qualitative or quantitative samples of soft sediments and macroinvertebrates inhabiting soft sediments in lakes, reservoirs, and other waterbodies. The Eckman grab sampler is well suited to collecting samples in deeper (up to 100 ft) waterbodies.

Use of brand names in this Standard Operating Procedure is not intended as endorsement or mandate that a given brand be used. Alternate equivalent brands of detectors, sensors, meters, etc. are acceptable. If alternate equipment is to be used, the contractor will provide applicable and comparable standard operating procedures for the maintenance and calibration of same.

2. MATERIAL

The following materials may be required:

Eckman grab sampler: a box-shaped device with two scoop-like jaws	Sample containers
Boat	Sieve – 500 µ (U.S. Standard No. 30)
Personal protective equipment	Stainless steel spoon or trowel
Personal flotation devices	

3. PROCEDURES

The following is a summary of procedures on use of the Eckman grab sampler:

- Cock the sampler by raising each jaw upward into the cocked position using the attached able and secure the cable to the catch pin located at the top of the sampler.
- Once cocked, lift the sampler overboard and lower slowly but steadily to the bottom.
- Once on the bottom, indicated by a slack line, the weighted messenger is sent down the line tripping the catch mechanism, causing the spring loaded jaws to close the bottom of the sampler, containing the sediment.
- Raise the sample at a slow but steady rate to prevent sample loss or washout.
- Once the sample is on board, empty the sample into a stainless steel, polytetrafluoroethelyne, or polytetrafluoroethelyne-lined bowl or tray for processing.
  - If the sediment will be analyzed for volatile organic compounds, transfer the sample into the appropriate sample containers immediately.

- If the sediment will not be analyzed for volatile organic compounds, use Stainless steel spoon to thoroughly homogenize sample, then transfer sample into appropriate containers. Add preservative (if required) and place in ice-filled chest.

  — If benthic macroinvertebrates are to be collected, sieve sample and transfer macroinvertebrates into appropriate container.

- Thoroughly decontaminate the device.

4. MAINTENANCE

Maintain according to manufacturer's suggestions.

5. PRECAUTIONS

The following precautions should be taken while using an Eckman grab sampler:

- Inspect the device for mechanical deficiencies prior to its use.
- This sampler is inefficient in waters deeper than approximately 75-100 ft, under adverse weather conditions, and in waters of moderate to strong currents or wave action.
- Exercise caution at all times once the grab is loaded or cocked because a safety lock is not part of the standard design.
- Operate the sampler from a boat with a winch and cable.
- Wear gloves when collecting sediment samples. Be sure to consult the health and safety plan for the proper dermal and respiratory protection prior to collecting any samples.
- Higher levels of personal protective equipment may be required by the Health and Safety Plan.
- While sampling from a boat in waterbodies with a depth of 5 ft or more, the sampling team will wear personal flotation devices (life jackets).
- Collect samples first from those areas that are suspected of being the least contaminated, thus minimizing the risk of cross-contamination.

6. REFERENCES

American Society for Testing and Materials. Standard 2.1. D4387 Guide for Selecting Grab Sampling Devices for Collecting Benthic Macroinvertebrates.

U.S. Environmental Protection Agency. 1990. Macroinvertebrate Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters. Office of Research and Development. EPA/600/4-90/030. November.

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Standard Operating Procedure No. 025
for
Soil Sampling

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure is to delineate protocols for sampling surface and subsurface soils. Soil samples give an indication of the area and depth of site contamination, so a representative sample is very important.

2. MATERIALS

The following materials may be required:

Bucket auger or push tube sampler	Split-spoon, Shelby tube, or core barrel sampler
Drill rig and associated equipment	Stainless steel bowl
Personal protective equipment as required by the Health and Safety Plan	Stainless steel spoon, trowel, knife, spatula (as needed)

3. PROCEDURE

3.1 SUBSURFACE SAMPLES

Don personal protective equipment. Collect split-spoon, core barrel, or Shelby Tube samples during drilling. Upon opening sampler, or extruding sample, immediately screen soil for volatile organic compounds using either a photoionization detector or flame ionization detector. If sampling for volatile organic compounds, determining the area of highest concentration, use a stainless steel knife, trowel, or laboratory spatula to peel and sample this area. Log the sample in the Field Logbook while it is still in the sampler. Peel and transfer the remaining sample in a decontaminated stainless steel bowl. Mix thoroughly with a decontaminated stainless steel spoon or trowel. Place the sample into the required number of sample jars. Preserve samples as required. Discard any remaining sample into the drums being used for collection of cuttings. Decon sampling implements. All borings will be abandoned.

NOTE: If sample recoveries are poor, it may be necessary to composite samples before placing them in jars. In this case, the procedure will be the same, except that two split-spoon samples will be mixed together. The Field Logbook should clearly state that the samples have been composited, which samples were composited, and why the compositing was done.

Samples taken for geotechnical analysis will be undisturbed samples, collected using a thin-walled (Shelby tube) sampler.

3.2 SURFICIAL SOIL SAMPLES

Don personal protective equipment. Remove vegetative mat. Collect a sample from under the vegetative mat with a stainless steel trowel, push tube sampler, or bucket auger. If a representative sample is desired over the depth of a shallow hole or if several shallow samples are to be taken to represent an area, composite as follows:

- As each sample is collected, place a standard volume in a stainless steel bowl.
- After all samples from each hole or area are in the bucket, homogenize the sample thoroughly with a decontaminated stainless steel spoon or spatula.

If no compositing is to occur, place sample directly into the sample jars. Place the leftover soil in the auger borings and holes left by sampling. If necessary, add clean sand to bring the subsampling areas back to original grade. Replace the vegetative mat over the disturbed areas. Samples for volatile organic compounds will not be composited. A separate sample will be taken from a central location of the area being composited and transferred directly from the sampler to the sample container. Preserve samples as required. Decon sampling implements.

4. MAINTENANCE

Not applicable.

5. PRECAUTIONS

Refer to the Health and Safety Plan.

Soil samples will not include vegetative matter, rocks, or pebbles, unless the latter are part of the overall soil matrix.

6. REFERENCES

ASTM International. Method D1586-84, Penetration Test and Split-Barrel Sampling of Soils.

———. Method D1587-83, Thin Walled Sampling of Soils.

Department of the Army, Office of the Chief of Engineers. 1972. Engineer Manual 1110-2-1907 Soil Sampling. 31 March.

Standard Operating Procedure No. 026
for
Active Soil Gas Analysis

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedures is to describe protocols for using the Sentex Scentograph Portable Gas Chromatograph (GC) to analyze soil gas samples for volatile organic compounds. The primary method described here for introducing samples into the GC uses an absorbent tube to concentrate samples prior to analysis, although sample loop and direct injection methods may also be used. Operation of the GC should not be attempted without first reading the operation manual.

Use of brand names in this Standard Operating Procedure is not intended as endorsement or mandate that a given brand be used. Alternate equivalent brands of detectors, sensors, meters, etc. are acceptable. If alternate equipment is to be used, the contractor will provide applicable and comparable standard operating procedures for the maintenance and calibration of same.

2. MATERIALS

The following materials may be required:

Argon (high purity) carrier gas	Sample loop assembly and loops
Battery charger for Scentograph GC	Sentex Scentograph Portable GC with argon ionization detector/electron capture detector
Battery charger for Toshiba PC	Spare analytical column
Calibration gases, as needed	Spare preconcentrator assembly
Copper gas transfer tubing and fittings	Spare Septa
Industrial Solvents Calibration Library software and empty data disks	Syringe cleaner
Multimeter	Syringes (1 µL, 5 µL, 10 µL, 100 µL, 1 mL, 5 mL, and 50 mL)
Other spare parts (e.g., tubing, swagelock fittings)	Three 1L Tedlar bags
Paperwork (applicable regulations and NRC license, Scentograph Operators' Manual, GC log book, table of ionization potentials)	Tools (Allen wrench, large adjustable wrench, small adjustable wrench, 0.25-in. wrench, small screwdrivers)
Regulator for calibration gas	Toshiba T 1200 laptop personal computer
Regulator for carrier gas	Vacuum pump for syringe cleaner

3. SETUP

The GC should preferably be operated in a clean environment, without significant concentrations of volatile organic compounds in the atmosphere. Batteries and internal gas canisters allow self-contained operation of up to 6-8 hours, but longer continuous operation requires a 110-V power supply and external source of ultra-high-purity argon carrier gas. After each portable operation, the instrument must be recharged for at least 8 hours, preferably overnight, before resuming operations. When the instrument is not in use, it should be connected to the battery charger.

Install regulator on the carrier gas cylinder, attach copper tubing to the outlet of the regulator, and briefly purge the tubing by carefully opening the cylinder valve slightly. Connect the free end of the copper tubing with quick connector to the fitting marked carrier on the back of the GC, being careful to insert the connector straight. Open cylinder valve and carrier gas valve on GC to fill the internal tank. The maximum pressure is 1,800 psi, and severe damage can result from over pressuring the internal tanks. Repeat this process for calibration gas, connecting tubing to fitting marked calibration. Do not operate the GC if the carrier gas pressure is less than 200 psi.

Set column pressure to desired value (typically 30 psi) by adjusting carrier gas regulator inside the GC with an Allen wrench. Do not use a column pressure of less than 10 psi. After at least 5 minutes, turn on the PC (with Sentex software disk in A drive and blank data disk in the B drive) and set initial conditions at the operating parameters menu. For the industrial solvents calibration library, the operating conditions should be as follows:

Sample time:	Adjust as needed, generally 10-20 seconds
Delay time:	0.5 seconds
Desorption time:	4.0 seconds
Inhibit time:	80 seconds
Oven temperature:	100°C
Chart duration:	20 minutes
Analyses/calibration:	Adjust as needed (used in automatic mode only)
Column:	12 ft 10 percent SP1000
Column pressure:	30 psi
Retention time window:	Typically 3 percent
Noise threshold:	Typically 50-100

Other operating conditions should be selected as needed depending on project needs if the Industrial Solvents Calibration Library is not being used.

4. CALIBRATION

Using the Industrial Calibration Library software, it is only necessary to calibrate with benzene. Otherwise, calibration gases containing the compounds of interest are needed. A calibration standard near the expected sample concentration should be used.

At the operating parameters menu, name the calibration mixture, identify the peaks, and specify their concentrations. Recheck operating parameters.

Calibration gas from the internal cylinder or from an external source may be used. If using the internal tank, turn on the calibration gas valve on the rear of the GC. If an external source is used, turn off the carrier gas valve, run calibrations until the calibration gas pressure is zero, and attach the carrier gas source (at atmospheric pressure) to the calibration port on the side of the GC.

Initiate the calibration run by pressing 4 [enter] at the main menu. If using the industrial solvents calibration library, the benzene peak must be the first peak and must fall between 230 and 242 seconds. If not, make small adjustments to the temperature or column pressure and repeat.

5. OPERATION

After satisfactory calibration of the instrument, attach a Tedlar bag or similar sample container to the analysis port on the instrument and open the inlet valve on the container. Type 3 followed by a return at the main menu to initiate a sample run. If manual operation is selected after a change in operating parameters before a calibration run, the instrument will automatically start a calibration cycle before the analysis run.

The instrument will match observed peaks with those in the calibration gas and in the calibration library (if used), identify the peaks, and calculate concentrations based on peak area. Peak data as well as operating conditions are stored on a data disk in the B drive.

6. QUALITY CONTROL

At a minimum, a quality control sample containing constituents of interest should be analyzed at the beginning and end of each batch of samples. The instrument should be calibrated before each sample batch, after any change in operation conditions, and when any changes in instrument response is noted. Duplicate samples should be analyzed every 10-20 samples.

7. RECALL AND DISPLAY OF RESULTS

To recall results, type 5 followed by a return at the operations menu. The analysis summary, listing trace number, analysis date, analysis time, peak identification, concentration, retention time, peak area, and sample (or calibrant) name, will be displayed. To view a particular trace, type 6 followed by a return at the operation menu, then specify the trace number.

8. SHUTDOWN

After the last analysis, turn off the PC. Allow the column and detector to cool before shutting off the carrier gas supply. Turn off carrier and calibration gas valves on the back of the GC and turn off cylinder valves. Bleed excess pressure from the copper tubing and disconnect from the GC.

9. PRECAUTIONS

The argon ionization detector uses a 150-mCi tritium source on a thin metal foil. The source is sealed in a steel cylinder. Any repairs of the detector must be made by the manufacturer. The detector housing and the sealed source must never be opened.

To prevent damage to the instrument, the following precautions must be observed:

- Do not operate the GC with less than 200 psi carrier gas pressure.
- Do not fill the internal tanks to over 1,800 psi.
- Allow at least 5 minutes of carrier gas flow through the column before turning off the instrument.
- Do not replace the preconcentrator assembly without instructions from the manufacturer.
- Do not select a column pressure less than 10 psi or greater than 30 psi.
- Use only carrier grade argon as a carrier gas (at least 99.995 percent, preferably 99.999 percent pure). Industrial grade argon (e.g., from a welding shop) will cause contamination.
- Use only high purity regulators for the gas supply.
- If problems occur, call Sentex Technical Support.

Standard Operating Procedure No. 027A
for
Passive Soil Gas Surveys
– Gore Sorbers

Prepared by

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1. SCOPE AND APPLICATION

The steps and information herein are the Standard Operating Procedures (SOPs) for conducting a GORE-SORBER Screening Survey. GORE-SORBER® Screening Modules and organic analyses will be supplied/conducted by:

W.L. Gore & Associates, Inc.
101 Lewisville Road
P.O. Box 1100
Elkton, Maryland 21922-1100
(410) 392-3300

Use of brand names in this SOP is not intended as endorsement or mandate that a given brand be used. Alternate equivalent brands of detectors, sensors, meters, etc. are acceptable. If alternate equipment is to be used, the contractor will provide applicable and comparable SOPs for the maintenance and calibration of same.

2. COLLECTOR DESCRIPTION

The sorbent containers and insertion/retrieval cords are constructed solely of inert, hydrophobic, microporous GORE-TEX® expanded polytetrafluoroethylene (ePFTE, similar to Teflon) with no fillers or plasticizer introduced during manufacturing. The unique feature of this construction is that the entire sorbent container surface area, as well as the surrounding insertion/retrieval "cord," facilitates vapor transfer. Sorbent containers (sorbers) are typically filled with TENAX®.

3. FIELD OPERATIONS

3.1 MATERIALS

The following materials may be required for field operations:

Cooler(s) with chilled ice packs or ice	Knife, scissors, and needle nose pliers
Corks with screw eyes	Latex surgical gloves or equivalent
Correctly scaled site map	Measuring tape, transit, or other distance measuring device
Electric power source (AC power outlet or generator)	Paper towels and American Society for Testing and Materials Type II water or equivalent
Electric rotary, hammer-action, or combination hammer with 1-in. carbide-tipped bit (31-36 in. long)	Patching compound for concrete and/or asphalt holes (if required)
Extension cord	Pen, clipboard, field notebook, chain-of-custody (COC) form, and SOP
Fiberglass staff flags or some other means of location marking	Slide hammer/tile probe
GORE-SORBER® Screening Modules and Vials	Small shovel
Insertion rod	Trash bags

3.2 LOCATING SAMPLE SITES

Lay out sampling grid using point spacing specified in Work Plan. From a known survey point, locate and mark all screening module location sites to the nearest inch using fiberglass staff flags.

Note on field maps and/or field log any deviations to the sample grid as presented in the Work Plan.

Drill Hole—A 9/16- to 1-in. hole is cored to a depth of 2-3 ft below ground surface (installation depth is held constant for a given survey). This depth has been selected to keep the modules below the daily effects of atmospheric temperature changes. Coring is accomplished using a variety of tools depending on the nature of the material being cored. The holes should be vertical and as free from debris as possible.

Prepare Sorber Unit and Note the Unique Serial Number—Immediately after the hole is cored, a GORE-SORBER® Screening Module is removed from its sealed container. Note that each module has a unique serial number recorded on top of the module vial and a metal tag attached to the module. Each vial is also individually numbered. **Record this number on the site map and/or field notebook immediately**.

Insert Sorber Unit—Insert the stainless steel insertion rod into the pocket in the bottom of the module, and lower it into the hole. Ensure that the module goes the entire way down the hole. If a large resistance is felt during insertion, remove the module and re-drill the hole. Re-insert the module. When the module is completely inserted in the hole, press the insertion rod against the side of the hole. Twist the rod and pull the rod out.

Seal Hole—Attach the end of the module to the screw eye in the cord. **Do not remove the metal ID tag**. Coil the excess retrieval cord and push it with the metal tag into the hole. Cork the hole to prevent the intrusion of rain and atmospheric gasses during exposure. If the cork does not fit snugly into the hole, and wrap a short length of the module retrieval cord around the cork and re-insert the cork into the hole.

Decontaminate the auger and insertion rod. After each use, decontaminate all intrusive equipment using decontamination procedures specified in Section 3.3.2 of SOP No. 005.

3.3 EXPOSURE TIME

Exposure times, typically 14 days, are defined in the site Work Plan. Exposure times should be sufficient to allow equilibration of the modules with subsurface conditions. Actual subsurface exposure time and conditions will be measured and recorded.

3.4 FIELD QUALITY CONTROL BLANKS

3.4.1 Temperature Control Blank

Water temperature control blanks are normally supplied by Gore with one blank supplied with each cooler of shipped modules. Temperature control blanks consist of a small vial of American Society for Testing and Materials Type I water that is used to determine the temperature of the modules upon arrival at the laboratory. One temperature control blank must be included with each cooler shipped to Gore for analysis.

3.4.2 Trip Blanks

The trip blank is a set of sorbent modules used to detect volatile organic compound (VOC) contamination during sample shipping and handling. Trip blanks travel to the site with the sampling modules and are returned to the laboratory with the sampling modules. The trip blank will not be exposed to field conditions. The trip blank will be used to assess whether or not any chemical detected by the sorbers are the result of sources other than the study sites. One trip blank is to accompany each cooler containing VOCs. Trip blanks will be kept in sample refrigerators during the course of field work.

3.4.3 Field Duplicates

The collection of field duplicate samples provides for evaluation of overall sampling and laboratory precision by comparing analytical results of two samples of the same matrix from the same location. Two sorber units will be installed into one hole for a duplicate sample. The additional modules will allow for duplicate analysis of several modules from the same hole. If there is a wide difference in analytical results between duplicate samples, it can indicate poor precision of analytical technique and suggest increased evaluation of the data may be warranted. Field duplicates will be collected at a frequency of 10 percent of the samples collected per event.

3.5 SORBER RETRIEVAL

Evaluate the Sample Site—Note any site disturbance that may have occurred since the sorber module was installed. Note any stains on the ground, cork removal, or other such features that might indicate tampering. Remove cork.

Remove Sorber Unit from Hole—Wearing surgical gloves, and wrap retrieval cord once or twice around your hand. Using slow, steady tension, pull the cord straight out of the ground. **Double check the Module ID number on the sample module, sample vial, and COC/Field Logbook to ensure that the correct module is retrieved from the correct grid position**. Cut off the cork and discard.

Place Sorber Unit in Vial—Put the entire retrieval cord, including the metal tag, back into the correctly labeled vial. Tightly reseal the vial. Immediately place the vial in a cooler with blue ice. Sorbers will be stored onsite in a freezer until shipped to the laboratory.

3.6 SORBER SHIPMENT

Sample packing procedures will follow the steps outlined in SOP No. 004. The sorbers should be packed in the blue ice certified by W.L. Gore to be volatile free. Do not use Styrofoam "peanuts" or any other packing material which may contain volatiles or out-gas and contaminate sorbers during shipment. Bubble packing is acceptable. Receive clearance from SciTech to ship samples.

Carefully cut three modules from each sorber unit, one sorber at a time. Care must be taken at this point to ensure that the serial number for each sorber unit is transposed to the sample vial and COC. Do not start a new sorber unit until the transfer of modules from the previous sorber unit is completed in full. Place these three modules in a clean bottle supplied by the contract laboratory.

Note the serial number of the sorber unit tag on the bottle label. Place this number on the contract laboratory COC. Seal the bottle. Place bottle in cooler and pack the samples following the steps in SOP No. 004.

Using the vial racks, coolers, and ice substitutes supplied by the contract laboratory, return the exposed vials and COC document to the contract laboratory via overnight carrier service. Return the remaining sorber module to the GORE vial and seal. Place vials in cooler and pack the samples following steps in SOP No. 004.

Using the vial racks, coolers, and ice substitutes supplied by Gore, return the exposed vials and COC document to Gore's analytical laboratory via overnight carrier service.

4. ANALYTICAL AND DATA PRESENTATION

4.1 SAMPLE RECEIVING

Upon receipt at the W.L. Gore and contract laboratories, all soil gas samplers are inspected and sample labels are cross-referenced against the COC form. Any anomalies observed during the inspection are noted on the COC. When all anomalies, if any, are resolved, the samplers are ready for analysis.

4.2 VOLATILE ORGANIC COMPOUND ANALYSIS

W.L. Gore will analyze for VOCs and report the results of this work directly to the organization conducting the soil gas survey.

4.3 SAMPLE HOLDING

There are no holding time limitations.

4.4 INSTRUMENTATION

Instrumentation at W.L. Gore consists of a Hewlett-Packard 5890-II gas chromatograph, 5971A mass selective detector, and 7673 liquid autosampler. A 25-m, 0.2-mm bore, 0.5 μm "HP-5" 95 percent dimethyl, 5 percent diphenyl polysiloxane capillary column is normally used. A typical temperature program developed for analyzing the sorbers is: initial temperature 40°C for 4 minutes, ramp 20 C/minute to 320°C, final temperature 2 minutes. Injection port temperature (for method extraction) is 250°C, detector transfer line is 380°C. A Perkin-Elmer ATD-400 Automated Thermal Desorption unit is the extraction device used by Gore for sites with low concentrations of gasoline and solvent contamination. By cryofocusing the sample extract prior to sample injection into the gas chromatograph column, Gore has achieved greatly increased sensitivity to all compounds, and superior separation of VOCs compared to solvent or headspace extraction methods.

4.5 ANALYTICAL PARAMETERS

Table SOP027A-1 includes proposed analytical parameters. The soil gas contractor will also conduct a library search to identify and report up to 100 organic chemical constituents present in each module if requested.

4.6 LABORATORY QUALITY ASSURANCE PROCEDURES

W.L. Gore will conform to its Quality Assurance Plan (1994) to be appended to the project-specific Quality Assurance Project Plan with regard to quality control sample type, frequency, handling, preparation, and analytical procedure.

4.7 MAPPING/REPORTING

Graphic presentation of the data extracted from the GORE-SORBER® Screening Modules is presented by overlaying the contamination patterns detected during the analysis onto computer-aided design maps supplied by the field investigator.

5. REFERENCES

W.L. Gore. 1994. Quality Assurance Plan.

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TABLE SOP027A-1 PROPOSED ANALYTICAL PARAMETERS PASSIVE SOIL GAS SURVEY

Analytes	Limit (µg/sorber)
Acetone	(a)
Benzene	0.04
2-Butanone	(a)
Carbon Tetrachloride	0.06
Chlorobenzene	0.03
Chloroform	0.03
Chloromethane	(a)
1,4-Dichlorobenzene	0.04
1,1-Dichloroethane	(a)
1,2-Dichloroethane	(a)
1,1-Dichloroethylene	(a)
trans-1,3-Dichloroethylene	(a)
1,2-Dichloropropane	(a)
cis-1,3-Dichloropropene	(a)
trans-1,3-Dichloropropene	(a)
Ethylbenzene	0.03
Methyl tert-Butyl Ether	0.07
Methylene Chloride	0.23
2-Methylnapthalene	0.03
2-Methylphenol	0.04
Naphthalene	0.03
Octane	0.02
Pentadecane	0.06
Phenanthrene	0.015
Phenol	0.05
Styrene	(a)
1,1,2,2-Tetrachloroethane	(a)
Tetrachloroethylene	0.07
1,2,4,5-Tetramethylbenzene	0.02
Toluene	0.03
1,1,1-Trichloroethane	0.06
1,1,2-Trichloroethane	(a)
Trichloroethylene	0.04
Tridecane	0.04
1,2,4-Trimethylbenzene	0.03
1,3,5-Trimethylbenzene	0.03
Undecane	0.04
Vinyl Chloride	(a)
m-Xylene	0.02
o-Xylene	0.03
Total Xylenes	(a)
(a) Method detection limit studies currently being conducted.	

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Standard Operating Procedure No. 027B
for
Passive Soil Gas Surveys
– Petrex Technique

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1. SCOPE AND APPLICATION

The steps and information herein are the Standard Operating Procedures (SOPs) for carrying out a Petrex environmental survey. Possible deviations from SOPs may occasionally be implemented onsite by EA field staff to adjust for unique survey conditions. The Petrex technique is also frequently used for oil and gas, geothermal, and mineral exploration which force slight variations on this SOP. Surveys performed in winter in frozen ground offer a unique situation and slightly different field practices.

The fact that the SOPs may occasionally be altered is done to maintain quality service while using the Petrex technique. It must also be understood that the ion flux data from one survey at a given site and a given time interval should not be compared to the flux numbers from another survey. Since the data are semi-quantitative, only the flux patterns of a survey or the relative difference between flux values of two samples from the same survey should be considered during interpretation.

If any questions arise upon review of this document, please address questions to Northeast Research Institute, Inc. (NERI) technical staff at:

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Use of brand names in this SOP is not intended as endorsement or mandate that a given brand be used. Alternate equivalent brands of detectors, sensors, meters, etc. are acceptable. If alternate equipment is to be used, the contractor will provide applicable and comparable SOPs for the maintenance and calibration of same.

2. SAMPLE PRODUCTION AND PREPARATION

2.1 CHARCOAL SIEVING

The static volatile organic compound (VOC) collector is prepared by applying pre-sieved activated charcoal to the end of a ferromagnetic wire.

2.2 CHARCOAL BONDING

The details of the procedure for preparing the activated charcoal are proprietary information. The procedure results in the production of a collector consisting of size-sorted activated charcoal bonded to the area within 1 cm of the end of a ferromagnetic wire with a Curie point of 358°C.

2.3 COLLECTOR CONTAINERS

Culture tubes, measuring 25 mm × 125 mm and having a screw cap closure, are washed in a biodegradable detergent, rinsed in methanol, and baked at 180°C for 1 hour.

2.4 WIRE CLEANING

The previously constructed wires are cleaned by heating in a special apparatus at 358°C a total of 35 times under high vacuum. The wires are cleaned in lots of 32 wires. From each lot, two wires are removed for immediate analysis to verify the cleanliness of the lot. The remaining 30 wires are then sealed in one clean culture tube under an inert atmosphere and placed in inventory.

2.5 PACKAGING FOR CLIENT

Immediately prior to shipping the wires to the field, the tubes containing 30 wires are removed from inventory and the wires are repackaged under an inert atmosphere in individual tubes. All of the repackaged tubes contain two wires. Ten percent of these have three wires. The collectors are packaged by bagging in zipseal plastic bags in an inert atmosphere. These bags are then placed in inventory in a temperature-controlled room. The basis for having two wires in each tube is that it allows NERI to analyze one wire by standard Thermal Desorption-Mass Spectrometry while the second sample is available for Thermal Desorption-Gas Chromatography/Mass Spectrometry or as a backup to the Thermal Desorption-Mass Spectrometry. The third wire in selected samples from each survey is used to establish optimum instrument parameters.

2.6 QUALITY CONTROL AND QUALITY ASSURANCE

Prior to releasing stocked wires for a field survey, two single wires from each lot are checked for cleanliness and collecting potential. This quality assurance/quality control phase measures and documents collector preparedness when leaving the laboratory. One of these wires is analyzed without exposure in order to demonstrate that the lot is clean, and the other wire is exposed to hexane vapor for two seconds and then analyzed in order to verify that the charcoal is highly adsorptive. The triplicate wires are used when the wires return from the field. These wires help determine the required machine sensitivity and act as a measure of reproducibility.

2.7 CUSTODY DOCUMENT

A "custody document" accompanies each group of collectors leaving the laboratory and remains with the group until the collectors have been exposed, analyzed, and disposed of.

3. FIELD OPERATIONS

3.1 LOCATING SAMPLE SITES

Sample placement sites, usually predetermined on an accepted survey proposal, are located from a nearby, surveyable landmark using a compass and pacing or some other measuring device (e.g., pacing wheel, hip chain, or tape measure). A transit may be used for more accurate placement, but such accuracy is seldom required.

3.2 SOIL CORING

Once a sample site has been established, a hole is cored to a predetermined depth (sample placement depth is held constant for a given survey). This is accomplished using a variety of tools depending on the nature of the material to be cored. The holes should be vertical and as free from debris as possible. When the sampling is performed in areas covered by asphalt or concrete, a generator-powered rotary hammer drill with a carbide-tipped bit is used to drill a 1.5-in. diameter hole in the cover. A hand auger is used to remove the cuttings and road base from the hole.

3.3 COLLECTOR PLACEMENT

Immediately after the hole is cored, a collector tube is removed from the zipseal plastic bag and the bag is resealed. The cap is then removed from the tube, and the tube is placed vertically, open end down, into the hole. The hole is then backfilled with the soil core which was removed. The cap is placed in a clean zipseal plastic bag and stored until collector retrieval. Collectors placed under asphalt or concrete are treated the same as those in uncovered soil, except for modifications to permit easy retrieval and to avoid potential down-hole contamination from surface cuttings. To allow retrieval of these collectors, a piece of galvanized wire is twisted around the neck of the tube and run to the surface so that the sample may be recovered by pulling the retrieval wire. An aluminum plug is then placed near the top of the hole, and the remainder of the hole is plugged with quick setting hydraulic cement.

3.4 SITE IDENTIFICATION

Each site is flagged using pin flags, spray paint, or ribbon flagging, and the site location is marked and numbered on a base map. A field logbook is used to record the date, collector number, site location description, soil type, and general observations.

3.5 EXPOSURE TIME

Time calibration collectors are included as part of every survey. These are quality assurance collectors used to monitor sample loading during the survey. These collectors are placed in an area of known or suspected contamination, and sets are retrieved and analyzed at intervals to indicate the appropriate residence time for survey samples. Separate "travel blank" collectors are also included as a quality control measure in every survey. These collectors are transported along with the survey collectors but the tubes are never opened. These control collectors monitor for potential contamination during transport or placement.

3.6 COLLECTOR RETRIEVAL

The collectors are retrieved when the time calibration collectors reveal that there has been sufficient loading of gases on the charcoal absorbent. In the field, the soil is removed until the tube is exposed. A cap is taken from the sealed zipseal plastic bag. The Viton seal is checked to make sure it is seated inside the cap. The culture tube is removed from the hole and any dirt that is on the threads of the tube is wiped off with a clean cloth. In the event the tube is broken or cracked, the collector wire is transferred to a new tube using forceps. The tube is capped and sealed. All flagging material is retrieved.

3.7 COLLECTOR NUMBERING

Each tube is immediately numbered according to the scheme established in the field notes and on the base map. The collector number is written on adhesive labels which are applied to the tube cap. No two sites may have the same number.

3.8 COLLECTOR SHIPMENT

Once the collectors have been retrieved, they are sealed in zipseal plastic bags and then wrapped with bubble packing. Materials such as styrofoam peanuts or newsprint can introduce possible contaminants to the collectors and should not be used for packaging. The collectors, field notes, base map, and chain-of-custody document are either hand carried back to NERI's analytical laboratories or shipped by overnight carrier service.

3.9 DECONTAMINATION

All down-hole equipment and tool parts which contact excavated soil are constructed of heavy gauge steel and have no natural or synthetic components that could absorb and retain most soil-borne organic contaminants. These tools are decontaminated between use at each sampling location by rotation through a four-step cleaning process:

1. Immersion and vigorous scrubbing in a mild solution of laboratory grade detergent until all visual accumulations of soil are removed

2. Thorough rinsing with potable water

3. Spray rinsing with methyl alcohol

4. Air dry.

All derived liquids (and sediment) are contained in dedicated disposable vessels.

4. COLLECTOR ANALYSIS

4.1 NUMBERING CHECK

Upon receipt of the collectors, the number on each tube is recorded and any missing or duplicated numbers are noted. A missing number generally indicates that the collector could not be retrieved. Samples with identical numbers generally cannot be used unless their true site location can be established.

4.2 SAMPLE HOLDING

A Petrex soil gas sample consists of a minute quantity of various volatile organic compounds sorbed onto a charcoal element and enclosed in a protective container with a near impervious Viton seal.

Maximum sample holding time is a function of both the chemical stability of the sorbed compounds and the integrity of the seal of the container.

It has been the experience of NERI that Petrex soil gas samples that are properly repackaged after retrieval from the field and stored under environmentally controlled conditions typically remain compositionally and quantitatively unchanged through periods of greater than 4 months.

All samples scheduled for analysis via Curie-point pyrolysis/mass spectrometry are analyzed within 3 weeks of retrieval from the field.

4.3 INSTRUMENTATION

Thermal desorption is accomplished using a Fisher radio frequency power supply and a Curie point pyrolizer designed by NERI and Extrel. The mass spectrometer used is an Extrel Spectrel quadrapole mass spectrometer. The analysis is controlled and recorded by a DEC PDP 11/23 microcomputer. Following the analysis, all data are collected and archived on a PDP 11/73 microcomputer. Data for all active jobs are stored on both of the PDP 11 computers, as well as on magnetic tape. Data for all completed jobs are stored on magnetic tape in perpetuity.

4.4 CALIBRATION

An Extranuclear Quadrupole Spectrometer equipped with a Curie-point pyrolysis/thermal desorption inlet is used for collector analysis. Mass assignment and resolution are manually adjusted using a perfluorotributylamine (PFTBA) standard. A linear correction, based on the known spectrum of PFTBA, is calculated. This correction is applied to a second PFTBA spectrum. If correct mass (M/Z) values are obtained, the operator proceeds to the next turning step. If not, Step 1 is repeated until correct masses are obtained.

Peak intensity ratios are set from the major peaks in the PFTBA spectrum using the following values:

Mass (M/Z)	Spectrum Intensities
69	100%
131	25%±5%
219	35%±5%
502	5%±2%

At the standard mass (M/Z = 69), PFTBA is measured at a preset sample pressure and detector voltage and compared to previous values at the same setting.

Electron energy is set to 70 electron volts and emission is set at 12 milliseconds. All other operating parameters, such as scans, scan range, and mass offset, are established in the computer program. These values may only be changed by the laboratory manager.

Tuning is performed at the beginning of a run so that an individual survey is analyzed at the same set of instrument conditions. The samples are analyzed in random order.

4.5 INSTRUMENT PARAMETERS

The instrument is operated with the following parameters:

Vacuum	<3 × 10-6 torr
Ionization Energy	70.0 eV
Ionization Current	12.0 mA
Desorption Time	5.0 sec
Desorption Temperature	358°C
Number of Scans/Sample	30
Scan Rate	1,250 amu/sec

4.6 MASS SPECTROMETER ANALYSIS AND QUALITY ASSURANCE/QUALITY CONTROL

Each collector wire is analyzed in random order. The entire group of survey collectors is analyzed as one run without interruption from other surveys.

The organic gases adsorbed on the carbon are thermally desorbed from the carbon, separated according to ion mass, counted, and a mass spectrum of masses from 29 to 240 is obtained.

Periodic (approximately every 20 samples) machine background analyses are performed as a quality control measure to assure minimal influence from internal communication. If there are peaks that are not related to atmospheric gases, the supervisor is notified and the mass spectrometer is shut down and cleaned as necessary.

A written sample number record is kept during the analysis to prevent accidental cross numbering.

The mass spectrometer control program prompts the operator with a warning if a sample number is entered that has already been used. The operator then checks the current number, along with the disk storage location of the previously entered number, to resolve the true numbering situation.

4.7 DATA FILING

The raw data file generated by the sample analysis is labeled and stored under a unique file name.

4.8 SCHEDULE OF MAINTENANCE

1,000 Samples: Cleaning of sample introduction area, ion source, and expansion chamber by in-house technicians.

4,000 Samples: Above noted procedures plus cleaning of lenses and quadrapoles

Annually: Preventative maintenance program conducted by manufacturer's service representative.

5. DATA INTERPRETATION AND PRESENTATION

5.1 MAP GENERATION

The sample location maps are created by placing the field base map on a digitizing board and entering each site as an X-Y coordinate relative to an origin. The relative ion counts for each compound can then be plotted at the sample locations. Cultural and topographic features can also be digitized onto the map as reference points.

5.2 COMPOUND IDENTIFICATION

The mass spectrum that is drawn for each sample is compared to a library of mass spectra derived from known volatile organic compounds. Several thousand pure compound spectra have been developed by the Bureau of Standards and are available for spectra comparison. NERI has also developed its own library of spectra through headspace analysis of pure compounds using the Petrex wires. Once a compound has been identified in this manner, the ion current or "flux"

for this compound is defined as the total ion current for the "parent peak" or least interfered peak of that compound.

5.3 RELATIVE FLUX DETERMINATION

The process of determining ion currents (relative intensities) of indicator peaks is computerized. All ion current data are extracted from the original data file and processed for identification.

The relative ion current intensity (relative intensities) of the gases that are desorbed from the collectors is matched with sample locations on a map of the survey area. These relative intensities are useful for inferring the areal extent of contamination and relative differences in the concentrations of compounds in the soil or groundwater. This can aid in determining the location of source areas or direction of movement of contamination.

These surface collections and analyses **cannot** be used to determine the depth to the source contaminants or the precise concentration at depth.

Because compounds can be differentiated by their spectra, analyses from the carbon collectors can be used to help differentiate multiple compounds and multiple source areas within a single survey.

5.4 DATA INTERPRETATION

Once the relative intensities for a compound are mapped, the data can be contoured to reveal those areas with "hot spots" and the orientation of plume migration. All other available data, such as geologic setting, soil types, groundwater conditions, type of contaminant, site history, and other factors, are taken into account as the interpreter draws his/her conclusions.

5.5 ADDITIONAL USES OF PETREX COLLECTORS

Some of the other uses of the Petrex Technique that are utilized in surveys are headspacing of soil and water samples and depth profiling.

5.5.1 Headspace

A headspace soil sample is analyzed by collecting approximately 25 g of soil, which are transferred to a thermochemically cleaned headspace container. Several adsorption wires are added and the headspace container is sealed and allowed to equilibrate for up to 24 hours, depending on the level of contamination. The wires are then removed and prepared for desorption mass spectrometric analysis as described earlier. An identical process is performed for screening water samples.

5.5.2 Depth Profiling

In order to determine if the source of the soil gas signal is near surface or in a deeper vadose/saturated zone, depth profiling can be used.

At each selected location, shallow boreholes are drilled a few feet apart to depths such as 1, 2, 4, and 6 ft deep. After the loose cuttings and carvings have been removed from the bottom of the hole, a core of soil may be taken for headspace analysis. Next, a Petrex collector is lowered into the hole and backfilled. The collectors remain in place for the same length of time as the survey wires.

Each of the sampling methods addresses a different aspect that will help indicate the nature of the VOC source. In the case of composite soil sampling, detection of VOCs during analysis implies that the VOCs are actually contained within the soil matrix. When the VOC is anthropogenic in nature, the VOC presence is indicative of soil contamination of that depth interval.

When performing an *in situ* time-integrated sampling program with Petrex collectors, the collector serves as both an extended headspace sampler relative to the soil matrix in its immediate vicinity, as well as measuring the soil gas flux through that zone during the exposure period.

Soil gas movement through the vadose zone is theorized to be a diffusion process. If the headspace data indicate that the VOC is not present in the soil matrix, then the *in situ* depth profiling collectors should show a relative increase of ion counts as the depth increases. By combining both pieces of data, the nature of the VOC source (near surface or deep vadose/saturated) can be inferred.

5.6 DATA PRESENTATION

Once the data have been compiled, interpreted, and mapped, a report is produced for the client's use. The maps are printed which display the relative intensity of the compounds of the client's specifications. These reports and maps are for the client's use only, and no report or map is released to anyone else without prior written consent of the client. This confidentiality policy is never breached.

6. INTERPRETATION OF PETREX MAPS

The policies outlined in this SOP are strictly followed on each survey. It should be noted that the relative intensities for any compound at one sample location can only be compared to another location within the same survey for the same compound. Relative intensities of different compounds cannot be compared to each other. The relative intensities of one survey cannot be compared to the relative intensities of any other survey, even between two surveys at different times of the year over the same site. However, the same "hot spots" and plumes should contour in the same place over multiple surveys at a given site, allowing for migration.

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Standard Operating Procedure No. 028
for
Well and Boring Abandonment

Prepared by

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure is to establish the protocols by which all wells and borings will be safely abandoned. The primary objective of well abandonment is to ensure that the abandoned well or boring does not provide a conduit for the vertical migration of contamination between aquifers.

2. MATERIALS

The following materials may be required:

Drill rig	Bentonite pellets (seal)
Filter pack material	Cement (Portland Type II)
Pure sodium bentonite with no additives (bentonite) powder (grout)	Approved water

3. PROCEDURE

The procedures used in boring abandonment will ideally accomplish two objectives: (1) protect aquifers from cross-contamination by sealing the borehole, and (2) restore the strata in the borehole to nearly original conditions by selective placement of fill material.

Any casing will be pulled, drilled out, or thoroughly pierced. Using tremie pipe, grout will be placed from the bottom of the hole to within 3 ft of the ground surface, and allowed to settle for 24 hours. The remainder of the hole will be filled with concrete. The surface of the concrete will be mounded, smoothed, and inscribed with "ABD," for abandoned, any assigned well or boring designation, and the date the hole was abandoned. All boring logs, samples, completion records, and abandonment procedures will be included in the records of work on the site or cluster.

If the hole is within 10 ft of a monitoring well in the same aquifer, or a replacement well is to be installed within 10 ft of the well, any temporary casing will be pulled, drilled out, or thoroughly pierced. Using tremie pipe, the hole will then be backfilled with filter pack material opposite sand strata and bentonite or grout opposite substantial (2 ft or thicker) clay and silt strata. Where sand as backfill approaches the ground surface, 2 ft of bentonite will be placed above the sand and a 3-ft concrete plug will be placed at the surface. Otherwise, backfill materials will be placed from the bottom of the hole to within 3 ft of the ground surface. These materials will be allowed to settle for 24 hours. The remainder of the hole will be filled with concrete. The surface of the concrete will be mounded, smoothed, and inscribed with "ABD," for abandoned, any assigned well or boring designation, and the date the hole was abandoned. All boring logs, samples, completion records, and abandonment procedures will be included in the records of work on the site cluster.

If the well is not within 10 ft of another monitoring well, or if there are no substantial, continuous sand bodies, and no replacement well is planned within 10 ft of the original well location, then the hole may be grouted from the bottom to the top.

3.1 GROUT

Grout used in construction will be composed by weight of:

- 20 parts cement (Portland cement, Type II or V)
- 0.4-1 part (maximum) (2-5 percent) bentonite
- 8 gal (maximum) approved water per 94-lb bag of cement.

Neither additives nor borehole cuttings will be mixed with the grout. Bentonite will be added after the required amount of cement is mixed with the water.

All grout material will be combined in an aboveground container and mechanically blended to produce a thick, lump-free mixture. The mixed grout will be recirculated through the grout pump prior to placement.

Grout placement will be performed using a commercially available grout pump and a rigid tremie pipe removal and grouting will be accomplished in stages, aquifer by aquifer, sealing the boring from the bottom to ground surface. This will be accomplished by placing a grout pipe to the bottom and pumping grout through the pipe until undiluted grout reaches the bottom of the next higher section of casing or, for the top-most section, until grout flows from the boring at ground surface. Efforts will be made to grout incrementally as the temporary casing is removed.

After 24 hours, the abandoned drilling site will be checked for grout settlement. On that day, any settlement depression will be filled with grout and rechecked 24 hours later. This process will be repeated until firm grout remains at the ground surface.

3.2 BORINGS

The term “Borings” as used in this Standard Operating Procedure applies to any drilled hole made during the course of a remedial investigation which is not completed as a well. This includes soil test borings, soil sampling borings, and deep stratigraphic borings. Whether completed to the planned depth or aborted for any reason prior to reaching that depth, borings will be grouted and normally closed within 4 hours, or within 4 hours or completion of logging of completion of logging.

3.2.1 Shallow Borings not Penetrating Water Table

Shallow borings made for the collection of subsurface soil samples will be abandoned by backfilling the hole with cuttings from the hole, **if and only if the boring does not penetrate the water table.** Clean sand will be used to make up any volume not filled by the cuttings.

3.2.2 Borings Penetrating the Water Table

Shallow borings made for the collection of subsurface soil samples **which penetrate the water table** will be abandoned by grouting the hole from the bottom to the top.

3.2.3 Deep Stratigraphic Borings

Deep stratigraphic borings will normally be located in areas which, by virtue of the historical record, are presumed relatively uncontaminated. Therefore, these borings are usually over 100 ft from any sampling well locations. Any boring located within 10 ft of a proposed well location, or located directly upgradient or downgradient (on anticipated flow line) of a proposed well location, will be abandoned by placing clean sand in the aquifer intervals and bentonite or grout in aquitard intervals as described above. If the boring is over 10 ft from and/or not upgradient of a proposed well location, the boring will be completely filled with grout.

3.3 WELLS

The following procedure applies to wells aborted prior to completion and existing wells determined to be ineffective or otherwise in need of closure.

Prior to abandoning any developed well, the proper well licensing body will be provided written notification along with an abandonment plan for that well.

If the well is within 10 ft of another monitoring well in the same aquifer, or a replacement well is to be installed within 10 ft of the well, casing will be pulled, drilled out, or thoroughly pierced. Using tremie pipe, the hole will then be backfilled with filter pack material opposite sand strata and bentonite or grout opposite substantial (2 ft or thicker) clay and silt strata. Where sand as backfill approaches the ground surface, 2 ft of bentonite will be placed above the sand and below the concrete plug near the surface. Backfill materials will be placed from the bottom of the hole to within 3 ft of the ground surface. These materials will be allowed to settle for 24 hours. The remainder of the hole will be filled with concrete. The surface of the concrete will be mounded, smoothed, and inscribed with "ABD," for abandoned, any assigned well or boring designation, and the date the hole was abandoned. All boring logs, samples, completion records, and abandonment procedures will be included in the records of work on the site cluster.

If the well is not within 10 ft of another monitoring well, and is not to be replaced by another well within 10 ft of the original location, casing will be pulled, drilled out, or thoroughly pierced. Using tremie pipe, grout will be placed from the bottom of the hole to within 3 ft of the ground surface, and allowed to settle for 24 hours. The remainder of the hole will be filled with concrete. The surface of the concrete will be mounded, smoothed, and inscribed with "ABD," for abandoned, any assigned well or boring designation, and the date the hole was abandoned. All boring logs, samples, completion records, and abandonment procedures will be included in the records of work on the site cluster.

4. REPLACEMENT WELLS

Replacement wells (if any) will normally be offset at least 10 ft from any abandoned well in a presumed upgradient or crossgradient groundwater direction. Site-specific conditions may necessitate variation to this placement.

5. PRECAUTIONS

None.

Standard Operating Procedure No. 032
for
Piezometer Installation

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to define acceptable piezometer types and installation techniques. For the purposes of this SOP, a piezometer is defined as a well installation designed to determine and/or monitor groundwater level rather than to acquire environmental samples. The objective of the selected installation technique is to ensure that the piezometer provides representative data while minimizing subsurface contamination, cross-contamination, and installation costs.

A piezometer may typically consist of a 2-in. diameter casing with attached screen. This installation may differ from a typical monitoring well installation in one of several ways. The screen may be stainless-steel, a stainless steel drive-point, slotted polyvinylchloride, or continuously wire-wrapped slotted polyvinylchloride. The piezometer screen may either be driven into place or set in a drilled, open hole. If the screen is driven into place, an engineered filter pack is omitted.

Regardless of the screen and casing material, and the method in which the piezometer is installed, proper care will be taken to avoid providing a vertical conduit for contaminants between aquifers. This will be accomplished by the use of bentonite and/or grout seals as appropriate.

Piezometers may be installed singly or in clusters to monitor one or more piezometric surface(s). Piezometers may not be located within 15 ft of an existing monitoring well. Piezometers should not be installed upgradient of monitoring wells. It is recommended that multiple (nested or clustered) piezometers be located 10-15 ft apart.

2. MATERIALS

The following materials may be required:

Casing	— OR —	Bentonite pellets (SOP No. 019)
Large stand-mounted hammer with attached leveling device		Cement (SOP No. 019)
Large wooden mallet		Drill rig
Hand-held level		
Personal protective equipment as required by contractor's Health and Safety Plan		
Stainless steel piezometer drive-points — or — stainless steel or slotted polyvinyl chloride well screens[1]		
Steel measuring tape		

1. Piezometer screen and casing should be inert with respect to the groundwater; therefore, the selection of screen and casing material will be based on select field tests of aquifer chemistry and potential contaminants.

3. INSTALLATION

Three options for the installation of piezometers are discussed in the following sections: installation of a well screen in an open hole (Section 3.1), installation of a driven sampling point (e.g., Geoprobe, Hydropunch, etc.) below a drilled hole (Section 3.2), and shallow installation of a driven point from the surface (Section 3.3).

Driven screens/sampling points are, by their design, point source samplers and their placement must be determined by a qualified geologist or geotechnical engineer onsite. Estimated depths of placement should be included in the work plans for piezometer installation. The maximum depth to which a given point can be driven is a function of a number of parameters, such as the degree of induration and friction coefficient of the material(s) through which it is being advanced, the rigidity of the rod(s), and the driving force available.

3.1 WELL SCREEN IN OPEN HOLE

If the piezometer is to be installed in a drilled, open hole, refer to SOP No. 019 for appropriate drilling and installation protocol. In this case, the piezometer will differ from a monitoring well only in the diameter of the casing. All other provisions for preventing vertical migration of contaminants will be observed.

3.2 DRIVEN POINT BELOW OPEN HOLE

If the piezometer will employ a drive-point screen driven through a hole which is pre-drilled to the top of the target aquifer, follow the drilling procedures detailed in SOP No. 019, set the drive point according to the procedures below, and grout the hole according to SOP No. 019.

3.3 DRIVEN POINT FROM SURFACE

If the piezometer is to be driven from the surface, the installation should be considered as temporary. The contractor's work plan must include a timetable for, and details of the abandonment plan (refer to SOP No. 028 [Well and Boring Abandonment] for details) for these piezometers. Follow the installation steps below:

- Drill or hand auger small hole to a maximum depth of 2 ft to serve as a guide for the drive point.

- Assemble and set the drive point, screen (typically a 2-ft length), and an appropriate number of threaded stainless steel casing extensions into this pilot hole.

- If a drill rig is used, the hydraulic system may be used to press the drive point downward or the drop hammer may be used to drive the point downward. If the piezometer site is inaccessible by drill rig, a tripod-mounted drop hammer may be used to drive the point. Threaded stainless steel casing (typically 2-ft lengths) extensions may be added as needed until the piezometers are driven to the desired depth.

- At sites where the sediment is relatively soft and the desired screen depth is no greater than 2 ft, a large mallet may be used to pound the piezometer to the desired depth directly from the surface.

- Add additional threaded casing onto the top of piezometer if needed so that piezometer extends 2-3 ft above ground surface. Place protective cap on top of piezometer.

- Measure height of the piezometer casing above ground surface. Record site number, screen depth, and height above ground surface.

- If a shallow pilot hole was used, fill the hole to ground surface with bentonite pellets.

- Decontaminate soil augers before moving onto another site.

- Complete drilled holes according to procedures detailed in SOP No. 019.

- Develop piezometers according to procedures in SOP No. 019.

Refer to SOP Nos. 003 (Field Logbook), 005 (Field Decontamination), 010 (Water Level and Well Depth Measurements), and applicable parts of 019 (Monitoring Well Installation).

4. MAINTENANCE

Not applicable.

5. PRECAUTIONS

Water, soil, and vapors at the sites may be contaminated with solvents, petroleum, chemical agents, explosives, and heavy metals or their respective byproducts. Therefore, extreme care will be taken to avoid skin contact with potentially contaminated material.

Refer to the site-specific Health and Safety Plan for discussion of hazards, preventive measures, and personal protective equipment to be used during piezometer installation and development activities.

If piezometers are being installed from boats or piers over bodies of open water, personal flotation devices (life jackets) will be required as part of the personal protective equipment.

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Standard Operating Procedure No. 033
for
Aquifer (Hydraulic) Testing

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to define various hydraulic test methods which may be used, to specify how these tests are to be performed, and to provide appropriate methodologies for data reduction and interpretation. This SOP assumes a high degree of technical competency on the part of the investigator, in that certain assumptions and interpretations must be made in the selection of the test and data analysis to achieve valid results.

Aquifer testing is a process performed on selected wells to characterize the **Hydraulic Conductivity**, **Transmissivity**, and **Storativity** of the aquifer into which those wells are installed. Aquifer tests fall into two broad categories: pumping tests and slug tests. Pumping tests and slug tests are relatively inexpensive when compared to the remedial investigation budget as a whole, but it should be noted that, as with many *in situ* tests, aquifer tests may yield non-unique solutions.

Pumping tests are typically performed on wells installed in highly permeable materials, confined aquifers, and in areas of little or no suspected contamination in the groundwater. The principle of pumping tests is to remove water from the aquifer at a sufficient rate and for a sufficiently long period of time to stress the aquifer and cause measurable drawdown in the pumped well and adjacent (10 to several hundreds of feet) observation well(s). The aquifer characteristics can then be calculated by substituting inter-well distances, drawdown and well discharge data into appropriate equations, employing curve matching techniques, or using computer programs to reduce the data.

- Advantages of performing pumping tests are: (1) they encompass large areas, (2) test results are more accurate, (3) they can resolve complex aquifer conditions (e.g., boundaries), (4) time periods and pump rates can be varied, and (5) pumping tests represent remedial actions.

- Disadvantages of pumping tests are: (1) large quantities of potentially contaminated water are generated, (2) the contaminant plume may be moved by the test, (3) they are very costly, and (4) the data produced are averages over large areas.

Single-Well Permeability Tests (Slug Tests) are conducted to determine the characteristics of an aquifer in materials whose conductivity is too low to perform a pumping test, or in aquifers which are highly contaminated. Slug tests consist of inserting and/or removing either a slug of inert material of known volume, or a "slug" of water of known volume. Either method will cause an instantaneous rise or fall and subsequent recovery of the water table within the aquifer.

- Advantages of slug tests are: (1) they provide location-specific data, (2) they are small-scale and unlikely to move the contaminant plume, (3) no contaminated water (other than decontaminated solutions) is generated, (4) they are low cost, therefore (5) high data density is feasible, and (6) they can be used as an aid in selecting an appropriate area to perform pumping test(s).

- Disadvantages of performing slug tests are: (1) they provide less precise estimates of parameters; (2) they may not yield values for storativity; (3) they cannot resolve complex geometries; and (4) since they are short-term tests, they cannot resolve long-term events.

2. MATERIALS

2.1 ALL TESTS

The following materials may be required for all tests:

Copy of the site Health and Safety Plan	Health and Safety monitoring equipment, and personal protective equipment as required by the Health and Safety Plan
Calculator	Portable computer[1]
Containers for investigation-derived materials	Program diskettes
Data diskettes	Stopwatches
Decontamination equipment and supplies	

2.2 PUMPING TESTS

The following materials may be required for pumping tests:

Generators (2), fuel, extension cords and/or other source of onsite electrical power	Stainless steel submersible pump with associated tubing, clamps, and wiring
Logbook	Steel register flowmeter or stopwatch and bucket, graduated cylinder, or rain gauge
Pump	Transducer or other water level indicator[1]
Recording barometer or other source of local barometric readings (e.g., local airport or National Weather Service recording station)	Type curves for curve-matching analyses
Semilogarithmic paper-arithmetic vertical scale and logarithmic horizontal scale, or log-log paper	

2.3 SLUG TESTS

The following materials may be required for slug tests:

1. Although removal (or insertion) of larger volumes of water may increase the recovery time(s) of the aquifer to the point that use of electrical water level meters or steel tapes is feasible, piezometers and data loggers are preferred because they tend to provide more complete records with less maintenance and operator error.

Test Conducted with Inert Cylinder	
Transducer[2]	Inert, negatively buoyant cylinder of known volume
Logbook and/or field data sheets (examples provided in SOP No. 016)	Type curves for curve-matching analyses
Semilogarithmic paper-arithmetic vertical scale and logarithmic horizontal scale	Slug device (solid stainless steel or a sealed polvyinyl chloride cylinder filled with sand or similar material)
Test Conducted with Input/Output of Water	
Teflon bailer with Teflon-coated stainless steel leader and rope or pump	
— OR —	
Stainless-steel submersible pump or centrifugal pump	Pump wiring
Teflon or polyethylene flexible piping	Steel register flowmeter
Generator and fuel or other onsite source of electricity	American Society for Testing and Materials (ASTM) Type II water
Stainless-steel hose clamps	
— AND —	
Logbook	Type curves for curve-matching analyses
Semilogarithmic paper	Approved water and/or containers for removed water as required in SOP No. 042
Transducer or other water level indicator[1]	

3. PROCEDURE

Regardless of the test method chosen, the following general procedures must be considered:

- All well intrusive equipment must be decontaminated prior to and after use.
- All water removed from the test wells is considered, and must be treated, as purge water.
- The accuracy of the reading(s) from pressure transducer (piezometer) and data logger output should be verified prior to beginning any test, periodically during the test, and immediately after the test by measuring the groundwater level with one of the aforementioned mechanical devices.
- All water level tapes and meters should be calibrated against one master tape which is traceable to the National Institute of Standards and Technology. This calibration should be recorded in the field logbook.
- Repeated measurements at any one well should be made using the same tape.

3.1 SELECTION OF TEST METHOD

Before beginning any aquifer test, the investigator should have a good conceptual model of the site's hydrogeologic condition. This is essential because of the assumptions made in each

2. Field portable computer and associated equipment are considered as optional. Access to a computer will be required to down-load dataloggers.

analysis method. If the site conditions do not correspond with the assumptions in a given model, the analysis will be invalid. The conceptual understanding of the hydrogeology of the site can be developed from driller's logs and/or borehole geophysical logs of the wells to be tested, or from previous reports on the hydrogeology of the area. Table SOP033-1 is a decision tree which can be used with this conceptual model to determine the appropriate test/analysis method(s) which may be used at a given site.

3.2 PUMPING TESTS

Pumping tests can be divided into two broad categories: (1) those in which the pumping (discharge) rate is kept constant, and (2) those in which the pumping rate varies over time. All water removed from pumping wells must be disposed of appropriately.

3.2.1 Constant Discharge

These methods require that the discharge or injection rate in the pumping well be kept constant. Of these, the Theis method is the most widely referenced and applied, and serves as the basis for the solution of other, more complex boundary condition problems. Both the Cooper & Jacob and the Jacob modifications to the Theis method recognize that if pumping times are long and/or the distances to control wells are small, the Theis solution will yield a straight line plot on semilogarithmic paper, thereby simplifying the Theis equation. The Thiem method, unlike the Theis/Modified Theis methods, assumes that steady-state (equilibrium) conditions can be achieved in a confined aquifer.

The Theis method is detailed in Section 5.1.1 and ASTM D4106, the modified Theis method in Section 5.1.2 and ASTM D4105, and the Thiem method in Section 5.1.3.

The preceding methods assume that the aquifer being tested is confined. If the aquifer is unconfined or semi-confined (leaky), the preceding methods are invalid. DeGlee developed an equation which assumes that the tested aquifer is either overlain or underlain by a continuous, leaky confining layer which has uniform properties, and that leakage from the aquitard is proportional to the hydraulic gradient across the aquitard. Hantush and Jacob derived the same equation. Hantush later observed that a simpler approximation is possible if the ratio of the distance to monitoring well/leakage across the aquitard is <0.05. As in all preceding cases, radial flow is assumed. The Hantush-Jacob method assumes that no storage occurs in the aquitard. The DeGlee equation and Hantush approximation is provided in Section 5.3.2.

Both Neuman and Witherspoon, and Hantush have proposed methods that take into account storage in the aquitard. The Neuman/Witherspoon method is provided in Section 5.3.1.

3.2.1.1 Field Operations

1. Arrange for all nearby extraction wells and automatic pump controls to be inoperative during the test period.

2. Measure and record the distance(s) between observation well(s) and pumping well.

3. Install pressure transducers in the pumping well and each observation well; submerge the transducer in the well to a sufficient depth to provide effective performance. Well bottom sediment plugging of the transducer must be avoided.

4. Perform a two-point calibration of each device as part of the installation, cross-checking data with a calibrated manual tape measure. Note that water levels must be noted and recorded to the nearest 0.01 ft.

5. Start dataloggers at each well several days before the test to record background fluctuations in the groundwater table. It is recommended that one observation well be selected beyond the expected influence of the test to monitor these background water table fluctuations during the actual test.

6. Using either the field barometer of data from a local meteorological station (Section 2.2), record precipitation and barometric pressure before, during and after the test.

7. Calibrate pump, flowmeter, and any other field instruments such as pH meters, etc.

8. Suspend pump at mid-point of pumping well screen and record water level.

    - If the recharge rate of the well is not known, conduct a step-drawdown test (Section 3.2.3) to determine the sustainable yield for the constant discharge test.

    - If the previous step is performed, the aquifer must be allowed to recover prior to performing the constant discharge test. At a minimum, the recovery period between step-test and pump test must be equal to the duration of the step test.

    - Manually check and record the water levels in all test wells before conducting the step test, at the end of the step test, and at 4-hour intervals (minimum) during the recovery period; recording these values in the field logbook.

9. Program the datalogger data acquisition rate as follows:

    - If the only mode of data acquisition is a fixed rate, program the datalogger(s) to record water levels every 5 seconds.

    - If a logarithmic data acquisition rate is possible, use this option.

    - If the data acquisition rate is programmable on the data logger, record data at incrementally lengthening frequencies. The following table is provided as an example, the actual rates at which data are acquired at a given site should be determined based on prior field tests.

Time after Aquifer Test Begins	Frequency of Measurements
0-60 minutes	Every 5-10 seconds
61-65 minutes	Every 15 seconds
65-75 minutes	Every 30 seconds
75-120 minutes	Every 5 minutes
120-180 minutes	Every 10 minutes
180 minutes – end of test	Every 30 minutes

10. Collect a complete round of static water levels, verifying transducer readings with a tape or electric water level meter.

11. Start data logger(s).

12. Start pump at previously selected rate. Monitor flow rate using flowmeter or stopwatch and bucket (rain gauge, graduated cylinder, etc.) half-hourly. Record this flow rate and adjust as necessary. Minimize fluctuations in flow rate, especially during the early stages of the test.

13. Periodically download data from the loggers and plot drawdown as a function of time to assess the status of the test in real time. Under no circumstances should the flow rate be varied during the test.[3] If drawdown is either falling substantially above or below predicted levels, then a decision should be made to continue the test at that pumping rate, terminate the test, allow the aquifer to recover, or restart the test at a different pumping rate.

14. Continue pumping and recording water levels for a total period of 72-96 hours (3-4 days). After the drawdown portion of the test, download the data onto data diskettes using the portable computer.

15. Reprogram the dataloggers to record a reading every 5 seconds or a logarithmic or variable interval if available on the datalogger.

16. Turn off the pump and allow the groundwater to recover to within 90 percent of static conditions. The pump should be equipped with a foot valve to prevent backflow of the column pipe fluid.

17. Periodically download data from the logger and plot recovery as a function of time to assess the status of the test in real time.

3. After a period of at least 12 hours into the test, brief interruptions (less than 5 minutes) in pumping due to mechanical failure are acceptable without re-starting the test. All critical equipment should have onsite backups as a contingency against equipment failures. Inasmuch as refueling an onsite generator every 4-10 hours while it is running is considered an unsafe practice, two generators should be provided at the pumping well site to maintain power to the pump during the test.

18. After recovery to 90 percent of static conditions, remove the dataloggers, pressure transducers, and cables from all the observation wells. Download the data onto data diskettes using the portable computer.

19. Collect a complete round of water levels from all wells in the monitoring network.

3.2.2 Variable Discharge

Variable discharge methods have been presented by numerous researchers. These methods are performed as a series of constant-rate, stepped changes in discharge rate. These changes in discharge rate may be linear or exponential. Type curves are derived for control wells. These methods can be applied in extensive leaky aquifers, but are generally used in confined aquifers. The only requirement is that the response to a unit stress be known. The step-test is incorporated as a preliminary measure to determine the optimal sustainable discharge rate for a given aquifer (Section 3.2.1.1). Otherwise, variable discharge methods are included herein for the sake of completeness. They are not widely used outside the research environment for aquifer characterization. No further details on variable pump rate tests are provided in this SOP.

Install a variable speed submersible pump and a pressure transducer into the pumping well.

Install pressure transducers into the nearby (closest) observation wells to provide preliminary indications of expected drawdown during the constant-discharge test.

Allow water level(s) to stabilize to original water level after installing the pump and transducer(s).

Program a datalogger to collect readings at 5- to 10-second intervals. If logarithmic programming is available, this collection period may be expanded to 1-minute increments by the completion of each step, where upon 5- to 10-second intervals will again be required to coincide with the start of the next step.

Measure static water levels from all wells expected to be influenced by the test, and calibrate pressure transducers. Record this information in the field logbook and field data sheets.

Select the pumping rates for the step-test. Four 100-minute steps should be run at steadily increasing flow rates. The flow rates should be selected, based on a preliminary estimate of a sustainable rate (ESR) as follows:

Step	Duration (minutes)	Pumping Rate (%)
1	100	25
2	100	50
3	100	100
4	100	125

Program the dataloggers, calibrate the pump to the initial flow rate, and initiate the test at 25 percent ESR. At the completion of the first step, increase the pumping rate to 50 percent ESR as instantaneously as possible. The pump should not be shut off between steps. At the completion of the second step, increase the flow rate to 100 percent ESR as instantaneously as possible. At the completion of the third step, increase the flow rate to 125 percent ESR as instantaneously as possible. At the completion of the fourth step, shut off the pump and record the recovery of water levels to at least 90 percent of static conditions.

During the test, plot drawdown in the pumping well on both arithmetic and semi-logarithmic graph paper to assess the performance of the test in real time. Make any adjustments to the test as appropriate, i.e., the addition of a fifth step at a higher rate if the aquifer does not appear to be adequately stressed, or termination of the test if the well is drawn dry.

At the conclusion of the test, analyze the data and select a pumping rate for the constant-discharge test. This rate should be sustainable for the anticipated duration of the test, and place the maximum stress on the aquifer.

Calibrate the variable speed pump to the selected rate so that at the start of the constant discharge test early fluctuations in flow rates will be minimized.

Allow the aquifer to fully recover for a period equal to or greater than the duration of the step-test prior to initiating the constant-discharge test.

3.3 SLUG TESTS

Slug tests involve the use of a single well, and evaluating its response to an instantaneous raising and/or lowering of the water level within the casing. If the well is poorly designed or poorly developed, the test may end up evaluating the performance of the well screen and/or filter pack rather than the aquifer.

Slug tests are usually of short duration, usually less than 5 minutes. The first 30 seconds are the most important in respect to data collected. Piezometers and digital data loggers are, therefore, a must.

3.4 DATA REDUCTION

If the data were recorded by the datalogger as feet of water above the pressure transducer, reduce these data to potentiometric head (in feet), relative to the initial water level as measured from the top of the casing. Record this with the respective changes in time. For each piezometer or well, tabulate the pre- and post-test water levels, dates, clock times, and times since pumping started or stopped.

Tabulate measurements of the rate of discharge at the control well, date, clock time, time since pumping started, and method of measurement.

Prepare a written description of each well, describing the measuring point, giving its elevation and the method of obtaining the elevation, and the distance of the measuring point above the mean land surface.

Once the data are collected and reduced, a variety of methods may be used to calculate aquifer parameters from pumping test data. Refer to Section 5 for analytical methods applied to test data.

Data can also be reduced electronically when downloaded from the transducers into software such as AQTESOLV®; this is software designed to calculate hydraulic conductivity, storativity and other aquifer properties from data sets collected during slug and aquifer (pumping) tests.

Text files, which are generated by commonly used pressure transducers, can be imported into the software and data can also be manually entered or pasted from a spreadsheet. After importing, the raw data can be manipulated using mathematical functions. For example, hydraulic head data can be converted to drawdown data. The program will also produce visual and automatic curve matching methods for confined, unconfined and leaky aquifers. Visual curve matching is analogous to traditional methods of aquifer test analysis with graph paper and type curves. The software is also capable of producing error logs which enable the user to quickly identify any deficiencies or inconsistencies detected in the data set.

4. FIELD DATA RECORDS

4.1 LOGBOOK

Only one site or installation per logbook, and only one slug test per data table (see below). The first page must include the well number, location, date of test, persons conducting the test, and reference plane for drawdown measurements. Next page(s) must be in table format with the columns designating time/date, water volume withdrawn/added or displaced by inert cylinder, water levels, etc.

Test data must be entered in a table as data are acquired. Data must include sufficient information to indicate that the water level was stable before the test, during equilibrium, and after the test(s).

5. INTERPRETATION OF DATA

5.1 CONFINED AQUIFER METHODS

5.1.1 Theis Method

The Theis test method involves pumping a well (pumped well) at a constant rate (Q) and measuring drawdown (s) in an adjacent observation well. Theis assumed that groundwater flow in an aquifer is analogous to heat flow in a solid and derived the following equation:

$$s=\frac{Q}{4\pi T}\int_{r^2\frac{S}{4Tt}}^{\infty}\left(\frac{e^{u}}{u}\right)du$$

Equation 1

where

s = Drawdown.
r = Radial distance to observation well.
Q = Pumping (discharge) rate.
T = Transmissivity (K × aquifer thickness).
K = Conductivity.
S = Storativity.
t = Time (since pumping began).

and

$$u=\frac{r^2S}{4Tt}$$

Equation 2

If the integral is expressed as the well function W(u), then the equation can be written as:

$$s=\frac{Q}{4\pi T}W(u)$$

Equation 3

which can be also written as:

$$T=\frac{Q}{4\pi s}W(u)$$

Equation 4

or

$$S=\frac{4Tt}{r^2}u$$

Equation 5

5.1.1.1 Assumptions

To permit an analytical solution for non-steady, radial flow into the well, the Theis method makes the following assumptions. Most of these assumptions are incorporated in the other analysis methods detailed herein. Only exceptions or additions to these assumptions will be noted in each method.

- The aquifer has seemingly infinite areal extent compared to the well, whose diameter is assumed infinitesimally small.
- The aquifer is homogeneous, isotropic, of uniform thickness, and horizontal.
- The head is uniform and constant prior to the test.
- Darcy's Law is valid.
- The well is pumped at a constant rate.
- Water is discharged from storage instantaneously.
- The well screen fully penetrates the aquifer.
- Flow within the aquifer is radial to the well and strictly horizontal.
- Drawdown data are taken from an adjacent observation well.

One additional assumption is made in this SOP, which was not made by Theis: The pumping well has been previously sampled and analysis of the groundwater at that site is not grossly contaminated (e.g., no non-aqueous phase liquids).

5.1.1.2 Procedure (see also ASTM D4106-91 and D4050-91)

Field Operations – Constant Discharge Test (Refer to Section 3.2.1)

Data Plots

1. Prepare a type curve of W(u) over 1/u on log-log paper. Figure SOP033-1 is an example of a type curve. Tables of data used to generate this curve may be found in ASTM D4106-91, ASTM D5270-92, or in most hydrology texts such as Fetter or Dominico[4]. It is recommended that this plot be copied onto tracing paper, drafting film, or an overhead viewer film copy be made to facilitate later steps. NOTE: W(u) over u can be plotted if preferred, but will require additional computational steps if used.

2. Plot drawdown over time for each observation well on log-log paper which has the same scale as the type curve (above). Note that for a single observation well, drawdown can be plotted as a function of time (t). However, for multiple observation wells, drawdown can be plotted as a function of t/r2, where r = radial distance from the pumping well to the observation well in which the measurements were made. This is done to normalize the data and allow comparison between wells.

4. See Section 6 for complete citations of these references.

3. Superimpose the type curve and the plot of observation well data. **Keeping both the X and Y axis of each plot parallel**, position the two curves to obtain the best match when overlain. NOTE: If only paper copies of both plots are available, a light table or brightly lit window will be required for this step.

4. Select a match point on the overlapping portion of the two graph papers such that the values for that point simplify the calculations (e.g., even log cycles of [W(u), 1/u] — [1,1]; [1,10] etc.).

5. Read coordinates for W(u), 1/u, s, and t.

6. Substitute the match point values for the appropriate variable in Equations 3, 4, and 5.

7. Repeat for each observation well.

5.1.2 Modified Theis (Cooper & Jacob; Jacob) Method (see also ASTM D4105-91)

5.1.2.1 General

From Equation 1, we have:

$$\int_u^{\infty}\left(\frac{e^u}{u}\right)du = W(u) = -0.577216 - \log_e u + u - \frac{u^2}{2!2} + \frac{u^3}{3!3} - \frac{u^4}{4!4} + \ldots$$

Equation 6.

Jacob noted that as values of u become small, the value of the series to the right of logeu becomes insignificant. That is the series becomes equal to or less than 0.01. The value of u decreases as the value of t (time) increases, and as the value of r (radial distance to observation well) decreases. Therefore, for long pumping times and/or observation wells reasonably close to the pumping well, the Theis equation can be stated as:

$$s = \frac{Q}{4\pi T}\left[-0.577216 - \ln\left(r^2\frac{S}{4Tt}\right)\right]$$

Equation 7.

Lohman was then able to show the following relationships:

$$T = \frac{2.3Q}{4\pi\Delta s/\Delta\log_{10} t}$$

Equation 8

and

$$T = \frac{2.3Q}{4\pi\Delta s/\Delta\log_{10} r}$$

Equation 9

where

Δs/Δlog10t = The drawdown (measured or projected) over one log cycle of time.
Δs/Δlog10r = The drawdown (measured or projected over one log cycle of radial distance from the control well.

5.1.2.2 Procedure

Field Operations (see Field Operations under Section 3.2.1.1)

Data Plots

1. Plot drawdown over time (log scale) on semilog paper.

2. Draw a best fit straight line through the later portion of the data and project it back to s = 0.

3. Read t0 as the time corresponding to the s = 0 point.

4. Solve for T using:

$$T=\frac{2.3Q}{4\pi\Delta s}$$

Equation 10

5. Solve for S using:

$$S=\frac{2.25Tt_0}{r^2}$$

Equation 11

where

t0 = the intercept of the line when extended to the zero drawdown axis.

6. Solve for K (K = T/aquifer thickness). Aquifer thickness = screened interval (see assumptions in Section 5.1.1.1).

7. Repeat for each monitoring well.

5.1.3 Thiem (Steady State Flow) Method

5.1.3.1 Assumptions

All of the Theis assumptions hold except that equilibrium has been reached between discharge and drawdown. Note that this condition is theoretically impossible in a confined aquifer where all discharge is derived from storage.

5.1.3.2 Equations

When these assumptions are met, the following equation expresses groundwater flow in the confined aquifer:

$$Q=\frac{2\pi T(s_1-s_2)}{\ln(\frac{r_2}{r_1})}$$

Equation 12

where

Q = Well discharge.
T = Aquifer transmissivity.
r1 and r2 are respective distances of OW-1 and OW-2 from the pumping well.
s1 and s2 are respective steady-state drawdowns in the observation wells.

Note that the Thiem equation is designed to solve for transmissivity only, and cannot be used to solve for storativity.

5.1.3.3 Procedure

Field Operations

1. Follow Steps 1 through 9 in Section 3.2.1.

2. Continue pumping until steady-state conditions are reached. This equilibrium is defined as the time when variations of drawdown with respect to time are negligible. Note that this may require considerably more time than with either the Theis or Modified Theis methods described above.

Data Plots Method 1

1. Substitute the steady-state drawdown of the two observation wells into Equation 12 along with the values of r and Q. Solve for T.

2. Repeat with all possible combinations of observation wells to obtain the mean transmissivity of the aquifer.

Data Plots Method 2

1. Plot the observed steady-state drawdown of each observation well over distance (log scale) to the pumping well.

2. Construct a best-fit straight line through the plotted points.

3. Determine the maximum drawdown per log cycle.

4. Substitute this value of (s1 - s2) in Equation 12 along with Q and solve. Note that the term ln(r2-r1) is taken to ln(10) equal to 2.30.

5.2 BOUNDED, NON-LEAKY, CONFINED AQUIFER

The test methods described in this section are essentially duplicates of the Theis and Modified Theis methods which are detailed above. The principal differences are that, by definition, a

bounded aquifer is limited in its areal extent by a fully-penetrating linear boundary, which is either a constant head (e.g., stream or lake) or a no-flow boundary (e.g., impermeable, or significantly less permeable geologic formation). These conditions are illustrated on Figure 2.

As stated, the equations used to evaluate data derived from bounded wells are modifications to the basic Theis equations. Drawdown(s) at any point in the aquifer is defined as the sum of the drawdown due to the real (r) and image (i) wells such that:

$$s_0 = s_r \pm s_i$$ Equation 13

so that Equation 1 can be rewritten as:

$$s = \frac{Q}{4\pi T}[W(u_r) \pm W(u_i)] = \frac{Q}{4\pi T}\sum W(u)$$ Equation 14

where

$$u_r = \frac{r_r^2 S}{4Tt}$$ Equation 15

and

$$u_i = \frac{r_i^2 S}{4Tt}$$ Equation 16

so that:

$$u_i = \left(\frac{r_i}{r_r}\right)^2 u_r$$ Equation 17

or

$$u_i = k_i^2 u_r$$ Equation 18

where

$$K_i = \frac{r_i}{r_r}$$ Equation 19.

NOTE: K_1 is a constant of proportionality and should not be confused with the hydraulic conductivity.

5.2.1 Assumptions

All assumptions listed under the Theis method apply with these exceptions:

- The non-leaky aquifer is of infinite areal extent except where limited by linear boundaries.
- The boundaries are vertical planes of infinite length, which fully penetrate the aquifer.
- The hydraulic boundaries are perfect. Impermeable boundaries yield no water to the aquifer; recharge boundaries are in perfect hydraulic connection with the aquifer.

5.2.2 Procedure (see also ASTM D5270-92)

Field Operations (see Section 3.2.1.1)

Data Plots

1. Generate a family of type curves for the solution of the modified Theis formula (Kl). This family of curves should include curves for both discharging and recharging image wells. Plot the coordinates of ∑W(u) on the vertical axis and 1/u (Figure 3). It is recommended that this plot be copied onto tracing paper, drafting film, or an overhead viewer film copy be made to facilitate later steps.

2. Plot drawdown (s) over t/r2 for each observation well on log-log paper which has the same scale as the type curve (above). NOTE: **t=time, r=radial distance from pumping well.**

3. Superimpose the type curves and the plot of observation well data. **Keeping both the X and Y axis of each plot parallel**, position the two curves to obtain the best match when overlain. NOTE: If only paper copies of both plots are available, a light table or brightly lit window will be required for this step.

4. Select a match point on the overlapping portion of the two graph papers such that the values for that point simplify the calculations (e.g., even log cycles of [∑W(u), 1/up] — [1,1]; [1,10] etc.).

5. Read coordinates for ∑W(u), 1/up, s, and t/r2.

6. Substitute the match point values for the appropriate variable in the equations below:

Transmissivity = $T=\frac{Q}{4\pi s}\sum W(u)$ Equation 20

Storativity = $S=4T(\frac{t}{r^2})u$ Equation 21

7. For each OW, determine the distance from the image well (r_i) using the following:

$r_i=K_f r$ Equation 22

8. Repeat for each observation well.

5.2.3 Modified Theis Non-Equilibrium Method

As in the case of a non-bounded aquifer, the hydraulic parameters can also be determined using a Modified Theis equation and a straight line (semi-log) plot of s and log10t.

5.2.3.1 Procedure

1. Refer to Section 5.1.2 (above) and ASTM D4105-91 for details on plotting the data and the equations to be used in calculating transmissivity and storativity using this method. Note that the data will define two rather than one straight line portions. This is due to the image well effect of the boundary conditions.

2. Select a convenient value of s within the initial straight-line part of the plot. Drawdown represented by this portion of the curve has not been affected by the boundary. Therefore, s = sr and the corresponding value of tr corresponds to sr.

3. Graphically extend the initial straight-line part of the curve to the right. The departure of the measured drawdown from the extended line represents the drawdown due to the presence of the boundary. This effect is also referred to as the image well drawdown, si.

4. Select a point on the second straight-line such that si = sr. Note the value of time ti which corresponds to si.

5. Since tr and ti are selected such that si = sr, then ur = ui and (Equation 23)

$$\frac{r_r^2 S}{4Tt_r} = \frac{r_i^2 S}{4Tt_i}$$

so that:

$$K_i = \frac{r_i}{r_r} = \sqrt{\frac{t_i}{t_r}} \qquad \text{(Equation 24)}$$

6. Determine the distance to the image well using Equation 22.

7. Repeat this calculation for each observation well.

Determine the location of the boundary as follows:

- Accurately plot the locations of the control and observation wells on a map.

- With a compass, using each observation well as the center point, draft a circle which has a radius equal to the distance from that well to the boundary.

- The image well is located at the intersection of these circles. If the circles do not intersect exactly, the probable well location is at the centroid of the intersections, or the polygonal area bounded by the circles in the case of no overlap.

- Draw a straight line from the pumping well to the image well. The boundary is defined as the perpendicular bisector to this line at the image well.

5.2.4 Limitations

The following caveats apply to either of the above two methods:

- In cases where this test method is employed to locate an unknown boundary, a minimum of three observation wells is required to accurately locate the image well which is the boundary. Two observation wells will yield two possible locations for the image well. One observation well will indicate the presence of a boundary, and the distance (radius) from the observation well, but the image well will be located somewhere on that surface.

- The effects of a constant head (recharging) boundary are indistinguishable from those of a leaky aquifer. It is, therefore, imperative that care be taken in developing the conceptual model of the geohydrologic system being studied prior to testing.

5.3 SEMI-CONFINED (LEAKY) AQUIFER

In some instances, the confining beds either above or below the aquifer will not be completely impermeable. In these cases, the aquifer is said to be "leaky." This condition can be readily determined from the Theis s over t plot on log-log paper. In the initial phase of pumping, the plot will look like the Theis "type" curve. As pumping continues and the aquifer is depressurized (piezometric head decreases), a gradient within the overlying and/or underlying aquitard(s) is induced. Instead of the expected type curve, the plot will be somewhat flattened, and values for s may actually decrease over time if the vertical component of groundwater flow through the aquitard(s) is sufficiently high. The log-log plot will yield a considerably flattened curve. This is one of the reasons it is recommended that these log-log plots be done in the field, so that such conditions can be detected early, and steps be taken to minimize any adverse environmental impact of aquifer cross contamination.

5.3.1 Neuman and Witherspoon Method

The Neuman and Whitherspoon approach to solving the problem of evaluating a leaky aquifer is two-fold. First, they assumed that if the distance between observation well and pumping well is minimized, the area of aquitard subjected to stress and possible leakage is minimized, and the Theis method could be employed. Next, they assumed that if only early time drawdown data were used, the effects of leakage could be further reduced. This is accomplished by closely monitoring the response curve(s) for transducers both in the aquifer and in the aquitard(s) themselves. When the s over t curve begins to flatten, indicating leakage, this is defined as the end of valid aquifer data. Data acquired beyond that point contains components of horizontal (aquifer) flow, and vertical (aquitard) flow. In order to accurately calculate the aquitard parameters, an undisturbed sample of the aquitard must be taken (ASTM D1587-83). The laboratory tests will provide values for storage of the aquitard(s). Conductivity within the aquitard(s) is provided from the s over t plots for transducers located within the aquitard.

5.3.1.1 Assumptions

The same assumptions as in the Theis method hold with the following differences:

- The aquifer is leaky.
- The aquifer and aquitard both have a seemingly infinite areal extent.
- Flow in the aquitard is vertical.
- Drawdown is negligible in both aquifer and aquitard.
- The aquitard has storage.
- The overlying and/or underlying aquifer(s) is capable of releasing water to the pumped aquifer through a decline in head.

5.3.1.2 Procedure

Field Operations

1. See field operations in Section 3.2.1.1.
2. In addition, set piezometers within the aquitard at 0.25 and 0.50 aquitard thickness. These should be set at essentially the same location as the observation well, either in the observation well or in a separate borehole adjacent to the observation well, and the same radial distance from the pumping well.

Data Plots

1. Prepare log-log plots of s over t for the observation well and transducers placed in the aquitard.
2. Use the valid early-time data and the Theis method to calculate the pumped aquifer parameters.
3. Calculate several s'/s ratios for the early time period used in b above.
4. Calculate the parameter tD — a "dimensionless" time parameter — using the following equation:

$$t_D = \frac{Kt}{Sr^2}$$

Equation 25

where

t = Time.
r = Radial distance to observation well (and transducers).
K = Pumped aquifer hydraulic conductivity.
S = Pumped aquifer storativity.

5. Using the value tD calculated in d (above), and s'/s, determine a value for t'D using Figure 4.

5.3.2 DeGlee Method and Hantush Approximation

DeGlee developed the following equation for steady-state drawdown within an aquifer with leakage from an aquitard proportional to the hydraulic gradient across the aquitard:

$$s=\frac{Q}{2\pi T}(K_0)\frac{r}{L}$$ Equation 26

where

T = Transmissivity.
s = Steady-state drawdown in observation well at distance r from pumping well.
Q = Discharge rate of pumping well.
L = Tc = leakage factor.
c = D'/K = hydraulic resistance of the aquitard.
D' = Saturated thickness of the aquitard.
K' = Hydraulic conductivity of the aquitard for vertical flow.
K0(x) = Modified bessel function of the second kind and of zero order (Hankel function).

Hantush observed that if r/L is small (0.05), Equation 14 can be estimated by:

$$s=2.30\frac{Q}{2\pi T}(\log 1.12\frac{L}{r})$$ Equation 27

5.3.2.1 Assumptions

See Section 5.3.1.1.

- Flow to the pumping well is in steady state.
- L is greater than 3D, where D is the saturated thickness of the aquifer.

5.3.2.2 Procedure

Field Operations

Field methods are identical to the Thiem method in Section 5.13.

Data Plots

Plot s over r (log scale) on semi-log paper where r/L is small, the points fall in a straight line plot. Where r/L is large, the curve approaches the zero-drawdown axis asymptotically.

5.3.3 Other Methods for Calculating Leaky Aquifer Parameters

The Neuman and Witherspoon Unsteady-state flow method, the Hantush Curve-Fitting Method, the Hantush Inflection Point Method, and the Walton Method. As before, these are mentioned for the sake of completeness, but not detailed herein.

5.4 UNCONFINED AQUIFERS

Flow to a pumping well in an unconfined (phreatic or water table) aquifer occurs in three phases. In the first phase, pumping has just begun, and the aquifer acts like a confined aquifer. Water is derived from storage (expansion of the water, compression of the aquifer). The time over drawdown plot for this phase closely mimics the Theis type curve. During the second phase, delayed yield occurs. This phenomenon results as water remaining in the pores is drained by gravity (specific yield), replenishing the portion of the aquifer supplying water to the well during the first phase, and results in a reduction in rate of drawdown over the first phase, and a flattening of the time-drawdown plot. The third phase brings equilibration in the rate of drawdown and the time-drawdown plot again looks like the Theis curve.

The duration of the first two phases is a function of the ratio of storage (S) to specific yield (Sy). If the ratio is in the range of 10-1 to 10-2, S is relatively large and the first phase drawdown should be significant. This condition is typical of saturated fine-grained sediments such as silts, clays, and fine-grained sands. If the ratio S/Sy is in the range of 10-4 to 10-6, Sy is relatively large, the second phase phenomenon is expected to be dominant, and coarser-grained sediments (sands and gravels) are indicated.

In addition to S/Sy, the distance between pumping well and observation well also affects the time-drawdown plot. As the distance to the observation well increases, the effects of S decrease.

5.4.1 Neuman Method

Flow to a pumping well in an unconfined (phreatic, or water table) aquifer occurs in three stages. During the first stage, the phreatic aquifer behaves like a confined aquifer, instantaneously releasing water from storage (expansion of the water, compression of the aquifer). This is

illustrated in Figure 5, where the early portion of the family of drawdown curves closely matches the Theis curve (1/uA). The second phase is termed a period of "delayed yield" or "delayed response," in which the rate of drawdown is lower than that predicted by the Theis curve. During this phase, specific yield, or gravity drainage of water remaining in the pore spaces in the vicinity of the pumping well replenishes the water being removed. During the third phase, the rates of yield and drawdown equilibrate, and the time-drawdown plots again converge on the Theis solution (1/uB).

5.4.1.1 Assumptions

- The same assumptions as listed in Section 5.1.1.1.
- At least one observation well located at r/b ≤ 1, where r = distance between pumping well and observation well, and b = aquifer thickness.

Drawdown in the observation well s ≤0.25 b.

5.4.1.2 Procedure

Field Operations

See Section 3.2.1.

Data Plots

1. Prepare A and B curves (Figure 5); tables of these values can be found in many hydrology texts such as Fetter
2. Plot s over t on log-log paper at the same scale as the Type A and B curves
3. Superimpose the late-time drawdown data over the B curves. Note the value for the curve which best matches the field data.
4. Select a match point which has a value of 1 for as many of the variables as possible.
5. At the selected match point, read values for s, t, W(uB,β) and 1/uB
6. Repeat steps a-e, superimposing the early time data over the A curve which has the same β value as the B curve.
7. Read values for s, t, W(uA,β) and 1/uA
8. Substitute these values in the following equations:

$$T_B = \frac{Q}{4\pi s}(W(u_B,\beta))$$

Equation 28. Transmissivity B curve.

$$T_A = \frac{Q}{4\pi s}(W(u'_A\beta))$$

Equation 29. Transmissivity A curve.

$$S_y = \frac{4T_B t u_B}{r^2}$$

Equation 30. Specific Yield.

NOTE: Transmissivities should be within ±10 percent of each other. If they are, their average should be used in the remaining equations, otherwise use the T value from the B curve.

5.5 SLUG TESTS

5.5.1 Preliminary to Operation (All Slug Tests)

Prior to conducting any tests, water level meters, transducers, dataloggers, and other materials should be examined for cleanliness and checked for defects.

Batteries should be checked in the calculator(s), water level meter(s), and datalogger(s).

Decontaminate all intrusive equipment prior to and after use at each location.

Lay plastic sheeting on the ground around the well casing.

Record the well number and other project and site information in the field logbook.

Check the well headspace for the presence of volatile organic compounds using applicable instruments. Record the results in the field logbook.

Measure and record the initial water level in the well and total depth of the well.

NOTE: If the static water level and water levels caused during testing are above the top of the screened, or the well consists of an open hole with no casing, then both rising-head and falling-head tests should be conducted.

If the static water level is at or below the top of the screened or open-hole interval, a rising-head test only should be conducted (i.e., falling-head slug tests are invalid for this situation).

5.5.2 Option 1 – Inert Object Insertion

This procedure describes the use of a solid slug to change the water level in a well.

Select an appropriate transducer for the range of water level change anticipated in the slug test.

Submerge the transducer in the well to a sufficient depth to provide effective performance. The range of the transducer must be considered in the determination of the submersion depth. Well bottom sediment plugging of the transducer must be avoided as well as transducer interference by the inert object.

Monitor water level until it returns to original level as measured in Section 5.5.2 before initiating the test.

Tie off the line to a decontaminated, inert cylinder (slug) prior to lowering it into the well. All intrusive equipment must be decontaminated.

"Instantaneously," but smoothly, lower the cylinder into the well, displacing the water and thereby raising the water level.

Measure and record water levels in the well initially. Record the water level response during cylinder insertion and every 5-10 seconds with the cylinder in place. Record the falling water level and time of each measurement in the field logbook and/or Field Permeability Test Data Sheet.

NOTE: If transducer and datalogger are employed, care must be taken to create backup copies and/or hardcopies of these data as soon as practicable.

Record data until water level has stabilized, or approximately 90 percent of the change in the water level has dissipated. The time for this to occur may range from less than 1 minute to more than a day. Usually, it is not necessary to continue measurements for more than a few hours because longer periods indicate extremely low hydraulic conductivity. Choose the time interval between measurements according to how rapidly the water level approaches the static level. From 10 to 30 measurements should be obtained at approximately equal time intervals during the recovery.

"Instantaneously," but smoothly, remove the cylinder from the well.

Conduct a rising head slug test by measuring the response of the water level to the removal of the cylinder. Record water levels and time until the water level equilibrates to 90 percent of the initial level, and record data as in Section 5.5.2.

Calculate the aquifer hydraulic conductivity using appropriate equations.

Decontaminate the slug and the tape or meter.

5.5.3 Option 2 – Adding or Removing Water

This procedure describes the use of a pump to change water level in a well and a datalogger and pressure transducer to measure the water level. The technique is intended for use in wells installed in highly permeable materials where the use of a slug may not induce a measurable

change in the water level. However, this technique can also be used in wells installed in low permeability materials. The methods described for the transducer/datalogger are also appropriate when using a solid slug or bailer for inducing a change in the water level in a well.

Select an appropriate transducer for the range of water level change anticipated in the slug test.

Submerge the transducer in the well to a sufficient depth to provide effective performance—usually this is to a depth at which its pressure rating is not exceeded but no less than 5 ft of water is above the transducer. The range of the transducer must be considered in selection of the submersion depth.

Check the transducer calibration at two different depths in the well. The transducer should be at least 1 ft above the bottom of the well to prevent bottom sediment from fouling the transducer and preventing accurate readings.

Turn on the datalogger to view the water level value (either in depth of submergence or depth to water).

IF REMOVING WATER: Insert the pump piping with check valve (if using a centrifugal pump) or submersible pump with check valve into the well at least 4 t below the water table but above the transducer. Attach pump discharge to treatment system, portable tanks, or drums to containerize the effluent if it is known or suspected to be contaminated.

— OR —

IF ADDING WATER: Insert piping from water source to a depth of about 1 ft below the surface of the water table (this will prevent undue aeration of the water column and possible anomalous readings).

Monitor water level until it returns to original level as measured in Section 3.1.2 before initiating the water addition/extraction test.

View water level value on datalogger. Values (either depth of submergence or depth to water) should be stable and approximately the same range as in Step C; if not, wait until the water level equilibrates to the initial value.

Begin logging and record the time.

Turn pump on until 4-5 ft of drawdown occurs or the well (at the depth of the poly pipe or pump) goes dry.

— OR —

Turn on water at supply tank until the water level in the well rises a minimum of 5 ft.

Shut off pump or water supply at the tank. Remove piping or pump to a position above the initial water level (water removal) or remove from the well (water addition or removal).

Record water levels and water volumes removed/added during the entire test.

Record water levels until approximately 90 percent of the change in the water level has dissipated. The time for this to occur may range from less than 1 minute to more than a day. Usually, it is not necessary to continue measurements for more than a few hours, because longer periods indicate extremely low hydraulic conductivity.

Periodically collect water levels manually using an electronic water level meter of tape to verify the datalogger values.

End logging and record the time. Remove the poly pipe and/or pump and pressure transducer and transfer data in datalogger to a computer disk. Make a backup copy of the file and record the file information in the field logbook.

Decontaminate intrusive equipment.

Calculate the aquifer hydraulic conductivity using appropriate equations.

5.5.4 Data Plots

Record the water level in the well immediately after the inert object emplacement/withdrawal (Option 1) or at the equilibrium of the water table (Option 2). This is the initial water level reading.

Following the initial water level reading, the water level in the well is continuously recorded along with the time of the level measurement.

The ratio of the initial water level to the change in head is plotted with respect to time.

The ratio is plotted on the arithmetic scale and time is plotted along the logarithmic scale.

The relationships of the initial water level to changes in the water level are a function of parameters shown on Figure 6 and the formation transmissivity. The values of the function relationship are plotted for a series of transmissivities and are depicted in Figure 5.

The resulting field data plot (curve) is compared to a series of type curves (Figure 5). The field-data curve is placed over the type curves with the arithmetic axis coincident. The field data curve is matched to the type curve that has the same curvature.

The formation transmissivity is determined.

The value of storativity is calculated.

6. REPORTS

After performing hydrologic tests, the contractor will generate a report which must contain a minimum of the following elements:

- A field data report including a site description, plots of water level and discharge with time, and a precursory analysis of data.
- The introduction should include the purpose of the test, dates and times water-level measurements were begun, dates and times discharge or injection was begun and ended, and the average rate of discharge or injection.
- Well logs (including construction diagrams) of all control wells, observation wells, and piezometers.
- Site map showing all well locations, distances between wells, and locations of all geologic boundaries or surface waterbodies which might affect the test.
- The locations of wells and boundaries which may affect the test generally need to be accurate within a radial distance of ±0.5 percent. For large-scale studies, it may be sufficient to locate wells from maps or aerial surveys. Small-scale studies require that well locations be surveyed. Additionally, other features such as faults, streams, and canals should be located. Well deviation surveys, which determine true horizontal distance between well screens, may be necessary if test wells are deep relative to their spacing.

7. MAINTENANCE

The transducers must be kept clean, operable, and thoroughly tested before emplacement in the well. A plugged or malfunctioning piezometer will give erroneous responses or fail to give any response.

8. PRECAUTIONS

In the case of slug tests, care should be exercised to maximize the efficiency of the well. If there is a great disparity between the conductivity of the aquifer and that of the well screen/filter pack, one may find that the slug test has accurately measured the conductivity of the well screen/filter pack rather than the aquifer.

Transducers should be double checked to ensure that they are calibrated in the correct water level range. Water level and well depth should be checked with an electronic water level meter or steel tape before and after placing the transducers.

Be sure that the wells used are well developed.

If the water removed is contaminated and cannot be discharged at the surface, a tank of sufficient size to hold the effluent of the pumping test must be available.

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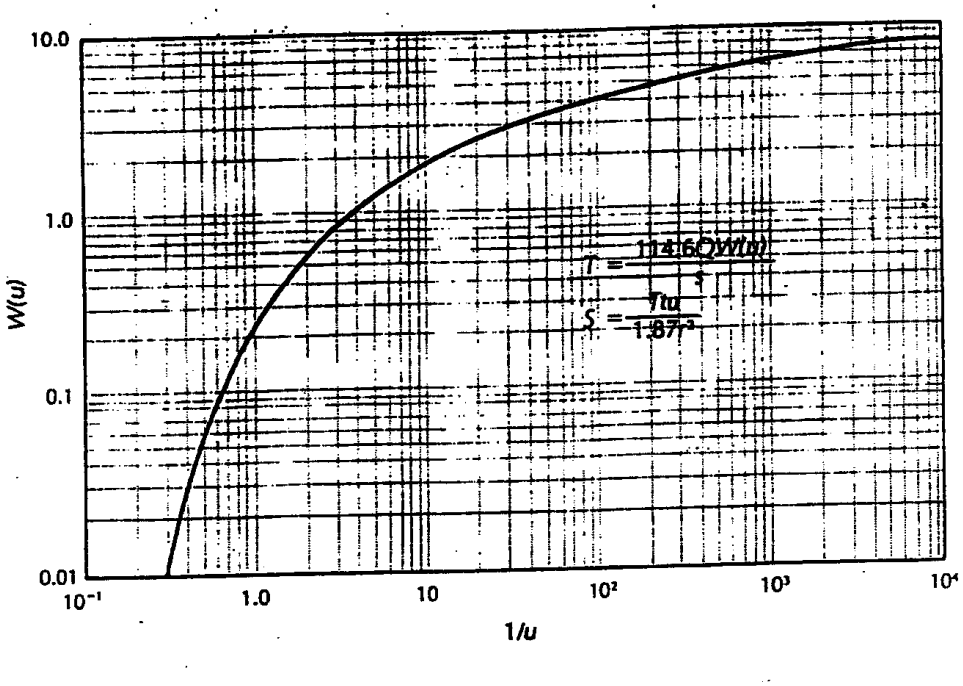

Figure SOP033-1. Theis type curve (after Fetter).

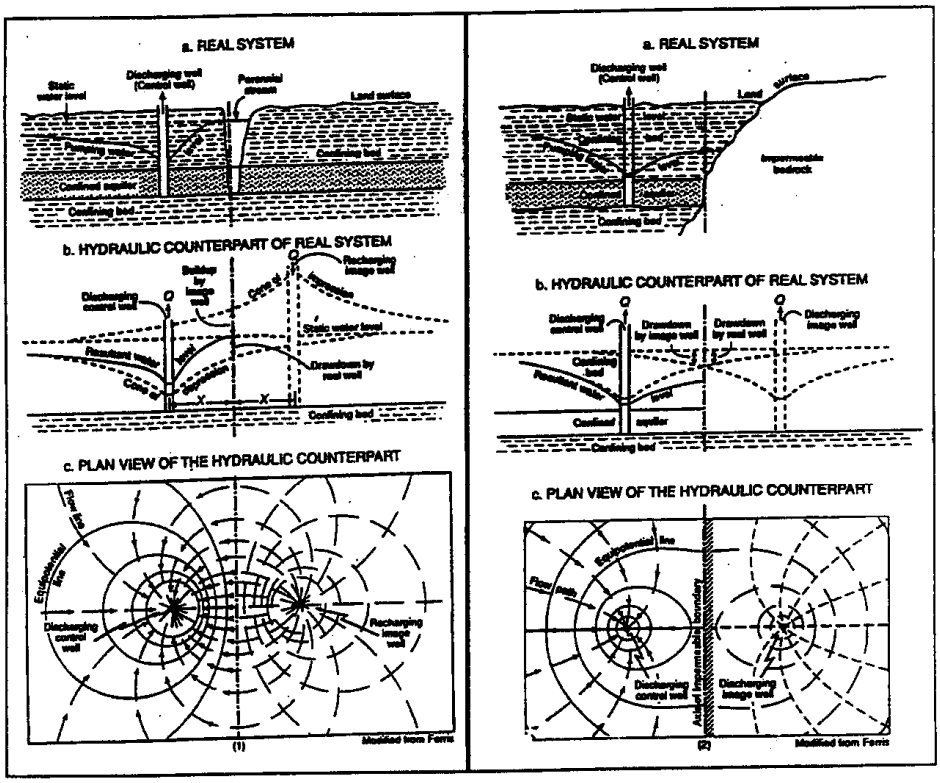

Figure SOP033-2. Illustration of boundary conditions
(after ASTM D-5270-92).

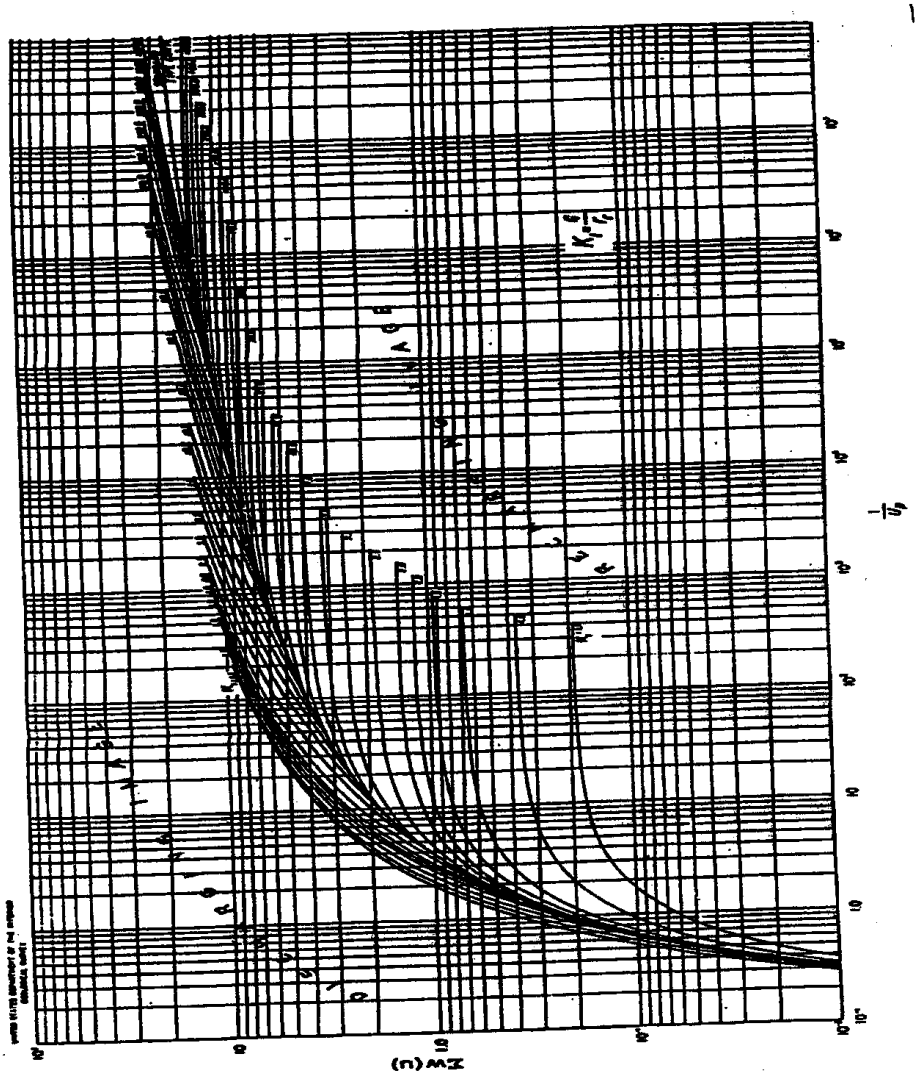

Figure SOP033-3. Family of type curves for the solution of the Modified Theis formula (after ASTM D-5270-92).

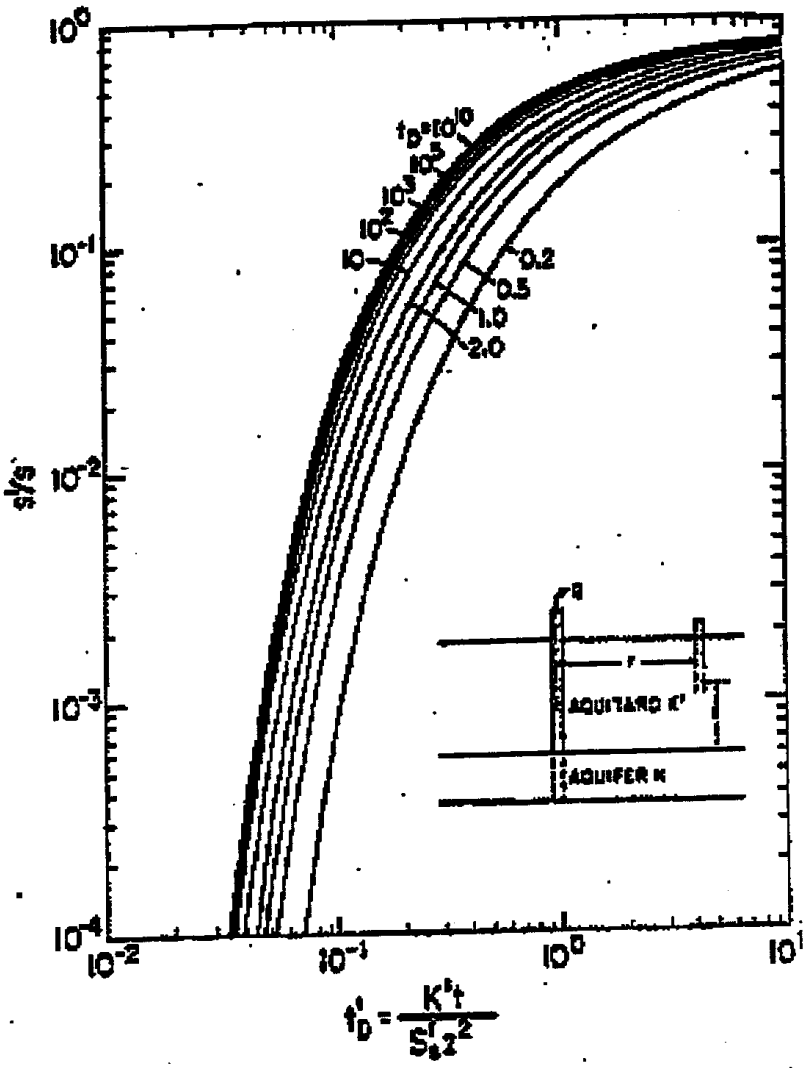

Figure SOP033-4. Variation of s'/s with t'$_d$ for a Semi-Infinite Aquitard (after Reynolds).

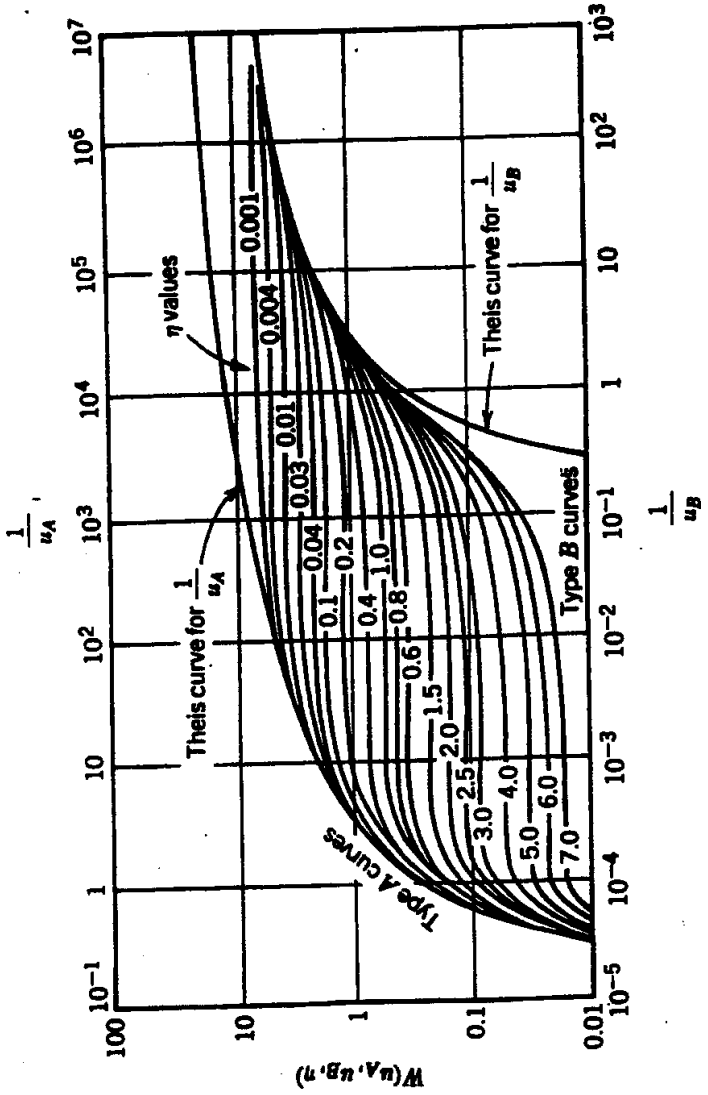

Figure SOP033-5. A and B type curves (after Dominico).

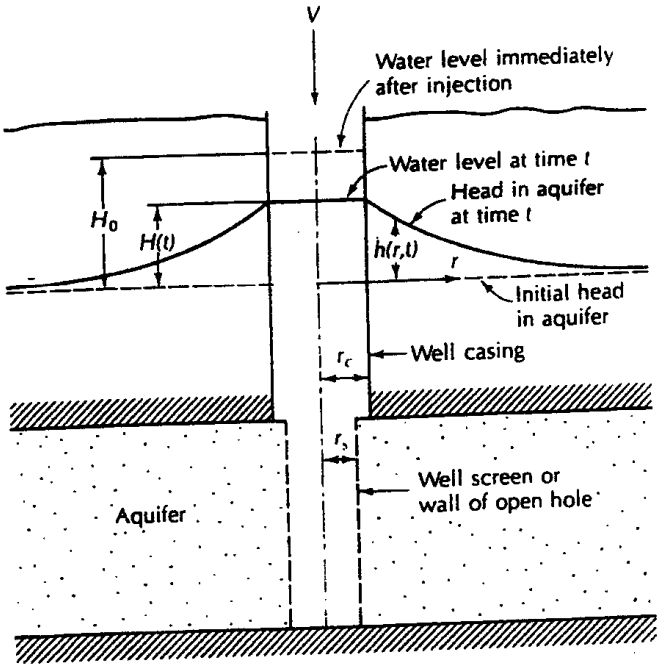

Figure SOP033-6. Well parameters – slug tests (after Fetter).

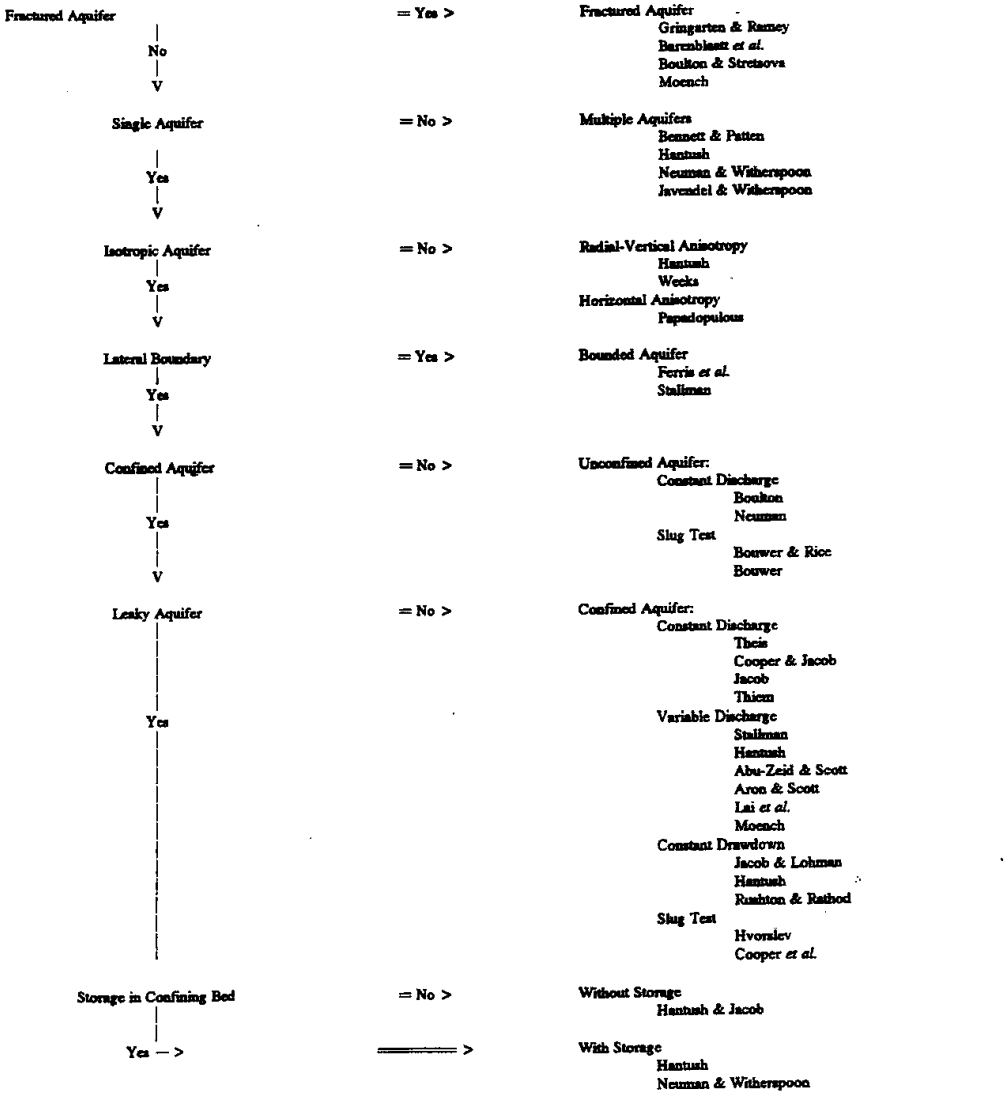

Table SOP033-1. Decision tree for selection of aquifer test method (after ASTM D-4043-91).

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Standard Operating Procedure No. 035
for
Small Boat Operations

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Revision: 2
March 2019

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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are any client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**also check Box A**), or if this SOP is being used with no changes (**only check Box B**).

☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 035	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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DOCUMENT REVISION HISTORY

ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
2	28 March 2019	Systematic review and update	John Morris Pete Garger	Matthew Bowman

1. BACKGROUND

The threat from working on or near surface water bodies comes from both chemical hazards and physical hazards such as drowning. When there is a need for sampling to be conducted using small boats, EA will provide the necessary safety gear (i.e., life vests, nets, and other floating devices) and appropriate training.

EA field staff and team members supporting field planning for projects involving small boat operations should be aware that individual states have different certification, training, and safety requirements. These requirements should be identified early in project planning and incorporated into field preparation efforts. The National Association of State Boating Law Administrators maintains a website (www.nasbla.org) that provides an online reference guide for state boating laws. In states where boating certification is required, the operator should have their certification card in their position whenever conducting small boat operations.

1.1 PURPOSE

This Standard Operating Procedure (SOP) establishes the operating requirements for small boats conducting inland and coastal marine work.

1.2 SCOPE

This SOP applies to the operation of small boats, including launches, motorboats, working platforms, and skiffs, for inland (rivers, lakes, and bays) and coastal marine work. This SOP applies to EA personnel operating a small boat or working on a subcontractor-operated small boat. This SOP covers small boat requirements, work over or near bodies of water, personal flotation devices (PFDs), lifesaving and safety skiffs, severe weather precautions, and cold water and drowning hazards. This SOP is mandatory for EA personnel. Subcontractors are responsible for analyzing the hazards of activities they control and for preparing job hazard analysis and maintaining equivalent safety requirements.

1.3 DEFINITIONS

Small Boat—Includes dinghies, 1- or 2-man rowboats, up to and including larger vessels typically up to 30 feet (ft) in length, and work barges.

Float Plan—A written summary of the details of the trip, including route, type of vessel, persons aboard, and other salient information that may be useful in the event of an emergency.

Job Hazard Analysis—A concise analysis of the specific task considering the body of water, vessel, unique job requirements, training and experience of crew, and other circumstances as may be appropriate.

1.4 RESPONSIBILITIES

The Project Health and Safety Officer is responsible for review and approval of small boat operations as described in the Health and Safety Plan. The Project Health and Safety Officer provides any necessary safety requirements to the project team. The Project Health and Safety Officer will review the job hazard analysis prepared by project personnel.

Health and Safety Officer—The Health and Safety Officer is responsible for ensuring the proper use of small boats at field locations. The Health and Safety Officer ensures that only trained personnel operate small boats, subcontractors implement safety programs, and that all equipment is properly maintained. The Onsite Safety Officer is responsible for filing or maintaining a float plan.

Small Boat Operators—Certified (as appropriate by the state where the project is located) EA personnel working on small boats will follow this procedure and any applicable health and safety procedures identified in the Health and Safety Plan and the vessel rules. Small boat operators will identify any conflicts in procedures or any problems or equipment failures to the Health and Safety Officer. Small boat operators will demonstrate training, experience, and compliance with state requirements for operator education and licensing prior to operating any vessel. For larger bodies of water, or rapidly moving water, knowledge of local conditions shall be obtained prior to embarkation.

2. SMALL BOAT REQUREMENTS

All small boats used by EA personnel must meet the minimum requirements in the U.S. Army Corps of Engineers Safety and Health Requirements Manual Engineer Manual (EM) 385-1-1 and the applicable Occupational Safety and Health Administration or state plan requirements, as well as meeting applicable U.S. Coast Guard Regulations. These requirements include the following:

- Small boats will meet the minimum flotation requirements of the U.S. Coast Guard, and must have a certification tag affixed to the hull.
- Small boats will have valid proof of registration.
- The maximum number of passengers and weight that may be safely transported must be posted on all small boats.
- The number of personnel on the small boat cannot exceed the number of Type I PFDs onboard.
- Each small boat will have sufficient room freeboard, and stability to safely carry the allowable number of personnel and cargo.

- Each small boat shall have an appropriate complement of hand tools onboard to address boat maintenance and emergency repair.

- Each motored boat measuring less than 26 ft in length will carry a minimum of one 1A-10 BC fire extinguisher; motored boats measuring greater than 26 ft will carry a minimum of two 1A-10 BC fire extinguishers.

Operators and occupants of small craft will review Federal Requirements and Safety Tips for Recreational Boats (U.S. Coast Guard 1994) before engaging in work from rafts, dinghies, canoes, rowboats, or Jon boats.

2.1 WORK OVER OR NEAR WATER

Work over or near water, where the potential exists for personnel to fall in and possibly drown, will be conducted in accordance with the requirements of applicable Occupational Safety and Health Administration standards and the U.S. Army Corps of Engineers EM 385-1-1 standards. This includes work from shore, bridges, work platforms, and vessels. Work within 15 ft of unobstructed access to water is within the requirements of this section. Personnel will follow the guidelines listed below except where personnel are protected by continuous guardrails, safety belts, or nets, or are conducting work along beaches or similar shorelines:

- Personnel will use the buddy system at all times.

- Swimming is prohibited, with the following exceptions: (1) certified divers performing their duties, and (2) personnel entering water to prevent injury or loss of life.

- All personnel will wear a U.S. Coast Guard-approved PFD of the type able to support an unconscious person (Type III) continuously. Type I PFDs must be available for all personnel on the vessel.

- At least one Type IV throwable device (e.g., ring buoy or horseshoe buoy) will be available on the small boat. Throwable devices should be U.S. Coast Guard-approved and equipped with 150 ft of 600-pound capacity rope.

- If specified in the Health and Safety Plan, at least one person will provide a dedicated safety watch/look-out.

2.2 PERSONAL FLOTATION DEVICES

All EA personnel will wear a U.S. Coast Guard-approved, Type III PFD when working over or near bodies of water. PFDs should meet the following requirements:

- Before and after each use, the PFD will be inspected for defects that would alter its strength or buoyancy.

- All PFDs will be equipped with retro reflective tape.

PFDs need not be donned when working on larger craft (>26 ft) when working within the boat's cabin. PFDs should be worn at all times when working on smaller craft.

2.3 SAFETY EMERGENCY DRILL

The vessel operator shall provide a list of crew duties for normal operations and emergencies. Emergencies that will be covered include man-overboard, vessel fire, and vessel emergency.

The vessel operator will provide an orientation and emergency drill. An emergency drill will be conducted at the start of each task, and monthly thereafter, or as provided for in U.S. Coast Guard regulations.

2.4 FLOAT PLAN

A float plan provides essential information to enable the U.S. Coast Guard or other emergency search and rescue teams to initiate a search in the event of personnel not reporting in on schedule. The vessel operator will file a project-specific daily float plan with the designated on shore individual and with the project health and safety representative listed in the Health and Safety Plan. Upon daily completion of on-water work, the vessel operator will check in with the designated on shore individual. The float plan form is provided in Attachment A.

2.5 EMERGENCY PLAN

The emergency plan should list a main dock and an alternate dock, and provide emergency medical support contact for each location.

2.6 COMMUNICATIONS

For open water, tidal environments, or industrial waterways, a marine very high frequency (VHF) radio will be maintained onboard and in operable condition. Mobile telephones can be substituted for a marine VHF radio at the discretion of the Health and Safety Officer on sites with minimal boat traffic on inland rivers, ponds, and lakes.

2.7 OCEAN AND NIGHTTIME REQUIREMENTS

These operations require a specialized skillset, experience, and additional training. Contact the Corporate Health and Safety Officer and Project Health and Safety Officer prior to planning any work that requires work in open ocean or nighttime operations.

2.8 SEVERE WEATHER PRECAUTIONS

During field operations involving small boats, EA personnel will make provisions for severe weather conditions in advance. Severe weather includes sudden and locally severe storms,

lightning, high winds, waves, hurricanes, and floods. Before beginning work over water, the Health and Safety Officer and Small Boat Operators will evaluate and track weather reports and conditions to ascertain local weather and prevent personnel exposure to severe weather. In the event that severe weather is encountered, personnel will cease field operations and immediately return to shore. Designation of multiple sheltering locations should be planned in advance.

2.9 COLD WATER AND DROWNING HAZARDS

EA personnel conducting field operations with a small boat may be exposed to cold water and drowning hazards. When water temperature is below 45 degrees Fahrenheit, hypothermia is a serious hazard. A person can lose feeling in extremities within 5 minutes, loss of consciousness in 10 minutes, and loss of life in 20 minutes. Under no circumstances will EA personnel enter the water from a small boat unless conducting diving operations or performing a rescue.

Symptoms of hypothermia are discussed during standard first aid training and in the EA Health and Safety Program Plan. If a person who has fallen into the water displays symptoms of hypothermia, he or she should be treated immediately and the field operations canceled. Under no circumstances should the victim be given hot liquids, since they can accelerate shock. Drinks no warmer than body temperature are acceptable. If symptoms are severe and rapid evacuation is not possible, remove the victim's wet clothing and cover the victim with a blanket. Continue to treat the victim for shock.

When a high risk of cold water and drowning hazards exists, all field staff members should be familiar with cold water survival techniques. If a team member falls into the water, he or she should not remove any clothing in the water because all clothing will provide insulation. Although clothing creates added drag while swimming, the added insulation of the clothing outweighs the disadvantage of the additional drag.

If a team member falls into the water, another team member should try to reach the person in the water with an oar, paddle, pole, or similar object. The victim should try to grab the extended item. If the victim is unconscious, the rescuer should try to hook the victim's PFD, clothing, or hair and pull him or her toward the boat. Once the victim is retrieved, the other team members should begin any necessary emergency medical procedures. A minimum of one team member on the vessel should be certified for cardiopulmonary resuscitation/first aid. If no emergency medical procedures are necessary, the victim should change into dry clothing.

An additional consideration that must be evaluated related to small boat operations associated with cold weather conditions is the presence of ice. Immediately prior to launch, ice and potential icing conditions should be assessed. Boat ramps can become very hazardous in icy conditions and can cause trucks to lose tracking when launching or removing a boat from the water.

2.10 JOB HAZARD ANALYSIS

The requirements for preparing a job hazard analysis apply specifically to all on-water operations. Attachment B provides a sample job hazard analysis; however, an actual job hazard analysis will consider the specific task including the body of water, vessel type, unique job requirements, training and experience of crew, and other circumstances such as tides, weather, water temperature, access of rescue craft, and other factors as may be appropriate. Job hazard analyses must be prepared specifically for each task and crew in accordance with the U.S. Army Corps of Engineers Safety and Health Requirements Manual EM 385-1-1.

3. REFERENCES

U.S. Coast Guard. 1994. Federal Requirements and Safety Tips for Recreational Boats.

Attachment A

Float Plan Form

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ATTACHMENT A
FLOAT PLAN FORM

FLOAT PLAN

INSTRUCTIONS: Complete this plan before you go boating and leave it with a reliable person who can be depended upon to notify the Coast Guard, or other rescue organization, should you not return or check-in as planned. If you have a change of plans after leaving, be sure to notify the person holding your Float Plan. For additional copies of this plan, visit: **www.floatplancentral.org**

www.cgaux.org — **Do NOT file this plan with the U.S. Coast Guard** — www.uscgboating.org

VESSEL

IDENTIFICATION:

Name & Hailing Port _____
Document / Registration No._____ HIN_____
Year & Make _____
Length____ Type_____ Draft____ Hull Mat._____
Color _____
Prominent Features_____

PROPULSION:

Primary-- Type_____ No. Eng.___ Fuel Capacity_____
Auxiliary--Type_____ No. Eng.___ Fuel Capacity_____

COMMUNICATION:

Radio Call Sign _____
DSC MMSI No. _____
Radio-1: Type _____ Ch./ Freq. Monitored_____
Radio-2: Type _____ Ch./ Freq. Monitored_____
Cell / Satellite No._____
E-mail _____

NAVIGATION: (Check all on board)

☐ Maps ☐ Charts ☐ Compass ☐ GPS / DGPS
☐ Radar ☐ Sounder ☐ _____

SAFETY & SURVIVAL

VISUAL DISTRESS SIGNALS:

☐ Electric S-O-S Light
☐ Orange Flag
☐ Orange Smoke
☐ Red Flares

AUDIBLE DISTRESS SIGNALS:

☐ Bell
☐ Horn / Siren
☐ Whistle

OTHER GEAR:

☐ Drogue / Sea Anchor
☐ EPIRB _____
☐ Fire Extinguisher
☐ Flashlight / Searchlight
☐ Food & Water for ____ days
☐ Foul Weather Gear
☐ Life raft / Dinghy
☐ Personal Locator Beacon
☐ Signal Mirror
☐ _____
☐ _____
☐ _____

PFDs: (Do not count Type IV devices)

____ Quantity On Board

GROUND TACKLE:

☐ Anchor: Line Length_____

PERSONS ONBOARD

OPERATOR: Age Gender Notes (Special medical condition, can't swim, etc.)

Name _____
Address _____ Has experience: ☐ with this Vessel ☐ with Area
City_____ State____ Zip Code_____ Home phone _____
Vehicle (Year, Make & Model) _____ Vehicle License No. _____
Trailer will be parked at:_____ Trailer License No. _____

PASSENGERS / CREW: Name & Address Age Gender Notes (Special medical condition, can't swim, etc.)

1. _____
2. _____
3. _____
4. _____
5. _____

Attach "Supplemental Passenger List" if additional passengers or crew on board.

ITINERARY

	DATE	TIME	LOCATION / WAYPOINT	MODE OF TRAVEL	REASON FOR STOP	CHECK-IN TIME
Depart						
Arrive						
Depart						
Arrive						
Depart						
Arrive						
Depart						
Arrive						
Depart						
Arrive						

Attach "Supplemental Itinerary" if there are additional locations or waypoints.

Contact 1: _____ Phone Number _____
Contact 2: _____ Phone Number _____

If you have a genuine concern for the safety or welfare of any persons on board the Vessel described above, who have not returned or checked-in in a reasonable amount of time, then follow the step-by-step instructions on the *Boating Emergency Guide*™ included with this float plan, or on the Internet at:

www.floatplancentral.org/help/BoatingEmergencyGuide.htm

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BOATING EMERGENCY GUIDE™

You will need the following items before you begin: 1) the **Float Plan** if one was given to you, 2) **Pen** or **Pencil**, 3) Clean sheet of **Paper** or **Writing Tablet**, and 4) your local **Telephone Directory**. Begin with Step 1 below.

Step 1: Do you have a genuine concern for the safety or welfare of any persons who have not returned or checked-in in a reasonable amount of time?

If YES, then continue with **Step 2**, otherwise STOP, no further action is required.

Step 2: Were you given a prepared Float Plan by anyone on board the vessel?

If YES, then continue with **Step 3**, otherwise got to **Step 5**.

Step 3: On the Float Plan, locate the two Contact lines at the bottom of the page. Call Contact number 1...

IF CONTACT #1	THEN
Answers phone	Take notes during your conversation. 1. Let the person know you are responding to a late return or check-in by the individuals designated on the Float Plan. 2. Determine if the person you are talking to, or anyone else at that location, has recently had contact with anyone on the vessel, and when and where that contact occurred. 3. Are you still concerned about the safety or welfare of any persons on board the vessel?

IF	THEN
Yes	Continue with **Step 4**.
No	STOP. No further action is required.

Does not answer phone	Continue with **Step 4**.

Step 4: Call Contact number 2...

IF CONTACT #2	THEN
Answers phone	Take notes during your conversation. 1. Let the person know you are responding to a late return or check-in by the individuals designated on the Float Plan. 2. Determine if the person you are talking to, or anyone else at that location, has recently had contact with anyone on the vessel, and when and where that contact occurred. 3. Are you still concerned about the safety or welfare of any persons on board the vessel?

IF	THEN
Yes	Continue with **Step 6**.
No	STOP. No further action is required.

Does not answer phone	Continue with **Step 6**.

Step 5: Take a moment to jot down the facts you know about each item in the checklist below.

DO NOT SPECULATE. Speculation about a detail may mislead Search And Rescue personnel, add to the overall search and rescue time, and adversely affect the outcome.

- ☐ Period of time the vessel has been overdue.
- ☐ Purpose of the trip or voyage.
- ☐ Description of the Vessel (type, size, color, features, etc.)
- ☐ Vessels departure point and destination.
- ☐ Places the Vessel planned to stop during transit.
- ☐ Navigation equipment on board (such as GPS, Loran C, Radar, Compass, Sounder, etc.)
- ☐ Number of people aboard the Vessel, as well as personal habits e.g. dependability, reliability, etc.
- ☐ Was the Vessel already moored, or did a vehicle tow it to the launch point?
- ☐ License plate number and description of the tow vehicle, and/or passenger transport vehicle.
- ☐ Communications equipment aboard, including type of radio and frequencies monitored, cellular or satellite telephone numbers of individuals, etc.
- ☐ Additional points of contact along the vessels planned route.
- ☐ Where there any pending commitments e.g. work, appointments, etc.

Continue with **Step 6**.

Step 6:

1. Contact your local Law Enforcement agency (Police or Sheriff).
2. Let the dispatcher know that you are responding to a late return or check-in by the persons on board the vessel.
3. The dispatcher will instruct you from here.

> **Note:** The dispatcher will provide you with the necessary contact or agency connection to get a search and rescue mission started. This is usually handled this way because it puts you closest to the agency conducting the actual search and rescue, eliminating an unnecessary middleman.
>
> If the dispatcher would like a follow-up call from you on the outcome of the rescue, they will let you know.

4. Continue with **Step 7**.

Step 7: Be patient... you've done everything you can possibly do for now. It is important to keep the telephone available, so emergency personnel can contact you with additional information and/or questions concerning the search and rescue effort.

STOP -- End of Guide

Float Plan Central™ is a service of the U.S. Coast Guard Auxiliary
www.floatplancentral.org

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Attachment B

Job Hazard Analysis Form

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APPENDIX B

JOB HAZARD ANALYSIS FORM

Activity Hazard Analysis		
Task	**Potential Hazards**	**Hazard Control Measures**
MOBILIZATION/ DEMOBILIZATION	Physical Hazards (slips, trips, falls, cuts, etc.)	• Clear walkways/work areas of equipment, tools, and debris. • Watch for accumulation of water and ice on work surfaces. • Mark, identify, or barricade obstructions. • Wear cut-resistant work gloves when the possibility of lacerations or other injury caused by sharp or protruding objects occurs.
	Physical Hazards (material handling moving, lifting)	• Observe proper lifting techniques. • Obey sensible lifting limits (50-pound maximum per person manual lifting). • Use mechanical lifting equipment (hand carts, trucks, etc.) to move large awkward loads. • Use two or more persons for heaving bulk lifting.
	Physical Hazards (vehicle and pedestrian traffic)	• Use orange traffic cones where necessary. • Use reflective warning vests if exposed to vehicular traffic. • Locate staging areas in locations with minimal traffic.
	Physical Hazards (cold/heat stress)	• Monitor cold/heat stress as recommended in Section 6 of the Generic Health and Safety Plan. • Workers should wear appropriate clothing and sunscreen to protect from potential sun and wind exposure. • Drink adequate water to avoid dehydration.
	Munitions and Explosives of Concern (MEC) Hazard	• Practice site reconnaissance with a trained, experienced MEC specialist capable of recognizing MEC hazards. • If MEC are discovered, use existing access roads to retract from the MEC.
	Biological Hazards (insects, poisonous plants, ticks)	• Wear protective outer clothing and insect repellant to avoid insect bites and ticks. • Wear long sleeve shirts when working in areas with poison ivy or oak. • Workers with allergies should carry antidote kits, if necessary.
SAMPLING ACTIVITIES	Physical Hazards (slips, trips, falls, cuts, etc.)	• Clear walkways/work areas of equipment, tools, and debris. • Watch for accumulation of water and ice on work surfaces. • Mark, identify, or barricade obstructions. • Wear cut-resistant work gloves when the possibility of lacerations or other injury caused by sharp or protruding objects occurs.
	Physical Hazards (electrical)	• Identify electrical utility hazards prior to sampling. • Inspect work areas for spark sources, maintain safe distances, properly illuminate work areas, and provide barriers to prevent inadvertent contact. • Maintain minimum clearance distances for overhead energized electrical lines as specified in the Generic Health and Safety Plan.
	Physical Hazards (weather)	• Monitor radio and/or cell phone for up-to-date severe weather forecasts. • Discontinue work during thunderstorms and severe weather events.
	Physical Hazards (vessel traffic)	• Coordinate with commercial vessel traffic. • Identify the location navigation buoys and lanes for vessel traffic. • Use reflective warning vests if exposed to vessel traffic.

Activity Hazard Analysis		
Task	**Potential Hazards**	**Hazard Control Measures**
SAMPLING ACTIVITIES (continued)	Physical Hazards (cold/heat stress)	• Monitor cold/heat stress as recommended in Section 6 of the Generic Health and Safety Plan.
	MEC Hazards	• Follow established MEC avoidance protocols when performing intrusive sampling activities. • If MEC are discovered or suspected, use existing access roads to retract from the MEC.
	Chemical Hazards (including MEC)	• Perform environmental monitoring as required in the Site-Specific Health and Safety Plan. • Where appropriate, personal protective equipment as indicated in the Site-Specific Health and Safety Plan.
	Biological Hazards (bloodborne pathogens)	• Wear proper personal protective equipment, including nitrile gloves and a face shield or goggles when sampling sludge. • Wash with soap and water as soon as personal protective equipment is removed or when contact or exposure has occurred.
	Biological Hazards (insects, poisonous plants, and ticks)	• Wear protective outer clothing and insect repellant to avoid insect bites and ticks. • Wear long sleeve shirts when working in areas with poison ivy or oak. • Worker with allergies should carry antidote kits, if necessary.
BOATING ACTIVITIES	Physical Hazards (weather)	• Monitor radio and/or cell phone for up-to-date severe weather forecasts. • Boat operators will be trained by the site supervisor and/or the senior boat operator. • Discontinue work during thunderstorms and severe weather events.
	Physical Hazard (slips, trips, and falls, including falls overboard)	• Boat operator will inspect the boat prior to operation. The operator will ensure the number of personal flotation devices is equal to or greater than the number of passengers onboard. • No personnel will embark or disembark the vessel without the direction of the vessel operator. Vessel operator will ensure passengers are wearing personal flotation devices while on deck. At the request of the operator, personnel will be seated. • Passengers will stay seated until boat is docked. Ensure three-point contact whenever possible or practical. • A Type IV throwable device will be readily available onboard.

Standard Operating Procedure No. 037
for
Dissolved Oxygen Measurements
(YSI Model 57)

Prepared by

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December 2014

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to delineate protocols for measuring the dissolved oxygen (DO) of all types of aqueous solutions, including drinking water, saline water, and industrial and domestic wastes. DO is a measurement of the amount of soluble oxygen in an aqueous solution. It is a general indication of an aerobic/anaerobic condition of a water sample.

Use of brand names in this SOP is not intended as endorsement or mandate that a given brand be used. Alternate equivalent brands of detectors, sensors, meters, etc. are acceptable. If alternate equipment is to be used, the contractor will provide applicable and comparable SOPs for the maintenance and calibration of same.

2. MATERIALS

The following materials may be required:

DO meter (YSI Model 57 or equivalent)
Self-stirring biological oxygen demand bottle probe
Membrane standards
Biological oxygen demand bottle

3. PROCEDURE

3.1 SETUP

It is important that before the meter is prepared for use and calibrated, it should be placed in the intended operating position, i.e., vertical, tilted, or horizontal. The instrument may need readjustment if the operating position is altered. The setup procedures should be as follows:

- With the switch set to **OFF**, adjust the meter pointer to zero with the screw in the center of the meter panel.
- Switch to **RED LINE** and adjust the **RED LINE** knob until the meter needle aligns with the red mark if necessary.
- Switch to **ZERO** and adjust to 0 mg/L scale with the **ZERO** control knob.
- Attach the prepared probe to the **PROBE** connector of the instrument and adjust the retaining ring finger tight.
- Before calibrating, allow 15 minutes for optimum probe stabilization. Repolarize whenever the instrument has been **OFF** or the probe has been disconnected.

3.2 CALIBRATION

Calibration is accomplished by exposing the probe to a known oxygen concentration, such as water-saturated air (%), or water of a known oxygen content (mg/L), and then adjusting the calibration controls so the display shows a reading matching the oxygen concentration of the known sample. Calibration can be disturbed by physical shock, touching the membrane, and fouling of the membrane or drying out of the electrolyte. Calibration will be checked after each series of measurements. Calibration of the DO meter will be performed on a daily basis as follows:

1. Place the probe in moist air. Biological oxygen demand probes can be placed in partially filled (50 ml) biological oxygen demand bottles. Wait 10 minutes for temperature to stabilize ± 2°C.

2. Switch to **TEMPERATURE** and read. Refer to Table SOP037-1 for solubility of oxygen in fresh water (calibration value).

3. Determine altitude or atmospheric correction factor from Table SOP037-2.

4. Multiply the calibration value from Table SOP037-1 by the correction factor from Table SOP037-2 to obtain the correct calibration value.

   EXAMPLE: Assume a temperature of 20°C and an altitude of 1,100 ft. From Table SOP037-1, the calibration value of 20°C is 9.09 mg/L. From Table SOP037-2, the correction factor for 1,100 ft is 0.96. Therefore, the corrected calibration value is 9.09 mg/L × 0.96 = 8.73 mg/L.

5. Switch to the appropriate mg/L range, set the **SALINITY** knob to zero and adjust the **CALIBRATE** knob until the meter reads the calibration value from Step 4. Wait 2 minutes to verify calibration stability. Readjust if necessary.

3.3 DISSOLVED OXYGEN MEASUREMENT

- With the instrument prepared for use and the probe calibrated, place the probe in the sample.

- Turn the **STIRRER** knob **ON**.

- Adjust the **SALINITY** knob to the salinity of the sample if appropriate.

- Allow sufficient time for the probe to equilibrate to the sample temperature and DO.

- Read DO on appropriate scale.

- Before measuring the DO of the next sample, rinse probe and sample bottle with distilled water and then with next water sample.

Follow steps above for the next sample(s).

The DO meter should normally be left on during the working day to avoid the delay of waiting for probe repolarization.

4. MAINTENANCE

The following steps will be taken to maintain the DO meter:

- Replace the batteries when the **RED LINE** knob is at its extreme adjustment or at least annually.

- In the **BATT CHECK** position on the **STIRRER** knob, the voltage of the stirrer batteries is displayed on the red **0-10** scale. Do not permit them to discharge below 6 volts.

- Replace membrane every 2 weeks depending on application. Probes will be stored in a humid environment to prevent drying out.

5. PRECAUTIONS

The DO meter case is water resistant when properly closed. As a precaution against damaged gaskets or loose fittings, the instrument case will be opened and inspected for moisture whenever the instrument has been subjected to immersion or heavy spray. The case is opened by removing the screws on the rear cover an lifting the cover off.

6. REFERENCES

Manufacturer's handbook.

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TABLE SOP037-1 SOLUBILITY OF OXYGEN IN WATER EXPOSED TO WATER SATURATED AIR AT 760 mm Hg PRESSURE

Temperature (°C)	Solubility (mg/L)	Temperature (°C)	Solubility (mg/L)	Temperature (°C)	Solubility (mg/L)
0	14.62	17	9.67	34	7.07
1	14.22	18	9.47	35	7.95
2	13.83	19	9.28	36	7.84
3	13.46	20	9.09	37	6.73
4	13.11	21	8.92	38	6.62
5	12.77	22	8.74	39	6.52
6	12.45	23	8.58	40	6.41
7	12.14	24	8.42	41	6.31
8	11.84	25	8.26	42	6.21
9	11.56	26	8.11	43	6.12
10	11.29	27	7.97	44	6.02
11	11.03	28	7.83	45	5.95
12	10.78	29	7.69	46	5.84
13	10.54	30	7.56	47	5.74
14	10.31	31	7.43	48	5.65
15	10.08	32	7.31	49	5.56
16	9.87	33	7.18	50	5.47

NOTE: Derived from 17th Edition, Standard Methods for the Examination of Water and Wastewater.
°C = Degree Celsius.
mg/L = Milligram per liter.

TABLE SOP037-2 CALIBRATION VALUES FOR VARIOUS ATMOSPHERIC PRESSURES AND ALTITUDES

Pressure			Altitude		Calibration Value (Percent)
Inches Mercury	Millimeter Mercury	Kilopascal	Feet	Meter	
30.23	768	102.3	-276	-84	101
29.92	760	101.3	0	0	100
29.61	752	100.3	278	85	99
29.33	745	99.3	558	170	98
29.02	737	98.3	841	256	97
28.74	730	97.3	1126	343	96
28.43	722	96.3	1413	431	95
28.11	714	95.3	1703	519	94
27.83	707	94.2	1995	608	93
27.52	699	93.2	2290	698	92
27.24	692	92.2	2587	789	91
26.93	684	91.2	2887	880	90
26.61	676	90.2	3190	972	89
26.34	669	89.2	3496	1066	88
26.02	661	88.2	3804	1160	87
25.75	654	87.1	4115	1254	86
25.43	646	86.1	4430	1350	85
25.12	638	85.1	4747	1447	84
24.84	631	84.1	5067	1544	83
24.53	623	83.1	5391	1643	82
24.25	616	82.1	5717	1743	81
23.94	608	81.1	6047	1843	80
23.62	600	80.0	6381	1945	79
23.35	593	79.0	6717	2047	78
23.03	585	78.0	7058	2151	77
22.76	578	77.0	7401	2256	76
22.44	570	76.0	7749	2362	75
22.13	562	75.0	8100	2469	74
21.85	555	74.0	8455	2577	73
21.54	547	73.0	8815	2687	72
21.26	540	71.9	9178	2797	71
20.94	532	70.9	9545	2909	70
20.63	524	69.9	9917	3023	69
20.35	517	68.9	10293	3137	68
20.04	509	67.9	10673	3253	67
19.76	502	66.9	11058	3371	66

NOTE: Derived from 17th Edition, Standard Methods for the Examination of Water and Wastewater.

Standard Operating Procedure No. 038
for
Redox Potential Measurements

Prepared by

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Revision 0
December 2014

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure is to delineate protocols for measuring the redox of flooded sediment and soil. Redox is an indication of the reduction of oxidation intensity of an anaerobic system. Redox will be expressed in mV. A complete anaerobic system redox potential is -150 Mv. A positive value indicates an aerobic system.

Redox measurement in a natural system is difficult to obtain due to the absence of true equilibria, heterogeneity of media, and pH effects deprived redox measurements in natural media of precise thermodynamic significance (Ponnamperuma 1972). Despite the difficulties involved in the redox measurements in natural media, it is widely accepted that redox readings in natural anaerobic systems can provide valuable environmental information. Whitfield found redox useful as a semi-quantitative indicator of the degree of stagnation of a particular aquatic environment as did Ponnamperuma for flooded soils and sediments. The redox measurements of natural waters are not representative of that median, since natural waters are in a highly dynamic state rather than in or near equilibrium, according to Stumm and Morgan 1970. It is generally recognized that redox measurements in oxygenated natural waters are invalid.

2. MATERIALS

The following materials may be required:

pH meter	Sample bottle
Combination pH electrode	Standard solution (pH 4 and 7 buffers saturated with quinhydrone)
Lint-free laboratory wipes (Kimwipes, or equivalent)	Wash bottle
Distilled water	

3. PROCEDURE

Calibration of the pH meter will be calibrated on a daily basis as follows.

- Prepare beaker of standard solution with known voltage(s)
- Connect electrodes to instrument
- Turn on and clear
- Rinse electrode with distilled water blot excess with laboratory wipes
- Immerse probe in beaker of standard solution
- Press mV key
- After the reading stabilizes, the absolute mV of solution is displayed.
- Rinse electrode and blot excess.

Redox will be measured after calibration as follows:

- Prepare sample in a beaker
- Rinse electrode and blot excess water
- Immerse electrode in sample and stir briefly
- Press mV switch
- Record the reading after it stabilizes
- For next sample(s), follow above steps.

4. MAINTENANCE

Check the batteries each time the meter is used.

Keep the probe stored in a 0.1 M KCL solution when not in use. Alternatively, the electrode may be rinsed with deionized water and trapping any residual water inside the protective cap.

5. PRECAUTION

Remove coatings of oil material or particulate matter that can impair electrode response by gentle wiping or detergent washing, followed by distilled water rinsing.

6. REFERENCES

Beckman Instruments, Inc. User Manual for 10, 11, and 12 pH/ISE meter.

Ponnamperuma, F.N. 1972. The Chemistry of Submerged Soils, Advances in Agronomy. Vol. 24.

Stumm, W. and J.J. Morgan. 1970. Aquatic Chemistry, Wiley, New York.

Whitfield, M. 1969. Eh as an Operational Parameter in Estuarine Studies. *Limnol. Oceanogr.*, Vol. 14.

Standard Operating Procedure No. 039
for
Sample Preservation and
Container Requirements

Prepared by

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Revision 2
September 2018

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PROJECT-SPECIFIC VARIANCE FORM

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☐ **B. No variances**

SOP No. 039	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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DOCUMENT REVISION HISTORY

ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
2	25 September 2018	Add notes about incremental sampling and minor changes	Daniel Hinckley, Sanita Corum	Matthew Bowman

1. PURPOSE AND SCOPE

The purpose of this Standard Operating Procedure (SOP) is to define the preservatives and techniques to be employed in preserving environmental samples between collection and analysis.

2. MATERIALS

The following materials may be required:

- Containers (Section 3 provides a description)
- Nitric acid
- Sulfuric acid
- Sodium hydroxide
- Ice chests
- Ice.

3. DEFINITION OF CONTAINER TYPES

Listed below are the definitions of various container types.

Type	Container	Closure	Septum
A	80-ounce amber glass, ring handle bottle/jug, 38-millimeter (mm) neck finish	White polypropylene or black phenolic, baked polyethylene cap, 38-430 size, 0.015-mm polytetrafluoroethelyne (PTFE) liner	
B	40-milliliter glass vial, 24-mm neck finish	White polypropylene or black phenolic, open top, screw cap, 15-mm opening, 24-400 size	24-mm disc of 0.005-inch) PTFE bonded to 0.120-inch silicon for total thickness of 0.125 inches
C	1-liter high density polyethylene, cylinder-round bottle, 28-mm neck finish	White polyethylene cap, white ribbed, 28-410 size; F217 polyethylene liner	
D	120-milliliter wide mouth glass vial, 48-mm neck finish	White polyethylene cap, 40-480 size; 0.015-mm PTFE liner	
E	250-milliliter Boston round glass bottle	White polypropylene or black phenolic, open top, screw cap	Disc of 0.005-inch PTFE bonded to 0.120-inch silicon for total thickness of 0.125 inches
F	8-ounce short, wide mouth, straight-sided, flint glass jar, 70-mm neck finish	White polypropylene or black phenolic, baked polyethylene cap, 48-400 size; 0.030-mm PTFE liner	
G	4-ounce tall, wide mouth, straight-sided, flint glass jar, 48-mm neck finish	White polypropylene or black phenolic, baked polyethylene cap, 48-400 size; 0.015-mm PTFE liner	

Type	Container	Closure	Septum
H	1-liter amber, Boston round, glass bottle, 33-mm pour-out neck finish	White polypropylene or black phenolic, baked polyethylene cap, 33-430 size; 0.015-mm PTFE liner	
K	4-liter amber glass ring handle bottle/jug, 38-mm neck finish.	White polypropylene or black phenolic, baked polyethylene cap, 38-430 size; 0.015-mm PTFE liner	
L	500-milliliter high-density polyethylene, cylinder bottle, 28-mm neck finish	White polypropylene, white ribbed, 28-410 size; F217 polyethylene liner	

4. PROCEDURE

All containers described in Section 3 must be certified clean (SOP Number [No.] 031), with copies of laboratory certification furnished upon request. There may be circumstances when alternative containers will be used (e.g., aluminum foil around tissue samples placed in plastic bags, plastic buckets or bags for large soil/sediment samples, etc.) for which laboratory certification may not be available. Such containering should be appropriately decontaminated or verified appropriately clean prior to using.

Water samples will be collected into pre-preserved containers appropriate to the intended analyte as documented in the Quality Assurance Project Plan. Samples taken for volatile organic compounds will be collected in accordance with SOP No. 003, Section 3.3.8. Samples taken for metals analysis will be verified in the field to a pH <2. The container should be tightly capped, then swirled to thoroughly mix the sample. The cap will then be loosened to release any excess pressure that this operation may have generated. Samples taken for total phosphorous content will be verified in the field to a pH <2. The container should be tightly capped and swirled to thoroughly mix the sample. The cap will then be loosened to release any excess pressure that this operation may have generated. Samples taken for cyanide will be verified for a pH >12. Most other samples do not require added preservation; however, there are analytes that may require special preservation, (i.e., sulfide that requires a zinc acetate preservation). Preservation must be performed as documented in the project-specific Quality Assurance Project Plan. These samples will be immediately placed on ice and cooled to 4±2 degrees Celsius (°C).

Soil and sediment samples will be collected into containers appropriate to the intended analyte as documented in the Quality Assurance Project Plan. Samples taken for volatile organic compound analysis will collected in accordance with the site-specific SOP. Samples taken for metals analysis will be tightly capped, placed on ice, and maintained at a temperature of 4°C. Samples taken for total phosphorous content will be tightly capped, placed on ice, and maintained at a temperature of 4°C. Large (1-2 kilograms) soil/sediment samples taken for incremental samples (SOP No. 057) can be placed in pre-cleaned (SOP No. 005) gallon plastic bags or plastic buckets. Under most circumstances, no preservatives will be added to soil or sediment samples; follow project-specific requirements as documented in the Quality Assurance Project Plan. These samples will be immediately placed on ice and cooled to 4±2°C.

5. MAINTENANCE

Not applicable.

6. PRECAUTIONS

Note that acidifying a sample containing cyanide may liberate hydrogen cyanide gas.

- Avoid breathing any fumes emanating from acidified samples.
- Acidify samples only in the open, rather than in closed spaces (i.e., a vehicle).
- Hold suspected hydrogen cyanide-generating sample away from body and downwind while manipulating it.
- See the Health and Safety Plan for other safety measures.

7. REFERENCES

U.S. Environmental Protection Agency (EPA). 1986. Test Methods for Evaluating Solid Waste, SW-846.

———. 1987. A Compendium of Superfund Field Operations Methods, EPA 540-P87-001.

———. 1991. A Compendium of ERT Soil Sampling and Surface Geophysics Procedures.

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Standard Operating Procedure No. 040
for
Confined Space Entry

Prepared by

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Revision 1
July 2018

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PROJECT-SPECIFIC VARIANCE FORM

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☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 040	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	6/28/2018	Systematic review and update	Pete Garger	Matt Bowman

1. PURPOSE AND SCOPE

This Standard Operating Procedure provides the instructions necessary for entering a confined space. Always consult with Safety Program Management prior to conducting a job that involves entering a confined space.

A "confined space" means any space having a limited means of access or egress or so enclosed that adequate dilution ventilation is not obtained by natural air movement, or mechanically induced movement; and is subject to the accumulation of toxic or combustible agents or an oxygen deficiency. Confined spaces include but are not limited to any of the following areas: a storage tank, tank car, process vessel, bin, tank trailer, or any other tank-like compartment usually having one or more manholes for entry; an open-topped space more than 4 feet deep, such as a bin, silo, pit, vat, vault, vessel, or floating roof storage tank; a ventilation or exhaust duct, manhole, sewer, tunnel, pipeline, and similar structure; and an oven, furnace, kiln, or similar structure.

Whenever personnel are to enter a confined space, due consideration must be given to the safety of the person entering the space (entrant) and to the person serving as the confined space attendant. The Project Manager, Field Operations Manager, and site workers will consider all possible options to ensure worker safety. At a minimum, consideration will be given to using lifelines, the buddy system, and standby safety personnel.

2. RESPONSIBILITIES

2.1 SAFETY PROGRAM MANAGER

The Safety Program Manager will:

- Provide guidance and assistance to field personnel in the preparation of procedures and the identification and classification of confined spaces
- Approve or disapprove entry procedures and standard operating procedures for entry into confined spaces
- Recommend engineering controls necessary to ensure a safe working environment.

2.2 PROJECT MANAGER/FIELD OPERATIONS MANAGER

The Project Manager/Field Operations Manager will:

- Complete all necessary confined space permits in coordination with the entrants and attendants

- Ensure all field personnel have read and understand the confined space entry procedure and have appropriate and documented confined space entry training
- Ensure team composition is adequate to safely perform tasks
- Ensure personnel entering confined spaces and the personnel serving as attendants are properly trained in rescue and cardiopulmonary resuscitation procedures
- Provide for constant communication between employees inside the confined space and employees outside the confined space.

2.3 CONFINED SPACE ENTRANT

Duties of Entrant:

- Know hazards that may be faced during entry, including information on mode, signs, or symptoms and consequences of exposure
- Properly use equipment as required by 29 Code of Federal Regulations (CFR) 1926.1204(d)
- Communicate with attendant as necessary to enable attendant to monitor entrant status and enable attendant to alert entrants of need to evacuate space as required by 29 CFR 1926.1209(f)
- Alert attendant whenever:
  - Entrant recognizes any warning sign or symptom of exposure to dangerous situation
  - Entrant detects prohibited condition
- Exit from permit space as quickly as possible whenever:
  - Order to evacuate is given by attendant or entry supervisor
  - Entrant recognizes any warning sign or symptom of exposure to a dangerous situation
  - Entrant detects prohibited condition
  - Evacuation alarm activated.

2.4 CONFINED SPACE ENTRY ATTENDANT

Duties of Attendant:

- Know hazards that may be faced during entry
- Be aware of possible behavioral effects of hazard exposure in authorized entrants

- Continuously maintains accurate count of authorized entrants
- Remain outside permit space during entry operations until relieved by another attendant
- Communicate with authorized entrants
- Monitor activities inside and outside space
- Summon rescue and other emergency services
- Perform non-entry rescues as specified by employer's rescue procedure
- Perform no duties that might interfere with primary duty to monitor and protect authorized entrants.

3. EQUIPMENT

The following equipment may be required:

Oxygen analyzer
Explosimeter
Organic vapor monitor
Personal protective equipment

4. PREREQUISITES

Personnel working in confined spaces are properly trained in safe entry and rescue procedures. A confined space entry attendant is available to remain outside the confined space to give assistance as needed. The attendant will be equipped with a self-contained breathing apparatus if conditions warrant.

5. PRECAUTIONS AND LIMITATIONS

If, for any reason, a hazardous or unsafe condition presents itself for which there is no clear procedure or guideline, work will cease until Program Safety Management can be notified and the condition rectified.

No person will enter a confined space without an emergency response attendant outside the confined space.

A ladder will be provided for any trench that is deeper than 4 feet or when appropriate in other confined spaces.

6. PERFORMANCE STEPS

1. Evaluate the work area against the definition of a confined space.

2. Notify the Project Manager or Program Safety Management of any work spaces not previously identified that are suspected of meeting the definition of a confined space.

3. Contact the designated confined space entrant and attendant prior to entry and verify requirements for entry.

4. Obtain positive identification of the materials that are (or have been) present in the space.

   a. Evaluate the hazards presented by the materials and byproducts
   b. Determine if any atmospheric monitoring will be required.

5. Enter a confined space.

   a. Prepare a confined space entry permit. Include the following as a minimum:

      (1) Identity of the space
      (2) Purpose of the entry
      (3) Date of authorized entry
      (4) Authorized entrants
      (5) Eligible attendants
      (6) Personnel eligible to be in charge of entry
      (7) Substances stored in the confined space
      (8) Potential hazards
      (9) Permitted work
      (10) Personal protective equipment requirements
      (11) Safety equipment requirements
      (12) Signature and printed name of authorizing person

   b. Ensure that any line, except for a fire suppressant or extinguishing system that enters the space and carries a harmful agent, is physically disconnected from the space or blocked by a device capable of ensuring complete closure.

   c. Render inoperable by disconnection any fixed mechanical device or equipment that, if operated, might endanger personnel.

   d. Except for lighting, padlock or tag out-of-service electrical service equipment.

   e. Select a suitable entrance point that will be safe for the entrant to pass through. Open the entrance.

f. Survey the entrance to the confined space for oxygen levels, combustible vapors, and other hazards.

g. Verify, based on levels obtained from Step f above, that all precautions are sufficient to permit entry. Ensure entrant is properly suited in required personal protective equipment. Allow entrant to enter the confined space.

h. Conduct atmospheric monitoring inside the confined space to determine the presence of combustible, toxic gases, or an oxygen deficient atmosphere.

   (1) Determine oxygen levels prior to any other testing.

   (2) Draw test air from lowest to highest elevations of the confined space: 12-18 inches off the floor, mid-levels, and within 12-18 inches of the top (if possible).

   (3) For spaces greater than 500 cubic feet, draw test air from additional sample points in sufficient number to categorize the atmosphere in the confined space.

i. Once inside, verify any communication equipment used is properly working.

j Monitor for oxygen levels, combustible vapors, and any other identified hazards on a continuous basis while working in Class A confined spaces. Continuous monitoring will include all instruments on with the alarms functioning and set, or a second attendant whose only purpose is to monitor the work environment for the identified hazards.

k. Proceed to Step 6.

6. Exit confined space.

7. Close off confined space to prevent unauthorized access.

8. Cancel confined space permit (if appropriate).

7. DOCUMENTATION

Document the entry and results of all atmospheric monitoring in the field logbook. Maintain a copy of the confined space entry permit (if appropriate) in the project files.

8. REFERENCES

Occupational Safety and Health Administration 29 Code of Federal Regulations 1926 Subpart AA, Confined Spaces in Construction.

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Standard Operating Procedure No. 041
for
Sludge/Lagoon Sampling

Prepared by

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Revision 1
March 2019

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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are any client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**also check Box A**), or if this SOP is being used with no changes (**only check Box B**).

☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 041	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	28 March 2019	Systematic review and update	John Morris Peggy Derrick	Matthew Bowman

1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to delineate protocols for sampling sludges. Sludges include solid matter derived from waste materials that are suspended in or settled from a liquid. This procedure can be applied to the collection of sludge samples from areas of deposition such as tanks, sumps, landfills, ditches, ponds, and lagoons. It is important to collect a representative sample of the waste material.

EA recognizes that other protocols have been developed that meet the criteria of quality and reproductivity. Clients may have their own sludge/lagoon sampling protocols, which may contain methodologies and procedures that address unique or unusual site-specific conditions or may be in response to local regulatory agency requirements. In such cases, EA will compare its and the client's protocols. The goal is to provide the client with the most quality; therefore, if the client's protocols provide as much or more quality assurance than EA's protocols for the particular site or project, EA will adopt those particular protocols and this SOP will be superseded in those respects. If EA is required to implement the client's protocols in lieu of EA's protocols, EA will make the client formally aware of any concerns regarding differences in protocols that might affect data quality and will document such concerns in the project file.

2. MATERIALS

The following materials may be required:

Plastic sheeting	Stainless steel hand core sludge sampler and extensions
Polypropylene rope	Stainless steel dip sampler, scoops, trowels, spoons, and ladles
Sample bottles	Utility knife
Stainless steel or Teflon® tray	

3. PROCEDURES

The liquid content of the sludge sample may vary from nearly all liquid to a dense, nearly liquid-free material. It may be necessary to use a variety of equipment to obtain the required samples, even at a single site.

3.1 GENERAL

1. Upon arrival at the site, immediately establish staging areas/work zones and organize the equipment.

2. Establish background levels of airborne organic compounds using a photoionization detector or a flame ionization detector (if applicable).

3. Cut a section of 6-mil plastic sheeting of approximately 6 feet × 6 feet. Place the sheeting on the upgradient side of the sample area.

4. Arrange the sample containers, sampler(s), and decontamination equipment on the plastic sheeting.

5. Don personal protective equipment (including chemical resistant gloves and safety glasses) in accordance with the Site Safety and Health Plan.

6. Collect the sample(s). The preferred method of collecting sludge samples will be by hand corer; refer to Section 3.2. If using a scoop, trowel, spoon, or ladle, refer to Section 3.3.

3.2 HAND CORER

1. Ensure that the corers and liners are properly decontaminated prior to use.

2. Force the corer into the sludge with a smooth, continuous motion to the target sample depth.

3. Twist the corer to detach the sample, then withdraw the corer in a single smooth motion.

4. Remove the top of the corer and, if excess liquid is present, decant the liquid into a sample bottle. This liquid may be labeled and analyzed separately.

5. Remove the nosepiece of the corer and extrude the sample into a stainless steel or Teflon tray. Sample material should be homogenized prior to placement in the sample container (unless indicated otherwise in the project Sampling and Analysis Plan.

6. Transfer the sample into sample bottles using a stainless-steel laboratory spoon or equivalent object as described in the project-specific Sampling and Analysis Plan.

7. Ensure that each sample bottle is properly labeled, noted on the chain-of-custody form, and placed in the sample cooler with ice packs.

8. Decontaminate sampling equipment according to SOP Number (No.) 005.

9. Dispose of all sampling wastes in properly labeled containers.

3.3 SCOOP, TROWEL, SPOON, OR LADLE

1. Ensure that the sampling equipment is properly decontaminated prior to use.

2. Insert the sampling device into the material at the selected point and slowly remove the sample. Care should be taken to retain as much of the solid component as possible.

3. Transfer the sample into the appropriate sample bottles.

4. Ensure that each sample bottle is properly labeled, noted on the chain-of-custody form, and placed in the sample cooler with ice packs.

5. Decontaminate sampling equipment according to SOP No. 005.

6. Dispose of all sampling wastes in properly labeled containers.

3.4 SAMPLING LOCATION

For all samples, mark the sampling location on a site map. Photograph (optional, recommended) the sampling site and material. Describe each sampling location in the field logbook. Establish the sampling coordinates using a Global Positioning System or other three-dimensional system (as appropriate). Record the coordinates for each sample in the field logbook.

4. MAINTENANCE

Not applicable.

5. PRECAUTIONS

The following precautions should be noted:

1. Sludges may contain high levels of contaminants.

2. It is extremely important to continually monitor the levels of contaminants, using the appropriate survey instruments (e.g., photoionization detector, indicator tubes) in the breathing zone of the sampler(s) and other field team members.

3. Refer to the Site Safety and Health Plan for appropriate personal protective equipment.

4. Field team members should consult with the Site Safety and Health Coordinator for all safety and health questions or concerns relating to sampling activities.

6. REFERENCES

Not applicable.

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Standard Operating Procedure No. 042
for
Disposal of
Investigation-Derived Material

Prepared by

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Revision 1
December 2014

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5. REFERENCES 6

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure is to define the required steps for disposing of investigation-derived material (IDM) generated during field activities.

IDM, as used herein, includes soil cuttings, drilling muds, extraneous sediment, purged groundwater, decontamination fluids, and disposable personal protective equipment. For the sake of clarity and ease in use, this Standard Operating Procedure is subdivided into procedures for disposal of liquid IDM and solid IDM as follows:

- Liquid IDM (Section 3.2) includes the following materials:
  - Water from initial development of new wells and the redevelopment of existing wells
  - Purge water from groundwater sampling
  - Decontamination fluids (Section 3.4)
- Solid IDM (Section 3.3) consists of the following materials:
  - Soil drill cuttings from monitoring well installation
  - Sediment remaining after collection of the required sample volume
  - Grout, a mixture of cement and bentonite, generated during installation of monitoring wells
  - Disposable personal protective equipment (Section 3.4).

2. MATERIALS

The following materials may be required:

Any additional equipment that may be dictated by project or site-specific plans	Hazardous waste labels
Bar codes	Permanent marker
Chain-of-custody forms	Field logbook (bound)
Department of Transportation 17C specification metal containers	Waste identification labels

3. PROCEDURE

3.1 GENERAL

No container will be labeled as a “Hazardous Waste” unless the contents are in fact known to be hazardous as defined by 40 Code of Federal Regulation 261.

IDM may be disposed onsite if it is: (1) initially screened, or evaluated to determine whether it is contaminated; (2) not abandoned in an environmentally unsound manner; and (3) not inherently waste-like.

IDM is to be considered contaminated if: (1) it is visually or grossly contaminated; (2) it has activated any field monitoring device that indicates that the level exceeds standard Level 1; (3) it has previously been found to exhibit levels of contamination above environmental quality standards; and (4) the responsible party and/or appropriate regulator deem(s) that records of historical uses indicate that additional testing of the IDM is needed, or additional caution is warranted handling IDM from a given site.

3.2 PROCEDURES FOR LIQUID INVESTIGATION-DERIVED MATERIAL DISPOSAL

Listed below are the procedures for the disposal of liquid IDM:

1. All water from the initial development of new wells, and purge water generated during the first round of groundwater sampling, will be containerized in Department of Transportation approved 55-gallon drums. Decontamination fluids may be bulk-containerized until completion of the field task.

2. Label all containers as to type of media, date the container was sealed, point-of-generation, and points-of-contact. The well number and container number will be identified on the container.

3. The contractor/support personnel will log all media generated onsite into a bound Field Logbook. Media information should include the following: date of generation, contents of containers, number of containers with the same contents (if applicable), location of containers, well number the media is associated with, personnel sampling the media, sampling dates, and sampling results.

4. Containers of well development water and purge water may be stored at the well site pending the first round analytical results.

5. Laboratory turnaround time must be no greater than 30 days. Upon receipt of the analytical results, a copy will be furnished to the client within 3 working days. Both the client and contractor will evaluate the data to determine disposal requirements, per state and local regulations. A disposal decision is required within 10 days of receipt of sampling results. Appropriate disposal must be performed no later than 50 days from the

1. This value is defined as two times background, where "background" values are to be determined as follows: (1) regional background values will be used where they are available; and (2) if regional values are not available, background may be empirically determined at uncontaminated sampling sites using onsite sensors such as organic vapor analyzers (photoionization detector or flame ionization detector), scintillometers, etc.

decision date unless prevented by inclement weather (e.g., rain and muddy conditions may preclude site access, freezing weather may freeze media).

Dispose of media in accordance with Steps 6 and 7 of this procedure, as appropriate.

6. If the first round analytical data of the liquid media are below the Maximum Contaminant Levels established by the Federal Safe Drinking Water Act, the water may be gradually infiltrated into the ground at least 50 feet downgradient of the well.

   If the well location has no downgradient area, the water will be infiltrated into the ground in an area deemed appropriate by the client and the contractor/support personnel.

   Disposal locations must allow percolation of the water and prohibit "ponding."

   Upon completion of water discharge to ground, enter type of media, amount of media, date of disposal, and discharge point(s) in a bound Field Logbook and provide this information to the client.

   Empty containers are to be properly decontaminated, stored, and reused by the appropriate personnel.

   If the liquid media sampling results do not meet the required Maximum Contaminant Levels and cannot be discharged to the ground, then determine if the waste meets the sanitary sewer discharge criteria (National Pollutant Discharge Elimination System standards).

7. If, at any time, visual contamination of purge/development water is observed, or if organic vapor monitor readings (HNu, photoionization detector) register more than 5 parts per million above background and/or radiological meters register more than twice the background mrems, then the liquid will be drummed and a composite sample will be taken that day. A disposal decision will be based on the analytical results of this sample rather than the first round of analytical results.

3.3 PROCEDURES FOR SOLID INVESTIGATION-DERIVED MATERIAL DISPOSAL

Listed below are the procedures for the disposal of solid IDM:

1. If the conditions outlined in Section 3.1 are met, proceed to Section 3.3, Step 2; otherwise, proceed to Section 3.3, Step 7.

2. During soil drilling operations or sediment sampling, the resulting cuttings, mud, and/or extraneous sediment will be discharged onto the ground (or waterbody for sediment) near the well (or sample location for sediment) if the following conditions are met: (1) no visual contamination is observed, (2) organic vapors are less than 5 parts per million

above background, (3) radiological meter readings (if applicable) are under two times background, and (4) the medium has been screened and found to be less than two times background if the potential for contamination exists.

Proper sediment and erosion control measures will be implemented as follows:

- Soil drill cuttings will be uniformly spread and contoured to blend with the surroundings of the site.
- If amount of solid IDM exceeds 5,000 square feet or 100 cubic yards of material, a sediment and erosion control plan is required.
- If the amount of solid IDM is under 5,000 square feet or 100 cubic yards, the site will be stabilized as soon as possible. Stabilization includes mulch, seed, and tack.
- Critical areas require stabilization within 7 days from the date of well completion. Critical areas include swales, water sources, drainage ditches, etc.
- All other disturbed areas require stabilization within 14 days from the date of well completion.

3. If the well location is in or near a wetland, the soil drill cuttings will be drummed and transported away from the site for spreading.

4. Label all IDM containers that will not be spread on the day of generation. Each container should be labeled with the type of media, date the container was sealed, point-of-generation, and name of the contact person. The well number or sample location and container number should be identified on the container.

5. The contractor/support personnel will log all media generated onsite into a bound Field Logbook. Media information should include: date of generation, contents in containers, number of containers with the same contents, location of containers, and well number or sample location the media is associated with.

6. Containers will be staged at the well site until contractor/support personnel spread the cuttings in the appropriate locations, using proper sediment and erosion control measures per Section 3.3.

7. If soil drilling mud, cuttings, or sediment show visible contamination, or organic vapor readings are more than 5 parts per million above background levels, or radiological meter readings (if applicable) show greater than two times background levels, or if the potential for contamination exists (levels greater than two times background), media will immediately be containerized, labeled appropriately (Section 3.2), and sampled on the same day.

8. The solid IDM should be sampled and appropriate Toxicity Characteristic Leaching Procedure analyses conducted prior to determining disposition. Laboratory turn-around time must be no greater than 30 days. Upon receipt of analytical results, a copy will be furnished to the client within 3 working days. The contractor will evaluate the data to determine disposal requirements within 10 days. Appropriate disposal must be performed no later than 50 days after the decision date if weather permits (Section 3.2).

    - If the solid IDM is determined to be non-hazardous and uncontaminated, proceed to Section 3.3.

    - If the solid IDM is determined to be non-hazardous but contaminated, proceed to Section 3.3.

    - If the solid IDM is found to be hazardous wastes, proceed to Section 3.3.

9. If the solid IDM is not a hazardous waste **and** analytical data show contaminant concentrations below the U.S. Environmental Protection Agency Region 3 (or applicable Region where work is being performed) Risk-Based Concentrations, contact the appropriate federal, state, or local agency for approval to discharge onto the ground or back to the waterbody near the site of generation.

    - Follow steps detailed in Section 3.3, Step 2 (above) pertaining to sediment and erosion control.

    - Upon completion of the solid IDM discharge to the ground or waterbody (for sediment), enter type of media, amount of media, date of disposal, and discharge point(s) in a bound Field Logbook. This information must be provided to the client.

    - Empty containers are to be properly decontaminated, stored, and reused by appropriate personnel.

10. If the intrusive media is not a hazardous waste but analytical data show concentrations above the screening criteria, dispose of the IDM according to state and local regulations.

    - Ensure that the waste containers are properly labeled as applicable in accordance with Section 3.3, Step 4.

    - Inform the client of the type and amount of waste, and location of the waste.

    - When the waste is removed, enter the type of waste, amount of waste, date of pickup, and destination of the waste in a bound Field Logbook. This information must be provided to the client.

3.4 PROCEDURES FOR DECONTAMINATION SOLUTION AND PERSONAL PROTECTIVE EQUIPMENT DISPOSAL

Decontamination solutions include catch water from steam-cleaning operations performed on large sampling equipment, drill rigs, and drums, as well as smaller quantities of soapy water and rinse solutions used in decontaminating field sampling equipment. At the completion of the field event, a composite sample of the decontamination solution will be taken. The decontamination solution will be treated as liquid IDM pending results (Section 3.2).

Personal protective equipment will be containerized onsite, appropriately labeled, and disposed in a designated trash receptacle.

4. MAINTENANCE

The waste manifest document and bill of lading should be uploaded to the project file as soon as possible in either hard copy or electronic format. Refer to EA's Records Retention Policy for archiving information.

5. REFERENCES

Environment Article Section 7-201(t).

U.S. Environmental Protection Agency. 1991. Management of Investigation-Derived Wastes during Site Inspections PB91-921331, OERR Directive 9345.3-02. Office of Emergency and Remedial Response U.S. Environmental Protection Agency, Washington, D.C. May.

Standard Operating Procedure No. 043 for Multi-Probe Water Quality Monitoring Instruments

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1. PURPOSE AND SCOPE

The purpose of this Standard Operating Procedure is to delineate protocols for field operation of multi-probe water quality instruments. The instrument can monitor a variety of basic parameters including dissolved oxygen, percent saturation, temperature, pH, specific conductance, resistivity, salinity, total dissolved solids, oxidation reduction potential (ORP), level, and depth.

Use of brand names in this Standard Operating Procedure is not intended as endorsement or mandate that a given brand be used. Alternate equivalent brands of detectors, sensors, meters, etc. are acceptable. If alternate equipment is to be used, the contractor will provide applicable and comparable standard operating procedures for the maintenance and calibration of same.

2. MATERIALS

The following materials may be required:

- Multi-probe instrument
- Probe/sonde with appropriate cables
- Appropriate standards
- Accessories (batteries, charger, case, etc.)
- Instrument logbook
- Manufacturer's Operations Manual.

3. CALIBRATION PROCEDURE

Calibration must be performed daily at a minimum before using the instrument. Calibration may be performed in the laboratory or in the field. Detailed step-by-step calibration procedures for the equipment described below are provided in the most recent version of the manufacturer's Operations Manual. Documentation includes at a minimum: time, date, analyst, standard, primary standard lot number, secondary standard lot number, and expiration dates of standards.

Fill the calibration cup with the appropriate standard as follows:

- Temperature: None required
- Specific Conductance: Conductivity standards
- pH: pH 7 buffer plus pH 4 and/or pH 10 buffer
- Dissolved Oxygen: Saturated air or saturated water
- ORP: Quinhydrone (Zobell's Solution)
- Turbidity: Nephelometric turbidity unit (NTU) standards
- Salinity: Calibration for specific conductance
- Depth/Level: Set zero in air.

3.1 CONDUCTIVITY CALIBRATION

Conductivity meters are calibrated at least once per day to at least one standard. The standard should be selected in accordance with the range expected to be measured (e.g., 1.0 µS/cm standard should not be used to calibrate meters being used in saltwater). See manufacturer's recommendations in the Operations Manual for additional information on calibration standard selection. Calibration information is recorded in conjunction with the data collected for that sampling event.

3.2 pH CALIBRATION

The pH meters are calibrated at least once per day to a minimum of two standard buffers (pH 4 and 7, or pH 7 and 10) in accordance with the range expected to be measured. The calibration is verified using a fresh solution of pH 7 buffer post-calibration. Calibration information is recorded in conjunction with the data collected for that sampling event.

3.3 DISSOLVED OXYGEN CALIBRATION

Dissolved oxygen meters are air calibrated at least once per day. Calibration information is recorded in conjunction with the data collected for that sampling event.

3.4 OXIDATION REDUCTION POTENTIAL CALIBRATION

ORP meters are calibrated at least once per day to at least one standard. It is recommended that Zobell's Solution is used; however, another solution can be used as long as it meets the manufacturer's specifications for calibration. Calibration information is recorded in conjunction with the data collected for that sampling event.

3.5 TURBIDITY CALIBRATION

The turbidity meters are calibrated at least once per day to a minimum of two standards (0 NTU and 100 or 126 NTUs recommended) in accordance with the range expected to be measured. Calibration information is recorded in conjunction with the data collected for that sampling event.

3.6 DEPTH/LEVEL CALIBRATION

The depth and level calibration is performed with the depth sensor module in the air and not immersed in any solution. The appropriate correction for height above the water surface is inputted into the meter. Calibration information is recorded in conjunction with the data collected for that sampling event.

3.7 ADDITIONAL CALIBRATIONS

Additional measurements may be taken with the multi-probe water quality instruments. For any of these measurements, the calibration procedures will be conducted in accordance with the manufacturer's specifications. Calibration information is recorded in conjunction with the data collected for that sampling event.

4. FIELD OPERATION

4.1 SETUP OF MULTI-PROBE WATER QUALITY INSTRUMENT

Post-calibration and prior to sampling, the multi-probe water quality instrument will be set up for data collection. If the cables have been unattached, they will be reconnected to the transmitter (if applicable) and the display. Once all cables are attached, the meter will be turned on and allowed to warm up for a few seconds in order to allow the display screen to load.

4.2 SURFACE WATER

Prior to sampling, check the condition of the probes before each deployment. When sampling in surface water, the sensor must be in an amount of water sufficient for all probes to be submerged. Data values displayed on the display screen are recorded in the field logbook and accepted into the instrument's data logger. Post-data collection, the sensor will be retrieved and rinsed for use at the next sample location. If travel time between sample locations is great, the display is to be turned off. When all sampling is completed, disconnect all equipment and return it to its proper storage location.

4.3 GROUNDWATER

Prior to sampling, check the condition of the probes before each deployment. When sampling groundwater, mount sampler on a flow-through sampler cup. Start sampler pump and allow pump/hose system to be purged of air bubbles. Sampling rate should be set to record all parameters each time 1-3 liters (unless otherwise specified in the sampling plan) have been removed from the well. Record all the monitored values in the appropriate field logbook to ensure against inadvertent data loss.

5. MAINTENANCE

All maintenance should be performed in accordance with the manufacturer's Operations Manual.

6. PRECAUTIONS

Check the condition of the probes frequently between sampling. Do not force pins into connections, note keying sequence. If field readings are outside the expected range, check for bubbles on, or damage to, the probes. If there are no bubbles or damage, recalibrate the sensor.

7. REFERENCES

Manufacturer's Operations Manual.

Standard Operating Procedure No. 044
for
Assessment of Existing Wells Using Downhole Geophysics

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to establish protocol for using downhole surveys to evaluate the integrity of older, existing wells at the site for which details of construction are not known. Numerous wells exist within the remedial investigation study area which predate the current remedial investigation efforts. Some of these wells were installed in locations which might yield valuable data. Unfortunately, construction records for these wells are frequently incomplete or missing. If the wells could be determined to be sufficient quality, they could be sampled, and the cost of installing new wells (possibly in less than optimal locations due to the exclusion zones mandated in SOP No. 019) would be avoided.

Selected downhole geophysical techniques could prove effective in determining the integrity of these older wells. This SOP describes four techniques: natural gamma logs, caliper logs, sonic logs, and downhole video camera, which, employed individually or together should yield data about well construction and/or integrity. These data can then be factored into the decision to use or replace the well.

2. MATERIALS

The following materials may be required:

Sonde(s) for gamma log and/or sonic log and/or caliper log and/or video camera	Field notebook
Associated hoisting mechanism(s)	Decontamination supplies (SOP No. 005)
Data logger(s)	Personal protective equipment as required by the contractor's Health and Safety Plan

3. PROCEDURE

The specific procedure for each logging technique will be detailed in the manufacturer's manuals and specifications sheets for a given instrument. Rather than attempt to cover these specific procedures, this SOP will characterize and describe the instruments, and the type and applications for the data each will yield.

The following steps are general procedures which must be followed regardless of the instrument:

- Become thoroughly acquainted with the manufacturer's manual.
- Review the procedures outlined therein with an experienced operator to verify that all procedures are understood.
- Just prior to testing, as part of the safety briefing, review instrument procedures.

- Record the well location, site characteristics, sketch map(s), and other pertinent data in the field logbook.

- Perform all steps in SOP No. 010 and note the readings in the field logbook.[1]

- Lower instrument(s) into hole. Use centralizers set to the hole diameter as needed to ensure the instrument(s) is/are centered, and run smoothly in the hole.

- Run test(s) in well. Multiple runs may be required to optimize data quality.

- If broken or missing well casing is encountered, the instrument(s) should not be advanced past the broken section. There is a danger of losing the instrument in the hole due to lodging and/or cave-in, and the broken casing (or screen) would preclude using that well for sampling in any case.

- Attach a wiper to the cable when withdrawing the instrument(s) to remove excess moisture from the cable. Decontaminate all downhole equipment before insertion and after use according to SOP No. 005.

- Review the data and procedures with the experienced operator to determine where refinement of technique may be required.

- Final data interpretation should be performed by experienced personnel.

3.1 GAMMA LOG

The gamma log is also called the natural gamma, gamma ray, or radioactivity log. This instrument measures the naturally occurring radioactivity in the geologic materials found in the borehole. Clays and clay-rich soils tend to be gamma emitters. Gamma particles are very active and can easily penetrate the well casing, thereby making this a good tool for determining stratigraphy.

3.2 SONIC LOG

Sonic logs, also called continuous velocity logs, rely on emitted pulses of sound which impinge upon the borehole walls and traverse the wall materials to one or more receivers which are mounted at known distances from the emitter. By comparing the travel time (velocity) and signal strength of the return signal, one can determine the relative densities of the wall materials. Cement and grout are more dense and, therefore, have higher velocities than do soil, voids and filter pack materials. This means that sonic logging is an excellent tool for determining the

1. Note that non-aqueous phase liquids may foul some instruments. Video cameras are particularly sensitive to lens fouling by light non-aqueous phase liquids. If non-aqueous phase liquids are found in the hole, use of downhole video may be omitted. If used, do not coat the lens with detergent, as recommended by some manufacturers, as this would introduce further contaminants into the hole.

integrity of the grout seal around the hole. The following table provides typical travel times for various materials:

Material	Sonic Velocity (ft/sec)	Transit Time (sec/ft)
Oil	4,300	232
Water	5,000-5,300	200-189
Neoprene	5,300	189
Shale	6,000-16,000	167-62.5
Rock salt	15,000	66.7
Sandstone	Up to 18,000	55.6
Anhydrite	20,000	50.0
Limestone (carbonates)	21,000-23,000	47.6-43.5
Dolomites	24,000	42

3.3 CALIPER LOG

Caliper logs use a set of spring calipers to make mechanical contact with the walls of the borehole or casing and provide a very sensitive means to determine the hole diameter, and to some extent, the roughness of the borehole or casing walls. A caliper log can often detect each joint in the well casing and will accurately locate the depth and length of the well screen(s).

3.4 DOWNHOLE VIDEO CAMERA

The downhole video camera is the only technique which gives the investigator a firsthand look at the borehole and/or well casing walls. In addition to the procedures outlined above in Section 3, before inserting the video camera, slowly pan the camera around the site to photographically record the site features. Also, if the recorder has voice recording capabilities, a commentary of the field operator's onsite interpretation of the scene should be recorded as the survey is run. Downhole, the camera may be stopped for additional commentary, detailed examination of a feature, and/or still photography.

If multiple lens capabilities are available, the downhole video should be run first with a forward-looking lens, to determine hole conditions, then with an off-axis (e.g., right angle) lens to record sidewall details.

4. MAINTENANCE

See manufacturer's manuals.

5. PRECAUTIONS

All wells should be considered contaminated unless proven otherwise. Appropriate personal protective equipment must be worn.

All safety checks required in SOP No. 010 must be performed.

As with any intrusive technique, each instrument must be properly decontaminated before and after each use. See SOP No. 005 for details.

6. REFERENCES

Krumbein, W.C. and L.L. Sloss. 1963. Stratigraphy and sedimentation. 2nd Edition. W.H. Freeman and Company, San Francisco. 660 pp.

Lahee, F.H. 1961. Field Geology, 6th Edition, McGraw-Hill Book Company, New York. 926 pp.

Standard Operating Procedure No. 046
for
Aqueous Diffusion Samplers

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1. SCOPE OF APPLICATION

The purpose of this Standard Operating Procedure is to establish the protocol for collecting groundwater samples using aqueous diffusion samplers. The procedure is designed to permit the collection of representative groundwater samples for analysis of volatile organic compounds (VOCs).

2. CONSTRUCTION OF AQUEOUS DIFFUSION SAMPLERS

The aqueous diffusion samplers are constructed by sealing de-ionized water in a 2-in. diameter × 1-mil thick polyethylene tubing. The de-ionized water is sealed in the poly tubing by using a heat seal device. One end of the poly tube is rolled over onto itself several times, then heat is applied to seal this end. The poly tube is then filled with de-ionized water. The top end (unsealed end) of the tube is then rolled over onto itself until there is no headspace in the poly tube; heat is then applied to seal this end. Care is taken to ensure that no headspace or air bubbles are present in the tube prior to sealing the top end. Each diffusion sampler is approximately 2 ft in length. The samplers are weighted with stainless steel bolts enclosed in 4-mil polyethylene tubing attached to the bottom of the sampler, and a string is attached to the top of the sampler for placement and retrieval.

3. EQUIPMENT/MATERIALS

3.1 AQUEOUS DIFFUSION SAMPLER PLACEMENT

- Well construction data, location map, and field data from the previous sampling event.
- Field logbook and Field Record of Well Gauging, Purging, and Sampling form (Figure SOP046-1).
- Electronic water level measuring device, 0.01-ft accuracy for monitoring water level prior to installation of the diffusion sampler.
- Diffusion sampler constructed of 2 ft length × 2 in. width 1-mil polyethylene lay-flat tubing filled with de-ionized water and weight attached to bottom.
- Twine, string, or rope. The depth of each sampler should be established prior to field placement so enough twine, string, or rope is available for installation.

3.2 AQUEOUS DIFFUSION SAMPLER RETRIEVAL

- Volatile organic analyte sample bottles and sample preservation supplies (as required by the analytical methods) needed for diffusion sampler retrieval.

- Sample tags or labels.

- Cooler with bagged ice for storage of sample bottles during shipment to a laboratory.

3.3 PRELIMINARY SITE ACTIVITIES

The following site activities are required prior to performing aqueous diffusion sampler installation and retrieval. Field logbooks and sampling forms should be filled out as the procedure is being performed, as noted:

- Enter the following information in the field logbook and installation and retrieval form, as appropriate: site name, project number, field personnel, well identification, weather conditions, date and time, equipment used, and quality assurance/quality control data for field instrumentation.

- Check well for damage or evidence of tampering, and record pertinent observations in field logbook and field sampling form.

- Unlock well and remove well cap (if applicable).

- Measure VOCs with a photoionization detector instrument at the rim of the well and in the breathing zone, and record the readings in the field logbook and the field sampling form.

- Measure and record the height of protective casing above the concrete pad or ground surface, as appropriate. This reading is compared to that recorded during well installation as an indication of possible well damage or settling that may have occurred.

- Measure and record the depth to water (to 0.01 ft) in the well to be sampled before installation of the aqueous diffusion sampler begins. If the well casing does not have a reference point (usually a v-cut or indelible mark in the well casing), make one. Care should be taken to minimize disturbance of any particulate attached to the sides or at the bottom of the well. The depth to well bottom will be measured prior to installation of the sampler.

3.4 SAMPLING PROCEDURE

The following general procedures should be followed to obtain representative groundwater samples. Field logbooks and sampling forms should be filled out as the procedure is being performed, as noted:

- Enter the following information in the field logbook and field sampling form, as appropriate, prior to installation of the diffusion sampler: date and time of sampler installation, depth of sampler, and total depth of well.

- Prepare the diffusion sampler by attaching weight at the base of the sampler and a string to the top of the sampler.

- Install the sampler at the predetermined depth. Depth of sampler will be determined on a well-by-well basis based on previous low-flow sampling data, or previously collected aqueous diffusion samplers.

- Allow the diffusion to equilibrate for approximately 21 days. Return after approximately 21 days to retrieve the sampler.

- Enter the following information in the field logbook and field sampling form, as appropriate, during retrieval of diffusion sampler: date and time of sampler retrieval, analytical method, and quality assurance/quality control as necessary.

- Retrieve the diffusion sampler from the well.

- After retrieval is complete, remove string and weight, and make a diagonal cut towards the top of the sampler. The diagonal cut allows easier filling of the sample containers.

- Begin filling the sample containers from the diagonal cut, allowing the water to fill the volatile organic analyte sample containers by allowing the water to flow gently down the inside of the container with as little agitation or minimal aeration as possible.

- Label each sample as it is collected. Samples will be placed into a cooler with ice for delivery to a laboratory.

- After collection of the samples, the wells will be capped and locked.

- Complete remaining portions of field sampling form after each well is sampled, including sample date and time (time of retrieval from the well), well sampling sequence, types of sample bottles used, sample identification numbers, preservatives used, parameters requested for analysis, and field observations of the sampling event.

3.5 SAMPLE PRESERVATION

- **VOCs**—Fill the sample bottle pre-preserved with hydrochloric acid, seal with a teflon-lined cap, and place in a cooler with ice for shipment to a laboratory. Cooler will maintain a temperature of 4°C for shipment to the laboratory.

Note that aqueous diffusion samplers are not submitted for other laboratory analytical parameters.

3.6 FIELD QUALITY CONTROL

Quality control samples are required to verify that the sample collection and handling process has not affected the quality of the groundwater samples. Field quality control samples must be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The following quality control samples will be collected for each sample delivery group (a sample delivery group may not exceed 20 samples) at the frequency noted:

- ***Equipment Blank***—One aqueous diffusion sampler will be constructed and submersed in a sealed container with de-ionized water for the 21-day equilibration period. This equipment duplicate should be analyzed the same as the other samplers to determine if materials used for aqueous diffusion samplers may have outgased VOCs, or otherwise affected laboratory analytical results.

- ***Field Duplicate***—Required at a frequency of 10 percent per sample delivery group, as per the site Long-Term Monitoring Plan.

- ***Matrix Spike/Matrix Spike Duplicate***—Required at a frequency of 5 percent, as per the site Long-Term Monitoring Plan.

- ***Trip Blank***—Required for VOC samples at a frequency of one per sample shipment, as per the site Long-Term Monitoring Plan.

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:		Project Number:	
Well ID:		Well Lock Status:	
Well Condition:		Weather:	

Gauge Date:		Gauge Time:	
Sounding Method:		Measurement Ref:	
Stick Up/Down (ft):		Well Diameter (in.):	

Purge Date:		Purge Time:	
Purge Method:		Field Personnel:	
Ambient Air VOCs (ppm):		Well Mouth VOCs (ppm):	

WELL VOLUME

A. Well Depth (ft):		D. Well Volume/ft (L):	
B. Depth to Water (ft):		E. Well Volume (L) (C*D):	
C. Liquid Depth (ft) (A-B)		F. Three Well Volumes (L) (E*3):	

G. Measurable LNAPL? Yes _____ /ft No _____

Parameter	Beginning	1	2	3	4	5
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (°C)						
Conductivity (µmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Total Quantity of Water Removed (L):			
Samplers:		Sampling Time (Start/End):	
Sampling Date:		Decontamination Fluids Used:	
Sample Type:		Sample Preservatives:	
Sample Bottle IDs:			
Sample Parameters:			

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Standard Operating Procedure No. 047
Direct-Push Technology Sampling

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1. SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) establishes the protocol for using direct-push technology (DPT) in media sampling and performing subsurface characterization. This SOP includes the following DPT methods: Geoprobe®, Hydropunch®, Cone Penetrometer Testing (CPT), and Site Characterization and Analysis Penetrometer System (SCAPS).

2. MATERIALS

The following materials may be required:

Appropriately sized, all-terrain vehicle-skid-or track-mounted; DPT equipment; and supplies (i.e., hydraulic derrick and hammer assembly)	Personal protective equipment
Bentonite grout and clean sand for DPT hole abandonment	Phosphate-free, laboratory-grade detergent (e.g., Liquinox, Alconox, etc.)
DPT stainless steel rods	Source of approved water
Heavy plastic sheeting	Steam cleaner/sprayer and water obtained from approved source for decontaminating DPT equipment
Logbook	Steel drums for intrusion derived wastes (e.g., contaminated personal protective equipment, decon solutions, etc.)
Long-handled bristle brushes	Wash and rinse tubs
Mini-bailer or tubing and peristaltic pump (groundwater sampling only)	

3. GEOPROBE® AND HYDROPUNCH®

3.1 MATERIALS

Water sources for Geoprobe® and Hydropunch® activities, grouting, sealing, filter placement, well installation, and equipment decontamination must be approved by the Project Manager prior to arrival of the Geoprobe® and Hydropunch® equipment. Information required for the water source includes: water source, manufacturer/owner, address and telephone number, type of treatment and filtration prior to tap, time of access, cost per gallon (if applicable), dates and results associated with all available chemical analysis over the past 2 years, and the name and address of the analytical laboratory (if applicable).

Pure sodium bentonite with no additives will be the only additive allowed, and its use must be approved by the Project Manager prior to the arrival of the Geoprobe® and Hydropunch® equipment. The information required for evaluation includes: brand name, manufacturer, manufacturer's address and telephone number, product number, product description, and intended use for the product.

Portland Type II cement will be used for grout (refer to SOP No. 019).

3.2 GROUNDWATER – HYDRAULIC PUSHING AND SAMPLING

The objective of the selected DPT sampling technique is to allow grab samples to be taken at a selected site to facilitate aquifer characterization and analysis of potential contaminants. The analytical results from sampling can also be used to determine the placement of monitoring wells.

A site geologist will be present during all sampling and installation procedures, and will fully document all procedures and soil characteristics in the Field Logbook (refer to SOP No. 016).

The site geologist will have on hand, at a minimum, a copy of the approved Health and Safety Plan, this SOP, the Field Investigation Work Plan, a hand lens (10X), a standard color chart, and a grain size chart.

Only solid vegetable shortening (e.g., Crisco®) without flavoring or additives may be used on downhole Geoprobe® and Hydropunch® equipment.

Surface runoff or other fluids will not be allowed to enter any DPT location or well during or after DPT activities.

The subcontractor will use the equipment specific guidelines for installation of the Geoprobe® DPT equipment. Probe rods will be forced into the ground by hydraulic means.

- Drive the sampler to the desired groundwater sampling interval. At the desired depth, insert extension rods down the inside diameter of the probe rods until the extension reaches the bottom of the screen. Remove the probe rods and sampler sheath while holding the screen in place.

- Collect the groundwater sample in the screen interval with a mini-bailer, peristaltic or vacuum pump, or other acceptable small diameter sampling device.

- The head of the rod may be equipped with a sensing device for characterization of soil properties or the contaminant content.

The subcontractor will use the equipment-specific guidelines for installation of the Hydropunch® equipment. Rods will be forced into the ground by hydraulic means.

- The Hydropunch® tool is a double cylinder, designed to be sealed until the desired sampling depth is reached. Upon reaching the desired sampling depth, the outer cylinder is pulled back, exposing a perforated, stainless steel sampling barrel covered with filter material.

- The water sample enters the barrel and the sample is retrieved by pulling the probe rods from the hole with the hydraulic derrick and hammer assembly. Groundwater is the only media that is sampled by Hydropunch® equipment.

- The head of the rod may be equipped with a sensing device for characterization of the soil properties or the contaminant content.

- The sample volume collected with this technique is approximately 500-1,000 ml. Larger sample volumes can be collected by inserting tubing attached to a peristaltic pump into the rods to obtain water samples.

If desired, a small diameter monitoring well may be installed at this point. Refer to SOP No. 019 (Monitoring Well Installation).

If a well will not be installed, the rods will be removed as the borehole is simultaneously filled with a bentonite/grout mixture. A polyvinyl chloride (PVC) tube fed into the rod casing will allow the addition of grout.

3.3 SUBSURFACE SOIL – HYDRAULIC PUSHING AND SAMPLING

The objective of the selected DPT sampling technique is to allow grab samples to be taken at a selected site for characterization of the stratigraphy and for analysis of potential contaminants. The analytical results from sampling can also be used to determine the placement of monitoring wells.

A site geologist will be present during all DPT sampling and soil characterization. All procedures and soil characteristics will be fully documented in the Field Logbook (refer to SOP No. 016).

The site geologist will have on hand, at a minimum, a copy of the approved Health and Safety Plan, this SOP, the Field Investigation Plan, a hand lens (10X), a standard color chart, and a grain-size chart.

Only solid vegetable shortening (e.g., Crisco®) without flavoring or additives may be used on downhole Geoprobe® equipment.

Surface runoff or other fluids will not be allowed to enter any DPT location or well during or after DPT activities.

The subcontractor will use the equipment specific guidelines for installation of the Geoprobe® DPT equipment. Probe rods will be forced into the ground by hydraulic means. Additional rods will be added in 3- to 4-ft increments until the leading edge of the sampler reaches the top of the desired sampling interval.

Once the desired sampling depth has been reached, insert extension rods down the inside diameter of the probe rods until it reaches the top of the sampler assembly. Attach the extension rod handle to the top extension rod. Turn the handle clockwise until the stop-pin detaches from the drive head. Remove the extension rods and the stop-pin. Attach a drive cap to the probe and drive the sampler approximately 2 ft using hydraulic derrick.

The DPT sampler can be retrieved by pulling the probe rods from the hole with the hydraulic derrick and hammer assembly.

The liner will be capped with Teflon® tape and vinyl end caps. The liners can be split open to remove samples for composition analysis or for transfer to other containers for shipment to the laboratory for analysis.

The head of the rod may be equipped with a sensing device for characterization of the soil properties or the contaminant content.

3.4 DECONTAMINATION

All Geoprobe® and Hydropunch® DPT equipment must be thoroughly cleaned before and after each use to allow retrieval of representative groundwater samples. Geoprobe® soil sample liners are disposed of after each use. Scrub all metal parts with a stiff, long bristle brush and a non-phosphate soap solution. Steam cleaning may be substituted where available. Rinse with distilled water and allow to air-dry before assembly.

After decontamination, a new clean liner will be installed and all parts will be inspected for wear or damage.

Refer to SOP No. 005 (Field Decontamination).

3.5 ABANDONMENT

Pure bentonite or a bentonite/grout mixture (20:1) will be used to fill the resulting borehole if the water table is penetrated. Boreholes that do not penetrate the water table will be backfilled with cuttings from the hole and topped with a bentonite seal. Clean sand will be used to fill any remaining volume in the borehole.

Abandonment of Geoprobe® and Hydropunch® generated DPT boreholes will meet the standards established under SOP No. 028 (Well and Boring Abandonment).

4. CONE PENETROMETER TESTING

4.1 MATERIALS

A CPT rig typically consists of an enclosed 20- to 40-ton truck equipped with vertical hydraulic rams that are used to force a sensor probe into the ground. The weight of the CPT rig is dependent upon the thrust required at the site. The majority of CPT rigs are mounted in heavy-duty trucks that are ballasted to a total dead weight of approximately 15 tons. Screw anchors are utilized to develop the extra reaction to reach the maximum thrust of 20 tons. The rig is separated into two separate workspaces: data acquisition and hydraulic push areas.

Water sources for CPT activities and decontamination must be approved by the Project Manager prior to arrival of the CPT equipment. Information required for the water source includes: water source, manufacturer/owner, address and telephone number, type of treatment and filtration prior to tap, time of access, cost per gallon (if applicable), dates and results associated with all available chemical analysis over the past 2 years, and the name and address of the analytical laboratory (if applicable).

Pure sodium bentonite with no additives will be the only additive allowed, and its use must be approved by the Project Manager prior to the arrival of the DPT equipment. The information required for evaluation includes: brand name, manufacturer, manufacturer's address and telephone number, product number, product description, and intended use for the product.

Portland Type II cement will be used for grout (refer to SOP No. 019).

4.2 SUBSURFACE CHARACTERIZATION

The objective of this technology is to collect stratigraphic information using CPT equipment to determine subsurface stratigraphy and geotechnical properties at a particular site. CPT activities will be in accordance with American Society for Testing and Materials D 3441-86 and American Society for Testing and Materials D 5778-95. The stratigraphic information gathered can be used to facilitate the selection of DPT sampling screen intervals. At the same time, it is possible to install a 0.25-in. diameter pre-packed PVC monitoring well.

CPT rods are used to hydraulically push the CPT probe into the subsurface. Probes cannot be pushed into hard rock, and significant gravel or cobble content in the formation may impede or preclude penetration of the probe. The depth of penetration achievable depends on the type of formation, type of sampling probe, and size of the hydraulic equipment used.

The CPT probe includes the following components:

- A conical tip to measure vertical resistance beneath the tip.
- A friction sleeve to measure frictional resistance on the side of the probe, as a function of depth.

- Two internal strain gauge-type load cells, which independently measure the vertical resistance and side friction.

- A cone pressure gauge to measure the water pressure as the probe is pushed into the ground.

- Inclinometer to determine potential drifting of the probe (optional).

- Seismic transducers to perform downhole seismic surveys (optional). Therefore, stratigraphic data collected with the CPT include: tip resistance, local friction, friction ratio, pore pressure, and resistivity.

Data will be transferred from the probe to the data acquisition system or logger through an electrical cable. The hole will be advanced continuously at a rate of 0.6-1.0 in. per second. The data will be logged at every 0.4-0.8 in. of penetration. Monitor the probe's stratigraphic position will be monitored as it advances downward. Perform pore water pressure dissipation tests in representative hydrostratigraphic intervals. Record dissipated pore water pressures to represent hydraulic head values.

Once the confining unit underlying the surficial aquifer or the required depth has been reached, the CPT is pulled from the ground. Target interval samples can be collected during CPT hole advancement using direct push sampling techniques, i.e., Geoprobe® or Hydropunch® (Section 3).

4.3 DECONTAMINATION

All CPT equipment must be thoroughly cleaned before arrival at the work site, between test holes, and prior to being moved out of a work area. Scrub all metal parts with a stiff, long bristle brush and a non-phosphate soap solution. Steam cleaning may be substituted where available. Rinse with distilled water and allow to air-dry before assembly.

Refer to SOP No. 005 (Decontamination).

4 .4 ABANDONMENT

If the push hole was developed for the stratigraphic test only, once the testing is completed, grout the hole from bottom to top. If the hole has not collapsed after removing the CPT, PVC piping will be used to grout the hole. If the hole has collapsed after removing the CPT, then hollow CPT rods and a sacrificial tip will be used to grout the hole. The PVC pipe or CPT rods will be pushed to the bottom of the hole. Grout will then be pumped to the bottom of the hole as the PVC pipe or CPT rods are withdrawn.

Refer to SOP No. 028 (Well and Boring Abandonment).

5. SITE CHARACTERIZATION AND ANALYSIS PENETROMETER SYSTEM

5.1 MATERIALS

SCAPS cone penetrometer and laser induced fluorescence (LIF) technology requires the use of a specialized 20-ton truck. The truck has two separate enclosed compartments. Each compartment is temperature controlled and monitored for air quality. The two rooms are the data acquisition and processing room, and the hydraulic ram/rod handling room. Approximately 20 ft of overhead clearance is required to fully extend the hydraulic ram and allow for leveling jack movement.

All materials required to complete SCAPS analysis are provided by the subcontractor to include cone penetrometer equipment. All hydraulic equipment, SCAPS rods, nitrogen lasers, etc. are included within the vehicle. A decontamination water source and a source of water for mixing the grout are required.

Water sources for equipment decontamination must be approved by the Project Manager prior to arrival of the SCAPS equipment. Information required for the water source includes: water source, manufacturer/owner, address and telephone number, type of treatment and filtration prior to tap, time of access, cost per gallon (if applicable), dates and results associated with all available chemical analysis over the past 2 years, and the name and address of the analytical laboratory (if applicable).

Pure sodium bentonite with no additives will be the only additive allowed, and its use must be approved by the Project Manager prior to the arrival of the SCAPS equipment. The information required for evaluation includes: brand name, manufacturer, manufacturer's address and telephone number, product number, product description, and intended use for the product.

Portland Type II cement will be used for grout (refer to SOP No. 019).

5.2 HYDRAULIC PUSHING AND SAMPLING

The objective of the SCAPS technique is to allow grab samples and stratigraphic information to be collected at a selected site to facilitate subsurface characterization and for analysis of potential contaminants. The analytical results obtained can also be used to determine the placement of monitoring wells. At the same time, it is possible to install a small diameter well for sampling purposes. Refer to SOP No. 019 (Monitoring Well Installation). If a well will not be installed, the borehole can be grouted as the equipment is removed.

A site geologist will be present during all installation and sampling procedures and will fully document all procedures and soil characteristics in the Field Logbook (refer to SOP No. 016).

The site geologist will have on hand, at a minimum, a copy of the approved Health and Safety Plan, this SOP, the Field Investigation Work Plan, a hand lens (10X), a standard color chart, and a grain-size chart.

Only solid vegetable shortening (e.g., Crisco®) without flavoring or additives may be used on downhole SCAPS equipment.

Surface runoff or other fluids will not be allowed to enter any DPT location or well during or after direct-push activities.

The subcontractor will use the equipment specific guidelines for installation of the SCAPS DPT equipment. Prior to SCAPS field activities, calibration soil samples will be collected and analyzed in order to determine the LIF sensor fluorescence threshold and detection limits for the site.

SCAPS LIF technology uses a pulsed nitrogen laser coupled with an optical detector to make fluorescence measurements via optical fibers. The LIF sensor is mounted on a cone penetrometer probe so that soil classification data and fluorescence data are collected simultaneously. The laser consumes nitrogen gas, which is supplied from cylinders stored on the accompanying trailer.

The SCAPS CPT sensors are used to gather stratigraphic information. See Section 4 for CPT operating procedures.

Target interval samples can be collected during SCAPS hole advancement using direct push sampling techniques such as Geoprobe® or Hydropunch® (Section 3).

5.3 DECONTAMINATION

Decontamination of SCAPS equipment is automated after initialization by a field team member. A pressurized hot water system is used to decontaminate the push rods as they are retracted from the ground. The SCAPS vehicle is equipped with a decontamination collar mounted to the bottom that cleans the rods. The decontamination water is removed by vacuum and transferred to a storage drum prior to disposal or treatment. A trailer attached to the back of the vehicle contains the water pump, heater for decontamination, and decontamination water containment drum.

Worker exposure is reduced by minimizing contact with contaminated media.

Refer to SOP No. 005 (Decontamination).

5.4 ABANDONMENT

SCAPS automatically grouts the penetrometer cavity as the rods are removed. The grout is pumped at high pressure through a 0.25-in. diameter tube in the center of the penetrometer rods. The tip is sacrificed at the bottom of the cavity to allow release of the grout.

A trailer attached to the back of the vehicle contains the 300-gal grout mixing bin and pump.

If the automatic grout feed does not work, the cavity will be manually filled with grout.

Abandonment of SCAPS generated borehole will meet the standards established under SOP No. 028 (Well and Boring Abandonment).

6. MAINTENANCE

Not applicable.

7. PRECAUTIONS

Refer to the site-specific Health and Safety Plan for discussion of hazards and preventive measures during intrusive activities.

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Standard Operating Procedure No. 048
for
Low-Flow Sampling

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1. GROUNDWATER SAMPLING BY LOW-FLOW PURGE AND SAMPLING METHOD USING DEDICATED PUMPS

1.1 SCOPE OF APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to establish the protocol for collecting groundwater samples using dedicated pump systems. The procedure is designed to permit the collection of groundwater samples with minimum turbidity.

1.2 EQUIPMENT/MATERIALS

- Work Plan.
- Well construction data, location map, and field data from last sampling event.
- Field logbook and Field Record of Well Gauging, Purging, and Sampling forms (Figure SOP048-1).
- Electric water level measuring device, 0.01 ft accuracy for monitoring water level during pumping operations.
- Pumps: adjustable rate, submersible pumps constructed of stainless steel and Teflon®.
- Tubing: Teflon or Teflon-lined polyethylene must be used to collect samples for organic analysis. For samples collected for inorganics analysis, Teflon or Teflon-lined polyethylene tubing will be used.
- Flow measurement supplies (e.g., graduated cylinder and stop watch).
- Power source (generator, etc.).
- Water quality indicator parameter monitoring instruments—pH, turbidity, specific conductance, and temperature. Optional indicators—Eh and dissolved oxygen.
- Flow-through cell (preferred) or clean container for water quality probes.
- Decontamination supplies (for monitoring instrumentation).
- Sample bottles and sample preservation supplies (as required by the analytical methods).
- Sample tags or labels.
- Cooler with bagged ice for sample bottles.
- Drum for purge water containment.

1.3 PRELIMINARY SITE ACTIVITIES

The following site activities are required prior to performing well purging and groundwater sampling. Field logbooks and sampling forms should be filled out as the procedure is being performed, as noted:

- Enter the following information in the field logbook and sampling form, as appropriate: site name, project number, field personnel, well identification, weather conditions, date and time, equipment used, and quality assurance/quality control data for field instrumentation.

- Check well for damage or evidence of tampering, record pertinent observations in field logbook and sampling form.

- Lay out sheet of polyethylene for monitoring and sampling equipment.

- Unlock well and remove well cap (if applicable).

- Measure VOCs with an ionization detector (flame or photo) instrument at the rim of the well and in the breathing zone, and record the readings in the field logbook and the sampling form.

- Measure and record the height of protective casing above the concrete pad or ground surface, as appropriate. This reading is compared to that recorded during well installation as an indication of possible well damage or settling that may have occurred.

- Dedicated sampling pumps should be positioned with the pump intake mid-point in the screened interval. If non-dedicated equipment is used, care will be taken to position pump or sampling hose intake at the screen mid-point.

- Measure and record the depth to water (to 0.01 ft) in the well to be sampled before purging begins. If the well casing does not have a reference point (usually a v-cut or indelible mark in the well casing), make one. If a reference point is made, it will be noted in the field logbook. Care should be taken to minimize disturbance of any particulate attached to the sides or at the bottom of the well. The depth to well bottom will be measured following the completion of sampling because of the potential to stir up sediment at the bottom of the well.

- Prepare the pump by checking electrical connections, discharge tubing, and motor (Grundfos Redi-Flo2). Locate the generator (if applicable) downwind of the well; connect the power converter to the generator and to the pump.

1.4 WELL PURGING AND SAMPLING PROCEDURE

The following general procedure should be followed to obtain representative groundwater samples. Field logbooks and sampling forms should be filled out as the procedure is being performed, as noted:

- Enter the following information in the field logbook and sampling form, as appropriate, prior to purging: purge date and time, purge method, and total well depth.

- Connect the flow-through cell or clean container containing the instrumentation header to the pump discharge and begin purging the well at 0.2-0.5 L/min, unless a different purge rate has been previously established for that well. Fill the flow cell completely. Care should be taken not to cause entrapment of air in the system. Record the purge start time and purge rate.

- Establish that the water level has not dropped significantly such that the pump is dry (bubbles in discharge) or water is heard cascading down the inside of the well. Ideally, the pump rate should cause little or no water level drawdown in the well (>0.5 ft and the water level should stabilize). The water level should be monitored every 3-5 minutes (or as appropriate) during pumping. Record pumping rate adjustments and depths to water. Pumping rates should, if needed, be reduced to the minimum capabilities of the pump (e.g., 0.1-0.2 L/min) to avoid pumping the well dry and/or to ensure stabilization of indicator parameters. If water levels continue to drop with the pump on the lowest flow rate, the pump will be shut off and the well will be allowed to recharge to prevent the well from going dry. **The well will not be purged to dryness prior to sampling to prevent erroneous field parameters and groundwater samples.** Sampling will commence as soon as the well has recharged to a sufficient level to collect the appropriate volume of samples with the pump.

- During purging of the well, monitor the water quality indicator parameters (turbidity, temperature, specific conductance, pH, etc.) every 3-5 minutes (or as appropriate). Record purge rate, volume purged, depth to water, water quality indicator parameters values, and clock time at 3- to 5-minute intervals in field logbook and sampling record. Purging of the standing well water is considered complete when three consecutive readings of the water quality indicator parameters agree within approximately 10 percent. Turbidity readings consistently below 10 nephelometric turbidity units (NTU) are considered to represent stabilization of discharge water for this parameter. If the parameters have stabilized, but the turbidity is not in the range of the 10 NTU goal, the pump flow rate should be decreased and measurement of the parameters should continue every 3-5 minutes.

- Purge water at a well will be containerized if a well has exceeded the MEG or MCL in previous sampling events. Any purge water that is collected will be treated at the groundwater treatment plant.

- Prior to sampling, disconnect the discharge tubing from the flow-through cell. If the water discharged by the pump is silty, wait for the water to clear before sampling. Ensure that bubbles are not observed in the discharge tubing. Record pertinent observations in field logbook and sampling records.

- Begin filling sample containers by allowing the pump discharge to flow gently down the inside of the container with as little agitation or aeration as possible. Collect the samples in the order below, as applicable:

  — VOCs
  — Inorganics.

- VOC samples requiring pH adjustment will have their pH checked to assure that the proper pH has been obtained. This will require that a test sample be collected to determine the amount of preservative that needs to be added to the sample containers prior to sampling. Details on sample preservation are discussed in Section 1.5.

- Label each sample as collected. Those samples (VOCs, etc.) requiring cooling will be placed into an ice cooler for delivery to the laboratory. Inorganic samples, after preservation, do not need to be cooled.

- After collection of the samples, restore the dedicated pumping assembly to the well by hanging the tube, electric line, and support cable inside the well by the specially-designed PVC well cap assembly. Lock well.

- Complete remaining portions of Field Record of Well Gauging, Purging, and Sampling form (Figure SOP048-1) after each well is sampled, including sample date and time, total quantity of water removed, well sampling sequence, types of sample bottles used, sample identification numbers, preservatives used, parameters requested for analysis, and field observations of sampling event.

1.5 SAMPLE PRESERVATION

The following preservation procedures are examples of typical preservation protocols specific to the indicated analyses. Pre-preserved bottles will be used if possible. Minimum sample preservation requirements for each parameter group are summarized below:

- **VOCs—**Aqueous VOC samples must be collected as specified below. Each VOC sample is taken in duplicate:

  — Uncap the sample bottle, taking care not to touch the Teflon-faced septum. If the septum is contaminated in any way, it should be replaced.

  — Fill a sample bottle, preserve with HC1, and check the pH. Adjust the volume of HC1 to assure pH<2.

— Add the amount of HC1 determined in the above step, and fill the sample vial slowly from the tubing, minimizing air entrainment, until the vial slightly overflows.

— Place the Teflon-faced silicon rubber septum on the convex meniscus, Teflon side (shiny side) down and screw cap on.

— Invert the bottle, tap lightly, and check for air bubbles.

— If air bubbles are present, open the bottle, add sample to eliminate air bubbles, and reseal. Repeat this procedure until the bottle is filled and no air bubbles are detected.

— Place samples on ice until shipment.

- **Inorganics—**Fill the sample bottle, preserve the sample to pH<2 with nitric acid (HNO_3), seal container, and place sample on ice for shipment.

Disposable pipettes should be used to introduce chemicals into the samples if necessary. Chemicals used for preserving should be poured into a 150-ml beaker. They should not be drawn directly from the preservative bottles because the bottle may become contaminated. Measurements for pH and temperature should not be taken from the sample containers. When preserving samples to a required pH, pH paper should be used to check the resultant pH. The sample should be poured across the pH paper. Never place pH paper directly into sample.

NOTE: Shipping regulations limit the amount of preservative which can be added. For a 1-L sample, this is generally 1.5 ml of acid preservative.

1.6 FIELD QUALITY CONTROL

Quality control samples are required to verify that the sample collection and handling process has not affected the quality of the groundwater samples. All field quality control samples must be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The following quality control samples will be collected for each sample delivery group (SDG) (an SDG may not exceed 20 samples) at the frequency noted:

- Field Duplicate—Required at a frequency of 10 percent per SDG.

- Matrix Spike/Matrix Spike Duplicate—Required at a frequency of 5 percent.

- Equipment Rinsate Blank—Required once prior to installation of dedicated pump systems.

- Source Water Blank—Required at a frequency of once per source per sampling event when equipment (rinsate) blank is required.

- Trip Blank—Required for VOC samples at a frequency of one per sample shipment.

1.7 DECONTAMINATION

Non-dedicated sampling equipment and field monitoring equipment will be decontaminated prior to use and following sampling of each well. This equipment will be decontaminated by the procedure listed below. Alternative procedures must be approved by the Project Manager prior to sampling event. Decontamination fluids will be collected in a 5-gal bucket and treated at the groundwater treatment plant.

The following decontamination procedure will be used:

- Flush the equipment with potable water
- Flush with non-phosphate detergent solution
- Flush with tap water to remove all of the detergent solution
- Flush with distilled/deionized water
- Flush with isopropyl alcohol
- Flush with distilled/deionized water.

It is recommended that the detergent and isopropyl alcohol used in the above sequence be used sparingly.

2. GROUNDWATER SAMPLING BY LOW-FLOW PURGE AND SAMPLING METHOD USING PERISTALTIC PUMPS

2.1 SCOPE OF APPLICATION

The purpose of this SOP is to establish the protocol for collecting groundwater samples using peristaltic pump systems. The procedure is designed to permit the collection of groundwater samples with minimum turbidity, and is intended to be used in conjunction with the analyses for the most common types of groundwater contaminants (VOCs and inorganic compounds).

2.2 EQUIPMENT/MATERIALS

- Work Plan.
- Well construction data, location map, field data from last sampling event.
- Field logbook and Field Record of Well Gauging, Purging, and Sampling forms (Figure SOP048-1).
- Water level measuring device, 0.01 ft accuracy (electronic preferred) for monitoring water level drawdown during pumping operations.
- Peristaltic pump.

- In-well tubing: Teflon or Teflon-lined polyethylene must be used to collect samples for organic analysis. For samples collected for inorganics analysis, Teflon or Teflon-lined polyethylene, PVC, Tygon, or polyethylene tubing may be used.
- Pump head tubing: Silicon tubing must be used to in the pump head assembly.
- Flow measurement supplies (e.g., graduated cylinder and stop watch).
- Power source (battery, etc.).
- Water quality indicator parameter monitoring instruments – pH, turbidity, specific conductance, and temperature. Optional indicators – Eh and dissolved oxygen.
- Flow-through cell (preferred) or clean container for water quality probe.
- Decontamination supplies (for monitoring instrumentation).
- Sample bottles and sample preservation supplies (as required by the analytical methods).
- Sample tags or labels.
- Cooler with bagged ice for sample bottles.
- Drum for purge water containment.

2.3 PRELIMINARY SITE ACTIVITIES

The following site activities are required prior to performing well purging and groundwater sampling. Field logbooks and sampling forms should be filled out as the procedure is being performed, as noted:

- Enter the following information in the field logbook and sampling form, as appropriate: site name, project number, field personnel, well identification, weather conditions, date and time, equipment used, and quality assurance/quality control data for field instrumentation.
- Check well for damage or evidence of tampering, record pertinent observations in field logbook and sampling form.
- Unlock well and remove well cap (if applicable).
- Measure VOCs with an ionization detector (photo or flame) instrument at the rim of the well and in the breathing zone and record the readings in the field logbook and the sampling form.

- Measure and record the height of protective casing above the concrete pad, or ground surface, as appropriate. This reading is compared to that recorded during well installation as an indication of possible well damage or settling that may have occurred.

- Measure and record the depth to water (to 0.01 ft) in the well to be sampled before purging begins. If the well casing does not have a reference point (usually a v-cut or indelible mark in the well casing), make one. If a reference point is made, it will be noted in the field logbook. Care should be taken to minimize disturbance of any particulate attached to the sides or at the bottom of the well. The depth to well bottom will not be measured following the completion of sampling because of the potential to stir up sediment at the bottom of the well.

- Position the intake of the sampling hose at the mid-point of the screened interval.

- Prepare the pump by checking electrical connections and discharge tubing. Locate the battery downwind of the well; connect the peristaltic pump to the battery.

2.4 WELL PURGING AND SAMPLING PROCEDURES

The following general procedure should be followed to obtain representative groundwater samples. Field logbooks and sampling forms should be filled out as the procedure is being performed, as noted:

- Enter the following information in the field logbook and sampling form, as appropriate, prior to purging: purge date and time, purge method, and total well depth.

- Measure the water level with the pump in well before starting the pump. Begin purging the well at 0.3-0.5 L/min, unless a different purge rate has been previously established for that well.

- If well diameter permits, establish that the water level has not dropped significantly such that the pump is dry (air in discharge) or tubing suction is broken. Ideally, the pump rate should cause little or no water level drawdown in the well (>0.5 ft and the water level should stabilize). The water level should be monitored every 3-5 minutes (or as appropriate) during pumping. Care should be taken not to cause pump suction to be broken, or entrainment of air in the pump system. Record pumping rate adjustments and depths to water. Pumping rates should, if needed, be reduced to the minimum capabilities of the pump (e.g., 0.3 L/min) to avoid pumping the well dry and/or to ensure stabilization of indicator parameters. If water levels continue to drop with the pump on the lowest flow rate, the pump will be shut off and the well will be allowed to recharge to prevent the well from going dry. **The well will not be purged to dryness prior to sampling to prevent erroneous field parameters and groundwater samples.** Sampling will commence as soon as the well has recharged to a sufficient level to collected the appropriate volume of samples with the pump.

- During purging of the well, monitor the field indicator parameters (turbidity, temperature, specific conductance, pH, etc.) every 3-5 minutes (or as appropriate). Purging of the standing well water is considered complete when three consecutive readings of the water quality indicator parameters agree within approximately 10 percent. Turbidity readings consistently below 10 NTU are considered to represent stabilization of discharge water for this parameter. If the parameters have stabilized, but the turbidity is not in the range of the 10 NTU goal, the pump flow rate should be decreased and measurement of the parameters should continue every 3-5 minutes.

- Purge water at a well will be containerized if a well has exceeded the MEG or MCL in previous sampling events. Any purge water that is collected will be treated at the groundwater treatment plant.

- Prior to sampling, disconnect the sample discharge tubing from the flow-through cell. If the water discharged by the pump is silty, wait for the water to clear before sampling. Ensure that bubbles are not observed in the discharge tubing.

- Collect groundwater samples directly from the silicon tubing into preserved (when appropriate) sample containers. Begin filling sample containers from the pump discharge, allowing the water to fill the containers by allowing the pump discharge to flow gently down the inside of the container with as little agitation or aeration as possible. Collect the samples in the order below, as applicable:

  — VOCs
  — Inorganics.

- VOC samples requiring pH adjustment will have their pH checked to assure that the proper pH has been obtained. This will require that a test sample be collected to determine the amount of preservative that needs to be added to the sample containers prior to sampling. Detail on sample preservation are discussed in Section 2.5.

- Label each sample as collected. Those samples (VOCs, etc.) requiring cooling will be placed into an ice cooler for delivery to the laboratory. Inorganic samples, after preservation, do not need to be cooled.

- After collection of the samples, restore the dedicated tubing assembly to the well by hanging the tube inside the well by the specially-designed PVC well cap assembly. Lock well.

- Complete remaining portions of Field Record of Well Gauging, Purging, and Sampling form (Figure SOP048-1) after each well is sampled, including: sample date and time, total quantity of water removed, well sampling sequence, types of sample bottles used, sample identification numbers, preservatives used, parameters requested for analysis, and field observations of sampling event.

- The silicon tubing used in the peristaltic pump will be changed after use at each well.

2.5 SAMPLE PRESERVATION

The following preservation procedures are examples of typical preservation protocols specific to the indicated analyses. Pre-preserved bottles will be used if possible. Minimum sample preservation requirements for each parameter group are summarized below:

- **VOCs—**Aqueous VOC samples must be collected as specified below. Each VOC sample is taken in duplicate:

  — Uncap the sample bottle, taking care not to touch the Teflon-faced septum. If the septum is contaminated in any way, it should be replaced.

  — Fill a sample bottle, preserve with HCL, and check the pH. Adjust the volume of HCL to assure pH<2.

  — Add the amount of HCL determined in the above step, and fill the sample vial slowly from the tubing, minimizing air entrainment, until the vial slightly overflows.

  — Place the Teflon-faced silicon rubber septum on the convex meniscus, Teflon side (shiny side) down, and screw cap on.

  — Invert the bottle, tap lightly, and check for air bubbles.

  — If air bubbles are present, open the bottle, add sample to eliminate air bubbles, and reseal. Repeat this procedure until the bottle is filled and no air bubbles are detected.

  — Place samples on ice until shipment.

- **Inorganics—**Fill the sample bottle, preserve the sample to pH<2 with nitric acid (HNO_3), seal container, and place sample on ice for shipment.

Disposable pipettes should be used to introduce chemicals into the samples if necessary. Chemicals used for preserving should be poured into a 150-ml beaker. They should not be drawn directly from the preservative bottles because the bottle may become contaminated. Measurements for pH and temperature should not be taken from the sample containers. When preserving samples to a required pH, pH paper should be used to check the resultant pH. The sample should be poured across the pH paper. Never place pH paper directly into sample.

NOTE: Shipping regulations limit the amount of preservative which can be added. For a 1-L sample, this is generally 1.5 ml of acid preservative.

2.6 FIELD QUALITY CONTROL

Quality control samples are required to verify that the sample collection and handling process has not affected the quality of the groundwater samples. All field quality control samples must be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The following quality control samples will be collected for each SDG (an SDG may not exceed 20 samples) at the frequency noted:

- Field Duplicate—Required at a frequency of 10 percent per SDG
- Matrix Spike/Matrix Spike Duplicate—Required at a frequency of 5 percent
- Equipment (Rinsate) Blank—Required once prior to installation of dedicated sample tubing
- Source Water Blank—Required at a frequency of one per source per sampling event
- Trip Blank—Required for VOC samples at a frequency of one per sample shipment.
- Temperature Blank—Required at a frequency of once per sample shipment container.

2.7 DECONTAMINATION

Non-dedicated sampling and field monitoring equipment will be decontaminated prior to use and following sampling of each well. This equipment will be decontaminated by the procedure listed below. Alternate procedures must be approved by the Project Manager prior to the sampling event. Decontamination fluids will be collected in a 5-gal bucket and treated at the groundwater treatment plant.

The following decontamination procedure will be used:

- Flush the equipment with potable water
- Flush with non-phosphate detergent solution
- Flush with tap water to remove all of the detergent solution
- Flush with distilled/deionized water
- Flush with isopropyl alcohol
- Flush with distilled/deionized water.

It is recommended that the detergent and isopropyl alcohol used in the above sequence be used sparingly.

3. SURFACE WATER AND LEACHATE SEEP SAMPLING PROCEDURE

3.1 SCOPE OF APPLICATION

The purpose of this SOP is to establish the protocol for collecting surface water and leachate seep samples. The procedure is designed to permit the collection of representative surface water and leachate seep samples, and has been adapted from the procedure outlined in the Work Plan. This SOP is suitable for collecting surface water and seep samples requiring analyses for the most common types of surface water contaminants (VOCs and inorganic compounds).

3.2 EQUIPMENT/MATERIALS

- Work Plan.
- Location map, field data from last sampling event.
- Field logbook and Field Record of Surface Water and Sediment Sampling forms (Figure SOP048-2).
- Water quality indicator parameter monitoring instruments – pH, turbidity, specific conductance, and temperature. Optional indicators – Eh and dissolved oxygen.
- Decontamination supplies (for monitoring instrumentation).
- Dedicated, pre-cleaned 1-L wide-mouth or volatile organic analyte sample container (for sample collection).
- Sample bottles and sample preservation supplies (as required by the analytical methods).
- Sample tags or labels.
- Cooler with bagged ice for sample bottles.

3.3 PRELIMINARY SITE ACTIVITIES

The following site activities are required prior to performing surface water or leachate seep sampling. Field logbooks and sampling forms should be filled out as the procedure is being performed, as noted:

- Enter the following information in the field logbook and sampling form, as appropriate: site name, project number, field personnel, sample station identification, weather conditions, date and time, equipment used, and quality assurance/quality control data for field instrumentation.

- Visually inspect sample station for evidence of changes in physical condition; record pertinent observations in field logbook and sampling form.

- Measure VOCs with a flame ionization detector instrument in the breathing zone and record the reading in the field logbook and sampling form.

3.4 SAMPLING PROCEDURE

The technique for surface water and leachate seep sampling must be selected after addressing such items as:

- Depth of waterbody
- Depth of sample
- Stratification
- Seasonal variations
- Analytical parameters of interest.

The following general procedure should be used to obtain representative surface water and leachate seep samples. Field logbooks and sampling forms should be filled out as the procedure is being performed, as noted:

- Enter the following information in the field logbook and sampling form, as appropriate, prior to sampling: date and time, sample method, and sample depth.

- Collect the sample from the surface water, within several tenths of a foot of the streambed, by immersing a new, dedicated 1-L glass or volatile organic analyte sample container into the waterbody. If a stream is being sampled, collect the sample upstream of the sampler with the opening of the sampling device oriented upstream but avoiding floating debris.

- Directly fill the appropriate sample containers from the 1-L or volatile organic analyte sampling device.

- Collect the samples in the order below, as applicable:

  — VOCs
  — Inorganics.

- Water sample containers are generally filled directly from the source or sampler without special considerations. The exception is the collection of aqueous VOC samples requiring pH adjustment. VOC samples will have their pH checked to assure that the proper pH has been obtained. This will require that a test sample be collected to determine the amount of preservative that needs to be added to the sample containers prior to sampling. Details on sample preservation methods are discussed in Section 3.6.

- Label each sample as collected. Those samples (VOCs, etc.) requiring cooling will be placed into an ice cooler for delivery to the laboratory. Inorganic samples, after preservation, do not need to be cooled.

- Measure water quality indicator parameters, if possible, by direct immersion of instrument probes into the waterbody immediately following sample collection. If direct measurement is not possible, measure these parameters from water remaining in the sampling device or another sample bottle. Record this information in the field logbook and sample data record.

- Complete remaining portions of the Field Record of Surface Water and Sediment Sampling form (Figure SOP048-2) after each station is sampled, including: time of sample collection, types of sample bottles used, sample identification numbers, preservatives used, parameters requested for analysis, and field observations of sampling event.

3.5 SAMPLE PRESERVATION

The following preservation procedures are examples of typical preservation protocols specific to the indicated analyses. Minimum sample preservation requirements for each parameter group are summarized below:

- **VOCs—**Aqueous VOC samples must be collected as specified below. Each sample is taken in duplicate:

  — Uncap the sample bottle, taking care not to touch the Teflon-faced septum. If the septum is contaminated in any way, it should be replaced.

  — Fill a sample bottle, preserve with HC1, and check the pH. Adjust the volume of HC1 to assure pH<2.

  — Add the amount of HC1 determined in the above step, and fill the sample vial slowly from the 1-L container, minimizing air entrainment, until the vial slightly overflows.

  — Place the Teflon-faced silicon rubber septum on the convex meniscus, Teflon side (shiny side) down and screw cap on.

  — Invert the bottle, tap lightly, and check for air bubbles.

  — If air bubbles are present, open the bottle, add sample to eliminate air bubbles, and reseal. Repeat this procedure until the bottle is filled and no air bubbles are detected.

  — Place samples on ice until shipment.

- **Inorganics—**Fill the sample bottle, preserve the sample to pH<2 with nitric acid (HNO_3), seal container, and place sample on ice for shipment.

Disposable pipettes should be used to introduce chemicals into the samples. Chemicals used for preserving should be poured into a 150-ml beaker. They should not be drawn directly from the preservative bottles because the bottle may become contaminated. Measurements for pH and temperature should not be taken from the sample containers. When preserving samples to a required pH, pH paper should be used to check the resultant pH. The sample should be poured across the pH paper. Never place pH paper directly into sample.

NOTE: Shipping regulations limit the amount of preservative which can be added. For a 1-L sample, this is generally 1.5 ml of acid preservative.

3.6 FIELD QUALITY CONTROL

Quality control samples are required to verify that the sample collection and handling process has not affected the quality of the surface water and leachate seep samples. All field quality control samples must be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The following quality control samples will be collected for each SDG (an SDG may not exceed 20 samples) at the frequency noted:

- Field Duplicate—Required at a frequency of 10 percent per SDG.
- Matrix Spike/Matrix Spike Duplicate—Required at a frequency of 5 percent.
- Equipment (Rinsate) Blank—Required at a frequency of once per day per media sampled.
- Source Water Blank—Required at a frequency of once per source per sampling event when equipment (rinsate) blank is required.
- Trip Blank—Required for VOC samples at a frequency of one per sample shipment.

3.7 DECONTAMINATION

Field monitoring equipment will be decontaminated prior to use and following sampling of each station by the procedure listed below. Laboratory pre-cleaned, dedicated 1-L glass sample collection containers are used once and discarded and, therefore, do not undergo any decontamination. Decontamination fluids will be collected in a 5-gal bucket and treated at the groundwater treatment plant.

The following decontamination procedure will be used:

- Flush the equipment with potable water
- Flush with non-phosphate detergent solution
- Flush with tap water to remove all of the detergent solution
- Flush with distilled/deionized water
- Flush with isopropyl alcohol
- Flush with distilled/deionized water.

It is recommended that the detergent and isopropyl alcohol used in the above sequence be used sparingly.

4. REFERENCES

U.S. Environmental Protection Agency. 1996. Groundwater Issue-Low Flow Sampling (Minimal Drawdown) Groundwater Sampling Procedures. April.

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:		Project Number:	
Well ID:		Well Lock Status:	
Well Condition:		Weather:	

Gauge Date:		Gauge Time:	
Sounding Method:		Measurement Ref:	
Stick Up/Down (ft):		Well Diameter (in.):	

Purge Date:		Purge Time:	
Purge Method:		Field Personnel:	
Ambient Air VOCs (ppm):		Well Mouth VOCs (ppm):	

WELL VOLUME

A. Well Depth (ft):		D. Well Volume/ft (L):	
B. Depth to Water (ft):		E. Well Volume (L) (C*D):	
C. Liquid Depth (ft) (A-B)		F. Three Well Volumes (L) (E*3):	

G. Measurable LNAPL? Yes _____ /ft No _____

Parameter	Beginning	1	2	3	4	5
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (°C)						
Conductivity (µmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Total Quantity of Water Removed (L):			
Samplers:		Sampling Time (Start/End):	
Sampling Date:		Decontamination Fluids Used:	
Sample Type:		Sample Preservatives:	
Sample Bottle IDs:			
Sample Parameters:			

Figure SOP048-1.

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	Project Number:	Date:
Well ID:	Field Personnel:	

Parameter	6	7	8	9	10	11
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (°C)						
Conductivity (µmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Parameter	12	13	14	15	16	17
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (°C)						
Conductivity (µmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Comments and Observations:

Figure SOP048-1.

FIELD RECORD OF SURFACE WATER AND SEDIMENT SAMPLING

Site Name:			Project Number:
Sample Location ID:			Date:
Time:	Start:	End:	Sample Team Members:

SURFACE WATER INFORMATION

Type of Surface Water:
( ) Stream ( ) River
( ) Pond/Lake ( ) Seep

Water Depth and Sample Location _____ (ft)

Depth of Sample from Top of Water _____ (ft)

Equipment Used for Collection:
( ) None, Grab into Bottle
( ) Bomb Sampler
( ) Pump _____

Decontamination Fluids Used:
( ) Isopropyl Alcohol
( ) ASTM Type II Water
( ) Deionized Water
( ) Liquinox Solution
( ) Hexane
( ) HNO_3 Solution
( ) Potable Water
( ) None

Water Quality Parameters
( ) Temperature ____
( ) Conductivity ___ µmhs/cm
( ) pH ____ units
( ) Dissolved oxygen ____ mg/L
( ) Turbidity ____ NTU
( ) Eh ____ mv

Velocity Measurements Obtained? ( ) No ( ) Yes, See Flow Measurement Data Record

Field QC Data: ( ) Duplicate ID _____ Used:
( ) MS/MSD

Field Duplicate Collected
( ) Yes
( ) No

Sample Location Sketch: Method
( ) Winkler
( ) Probe

SEDIMENT INFORMATION

Type of Sample Collected:
( ) Discrete
( ) Composite

Sediment Type:
( ) Clay
( ) Sand
( ) Organic
( ) Gravel

Equipment Used for Collection:
( ) Gravity Corer
( ) Stainless Steel Split Spoon
( ) Dredge
( ) Hand Spoon/Trowel
( ) Aluminum Pans
( ) Stainless Steel Bucket
( ) _____

Decontamination Fluids Used:
( ) Isopropyl Alcohol
( ) ASTM Type II Water
( ) Deionized Water
( ) Liquinox Solution
( ) Hexane
( ) HNO_3 Solution
( ) Potable Water
( ) None

Sample Observations:
( ) Odor _____
( ) Color

Field QC Data: ( ) Field Duplicate Collected ( ) MS/MSD
Duplicate ID _____

SAMPLES COLLECTED

Check if Required at this Location	Matrix: Surface Water	Matrix: Sediment	Check if Preserved with Acid/Base	Volume Required	Check if Sample Collected	Sample Bottle IDs			

NOTES/SKETCH

Figure SOP048-2.

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Standard Operating Procedure No. 051
for
Low Flow Purge and
Sampling with Dedicated Pumps

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1. SCOPE OF APPLICATION

The purpose of this Standard Operating Procedure is to establish the protocol for collecting groundwater samples using dedicated pump systems. The procedure is designed to permit the collection of groundwater samples with minimum turbidity, and is intended to be used in conjunction with the analyses for the most common types of groundwater contaminants (volatile organic compounds and semivolatile organic compounds, pesticides, polychlorinated biphenyls, metals, and inorganic compounds). This Standard Operating Procedure was prepared based on draft guidance prepared by the U.S. Environmental Protection Agency Region 1 and conforms to the procedures described in the Long-Term Monitoring Plan.

2. EQUIPMENT/MATERIALS

- Long-Term Monitoring Plan.
- Well construction data, location map, and field data from last sampling event.
- Field logbook, Field Record of Well Gauging Form (Figure SOP051-1), and Field Record of Well Gauging, Purging, and Sampling Form (Figure SOP051-2).
- Electronic water level measuring device, 0.01 ft accuracy for monitoring water level during pumping operations.
- Pumps: adjustable rate, submersible pumps constructed of stainless steel and Teflon.
- Tubing: Teflon or Teflon-lined polyethylene must be used to collect samples for organic and inorganic analyses.
- Flow measurement supplies (e.g., graduated cylinder and stop watch).
- Power source (generator, etc.).
- Water quality indicator parameter monitoring instruments—pH, turbidity, specific conductances, and temperature. Optional indicators—Eh and dissolved oxygen. Water quality indicator parameters will be measured in the field in accordance with EPA-600/4-79-020 (1983) using the following methods: temperature (Method 170.1), pH (Method 150.1), turbidity (Method 180.1), specific conductance (Method 120.1), and dissolved oxygen (Method 360.1).

- Flow-through cell for water quality parameters.
- Decontamination supplies (for monitoring instrumentation).
- Sample bottles and sample preservation supplies (as required by the analytical methods).
- Sample tags or labels.
- Cooler with bagged ice for sample bottles.

3. PRELIMINARY SITE ACTIVITIES

The following site activities are required prior to performing well purging and groundwater sampling. Field logbooks and sampling forms should be filled out as the procedure is being performed, as noted:

- Enter the following information in the field logbook and sampling form, as appropriate: site name, project number, field personnel, well identification, weather conditions, date and time, equipment used, and quality assurance/quality control data for field instrumentation.
- Check well for damage or evidence of tampering; record pertinent observations in the field logbook and sampling form.
- Lay out sheet of polyethylene for monitoring and sampling equipment.
- Unlock well and remove well cap (if applicable).
- Measure volatile organic compounds with a photoionization detector instrument at the rim of the well and in the breathing zone, and record the readings in the field logbook and the sampling form.
- Measure and record the height of protective casing above the concrete pad or ground surface, as appropriate. This reading is compared to that recorded during well installation as an indication of possible well damage or settling that may have occurred.
- Measure and record the depth to water (to 0.01 ft) in the well to be sampled before purging begins. If the well casing does not have a reference point (usually a v-cut or indelible mark in the well casing), make one. Care should be taken to minimize disturbance of any particulate attached to the sides or at the bottom of the well. The depth to well bottom will be measured following completion of the sampling because of the potential to stir up sediment at the bottom of the well.

- Prepare the pump by checking electrical connections, discharge tubing, and motor (Grundfos Redi-Flo2). Locate the generator (if applicable) downwind of the well; connect the power converter to the generator and the pump.

4. SAMPLING PROCEDURE

The following general procedure should be followed to obtain representative groundwater samples. Field logbooks and sampling forms should be filled out as the procedure is being performed, as noted:

- Enter the following information in the field logbook and sampling form, as appropriate, prior to purging: purge date and time, purge method, and total well depth.

- Connect the flow-through cell containing the instrumentation header to the pump discharge and begin purging the well at 0.2-0.5 L/min, unless a different purge rate has been previously established for that well. Fill the flow-through cell completely. Care should be taken not to cause entrapment of air in the system. Record the purge start time and purge rate.

- Establish that the water level has not dropped significantly such that the pump is dry (bubbles in discharge) or water is heard cascading down the inside of the well. Ideally, the pump rate should cause little or no water level drawdown in the well (<0.5 ft and the water level should stabilize). The water level should be monitored every 3-5 minutes (or as appropriate) during pumping. Record pumping rate adjustments and depths to water. Pumping rates should, if needed, be reduced to the minimum capabilities of the pump (e.g., 0.1-0.2 L/min) to avoid pumping the well dry and/or to ensure stabilization of indicator parameters. If the water level continues to drop with the pump on the lowest flow rate, the pump will be shut off and the well allowed to recharge to prevent it from going dry. **The well will not be purged to dryness prior to sampling to prevent erroneous field parameters and groundwater samples.** Sampling will commence as soon as the well has recharged to a sufficient level to collect the appropriate volume of samples with the pump.

- During purging of the well, monitor the water quality indicator parameters, including pH, temperature, specific conductance, oxidation-reduction potential, dissolved oxygen, and turbidity, every 3-5 minutes (or as appropriate). Record purge rate, volume purged, depth to water, water quality indicator parameters values, and clock time at 3- to 5-minute intervals in the field logbook and sampling record. Purging of the standing well water is considered complete when three consecutive readings of the water quality indicator parameters agree within the following: $\pm$ 0.1 for pH, $\pm$ 3 percent for conductivity, $\pm$ 10 mV for redox potential, and $\pm$ 10 percent for turbidity and dissolved oxygen. Temperature readings should also be recorded along with the aforementioned water quality indicators. Although it is not critical in determining the stabilization of the discharge water, it is important for data interpretation and should also be measured.

Additionally, turbidity readings consistently below 10 nephelometric turbidity units (NTUs) are considered to represent stabilization of discharge water for this parameter. If the parameters have stabilized but the turbidity is not in the range of the goal of 10 NTUs, the pump flow rate should be decreased and measurement of the parameters should continue every 3-5 minutes; however, it is important to note that natural turbidity levels in groundwater at some sites may exceed 10 NTUs.

- Prior to sampling, disconnect the discharge tubing from the flow-through cell. If the water discharged by the pump is silty, wait for the water to clear before sampling. Ensure that bubbles are not observed in the discharge tubing. Record pertinent observations in the field logbook and sampling records.

- The purging rate will be controlled so that the well is not purged dry before sampling. If necessary, purging will be temporarily halted to permit recharge rather than allowing the well to be purged dry.

- Begin filling sample containers from the pump discharge, allowing the water to fill the containers by allowing the pump discharge to flow gently down the inside of the container with as little agitation or aeration as possible.

- Label each sample as collected. Those samples requiring cooling will be placed into an ice cooler for delivery to the laboratory.

- After collection of the samples, restore the dedicated pumping assembly to the well by hanging the tube, electric line, and support cable inside the well by the specially-designed PVC well cap assembly. Lock well.

- Complete remaining portions of Field Record of Well Gauging, Purging, and Sampling form (Figure SOP051-2) after each well is sampled, including sample date and time, total quantity of water removed, well sampling sequence, types of sample bottles used, sample identification numbers, preservatives used, parameters requested for analysis, and field observations of sampling event.

5. SAMPLE PRESERVATION

The following preservation procedures are examples of typical preservation protocols specific to the indicated analyses. Minimum sample preservation requirements for each parameter group are summarized below and in Table 3-1 of the Quality Assurance Project Plan:

- **Pesticides and Herbicides**—Fill the sample bottle, seal with a Teflon-lined cap, and place on ice for shipment.

6. FIELD QUALITY CONTROL

Quality control samples are required to verify that the sample collection and handling process has not affected the quality of the groundwater samples. All field quality control samples must be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The following quality control samples will be collected for each sample delivery group (a sample delivery group may not exceed 20 samples) at the frequency noted:

- ***Field Duplicate***—Required at a frequency of 10 percent per sample delivery group
- ***Matrix Spike/Matrix Spike Duplicate***—Required at a frequency of 5 percent
- ***Equipment Rinsate Blank***—Required once prior to installation of dedicated pump systems
- ***Source Water Blank***—Required at a frequency of once per sampling event when equipment rinsate blank is required.
- ***Trip Blank***—Required for volatile organic compound samples at a frequency of one per sample shipment.

NOTE: The dedicated pumps remain in the wells between sampling events.

7. DECONTAMINATION

Non-dedicated sampling equipment and field monitoring equipment will be decontaminated prior to use and following sampling of each well. This equipment will be decontaminated by the procedure listed below. Alternative procedures must be approved by the Project Manager prior to sampling event. Decontamination fluids will be collected in a 5-gal bucket and treated at the groundwater treatment plant.

The following decontamination procedure will be used:

- Flush the equipment with potable water
- Flush with non-phosphate detergent solution
- Flush with tap water to remove all of the detergent solution
- Flush with distilled/deionized water
- Flush with isopropyl alcohol
- Flush with distilled/deionized water.

It is recommended that the detergent and isopropyl alcohol used in the above sequence be used sparingly.

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Project Name:			Project No:		Date:
Weather/Temperature:					
EA Personnel:			Equipment:		
Well Number	Well Elevation	Depth to Water	Depth to LNAPL	LNAPL Thickness	Corrected Water Table Elevation[(a)]

(a) Based on an assumed specific gravity of 0.80 for LNAPL.

NOTE: All measurements in feet.
LNAPL = Light, non-aqueous phase liquid.

Figure SOP051-1. Field record of well gauging.

Site Name:		Project Number:	
Well ID:		Well Lock Status:	
Well Condition:		Weather:	

Gauge Date:		Gauge Time:	
Sounding Method:		Measurement Ref:	
Stick Up/Down (ft):		Well Diameter (in.):	

Purge Date:		Purge Time:	
Purge Method:		Field Personnel:	
Ambient Air VOCs (ppm):		Well Mouth VOCs (ppm):	

WELL VOLUME			
A. Well Depth (ft):		D. Well Volume/ft (L):	
B. Depth to Water (ft):		E. Well Volume (L) (C*D):	
C. Liquid Depth (ft) (A-B)		F. Three Well Volumes (L) (E*3):	
G. Measurable LNAPL? Yes _____ /ft No _____			

Parameter	Beginning	1	2	3	4	5
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (°C)						
Conductivity (µmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Total Quantity of Water Removed (L):			
Samplers:		Sampling Time (Start/End):	
Sampling Date:		Decontamination Fluids Used:	
Sample Type:		Sample Preservatives:	
Sample Bottle IDs:			
Sample Parameters:			

Figure SOP051-2. Field record of well gauging, purging, and sampling.

Standard Operating Procedure No. 054
for
Collection of Fish Tissue for Chemical Analysis

Prepared by

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Revision 1
March 2019

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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are any client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**also check Box A**), or if this SOP is being used with no changes (**only check Box B**).

☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 054	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	28 March 2019	Expanded alternative fishing methods and strengthened need for scientific permits	Daniel Hinckley Sanita Corum Martha McCauley	Matthew Bowman

1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure is to delineate protocols for the collection of fish samples for tissue analysis.

2. MATERIALS

The primary instrument for collecting fish in freshwater environments is electrofishing, either by boat or by wading in a stream/shallow river. A Smith-Root VVP-15 or similar model electrofishing unit will be employed at deep water locations using an 18-foot (ft) boat platform. In shallow depths where a smaller electrofishing unit is necessary, a Smith-Root 1.5-kilovolt ampere unit mounted in a 14-ft Jon boat will be used. For streams and small rivers where wading is possible, a Smith-Root or similar model portable backpack electrofishing unit will be utilized. The electrofishing units will be used in the pulsed direct current mode.

Other equipment used in fish collection studies may include:

- Hand nets (dip nets)
- 5-gallon buckets
- A Global Positioning System unit (for marking collection areas or navigating to previously sampled locations)
- Glass or polytetrafluoroethylene (PTFE) cutting board
- Stainless-steel filet knife
- Aluminum foil
- Large zip-lock bags
- Indelible markers
- Sample labels
- Project Scope of Work, Site Safety and Health Plan, and this Standard Operating Procedure for Fish Tissue Analysis
- U.S. Environmental Protection Agency (EPA) Guidance for Assessing Chemical Contamination Data for Use in Fish Advisories Volume 1 Fish Sampling and Analysis – Third Edition (November) (EPA 823-B-00-007) (EPA 2000)

- Copy of the Scientific Collector's Permit
- Location map
- Field logbook and datasheets
- Chain-of-custody (COC) form(s)
- Coolers and ice
- Live well and aerator
- Appropriate weight measurement device
- Appropriate length measuring device
- Scissors and pliers to cut fish spines
- Digital camera
- Deionized water
- Nitric acid solution.

Additional gear may be employed if electrofishing is inappropriate for use at the project site and to supplement the electrofishing method. These may include seine net, gill net, Fyke net, jug line, eel traps, minnow traps, crab traps, or rod and reel.

In marine environments (salt water with high conductivity), electrofishing is not used since the conductivity carries the electric current around the fish. In marine fish tissue surveys, other equipment is employed. This may include gill nets, seine nets, trawl nets, jug lines, or rod and reels.

3. COLLECTION PROCEDURE

The purpose of this section is to provide a broad description of selected methods of collection so that there are several routes by which to obtain field samples.

The primary method for fish collections will be boat electrofishing. This method is effective at collecting all trophic levels of fish to be analyzed at each of the selected locations, while reducing negative impacts to non-targeted fauna. The boat operator will move the boat slowly through likely fish habitat, including areas providing cover (e.g., snags, submerged aquatic vegetation, and other forms of structure). The primary collector stands on the bow of the boat

and initiates the electric current using a "deadman's" switch foot peddle and collects stunned fish using a long-handled dip net. The duration of the current can be adjusted by the collector based on the number of stunned fish observed and the rate at which they recover and escape. The second collector will stand in the mid-section of the boat using a dip net to capture fish drifting past the boat. Alternatively, if space allows, two collectors will stand side-by-side on the bow, collecting both fish off the bow and the sides of the vessel, with each collector focusing on the side they are nearest. One collector will be designated to operate the "deadman's" switch foot peddle prior to the sampling effort.

In order to assess the relative availability of target species versus the need to consider targets of opportunity, all stunned fish captured will be placed in live wells; the water will be refreshed periodically to minimize stress to the captured fish resulting from depletion of dissolved oxygen. At such a point when it becomes clear that target species are available in adequate numbers to meet the sample quotas, only target species will be captured and held.

When sampling marine waters and other circumstances for which electrofishing is inappropriate, traps should be checked regularly and non-target fish released. Target fish should be processed as necessary (fileting and compositing) and placed in coolers, as soon as possible.

During project planning and field sampling documentation (work plans and quality assurance project plans), it is important to include all potential methods for catching fish that may be used for the project. In addition, it is common for targeted species to not be present; consequently, alternative species should be considered during project planning.

4. COLLECTION PERMIT

Permission is required to conduct these studies, and approval must be granted by the regulatory authority within the state where the study will be conducted. A Scientific Collector's Permit must be applied for and the study plan approved by the proper agency or agencies prior to initiating the study. Be sure to apply for the Scientific Collector's Permit ahead of time to allow the paperwork to be completed and provided. Under no circumstances, should fish collections be performed without the required Scientific Collector's Permit. Copies of Scientific Collector's Permits should be carried with the field crew to provide documented evidence as needed to authorities.

5. DOCUMENTING SAMPLE LOCATION

The location of samples will be noted in a field logbook and on a map used in the field. Coordinates will be obtained using a hand-held Global Positioning System and recorded in the field logbook. Fish collection efforts are conducted over a general area that is sampled; therefore, specific coordinates collected will relate to the approximate center point of the collection effort for a specific location. The location should also be marked on a field map

relative to a position on the shoreline. Significant events, observations, and measurements during the field investigation will also be recorded in the field logbook.

Field logbook entries will include, at a minimum, the following information:

- Author, date and time of entry (use 24-hour military time), and physical/environmental conditions during the field activity.
- Names and titles of field crew.
- Names and titles of any site visitors.
- Type of sampling activity.
- Location of sampling activity, sampling time, water temperature, dissolved oxygen, conductivity, and pH.
- Field observations.
- For each submitted fish sample, the number of fish included, and the species name, weight, and size of each fillet, whole body, or other appropriate measures included in the composite analytical sample. Also, whole body characteristics should be included for each fish fillet collected.
- Any deformities (lesions, sores, etc.) observed on any of the fish.
- Any photos taken and their reference numbers
- Analyses to be performed on these fish samples.
- If any page is not completely filled in, a line drawn through the unused portion and initialed by the person keeping the log.
- Decontamination procedures.
- Documentation of any deviations from the Field Sampling Plan.
- Unusual incidents or accidents.

Original data recorded in these field logbooks, field data sheets, sample labels, or COCs should be made using indelible dark blue or black ink. None of these documents will be destroyed or discarded, even if they are illegible or contain inaccuracies.

If an error is made on any of these documents, the error will be corrected by crossing a line through the error and entering the correct information, then initialing and dating the cross-out. Any subsequent error discovered on one of these documents will be corrected by the person who made the entry, and will be initialed and dated as appropriate.

Photographs will be taken of field activities. Each photograph will have an entry in the field logbook indicating the location, date, and time it was taken. Photographs of activities such as biota sampling locations will be taken to record activities.

6. FIELD HANDLING AND DATA COLLECTION

Individual fish used for a sample will be measured for total length and weighed. Each fish will be rinsed with water to remove any sediment or detritus and inspected for anomalies and the information recorded in the field logbook and representative datasheet if applicable. Targeted species that will be used for sample preparation will be evaluated for their suitability as part of a composite sample.

Sample preparation will be specific to the laboratory conducting the tissue analysis. Selected specimens will be either wrapped in aluminum foil then bagged in plastic bags or directly bagged in plastic bags. All samples will be labeled with sample number, location, number of fish in composite, date, taxa, initials of the sampling crew, and disposition (i.e., fillet or whole body) and placed in a cooler of ice. Each sample will be provided with an internal label that is in the bag with the specimen and an external label on the bag containing the sample. At the end of each day, fish will be processed (be it filleted or whole body), composited, and either frozen and held for shipping at a later date or shipped to the laboratory immediately.

A composite sample will consist of a minimum of 3 fish collected at a specific location and of a specific trophic level (predator, bottom feeder). The number of specimens included in the composite should satisfy the tissue mass requirement by the analytical laboratory. All information regarding sample contents will be recorded in the field logbook and a representative datasheet.

7. SAMPLE HANDLING

If the project study plan specifies fillets, then samples of target species will be cut either by the field crew at the end of each day or, if preferred, by the analytical laboratory. This decision will be dictated by the laboratory prior to the initiation of the field sampling effort. Fillet samples will be prepared according to the EPA Guidance for Assessing Chemical Contamination Data for Use in Fish Advisories Volume 1 Fish Sampling and Analysis – Third Edition (November) (EPA 823-B-00-007) (EPA 2000).

Fish should be scaled prior to being filleted; do not remove the skin. To scale fish, place on a clean glass or PTFE cutting board. Run the edge of the knife blade from the tail toward the head

to scrape off the scales. Cross-contamination can be avoided by rinsing the cutting board and knife with acid and distilled water. After scaling, rinse the fish with distilled water and place on a clean cutting board; the fish is then ready for filleting.

Prior to filleting, hands should be washed and rinsed with distilled water and, if gloves are worn, they should be talc-free and dust-free. Place fish on a clean glass or PTFE cutting board. Care should be taken to avoid puncturing internal organs because the fillet tissue can become contaminated from materials released from the organs. If organs are punctured, the fillet tissue should be rinsed in contaminant-free deionized distilled water and blotted dry.

Fillets should be cut as follows:

- Make a diagonal cut from the base of the cranium following just behind the gill to the ventral side just behind the pectoral fin.
- Remove the flesh and ribcage from one side of the fish by cutting from the cranium along the spine and dorsal rays to the caudal fin.
- The skin should be scored prior to homogenizing the entire fillet.

Fillets should be weighed and recorded to the nearest gram. Sample weights will vary according to project specifications. Residue from the filleting process should be placed in a double-bagged plastic trash bag and disposed of properly in a dumpster.

8. COMPOSITING TECHNIQUES AND RECOMMENDATIONS

The sample weight/size is project specific. Following is the compositing technique assuming a 200-gram (0.44-pound) sample weight. The composited sample should contain, at a minimum, three individuals of similar size. The number and length of individuals or fillets should be recorded for each composite sample.

All samples in a composite sample should be similar in length such that the product of the length of the smallest individual divided by the length of the largest individual multiplied by 100 is greater than or equal to 75 percent:

$$\frac{Minimum\,Size}{Maximum\,Size} \times 100 = \_\_\_\_\_ \geq 75\%$$

This will ensure similarities in age and exposure to the area in question (EPA 2000).

9. SAMPLE CONTAINERS AND PRESERVATION TECHNIQUES

Composite fillet samples will be individually labeled and placed in the appropriate container; the container type will be dictated by the analytical laboratory and/or client scope of work. Whole-body fish composites will be individually labeled with both a label in the bag and an external label, wrapped in aluminum foil, and double-bagged in clean plastic, zip-lock airtight bags as preferred by the analytical laboratory and/or client scope of work. Individual sample labels will contain the following information:

- Project number
- Sample location and station number
- Species (genus and specific epithet)
- Individual sample number
- Total number of individuals in composite
- Sampler's initials
- Date and time of sample processing.

For shipping to the analytical laboratory, a 3-inch layer of inert cushioning material (bubble wrap) will be placed on the bottom of a waterproof cooler or ice chest. The samples will then be placed on the cushioning material and surrounded with ice double bagged in plastic bags to maintain a temperature of 4 degrees Celsius or lower. Review shipping and packing requirements with the receiving laboratory prior to sample collection to identify project- or analysis-specific requirements (e.g., use of dry ice).

A temperature blank should be included in each cooler. COC records will be completed at the time of sample preparation and compositing. All samples will be sent by overnight express to the laboratory or hand-delivered the day after collection. The COC must be signed showing any sample transfer and placed in a plastic bag taped to the inside lid of the cooler. Each cooler should have a COC for those samples contained in that cooler. The cooler/ice chest drain should be taped shut. Appropriate shipping labels are attached to the top of the cooler and "This Side Up" labels placed on all four sides of the cooler/ice chest. Lastly "Fragile" labels should be placed on at least two locations of the cooler/ice chest. Be aware of any weight limitations that a shipper may have for shipping the cooler/ice chests.

10. REFERENCES

U.S. Environmental Protection Agency (EPA). 2000. *EPA Guidance for Assessing Chemical Contamination Data for Use in Fish Advisories Volume 1 Fish Sampling and Analysis – Third Edition* (EPA 823-B-00-007). November.

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Standard Operating Procedure No. 055
for
Continuous Multi-Channel Tubing Groundwater Sample Collection

Prepared by

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Revision 0
December 2014

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1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to delineate protocols for the collection of groundwater samples from monitoring wells with continuous multi-channel tubing (CMT). CMT monitoring wells are used to collect groundwater samples from many discretely isolated zones within a single monitoring well. This SOP will cover groundwater sampling protocol for dedicated CMT systems that have already been installed in a monitoring well, in accordance with the manufacturer recommendations. For general protocols for groundwater sample collection, consult SOP No. 013 – Collection of Monitoring Well Samples.

2. MATERIALS

The following materials may be required:

Air compressor (12V)	Personal protective equipment
Contractor garbage bags	Phosphate-free, laboratory grade detergent (e.g., Liquinox, Alconox, etc.)
Drum for purge water	Photoionization detector
Gas source (nitrogen)	Pump (peristaltic, mini-inertial, or double valve)
Heavy plastic sheeting	Stiff bristle brush
Log book	Tubing (pump specific)
Multi-parameter meter	Wash and rinse tubs

3. PROCEDURE

3.1 GENERAL

Groundwater sampling will follow these general steps:

- Arrive onsite
- Set up apparatus (compressors, pumps, etc.)
- Glove
- Use photoionization detector to collect organic vapor readings
- Collect water level and well depth measurements
- Purge well
- Collect samples (see SOP No. 013 – Collection of Monitoring Well Samples for specifics)

— Using a peristaltic pump to sample (Section 3.3)
— Using a mini-inertial pump to sample (Section 3.4)
— Using a double-valve pump to sample (Section 3.5)

- Decontaminate/reglove

- Decontaminate/dispose of wastes and move equipment to next site.

3.2 WELL PURGING GENERAL RULES

Water within the casing of a well will stagnate, de-gas, loose volatiles, possibly precipitate metals due to changes in redox potential, and may react with the screen and/or casing material. It is, therefore, necessary to purge a sufficient volume of this stagnant water from the well and/or casing to ensure that a representative sample of formation water can be obtained. Monitoring of select chemical and physical properties of the sample medium will be used to determine when a representative sample may be taken from a well.

Acceptable purge/sampling devices for CMT sampling include: peristaltic pumps, mini-inertial pumps, or double valve pumps. It is recommended to purge and sample at similar rates with one type device per well. For shallow wells (<25 ft deep), peristaltic pumps are sufficient for purging. In situations where the water level is >25 ft deep but <150 ft deep, then a mini-inertial pump is recommended; if the well is >150 ft deep, a double valve pump shall be used for purging. If the well is fast recharging, then a high discharge double valve pump shall be used to purge the well, and a peristaltic or mini-inertial pump shall be used to sample the same well. However, peristaltic and mini-inertial pumps can cause volatilization; therefore, when sampling for volatile organic compounds, double valve pumps will be used for sample collection.

Due to the small diameter tubing used for CMT (0.5-inch [in.], 3/8-in., or 0.25-in. inner diameter), water levels cannot usually be monitored using a water level indicator while the pump is installed; therefore, the well is usually purged until three consecutive readings of the following selected in-line water quality stabilization parameters vary by 10 percent or less: temperature, conductivity, pH, turbidity, redox potential, and dissolved oxygen level. In the case of relatively large diameter tubing, narrow diameter water level indicators can be used to monitor water level before and after purging for hydraulic influence from purging.

Purge water will be containerized (per project-specific Work Plan) until analysis of samples is completed. Based on sample results, accumulated purge water will be properly disposed (per project-specific Work Plan).

3.3 CONTINUOUS MULTI-CHANNEL SAMPLING WITH PERISTALTIC PUMP

The peristaltic pump will draw a sample of water if the water level is within an estimated 25 ft of ground surface at sea level. The peristaltic pump is most often used with 0.25-in. diameter low density polyethylene (LDPE) tubing that is lowered into the channel of the CMT. Once the

LDPE tubing is lowered to the desired sampling depth, connect it to flexible tubing[1] that has been placed into the linear or circular pump casing (dependent upon model of peristaltic pump in use). Once that connection is made, connect another piece of LDPE tubing to the other end of the flexible tubing, which will discharge into the sampling bottle. The rate of pump speed can be manually adjusted to the desired purge/sample frequency, per the manufacturer's guide for the type of peristaltic pump in use.

After stabilization (Section 3.1), collect samples for laboratory analysis. Filtration of metal samples will be accomplished using an in-line filter attached to the tubing discharging into the sample bottle (Section 3.1 and SOP No. 013). This sampling method is not appropriate for the collection of volatile organic compound samples as peristalsis introduces air into the sample; thereby affecting the sample results.

3.4 CONTINUOUS MULTI-CHANNEL SAMPLING WITH MINI-INTERTIAL PUMP

Where the water level is too deep for a peristaltic pump (>25 ft below ground surface [bgs]), but no deeper than 150 ft bgs, the mini-inertial pump is recommended. The mini-inertial pump consists of a length of polyethylene tubing with a check valve placed at its base.

The mini-inertial pump tubing is 0.25-in outer diameter × 0.17-in. inner diameter LDPE, or Teflon-lined LDPE can be used for applications up to 50 ft bgs. At depths ranging from 50 to 150 ft bgs, pure Teflon should be used to reduce the friction effects encountered at greater depths. The check valve assembly will be pushed into the base of the 0.25-in. tubing using an insertion tool that is similar to a short, narrow diameter screwdriver. The tubing is then lowered into the CMT port within the well to the desired sampling depth, and the sample is collected by raising and lowering the system, usually by hand and approximately 1 ft; a pulse or slug of groundwater migrates up the tubing and can be collected at the surface.

3.5 CONTINUOUS MULTI-CHANNEL SAMPLING WITH DOUBLE VALVE PUMP

The double valve pump can be used for deep or shallow wells and is ideal for volatile organic compound sampling at sites where peristaltic or mini-inertial pumps are not considered appropriate. The double valve pump is connected directly to each tubing port. Polyethylene or Teflon® tubing of the pump connects directly to the CMT ports at the wellhead. Purging and sampling of groundwater from some or all CMT levels can be accomplished simultaneously by double valve pumps equipped with multi-purge manifolds, a feature not common to every automatic double valve pump.

[1] It is important to select tubing with appropriate chemical resistance toward the liquid being pumped. Types of tubing commonly used in peristaltic pumps include: polyvinyl chloride, silicone rubber, and fluoropolymer.

Sampling setup:

- Push the double valve pump tubing inserts into the CMT. The double valve pump tubing should be fed into the drive and sample compression fittings of the double valve pump. The compression fitting nuts may have to be loosened before the tubing is inserted.

- Lower the assembled double valve pump to the wellhead.

- Connect the "air in" line from the 12V air compressor (connected to the battery in the truck or portable battery) or gas source (i.e., nitrogen) to the quick connect fitting on the electric control unit.

- Connect the "air out line" to the quick connect fitting on the side of the pump head manifold.

- This feeds air or nitrogen to the drive line, which is the larger diameter tubing.

- The smaller inner tube is the sample line.

Sample collection:

- Insert the sample line at surface into the sample container.

- Adjust the control unit "Pressure Regulator" to the appropriate value.

- Adjust the Drive and Vent times on the electric control unit to adjust the sampling flow rate to the desired amount.

- During the Drive period on the control unit, the sample line will produce the water sample. During the Vent period on the control unit, the Drive Line is filling again under hydrostatic pressure.

- Select the desired flow rate from the pre-set screens. Use the flow regulator to adjust flow to the desired rate. If a higher flow is required, slowly increase the Drive time to increase the flow rate. If air is expelled, decrease the Drive time. To further optimize the flow rate, increase or decrease Vent time until the highest flow rate is achieved.

- Once optimum flow rates have been achieved, record the pressure, flow rate, and timer settings for subsequent sampling dates in the field log book. For example, with an 85 ft double valve pump assembly, a static water level of 60 ft bgs, and a pump pressure of 50 psi ([85 ft × 0.4] + 10 psi), a suitable drive of 11 seconds and vent of 9 seconds will produce a flow rate of approximately 150 milliliter/minute.

- Monitor water quality stabilization parameters beginning immediately, using an in-line monitoring system not exposed to the atmosphere. When these parameters stabilize to within 10 percent over three consecutive readings, begin collecting samples per SOP No. 013 – Collection of Monitoring Well Samples.

- Upon completion of sample collection, remove and decontaminate water level probe and pump.

3.6 DECONTAMINATION

All non-dedicated CMT sampling equipment must be thoroughly cleaned before and after each use to allow retrieval of representative groundwater samples. Scrub all metal parts with a stiff, long bristle brush and a non-phosphate soap solution. Steam cleaning may be substituted where available. Rinse with distilled water and allow to air-dry before assembly.

Refer to SOP No. 005 – Field Decontamination for additional information.

4. MAINTENANCE

Refer to manufacturer's requirements for maintenance of pumps and compressors and specific sampling techniques or requirements.

5. PRECAUTIONS

Refer to the site-specific Health and Safety Plan for appropriate personal protective equipment.

6. REFERENCES

EA Engineering, Science, and Technology, Inc., PBC (EA). 2014a. Standard Operating Procedure No. 005 – Field Decontamination. December.

EA. 2014b. SOP No. – 013 Collection of Monitoring Well Samples. December.

(U.S.) Environmental Protection Agency (EPA). 1993. Subsurface Characterization and Monitoring Techniques, Volume 1, Appendices A and B. May.

Website: *http://www.solinst.com/* – Bladder Pump Operating Instructions.

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Standard Operating Procedure No. 056
for
X-Ray Fluorescence Analysis of Soil

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Revision 1
January 2018

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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are any client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**also check Box A**), or if this SOP is being used with no changes (**only check Box B**).

A. ☐ **Variances required; cite section(s) of the SOP to which there is a variance (add additional pages if necessary)**

B. ☐ **No variances**

SOP No. 056	
SOP Section	**Variance**

Project Manager (Name) Date

Project Manager (Signature) Date

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DOCUMENT REVISION HISTORY

ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	January 2018	Updated protocols/information in Sections 2, 3, 4, 5, and 7.	Caron Mierczak	Amy Sponaugle Steve Yankay Pete Garger Matthew Bowman

1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to describe protocols for using an Innov-X Systems Alpha 4000SL or Niton XL3t GOLDD tube-based x-ray fluorescence (XRF) analyzer for field analysis of soil samples for metals. Quality control protocols in this SOP are consistent with the protocols identified in U.S. Environmental Protection Agency (EPA) Method 6200 (EPA 2007). Client-specific quality control protocols regarding sample preparation and analysis for the U.S. Army Corps of Engineers (USACE)–Omaha District have been included in this SOP.

Any client-, project-, or site-specific variances to this SOP (if any) are documented on the Project-Specific Variance Form, located immediately after the SOP title page. Prior to using this SOP, field personnel should refer to the Project-Specific Variance Form to verify whether any variances are required.

Use of brand names in this SOP is not intended as endorsement or mandate that a given brand be used. Alternative equivalent brands of detectors, sensors, meters, etc. are acceptable.

2. MATERIALS

The following materials may be required:

Innov-X Systems x-ray tube-based XRF with Compaq personal data assistant (PDA) that includes appropriate expansion card and Innov-X Software OR ThermoScientific/Niton XL3t GOLDD XRF with Mini-USB to USB cable	
Laptop computer	Plastic zipper-type bags (1-mil thickness)
Battery for XRF	Containers (for sample collection and storage)
Battery charger for personal computer	2-mm mesh sieve(s)
Standard Reference Material (SRM) for calibration check of XRF	Silicon blank
Soil test stand/bulk sample analyzer sled	Paper towels
Mylar, Kapton, Spectroleen, polypropylene, or equivalent film	Paperwork (applicable regulations and licenses, XRF Operators' Manual, and emergency contacts)
Polyethylene sample cups (31- to 40-millimeters [mm] in diameter with collar)	Proper site-specific personal protective equipment and dosimetry

3. GENERAL

Procedures for handling and control of company-owned and rented equipment containing radioactive materials and x-ray tubes are specified in the EA Engineering, Science, and Technology, Inc., PBC (EA) Radiation Protection Program (EA 2014), which is administered by the Radiation Safety Officer (RSO), under direct supervision of EA's Corporate Health and Safety Director. Personnel using this SOP must be familiar with the procedures identified in the Radiation Protection Program (EA 2014).

The use of radioactive materials and x-ray generating equipment is highly regulated by federal and state agencies. Licensees of radioactive materials and x-ray generating equipment are required to follow regulatory requirements and are subject to periodic inspections. Licensees may face disciplinary action by federal or state agencies if determined to be out of compliance with regulations. The RSO must be informed about any XRF usage (rental or company-owned) prior to use, including the scheduled timeframe of use; the state within which the XRF will be used; and the safety and security measures that will be enforced during transportation (either over land or by air), storage, and use of the instrument. Licensing, registration, or reciprocity may be required prior to using the XRF (i.e., a certificate of reciprocity or license/registration might be required from the destination state). In addition, per EA policy, the RSO will assign dosimetry badges to the operators (regardless of whether the instrument is EA-owned or rented) to measure potential radiation dose. Dosimetry is personnel-specific (i.e., cannot be shared by multiple personnel), and must be replaced every 3 months.

The XRF shall be operated by a trained operator, knowledgeable in aspects of radiation safety. Operators need to complete the manufacturer's-specific operator's training, transport of lithium-ion batteries training, and EA's Radiation Safety Training and Hands-On XRF Operational Training. All certificates of training completion must be received and documented by the RSO prior to using the XRF.

The XRF should be operated in a clean environment, out of direct sunlight, and without significant concentrations of dust.

The XRF shall be in direct control of a trained XRF operator at all times. When not in use, the XRF shall be placed within a locked case, and stored in a locked storage area (i.e., cabinet), in a locked room or building when not in use ("triple locked").

Batteries are provided for portable operation of the XRF; however, the batteries have a limited operating time. It is highly recommended to connect the unit to an alternating current power source, especially for operating times exceeding 4 hours. Failure of the batteries during a screening session may result in data loss. After each portable operation, the instrument batteries must be recharged before resuming operations.

4. QUALITY CONTROL

The RSO will ensure that the XRF adheres to manufacturer's specifications for calibration. Onsite calibration verification checks will be performed by the operator. The quality control protocols specified in this section are consistent with the protocols identified in EPA Method 6200 (EPA 2007).

The accuracy of the XRF can be evaluated by performing calibration verification checks. These checks are performed by analyzing SRMs traceable to the National Institute of Standards and Technology (NIST). A minimum of two SRMs will be analyzed daily: once at the beginning of the day and end of the day, or at the beginning of the day and after every 20th sample, whichever occurs first. The actual (NIST-certified) concentration of the SRM as well as the concentration

displayed by the XRF will be recorded (NIST certified concentrations can be obtained from the RSO or the NIST website: https://www-s.nist.gov/srmors/viewTableH.cfm?tableid=86).

The relative percent difference (RPD) between the actual and displayed concentrations will be calculated as follows:

$$RPD = [2(SRM-R)/(SRM+R)] \times 100$$

where

SRM = Concentration of the standard reference material.
R = Displayed concentration from XRF.

The result will be compared to the project data quality objectives (DQOs), if applicable, to evaluate if the XRF accuracy is within project limits. A typical DQO for this indicator is +/20 percent. Note that a site-specific sample with a known concentration of the compound(s) of interest may be used in lieu of an SRM to perform the calibration verification checks; however, this SOP deviation should be noted on the Project-Specific Variance Form.

To assess the precision of the XRF, a precision analysis may be performed. If project DQOs do not require a precision analysis, it will be noted on the Project-Specific Variance Form. The precision analysis is performed by running 10 replicate analyses on the same site sample and calculating the relative standard deviation (RSD) of the sample mean as follows:

$$RSD = (SD/Mean\ Concentration) \times 100$$

where

RSD = Relative standard deviation for the precision measurement for the analyte.
SD = Standard deviation of the reported analyte concentration for the precision sample.
Mean Concentration = Mean analyte concentration of the seven replicate analyses.

The site sample should have detectable concentrations of metals (i.e., above the instrument's detection limits). Precision analysis should be performed at a minimum of once per day, but may be required more often depending upon the project DQOs (the Project-Specific Variance Form will document if this analysis is not required). A typical DQO for this indicator is <20 percent.

Duplicate analysis (or triplicate) is another quality control check that may be performed on the XRF (the Project-Specific Variance Form will document if this analysis is not required). A typical duplicate analysis scheme would require the preparation and analysis of a duplicate sample at a rate of 1 per every 20 normal site samples. A duplicate is a second sample collected and prepared as a normal sample would be. The duplicate is analyzed and the results compared to the normal sample by calculating the RPD. The DQO for duplicate samples is project specific; however, a typical objective is an RPD of no more than 30 percent.

An alternative to duplicate sample analysis would be replicate sample analysis. Replicate sample analyses are two analyses of the same prepared sample. Generally, the sample is moved/rotated; re-homogenized; or, if prepared in a sample cup, inverted (on a double open-ended cup) for the second analysis. This approach assesses comparability between results without interference from field sampling variability. The replicate sample results are compared to the normal sample results in the same manner as a duplicate sample analysis.

Blank analyses may be performed to assess whether equipment cross contamination is occurring. Two types of blank sample analyses are typical: instrument blank and method blank.

The instrument blank is performed by analyzing silicon dioxide (or clean sand), a Teflon block, or a quartz block. The frequency of blank analysis is dependent upon project DQOs but is typically performed twice daily, prior to and after sample analyses for that day (the Project-Specific Variance Form will document if this analysis is not required). Typically, the instrument blank analysis is performed concurrently with the SRM calibration verification analysis. Instrument blanks may also be performed after every 20 samples; again, depending on project DQOs. Results should be below detection.

Method blanks are performed to monitor decontamination efficiency on equipment that is not dedicated. The blank is performed by substituting clean sand in the sample preparation process, and analyzing in the same manner as a site sample. Results should be below the instrument's detection limits.

5. SITE SAMPLE PREPARATION AND ANALYSIS

Sample preparation is dependent upon project DQOs and may be different than the preparation described herein (the Project-Specific Variance Form will document any deviations to this protocol). More rigorous sample preparation protocols are available (e.g., EPA Method 6200 [EPA 2007]). The project planning document and DQOs should be referenced to determine if the method described herein is adequate for any specific project.

- Don appropriate personal protective equipment as required by the project health and safety plan; at a minimum, gloves and radiation dosimetry will be utilized.

- Collect soil sample as described in the project planning documents, including a minimum of 50 grams of soil for XRF analysis.

- If the sample is noticeably wet (>20 percent moisture), dry the sample in an oven. Alternatively, the samples may be dried with paper towels and/or by allowing the sun to evaporate the moisture. Microwave drying is not recommended; field studies have shown that microwave drying can increase variability between XRF data and confirmatory analysis, and metal fragments in the sample can cause arcing to occur in a microwave.

- Inspect the sample to ensure no foreign (non-soil) materials are present in the sample (i.e., paint chips, lead shot, concrete chips, leaves, rocks, or asphalt). Note the presence of foreign matter in the project log. If the quantity of foreign material is such that removal is impractical, note in the project log that the foreign material could not be removed.

- Pass soil through a decontaminated 2-mm mesh sieve collecting the soil in a dedicated zipper-type plastic bag, labeled with the sample identification. This step may be eliminated in lieu of hand processing (removal of stone, debris, lead shot, paint chips, and organic material) of the sample simultaneously with the following step, but should be noted on the Project-Specific Variance Form if this method is performed.

- Homogenize the soil by rolling the soil within the bag, being sure to break up large clumps of soil.

- Assemble a sample cup, label with sample identification, and pack the soil tightly into the cup. Cover the cup with polypropylene (or equivalent) film and use the collar to secure in place. This step may be eliminated for the analysis of the sample through the zipper-type plastic bag, but should be noted on the Project-Specific Variance Form if this method is performed.

- Place the sample cup/zipper-type bag onto the soil test platform. Inconsistent positioning of samples in front of the probe window is a potential source of error because the x-ray signal decreases as the distance from the radioactive source increases. This error is minimized by maintaining the same distance between the window and each sample. For the best results, the window of the probe should be in direct contact with the sample, which means that the sample should be flat and smooth to provide a good contact surface.

- Initiate the XRF reading using the trigger or start button on the PDA.

- Allow the analyzer to run and collect data for a nominal sample time of 60 seconds; a project-specific variation to the nominal sample time will be noted on the Project-Specific Variance Form.

- Record the sample designation and result(s) in either a field logbook or on appropriate data sheets.

- Retain the cupped/bagged sample for possible laboratory confirmatory analysis.

- Use the same procedure for the analysis of method blank, duplicate, replicate, SRMs, and precision analysis samples.

- Download the XRF data daily to a computer (if possible). Back up the data to a server, disc, or compact disc.

The comparability and quality of the XRF analysis are determined by submitting XRF-analyzed samples for confirmatory analysis to a laboratory. The confirmatory samples must be splits of the homogenized sample material. A minimum of 1 sample for each 10 XRF-analyzed samples should be submitted for confirmatory analysis (for USACE–Omaha projects, they request a minimum of 12 samples for confirmation). Note on the Project-Specific Variance Form if there is a deviation from this frequency. The confirmatory samples should be selected from the lower, middle, and upper range of concentrations measured by the XRF. They should also include samples with analyte concentrations at or near the site action levels or project remedial goals. The results of the confirmatory analysis and XRF analyses should be evaluated with a least-squares linear regression analysis. If the measured concentrations span more than one order of magnitude, the data should be log-transformed to standardize variance that is proportional to the magnitude of measurement. The correlation coefficient (r) for the results should be 0.7 or greater for the XRF data to be considered screening level data (EPA 2007). If the r is 0.9 or greater and inferential statistics indicate the XRF data and the confirmatory data are statistically equivalent at a 99 percent confidence level, the data could potentially meet definitive level data criteria.

6. PRECAUTIONS

The XRF produces ionizing radiation in the x-ray spectrum. This SOP and the precautions herein are applicable to the Innov-X Systems Alpha 4000SL or the ThermoScientific/Niton NL3t GOLDD tube-based instruments. Additional precautions not contained herein are necessary if utilizing a radioactive source-based XRF (e.g., cadmium-109). The tube-based instrument is capable of producing x-rays when the instrument is powered and an analysis initiated. The instrument has a red light near the shutter that will flash when the instrument is emitting x-rays. When the shutter is open, and the light is flashing, the instrument is emitting x-rays. At this time, the following must be observed:

- Always be aware of the location of the tube and direction of the x-ray beam.
- Open the shutter only to conduct a test.
- The person conducting the XRF analysis must be a trained operator in accordance with the requirements in Section 3 and is required to wear dosimetry.

The XRF is able to function as a handheld screening tool by wielding the detector by hand and pressing it to the sample for analysis. For soil screening, this action has the potential of exposing the operator to inadvertent x-ray radiation. For this reason, it is highly recommended that the operator make use of the manufacturer-specific stand that incorporates x-ray shielding, automatic x-ray beam shut-off safety features, and protects the operator from exposure. Any deviation from use of the soil test stand must be approved by the RSO.

EA's emergency procedures for the XRF (in the event that the XRF unit is damaged, destroyed, lost, or stolen) are provided to authorized users and will be used in the event of an emergency.

Decontamination of the soil test stand is to be restricted to wiping the test stand with a damp cloth. Any additional decontamination procedures must be approved by the RSO.

7. REFERENCES

EA Engineering, Science, and Technology, Inc. (EA). 2014. Radiation Protection Program. August.

U.S. Environmental Protection Agency (EPA). 2007. Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment. Method 6200. February.

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Standard Operating Procedure No. 059
for
Field Logbook

Prepared by

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Revision: 1
December 2014

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1. SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to delineate protocols for recording field survey and sampling information in the Field Logbook.

2. MATERIALS

The following materials may be required:

- Field Logbook (Teledyne 415 Level Book, or equivalent)[1]
- Indelible ink pen (e.g., Sharpie®).

3. PROCEDURE

All information pertinent to a field survey or sampling effort will be recorded in a bound logbook. Each page/form will be consecutively numbered, dated, and signed. All entries will be made in indelible ink, and all corrections will consist of line-out deletions that are initialed and dated. The person making the correction will provide a brief explanation for the change. Entries are factual only. No personal opinions should be entered.

There should be no blank lines on a page. A single blank line or a partial blank line (i.e., at the end of a paragraph) should be lined to the end of the page. If only part of a page is used, the remainder of the page should have an "X" drawn across it. The bottom of each page must be signed and dated by the field personnel entering the information.

At a minimum, entries in the Field Logbook will include but not be limited to the following:

- Date.
- Project number and project name.
- Name and address of field contact.
- Identification of sample crew members.
- Documentation should include model numbers of equipment used (e.g., drilling rigs) and calibration (if applicable). Each day's entry should begin with time onsite, who is onsite (including observers other than the sampling crew), brief description of what work will be performed that day and how, and the weather.

[1] Pre-printed, bound forms are approved as well. See SOP No. 016 for recommended content and format.

- If samples are being taken in or near tidal waters, the time of high and low tide for the site should be determined from local gauges or tables and recorded.

- References such as maps of the sampling site.

- Times of key daily milestones should be entered (e.g., time borings began, times personnel arrived and left site, times subcontractors arrived and left site, etc.). Time should be recorded in the left-hand margin on the page in military time.

- Sample-specific information:

  — Unique, sequential field sample number

  — Purpose of sampling

  — Location, description, and log of photographs of each sampling point

  — Details of the sample site (e.g., elevation of the casing, casing diameter and depth, integrity of the casing, etc.)

  — Documentation of procedures for preparation of reagents or supplies which become an integral part of the sample (e.g., filters and absorbing reagents)

  — Type of media of sample (e.g., groundwater, surface water, soil, sediment, and product)

  — Suspected waste composition

  — Number and volume of sample taken

  — Sampling methodology, including distinction between grab and composite sample

  — Sample preservation

  — Date and time of collection

  — Collector's sample identification number(s)

  — Sample shipment (e.g., name of the laboratory and cartage agent: Federal Express, United Parcel Service, etc.)

  — Field observations (e.g., oily sheen on groundwater sample, incidental odors, soil color, grain size, plasticity, moisture content, layering, Unified Soil Classification System classification, etc.)

— Any field measurements made (e.g., pH, conductivity, explosivity, water depth, organic vapor analyzer readings, etc.)

— Signature and date by the personnel responsible for observations

— Decontamination procedures.

Sampling situations vary widely. No general rules can specify the extent of information that must be entered in a Field Logbook. However, records should contain sufficient information so that someone can reconstruct the sampling activity without relying on the sampler's memory. Further, the project work plan or field sampling plan should be reviewed to identify additional specific information or requirements that should be included in the Field Logbook.

The Project Manager will keep a master list of all Field Logbooks assigned to the Sampling Team Leaders. One Field Logbook kept by the Project Manager will be a master site log of daily activities and will contain the list of Field Logbooks assigned to Sampling Team Leaders.

Project name and number should be clearly marked on the outside cover using indelible ink. If more than one Field Logbook exists for the project, then the number of the Field Logbook should also be clearly marked on the outside cover.

4. MAINTENANCE

At the end of the field sampling effort, the Field Logbook should be scanned and filed in the electronic file for the project and maintained according to the EA Records Retention Policy or contract requirements.

5. PRECAUTIONS

None.

6. REFERENCES

EA Engineering, Science, and Technology, Inc., PBC. 2014. Standard Operating Procedure No. 016 for Surface Water, Groundwater, and Soil/Sediment Field Logbooks. December.

U.S. Environmental Protection Agency. 1980. *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, QAMS-005/80.

———. 1990. *Sampler's Guide to the Contract Laboratory Program*. EPA/540/P-90/006, Directive 9240.0-06, Office of Emergency and Remedial Response, Washington, D.C. December.

———. 1991. *User's Guide to the Contract Laboratory Program*. EPA/540/O-91/002, Directive 9240.0-01D. Office of Emergency and Remedial Response. January.

Standard Operating Procedure No. 073
for
Sampling for Per- and Polyfluorinated Alkyl Substances

Prepared by

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Revision 1
June 2019

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PROJECT-SPECIFIC VARIANCE FORM

This form is to be completed to indicate if there are client-, project-, or site-specific variances to this Standard Operating Procedure (SOP) (**check Box A**), or if this SOP is being used with no changes (**check Box B**). This form should be archived with the project files.

☐ **A. Variances required; cite section(s) of the SOP to which there is a variance**

☐ **B. No variances**

SOP No. 073	
SOP Section	**Variance**

Project Manager (Name)

Project Manager (Signature) Date

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DOCUMENT REVISION HISTORY

ORIGINAL (MASTER) DOCUMENT REVISION HISTORY				
Revision Number	**Revision Date**	**Revision Summary**	**Revised By**	**Reviewed By**
1	June 2019	Note regarding water-tight lids	F. Barranco	F. Barranco

1. SCOPE AND APPLICATION

The objective of this Standard Operating Procedure (SOP) is to delineate protocols for collecting environmental samples for analysis of per- and polyfluorinated alkyl substances (PFAS), also known generally as perfluoroalkyl compounds or chemicals (PFCs).

This SOP includes sampling procedures and requirements specific to analysis of PFAS, which are ubiquitous and have a high potential for cross-contamination from common consumer products and sampling materials, even when new and clean. This SOP should be used in combination with appropriate SOPs applicable to the target medium and sampling methodology (e.g., but not limited to SOP No. 007 Surface Water Sampling, SOP No. 013 Collection of Monitoring Well Samples, SOP No. 21 Sediment Sampling, SOP No. 25 Soil Sampling, or SOP No. 047 Direct-Push Technology Sampling).

This SOP was developed primarily based on guidance from the U.S. Army Corps of Engineers (2016) and the Interstate Technology Regulatory Council (ITRC 2018).

2. ACCEPTABLE MATERIALS

Table 1 provides a summary of Prohibited Items that should NOT be used or present during sampling for PFAS because they may contain PFAS, along with Acceptable (PFAS-free) Alternatives that may be used if appropriate for project requirements. In general, in the context of sampling events, PFAS are commonly found in waterproof and nonstick materials (including food packaging, rain gear, and anything containing Teflon®), personal care products, and certain plastics (e.g., low-density polyethylene [LDPE]) and synthetic fibers.

Table 1. Prohibited Items and Acceptable Alternatives for Use during PFAS Sampling

Prohibited Items	Acceptable Alternatives
Field Equipment	
Teflon-containing or LDPE materials (including tubing, bailers, tape)	HDPE or silicone materials
Waterproof field books, plastic clipboards, binders, or spiral hard cover notebooks	Loose paper (non-waterproof) on aluminum or Masonite clipboards
Sharpies®/markers, waterproof pens	Non-waterproof pens or pencils
Sticky notes (e.g., Post-It®) and glues	Not applicable
Re-usable chemical (blue) ice packs	Regular ice in polyethylene bags (double bagged)
Aluminum foil	Thin HDPE sheeting
Plastic spoons used in soil/sediment sampling	Stainless steel trowels/spoons
Reusable core liners	Single-use PVC or acetate liners
LDPE HydraSleeve	HDPE HydraSleeve
Field Clothing and Personal Protective Equipment	
New cotton clothing; synthetic water resistant, waterproof, or stain- treated clothing; clothing containing Gore-Tex™	Well-laundered clothing, defined as clothing that has been washed 6 or more times after purchase, made of natural fibers (preferably cotton)
Clothing laundered using fabric softener	No fabric softener
Boots (e.g., steel-toed or waders) containing Gore-Tex™ or waterproof coatings	Boots made with polyurethane or PVC with no waterproof coating

Prohibited Items	Acceptable Alternatives
Coated Tyvek® suits	Uncoated/plain Tyvek suits not containing PFAS
Cosmetics, shampoo, conditioner, body gel, moisturizers, hand cream, waxed dental floss, or other personal care products used on the day of sampling.	Use bar soap not containing moisturizers and rinse well on the day of sampling (including for hand washing). Use any other required products the night before (rather than the day of) sampling.
Paper towels	Air dryers (for hand drying)
No sunscreens or insect repellents except approved 100% natural products such as those noted in the Alternatives column.	**Acceptable Sunscreens:** Alba Organics Natural Sunscreen, Yes To Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss My Face, "free" or "natural" sunscreens for babies **Acceptable Insect Repellents:** Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect Repellant, Herbal Armor, California Baby
Sample Containers	
LDPE or glass containers	HDPE containers (or polypropylene if required)
Teflon-lined caps	Unlined HDPE (or polypropylene if required) caps
Rain Events	
Rain gear that has been treated to make it waterproof/resistant and breathable (e.g., Gore-Tex™ treated)	PVC or polyurethane- or wax-coated rain gear that is confirmed not to contain PFAS, or utilize a gazebo tent that is only touched or moved prior to and following sampling activities.
Equipment Decontamination	
Decon 90	Alconox®, Liquinox®, and/or Citranox®
Water from an onsite well	Potable water from municipal drinking water supply (not containing PFAS), and "PFAS-free" deionized water for final rinse
Food Considerations	
All food and drink, with exceptions noted in the Alternatives column. Paper food packaging (e.g., fast food wrappers, drink cups, paper bags) and foil, in particular, often contain PFAS.	Bottled water and hydration drinks (i.e., Gatorade® and Powerade®) to be brought and consumed only in the staging area
NOTES: HDPE = High-density polyethylene. PVC = Polyvinyl chloride.	

If a plastic product or chemical not included in the Acceptable Alternatives column of Table 1 is proposed for use, it is recommended that Safety Data Sheets and other references be reviewed prior to use to confirm that the material does not contain PFAS. Indications of potential PFAS ingredients, in addition to the items listed in Table 1, include the following materials (ITRC 2018):

- Polytetrafluoroethylene (fluorocarbon solids such as Teflon)
- Fluorinated ethylene propylene
- Ethylene tetrafluoroethylene
- Polyvinylidene fluoride
- Generally, any other ingredient names containing the prefix "fluoro."

Specific to the use of HDPE sample containers, note that the associated lids are not typically "water-tight." Therefore, HDPE sample containers should be individually placed in water-tight bags prior to placement in shipping containers loaded with ice.

3. PROCEDURES

As stated above, this SOP includes procedures specific to analysis of PFAS, and should be used in combination with the appropriate SOPs applicable to the target medium and sampling methodology.

3.1 GENERAL CONSIDERATIONS

Materials listed in the Prohibited Items column of Table 1 and other materials containing PFAS ingredients should not be used. However, in some cases, these materials must be used due to factors outside the control of the scope of the work or utility of the project team (e.g., health and safety requirements where other hazardous chemicals are present, or where the sampling requirements are prescriptive, unexpected, or time-sensitive). In these cases, the sampling team should purge/rinse equipment adequately with PFAS-free water where available, and collect additional quality control samples (Section 3.7) to assess the degree of cross-contamination associated with the use of known or suspected PFAS-containing materials during sampling.

NOTE: Most steel-toed boots are made from coated leather and synthetic fibers. PVC or polyurethane are preferred PFAS-free materials for boots. If not possible to obtain PFAS-free footwear that comply with specified health and safety requirements for personal protective equipment, then field personnel should minimize contact with footwear while in the sampling area, and always change gloves after touching footwear.

Disposable nitrile gloves shall be worn at all times during PFAS sampling activities. A new pair of nitrile gloves shall be donned after contacting potential contaminants including all non-decontaminated surfaces. New gloves shall also be donned before touching containers used for storage of PFAS samples, decontaminating re-usable sampling equipment, or handling quality control samples (Section 3.7).

Food shall not be eaten within 10 meters of any sampling area. Before eating or drinking, sampling personnel shall remove their gloves and any outer garments (e.g., coveralls) and leave the work area. When finished, sampling personnel shall wash their hands, remove any visible residue, and put new gloves and any outer garments back on prior to returning to the work area.

PFAS-containing stain resistant products are often applied to vehicle seats that have fabric upholstery. Therefore, if no outer garments (e.g., coveralls) will be worn, or if the outer garments will be worn in the field vehicle then, if feasible, the seats of the vehicle should be covered in a well-laundered cotton blanket to avoid contact between clothing and the seats.

Visitors to the sampling area shall remain at least 10 meters at a distance.

As indicated in Table 1, sampling personnel shall not use the personal care products or cosmetics (other than bar soap) prior to or during sample collection on any day. Additionally, clothes worn during sampling should be well-washed natural fibers.

Other personnel who come within 2-3 meters of the sample collection area should follow the guidelines above and in Table 1.

Fluids used during laboratory- or fieldwork (e.g., drilling for monitoring well installation or for deep soil sampling) should be confirmed PFAS-free.

When sampling on a surface water body, associated gear (e.g., waders, life preservers) should be confirmed PFAS-free.

3.2 EQUIPMENT DECONTAMINATION

Wherever possible, dedicated or disposable equipment shall be used to avoid the need for decontamination, which introduces additional potential for cross-contamination.

Large field equipment (e.g., drill rigs) should be decontaminated with potable water using steam or high-pressure water. Laboratory-certified "PFAS-free" water should be used to perform a final rinse of portions of the sampling equipment that will be in direct contact with samples, wherever practical.

Hand-held, non-dedicated sampling equipment, which is used at multiple field sampling locations, shall be decontaminated using the following procedure:

- Rinse with a non-PFAS-containing detergent (e.g., Alconox, Liquinox, or Citranox)
- Rinse with laboratory-provided, "PFAS-free" water (Grade 3 distilled, Millipore deionized)
- Rinse with methanol
- Rinse with laboratory-provided, "PFAS-free" deionized water.

The Safety Data Sheet for the selected detergent should be reviewed to ensure that it does not contain fluoro-surfactant ingredients.

Wherever possible, equipment should be rinsed with "PFAS-free" water immediately prior to use at each sampling location.

3.3 SAMPLE COLLECTION AND PRESERVATION

The sampling team shall coordinate with the analyzing laboratory regarding requirements for sample bottle, volume, and preservation requirements for samples for PFAS analysis, and the laboratory should provide certified "PFAS-free" containers. HDPE bottles with unlined caps are

typically used for collection of samples for PFAS analyses. Polypropylene may also be used for specific applications (e.g., collection of drinking water samples to be analyzed for the short list of PFASs by Method 537) (Department of Defense Environmental Data Quality Workgroup 2017).

Containers for collection of PFAS samples shall never be left uncapped, either before or after sample collection, and the lid/cap shall be kept in a gloved hand and not be set down while removed from the container.

Sampling personnel shall put on a clean pair of nitrile gloves immediately prior to collection of each sample for PFAS analyses, prior to removing the lid from the sampling container. After the sample is collected and the container is closed, pens or pencils, but not markers, shall be used in completing sample labels or in the vicinity of samples during collection.

Following sample collection and addition of preservative (if required), sample containers for PFAS analyses shall be placed in coolers with new, double-bagged ice and not re-usable chemical ice packs unless confirmed PFAS-free and regulatorily accepted, such that meltwater does not contact sample containers during transport.

3.4 SOIL/SEDIMENT SAMPLING CONSIDERATIONS

Surface soil and sediment samples for PFAS analyses should be collected using a clean, stainless-steel tool (e.g., a trowel or Ponar grab sampler).

For field collection of soil and sediment cores, single-use PVC, HDPE, or acetate liners shall be used, and samples for PFAS analysis should be collected from the cores directly or using a stainless-steel tool.

3.5 GROUNDWATER SAMPLING CONSIDERATIONS

It is recommended that, where feasible, measurements of monitoring well water levels and well depths be performed after sampling for PFAS to avoid possible cross-contamination.

HDPE or silicone tubing shall be used for purging and sample collection, where applicable. Teflon and LDPE shall NOT be used. During sampling, sampling personnel shall ensure that no tubing or other equipment contacts the inside or rim of the sample bottle. Any foaming observed in the sample during collection should be noted on the chain-of-custody form that accompanies the samples to the analytical laboratory.

If analyses to be performed by the laboratory include less common PFAS chemicals that have relatively high volatility (including fluorotelomers and sulfonamide/alcohols such as fluorotelomer alcohols, fluorotelomer acrylates, and methyl/ethyl fluorosulfonamides and sulfonamidoethanols), then precautions should be taken during sample collection to minimize loss of volatiles (e.g., minimizing turbulence in water as it flows into the sample container).

If use of passive/no-purge sample collection technology is to be utilized, it is critical to confirm that the sampling device does not contain LDPE (e.g., HydraSleeves made of HDPE rather than LDPE may be requested for PFAS sampling).

Filtration is not recommended because the filter may sorb PFAS or be a source of PFAS contamination.

3.6 SURFACE WATER AND POREWATER SAMPLING CONSIDERATIONS

Capped surface water sample containers shall be rinsed multiple times with site surface water prior to sampling.

Because PFAS tend to accumulate at the air/water interface, specific procedures for surface water sampling shall be followed. After rinsing, the capped container shall be lowered into the surface water, with the top pointed down. The container shall then be reoriented with the top pointed upward and opened under water at the depth targeted for sampling, ideally at least 10 centimeters from both the sediment surface and the water surface. During sample collection, the sample collection point shall be positioned upstream of the sampler, gloves, etc. If an extension rod must be used due to the depth of sampling, the rod shall be made of clean, PFAS-free material.

For porewater sampling, the common stainless-steel and PVC samplers, with HDPE and silicone tubing, are acceptable. The samplers should not be reused at multiple sampling locations.

As for groundwater samples, filtration is not recommended.

3.7 FIELD QUALITY CONTROL SAMPLES

It is recommended that field blanks and equipment (i.e., rinsate) blanks be collected at least daily, using laboratory supplied “PFAS-free” water, to detect any cross-contamination that occurred despite precautions taken during sampling. If a peristaltic pump is used for sample collection, then at least one equipment blank should be collected by pumping “PFAS-free” water through the pump with clean HDPE tubing.

Field duplicates should also be collected to assess the precision of the results.

Analysis of trip blanks may be advisable on a project-specific basis, particularly if relatively volatile PFAS chemicals will be analyzed.

The same precautions taken during collection of specified samples should be taken during the collection of quality control samples (Section 3.7).

4. MAINTENANCE

Not applicable.

5. PRECAUTIONS

See detailed precautions noted above.

6. REFERENCES

Department of Defense Environmental Data Quality Workgroup. 2017. *Bottle Selection and other Sampling Considerations When Sampling for Per-and Poly-Fluoroalkyl Substances (PFAS)*. Revision 1.2. July.

Interstate Technology Regulatory Council (ITRC). 2018. *Fact Sheet: Site Characterization Considerations, Sampling Precautions, and Laboratory Analytical Methods for Per- and Polyfluoroalkyl Substances (PFAS).* March.

U.S. Army Corps of Engineers. 2016. *Standard Operating Procedure 047: Per/Poly Fluorinated Alkyl Substances (PFAS) Field Sampling*. March.

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Appendix B

Field Forms

- Fish Sampling Log
- Indoor Air Sampling Form
- Monitoring Well Development Log
- New York State Department of Health Indoor Quality Questionnaire and Building Inventory Center for Environmental Health
- Well Purging and Sampling Record
- Sediment Sampling Log
- Soil Boring Log
- Soil Vapor Sampling Log
- Surface Soil Sampling Log
- Surface Water Sampling Log
- Test Pit Log

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EA Engineering, P.C. and Its Affiliate
EA Science and Technology

FISH SAMPLING LOG

page _____ of _____

Project and Site Name _____ DEC Region _____

Collections made by (names) _____

Sampling Method: ☐Electrofishing ☐Gill netting ☐Trap netting ☐Trawling ☐Seining ☐Angling ☐Other _____

Preservation Method: ☐Freezing ☐Other _____ Notes (SWFDB survey number): _____

FOR LAB USE ONLY- LAB ENTRY NO.	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	LOCATION	AGE	SEX &/OR REPROD. CONDIT	LENGTH ( )	WEIGHT ( )	REMARKS

Field form adapted from NYSDEC format. richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17

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INDOOR AIR SAMPLING FORM

EA Engineering, P.C. and Its Affiliate EA Science and Technology	Project No. Project Name: Location: Project Manager:

Sample Location Information:

Site ID Number:		Sampler(s):	
PID Meter Used: (Model, Serial #)		Building I.D. No.:	

SUMMA Canister Record:

INDOOR AIR - FIRST FLOOR		INDOOR AIR - BASEMENT		SUBSLAB SOIL GAS		OUTDOOR AIR	
Flow Regulator No.		Flow Regulator No.		Flow Regulator No.		Flow Regulator No.	
Canister Serial No.		Canister Serial No.:		Canister Serial No.:		Canister Serial No.:	
Start Date/Time:		Start Date/Time:		Start Date/Time:		Start Date/Time:	
Start Pressure: (inches Hg)		Start Pressure: (inches Hg)		Start Pressure: (inches Hg)		Start Pressure: (inches Hg)	
Stop Date/Time:		Stop Date/Time:		Stop Date/Time:		Stop Date/Time:	
Stop Pressure: (inches Hg)		Stop Pressure: (inches Hg)		Stop Pressure: (inches Hg)		Stop Pressure: (inches Hg)	
Sample ID:		Sample ID:		Sample ID:		Sample ID:	

Other Sampling Information:

Story/Level		Story/Level		Basement or Crawl Space?		Direction from Building	
Room		Room		Floor Slab Thickness (inches) *[if present]*		Distance from Building	
Indoor Air Temp (^{o}F)		Indoor Air Temp		Potential Vapor Entry Points Observed?		Intake Height Above Ground Level (ft.)	
Barometric Pressure?		Barometric Pressure?		Ground Surface Condition (Crawl Space Only)		Intake Tubing Used?	
Intake Height Above Floor Level (ft.)		Intake Height Above Floor Level (ft.)		If slab, intake Depth If Crawl Space, intake height		Distance to nearest Roadway	
Noticeable Odor?		Noticeable Odor?		Noticeable Odor?		Noticeable Odor?	
PID Reading (ppb)		PID Reading (ppb)		PID Reading (ppb)		PID Reading (ppb)	
Duplicate Sample?		Duplicate Sample?		Duplicate Sample?		Duplicate Sample?	

Comments:

Sampler Signature:

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EA Science and Technology

MONITORING WELL DEVELOPMENT LOG

Well I.D.:	**EA Personnel:**	**Client:** NYSDEC
Location:	**Well Condition:**	**Weather:**
Sounding Method:	**Gauge Date:**	**Measurement Ref:**
	Gauge Time:	
Stick Up/Down (ft):	**PID Headspace Reading:**	**Well Diameter (in):**

Purge Date:	**Purge Time:**
Purge Method:	**Field Technician:**

Well Volume

A. Well Depth (ft):	**D. Well Volume (ft):**	**Depth/Height of Top of PVC:**
B. Depth to Water (ft):	**E. Well Volume (gal) C*D):**	**Pump Type:**
C. Liquid Depth (ft) (A-B):	**F. Three Well Volumes (gal) (E3):**	**Pump Intake Depth:**

Water Quality Parameters

Time (hrs)	pH (pH units)	Conductivity (mS/cm)	Turbidity (ntu)	DO (mg/L)	Temperature (^{o}C)	ORP (mV)	DTW (ft btoc)	Rate (Lpm)	Volume (liters)

Total Quantity of Water Removed (gal): _____ **Personnel:** _____

COMMENTS AND OBSERVATIONS: _____

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No._____

Purpose of Investigation_____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: _____

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

Does it include residences (i.e., multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors_____ Building age_____

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

_____

_____

_____

Airflow near source

_____

_____

_____

Outdoor air infiltration

_____

_____

_____

Infiltration into air ducts

_____

_____

_____

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other _____
c. Basement floor:	concrete	dirt	stone	other _____
d. Basement floor:	uncovered	covered	covered with _____	
e. Concrete floor:	unsealed	sealed	sealed with _____	
f. Foundation walls:	poured	block	stone	other _____
g. Foundation walls:	unsealed	sealed	sealed with _____	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	
j. Sump present?	Y / N			
k. Water in sump?	Y / N / not applicable			

Basement/Lowest level depth below grade: _____(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

_____

_____

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other_____
Air conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

_____

_____

_____

_____

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	_____
1st Floor	_____
2nd Floor	_____
3rd Floor	_____
4th Floor	_____

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA
Please specify_____

d. Has the building ever had a fire? Y / N When?_____

e. Is a kerosene or unvented gas space heater present? Y / N Where? _____

f. Is there a workshop or hobby/craft area? Y / N Where & Type? _____

g. Is there smoking in the building? Y / N How frequently? _____

h. Have cleaning products been used recently? Y / N When & Type? _____

i. Have cosmetic products been used recently? Y / N When & Type? _____

j. Has painting/staining been done in the last 6 months? Y / N Where & When? _____

k. Is there new carpet, drapes or other textiles? Y / N Where & When? _____

l. Have air fresheners been used recently? Y / N When & Type? _____

m. Is there a kitchen exhaust fan? Y / N If yes, where vented?_____

n. Is there a bathroom exhaust fan? Y / N If yes, where vented?_____

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type?_____

Are there odors in the building? Y / N
If yes, please describe: _____

Do any of the building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? _____

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) No
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: _____
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply:	Public Water	Drilled Well	Driven Well	Dug Well	Other: _____
Sewage Disposal:	Public Sewer	Septic Tank	Leach Field	Dry Well	Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

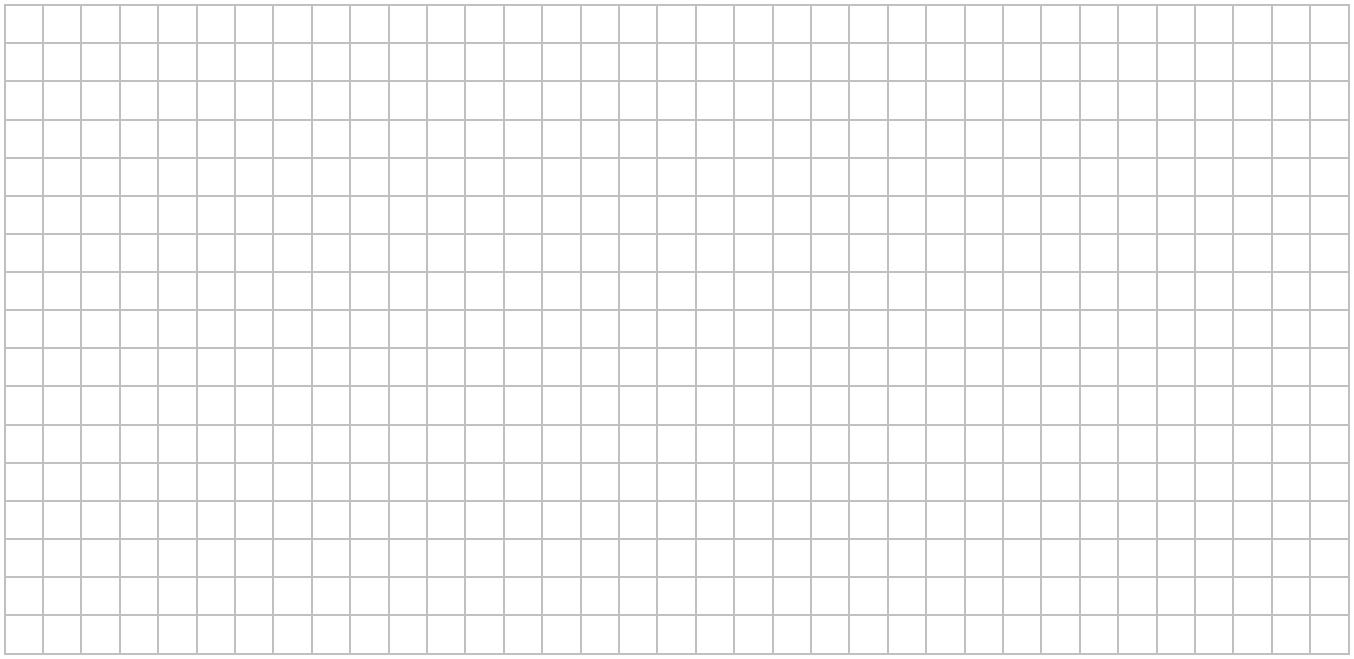
c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

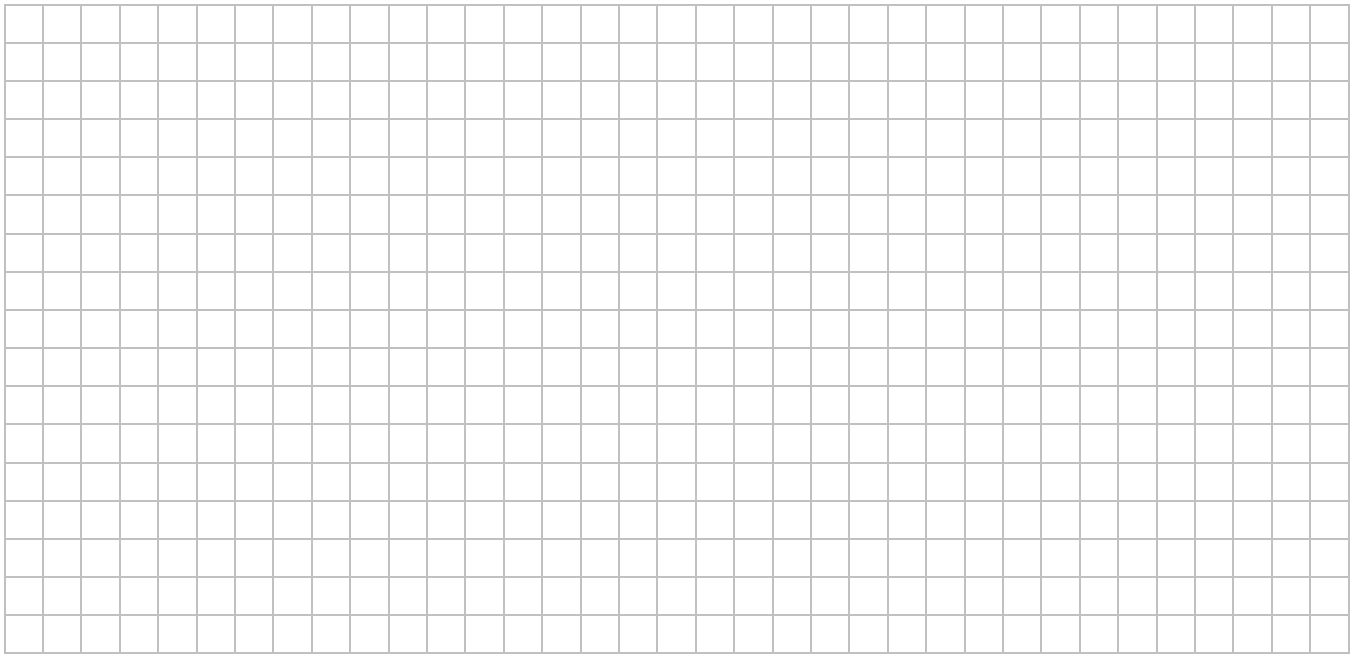
11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement:



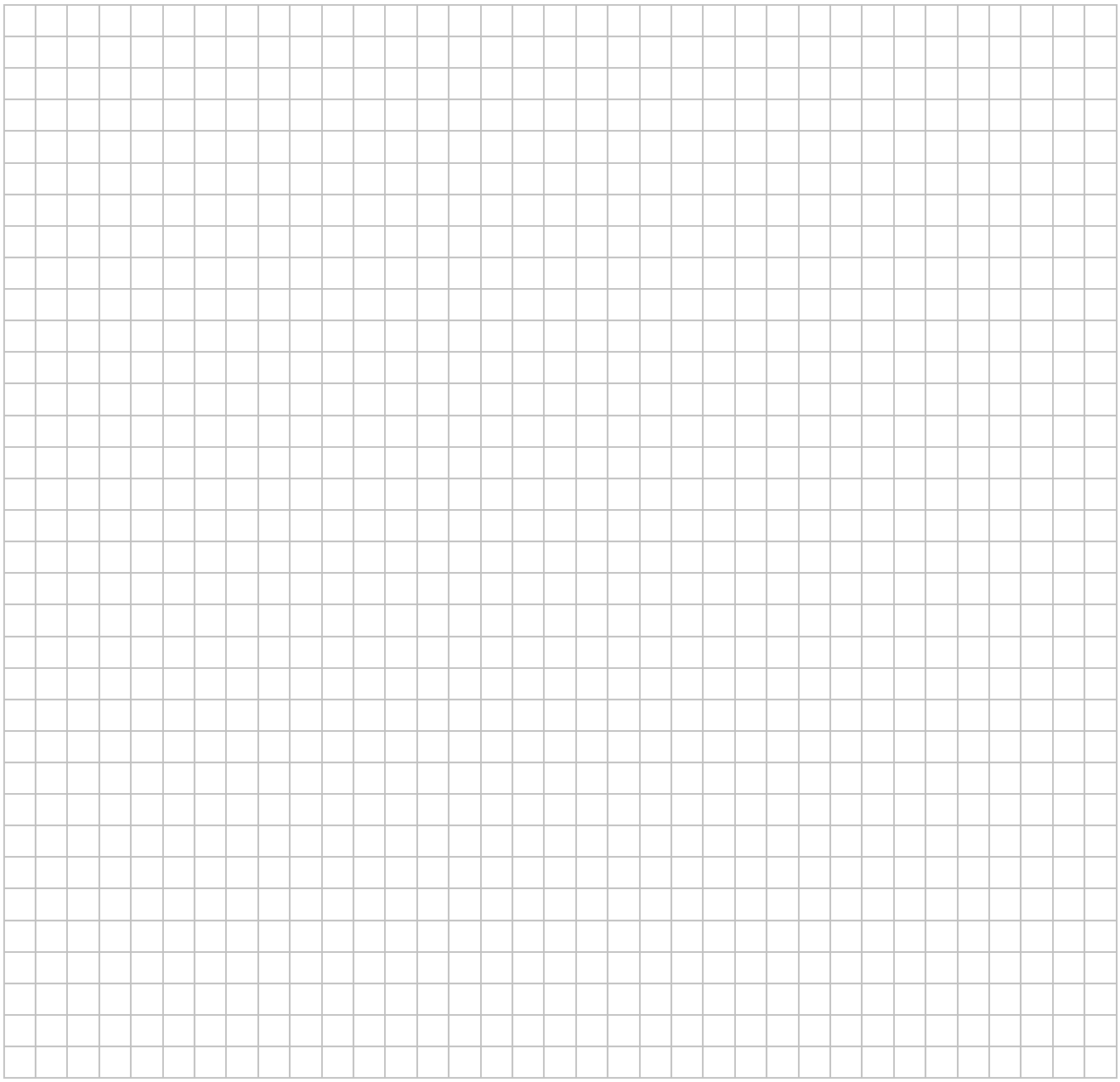
First Floor:



12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo ** Y / N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

WELL PURGING AND SAMPLING RECORD

Site Name/Location	Project No:	Page of
Well ID	Date	Time
Well Site Description		
Weather/Temp		
Field Technician		

WELL CONSTRUCTION DATA

TOC Elevation (ft amsl)	Screened Interval (ft bgs)
Well Diameter (in.)	Nominal Borehole Diameter (in.)

FIELD MEASUREMENTS

Well Depth (gauge after sampling) (ft)	Gallons per foot of depth
Depth to product (ft)	Static water level (ft)
Product column height (ft)	Water column height (ft)
Product volume (Gallons)	Water volume (Gallons)

PURGE INFORMATION

Pump Type / ID		Water Quality Meter Type / ID
Pump Intake Depth (ft)		Flow-Thru Cell Volume (L)
Purge Start Time		Appearance/Odor (Start)
Purge End Time		Appearance/Odor (End)
Average Purge Rate (mL/min)		Total Drawdown (ft)
Well Went Dry (Y/N)	Stop Time	Volume removed (L)
Recovery Time	Recovery Rate (mL/min)	Restart Purge Time
Total Volume Removed (L)		Total Pump Time (min)

Date	Time	Purge Rate (mL/min)	Volume Removed (LPM)	pH (+/-0.1)	Cond. (µS/cm) (+- 3%)	Temp. (°C) (+- 3%)	ORP (mV) (+/- 10)	Turbidity (NTU) +/-10% or <5 NTU	DO (mg/L) +/-10% or <5 mg/L	Depth to Water (ft below TOC)

COMMENTS _____

SAMPLE COLLECTION

Sample Date	Sample Time
Sample ID	
QA/QC Collected / ID	Sample Appearance/Odor
Analyses	
Sampler	Signature

SEDIMENT SAMPLING LOG

Client Name and Project Name	Location/Boring Name	Sheet of

1 Geologist Name/Signature	5 Project Number	8 Start - Stop (Date/Tme)
2 Subcontractor/Equipment Operator	6 Latitude/Northing/Grid	9 Sed Surface Elevation ft
		10 Coordinate System H V
		11 Depth of Water (start) ft
3 Operator Name *(Licence # If Required)*	7 Longitude/Easting/Grid	12 Depth of Water (end) ft
		13 Sunny/Cloudy/Rain
		14 Temperature (start/high) *F*
4 Sampling Equipment and Methodology (Check One)		15 Wind Direction
Rotosonic: ___ -ft barrel ___ -in diameter ___ -ft spoon/sample		16 Total Boring Depth ft
Core: ___ -ft barrel ___ -in diameter ___ -VPM Manual/Vibracore/Other		17 Recovery Depth ft %
Grab Sample: -ft x -ft x -ft Box/Ponar/Van Veen/Other		18 Location Notes
Other:		
Sample Collection Method:		

Interval *(Depth)*	**Recovery** *(ft & %)*	**Description of Materials** Munsell Color; Moisture; Density; Consistency (Other Remarks)	**Sample ID** **Sample Interval**	**USCS** *Code*

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EA Science and Technology

SOIL BORING LOG

Coordinates: Northing _____ Easting: _____
Surface Elevation:
Casing Below Surface:
Reference Elevation:
Reference Description:

Job. No.	**Client:** NYSDEC **Project:**	**Location:**
Drilling Method:		**Soil Boring Number:**
Sampling Method:		**Sheet 1 of**

					Drilling	
Water Level:					**Start**	**Finish**
Time:					DATE	DATE
Date:					TIME	TIME

Surface Conditions:
Weather:
Temperature:

Blow Counts (140-lb)	**Ft. Driven/ Ft. Record**	**Boring Diagram**	**PID (ppm)**	**Depth in Feet**	**USCS Log**
				0	
				1	
				2	
				3	
				4	
				5	
				6	
				7	
				8	
				9	
				10	
				11	
				12	
				13	
				14	
				15	
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				22	
				23	
				24	
				25	
				26	
				27	
				28	
				29	

Monitoring Well Construction Information

Monitoring Well Diameter: _____ in
Bottom of Monitoring Well: _____ ft bgs
Stick Up or Flush Mount: _____
Screen Interval: _____ To _____ ft bgs
Riser Interval: _____ To _____ ft bgs
Sand Pack Interval: _____ To _____ ft bgs
Bentonite Seal: _____ To _____ ft bgs
Grout Interval: _____ To _____ ft bgs

Soil Vapor Point Installation Information

Depth of Soil Vapor Point: _____ ft
Bottom of Tubing: _____ ft
Top of Sand Pack: _____ ft
Top of Bentonite Seal: _____ ft

Logged by: _____ Date: _____
Drilling Contractor: _____ Driller: _____

EA Engineering, P.C. and Its Affiliate EA Science and Technology **SOIL VAPOR SAMPLING LOG**		Project #: Project Name: Location: Project Manager:

Sample Location Information:

Site ID Number:				Sampler(s):	
PID Meter Used (Model, Serial #) :				Soil Vapor I.D. No.:	

SUMMA Canister Record:

SOIL VAPOR POINT		DUPLICATE SAMPLE (IF COLLECTED)	
Flow Regulator No.:		Flow Regulator No.:	
Canister Serial No.:		Canister Serial No.:	
Start Date/Time:		Start Date/Time:	
Start Pressure: (inches Hg)		Start Pressure: (inches Hg)	
Stop Date/Time:		Stop Date/Time:	
Stop Pressure: (inches Hg)		Stop Pressure: (inches Hg)	
Sample ID:		Sample ID:	

Other Sampling Information:

Helium percentage achieved in enclosure for Tracer Gas Test:		Depth to sample point:	
Tracer Gas test result (% of Helium):		Nearest Groundwater Elevation:	
Noticeable Odor?		Additional info:	
Purge Volume PID Reading (ppb)			
Duplicate Sample?			
Outdoor Ambient Temperature:			
Wind Direction:			

Comments:

Sampler Signature:

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EA Engineering, P.C. and Its Affiliate
EA Science and Technology

SURFACE SOIL SAMPLING LOG

Coordinates: Northing: _____ Easting: _____
Surface Elevation: _____
Reference Elevation: _____
Reference Description: _____

Job. No.	Client: NYSDEC Project:	Location
Sampling Location Description:		Sample Location ID:
		Sheet 1 of 1
		Sampling Date/Time
Sample Method:	Start	Finish
	DATE TIME	DATE TIME

Sample Interval (in.)	PID (ppm)	TCL VOCs	TCL SVOCs	TCL Metals	TCL PCBs/ Pesticides	USCS Log	Surface Conditions: Weather: Temperature:

Logged by: _____ **Date:** _____

Sample Interval: _____ **Time:** _____

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SURFACE WATER SAMPLING LOG

Job. No.	**Client:** NYSDEC **Project:**	**Location**	
Sampling Location Description:		**Sample Location ID:**	
		Sheet 1 of 1	
Sample Method:			
Depth of Water Body:		**Sampling Date/Time**	
Width of Water Body:		**Start**	**Finish**
Water Body Location		DATE	DATE
		TIME	TIME

Coordinates: Northing: Easting:
Surface Water Elevation:
Reference Elevation:
Reference Description:

	Water Quality Parameters							
	Time	**pH**	**Cond.**	**Turb.**	**DO**	**Temp**	**ORP**	**Surface Conditions:**
	(hrs)	**(pH units)**	**(mS/cm)**	**(ntu)**	**(mg/L)**	**(°C)**	**(mV)**	**Weather:**
								Description of Surface Water

Total Quantity of Water Removed (gal):
Samplers:
Sampling Date:

Sampling Time:
Split Sample With:
Sample Type:

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TEST PIT LOG

Job. No.	**Client:** NYSDEC **Project:**	**Location**	
Sampling Location Description:		**Sample Location ID:**	
		Sheet 1 of	
Sample Method:			
Depth of Test Pit:		**Sampling Date/Time**	
Depth to Bedrock (ft bgs):		**Start**	**Finish**
Groundwater Encountered (ft bgs):		DATE	DATE
Disposition of Test Pit:		TIME	TIME

Coordinates: Northing: Easting:
Surface Elevation:
Reference Elevation:
Reference Description:

Surface Conditions:
Weather:

Depth Interval (ft bgs)	PID (ppm)	Analysis						USCS Log	Description of Material
		TCL VOCs	TCL SVOCs	TCL Metals	TCL PCBs/ Pesticides	Other	Other		

Logged by: _____ **Date:** _____

Sample Interval: _____ **Time:** _____

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Appendix M.
FEMA Flood and Wildfire Risk Analysis

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National Risk Index

April 23, 2024

Nassau County, New York

Summary

Risk Index is **Relatively High** Score **96.7**

Expected Annual Loss is **Relatively High** Score **97.3**

Social Vulnerability is **Relatively Low** Score **27.8**

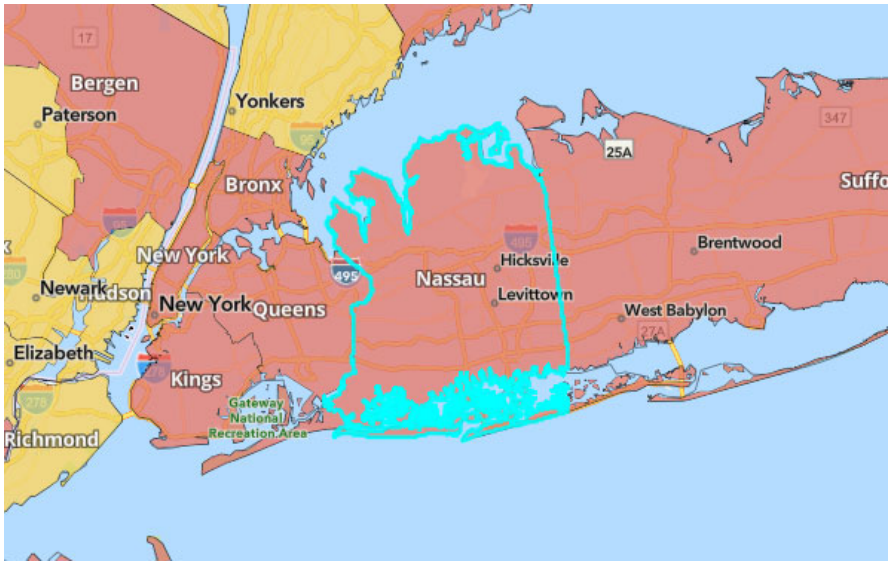
Community Resilience is **Very High** Score **95.0**

While reviewing this report, keep in mind that low risk is driven by lower loss due to natural hazards, lower social vulnerability, and higher community resilience.

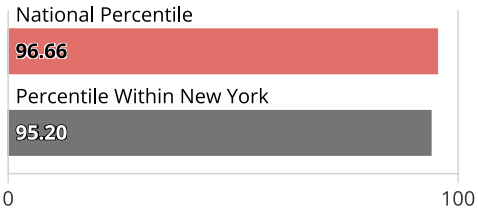
For more information about the National Risk Index, its data, and how to interpret the information it provides, please review the **About the National Risk Index** and **How to Take Action** sections at the end of this report. Or, visit the National Risk Index website at hazards.fema.gov/nri/learn-more to access supporting documentation and links.

Risk Index

The Risk Index rating is **Relatively High** for **Nassau County, NY** when compared to the rest of the U.S.



Score **96.66**



97% of U.S. counties have a lower Risk Index

95% of counties in New York have a lower Risk Index

Risk Index Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low

No Rating | Not Applicable | Insufficient Data

Hazard Type Risk Index

Hazard type Risk Index scores are calculated using data for only a single hazard type, and reflect a community's Expected Annual Loss value, community risk factors, and the adjustment factor used to calculate the risk value.

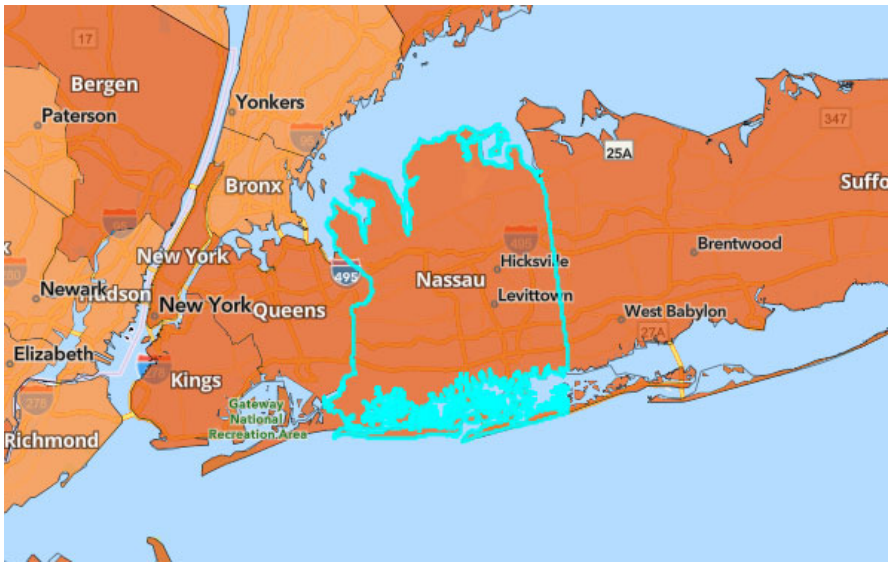
Hazard Type	Risk Index Rating	Risk Index Score	National Percentile
Avalanche	Not Applicable	--	
Coastal Flooding	Relatively Moderate	83.9	0 100
Cold Wave	No Rating	0	0 100
Drought	Very Low	17.4	0 100
Earthquake	Relatively Low	92.7	0 100
Hail	Relatively Low	72.9	0 100
Heat Wave	Relatively Moderate	92.4	0 100
Hurricane	Relatively High	97.2	0 100
Ice Storm	Very High	100	0 100
Landslide	Relatively Moderate	84.2	0 100
Lightning	Relatively High	98.4	0 100
Riverine Flooding	Relatively High	98.3	0 100
Strong Wind	Relatively High	97.8	0 100
Tornado	Relatively Moderate	75	0 100
Tsunami	Insufficient Data	--	
Volcanic Activity	Not Applicable	--	
Wildfire	Very Low	57.7	0 100
Winter Weather	Very High	98.3	0 100

Risk Factor Breakdown

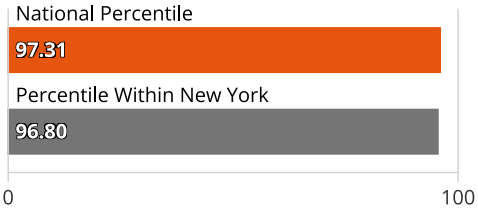
Hazard Type	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
Hurricane	$88,326,120	Relatively Low	Very High	0.95	$83,334,923	97.2
Ice Storm	$25,695,388	Relatively Low	Very High	0.95	$25,165,201	100
Riverine Flooding	$21,601,482	Relatively Low	Very High	0.95	$20,443,331	98.3
Earthquake	$5,368,192	Relatively Low	Very High	0.95	$5,283,109	92.7
Strong Wind	$4,435,832	Relatively Low	Very High	0.95	$4,367,703	97.8
Tornado	$3,090,199	Relatively Low	Very High	0.95	$3,007,090	75
Coastal Flooding	$2,700,176	Relatively Low	Very High	0.95	$2,524,190	83.9
Lightning	$2,373,720	Relatively Low	Very High	0.95	$2,328,902	98.4
Heat Wave	$1,499,054	Relatively Low	Very High	0.95	$1,471,185	92.4
Winter Weather	$1,391,020	Relatively Low	Very High	0.95	$1,361,271	98.3
Hail	$329,229	Relatively Low	Very High	0.95	$327,556	72.9
Landslide	$140,020	Relatively Low	Very High	0.95	$133,859	84.2
Wildfire	$81,076	Relatively Low	Very High	0.95	$68,147	57.7
Drought	$297	Relatively Low	Very High	0.95	$247	17.4
Cold Wave	$0	Relatively Low	Very High	0.95	$0	0
Avalanche	--	Relatively Low	Very High	0.95	--	--
Tsunami	--	Relatively Low	Very High	0.95	--	--
Volcanic Activity	--	Relatively Low	Very High	0.95	--	--

Expected Annual Loss

In **Nassau County, NY**, expected loss each year due to natural hazards is **Relatively High** when compared to the rest of the U.S.



Score	97.31



97% of U.S. counties have a lower Expected Annual Loss

97% of counties in New York have a lower Expected Annual Loss

Expected Annual Loss Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low

No Expected Annual Losses | Not Applicable | Insufficient Data

Composite Expected Annual Loss	**$157,031,805.86**
Composite Expected Annual Loss Rate National Percentile	**25.2**

Building EAL	**$104,781,304.36**	Population EAL	**4.50** fatalities
Building EAL Rate	**$1 per $2.58K of building value**	Population EAL Rate	**1 per 309.85K people**
Agriculture EAL	**$2,935.65**	Population Equivalence EAL	**$52,247,565.85**
Agriculture EAL Rate	**$1 per $318.63 of agriculture value**		

Expected Annual Loss for Hazard Types

Expected Annual Loss scores for hazard types are calculated using data for only a single hazard type, and reflect a community's relative expected annual loss for only that hazard type.

15 of 18 hazard types contribute to the expected annual loss for **Nassau County, NY**.

Hazard Type	Expected Annual Loss Rating	EAL Value	Score
Hurricane	Relatively High	$88,326,121	97.5
Ice Storm	Very High	$25,695,388	100.0

Hazard Type	Expected Annual Loss Rating	EAL Value	Score
Riverine Flooding	Relatively High	$21,601,482	98.8
Earthquake	Relatively Moderate	$5,368,192	92.6
Strong Wind	Very High	$4,435,832	98.2
Tornado	Relatively Moderate	$3,090,199	79.7
Coastal Flooding	Relatively Moderate	$2,700,176	87.2
Lightning	Very High	$2,373,720	98.8
Heat Wave	Relatively Moderate	$1,499,054	93.7
Winter Weather	Very High	$1,391,020	98.7
Hail	Relatively Low	$329,229	76.6
Landslide	Relatively Moderate	$140,020	88.1
Wildfire	Very Low	$81,077	61.7
Drought	Very Low	$297	19.9
Cold Wave	No Expected Annual Losses	$0	0.0
Avalanche	Not Applicable	--	--
Tsunami	Insufficient Data	--	--
Volcanic Activity	Not Applicable	--	--

Expected Annual Loss Values

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Avalanche	--	--	--	--	--
Coastal Flooding	$2,700,176	$2,685,565	$14,611	0.00	n/a
Cold Wave	$0	$0	$0	0.00	$0
Drought	$297	n/a	n/a	n/a	$297
Earthquake	$5,368,192	$4,507,132	$861,060	0.07	n/a
Hail	$329,229	$4,691	$324,538	0.03	$0
Heat Wave	$1,499,054	$0	$1,499,019	0.13	$34
Hurricane	$88,326,120	$86,531,119	$1,792,474	0.15	$2,528
Ice Storm	$25,695,388	$6,763,940	$18,931,447	1.63	n/a
Landslide	$140,020	$119,193	$20,827	0.00	n/a
Lightning	$2,373,720	$66,386	$2,307,334	0.20	n/a
Riverine Flooding	$21,601,482	$924,215	$20,677,200	1.78	$66

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Strong Wind	$4,435,832	$918,701	$3,517,131	0.30	$0
Tornado	$3,090,199	$2,044,733	$1,045,456	0.09	$9
Tsunami	n/a	n/a	n/a	n/a	n/a
Volcanic Activity	--	--	--	--	--
Wildfire	$81,076	$80,938	$138	0.00	$0
Winter Weather	$1,391,020	$134,690	$1,256,330	0.11	$0

Exposure Values

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Avalanche	--	--	--	--	--
Coastal Flooding	$2,122,959,475,061	$36,827,634,941	$2,086,131,840,120	179,838.95	n/a
Cold Wave	$0	$0	$0	0.00	$0
Drought	$621,611	n/a	n/a	n/a	$621,611
Earthquake	$16,461,335,912,000	$270,357,512,000	$16,190,978,400,000	1,395,774.00	n/a
Hail	$16,459,135,495,111	$270,360,159,717	$16,188,774,400,000	1,395,584.00	$935,394
Heat Wave	$16,459,135,495,111	$270,360,159,717	$16,188,774,400,000	1,395,584.00	$935,394
Hurricane	$16,457,765,787,651	$270,344,128,363	$16,187,420,723,894	1,395,467.30	$935,394
Ice Storm	$16,383,983,660,547	$268,703,556,931	$16,115,280,103,615	1,389,248.28	n/a
Landslide	$950,977,144,244	$21,352,314,023	$929,624,830,221	80,140.07	n/a
Lightning	$16,459,134,559,717	$270,360,159,717	$16,188,774,400,000	1,395,584.00	n/a
Riverine Flooding	$1,559,174,345,191	$27,529,872,023	$1,531,644,468,130	132,038.32	$5,038
Strong Wind	$16,459,135,495,111	$270,360,159,717	$16,188,774,400,000	1,395,584.00	$935,394
Tornado	$16,459,135,495,111	$270,360,159,717	$16,188,774,400,000	1,395,584.00	$935,394
Tsunami	n/a	n/a	n/a	n/a	n/a
Volcanic Activity	--	--	--	--	--
Wildfire	$112,264,216,321	$2,734,153,126	$109,530,047,737	9,442.25	$15,459
Winter Weather	$16,459,135,495,111	$270,360,159,717	$16,188,774,400,000	1,395,584.00	$935,394

Annualized Frequency Values

Hazard Type	Annualized Frequency	Events on Record	Period of Record
Avalanche	--	--	--

Hazard Type	Annualized Frequency	Events on Record	Period of Record
Coastal Flooding	3.8 events per year	n/a	Various (see documentation)
Cold Wave	0 events per year	0	2005-2021 (16 years)
Drought	0.7 events per year	21	2000-2021 (22 years)
Earthquake	0.073% chance per year	n/a	2021 dataset
Hail	2 events per year	47	1986-2021 (34 years)
Heat Wave	0.7 events per year	7	2005-2021 (16 years)
Hurricane	0.2 events per year	28	East 1851-2021 (171 years) / West 1949-2021 (73 years)
Ice Storm	0.8 events per year	38	1946-2014 (67 years)
Landslide	0 events per year	1	2010-2021 (12 years)
Lightning	36 events per year	535	1991-2012 (22 years)
Riverine Flooding	3.4 events per year	81	1996-2019 (24 years)
Strong Wind	6 events per year	138	1986-2021 (34 years)
Tornado	0.1 events per year	8	1950-2021 (72 years)
Tsunami	n/a	n/a	1800-2021 (222 years)
Volcanic Activity	--	--	--
Wildfire	0.008% chance per year	n/a	2021 dataset
Winter Weather	3.4 events per year	37	2005-2021 (16 years)

Historic Loss Ratios

Hazard Type	Overall Rating
Avalanche	--
Coastal Flooding	Very Low
Cold Wave	No Rating
Drought	Relatively Moderate
Earthquake	Relatively Low
Hail	Very Low
Heat Wave	Very Low
Hurricane	Relatively Moderate
Ice Storm	Relatively Moderate
Landslide	Very Low
Lightning	Relatively Low

Hazard Type	Overall Rating
Riverine Flooding	Very Low
Strong Wind	Very Low
Tornado	Very Low
Tsunami	Insufficient Data
Volcanic Activity	--
Wildfire	Relatively Moderate
Winter Weather	Relatively Low

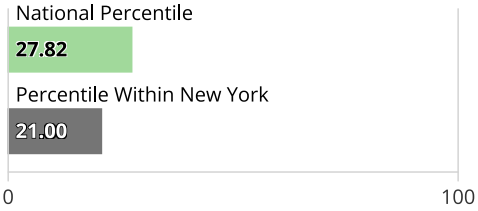
Expected Annual Loss Rate

Hazard Type	Building EAL Rate (per building value)	Population EAL Rate (per population)	Agriculture EAL Rate (per agriculture value)
Avalanche	--	--	--
Coastal Flooding	$1 per $100.67K	1 per 1.11B	--
Cold Wave	--	--	--
Drought	--	--	$1 per $3.15K
Earthquake	$1 per $59.98K	1 per 18.80M	--
Hail	$1 per $57.63M	1 per 49.88M	$1 per $1.91M
Heat Wave	$1 per $9.20T	1 per 10.80M	$1 per $27.19K
Hurricane	$1 per $3.12K	1 per 9.03M	$1 per $370.08
Ice Storm	$1 per $39.97K	1 per 855.13K	--
Landslide	$1 per $2.27M	1 per 777.30M	--
Lightning	$1 per $4.07M	1 per 7.02M	--
Riverine Flooding	$1 per $292.53K	1 per 782.93K	$1 per $14.12K
Strong Wind	$1 per $294.29K	1 per 4.60M	$1 per $371.57M
Tornado	$1 per $132.22K	1 per 15.48M	$1 per $99.30K
Tsunami	--	--	--
Volcanic Activity	--	--	--
Wildfire	$1 per $3.34M	1 per 117.02B	$1 per $27.28M
Winter Weather	$1 per $2.01M	1 per 12.89M	$1 per $4.28M

Social Vulnerability

Social groups in **Nassau County, NY** have a **Relatively Low** susceptibility to the adverse impacts of natural hazards when compared to the rest of the U.S.

Score **27.82**



28% of U.S. counties have a lower Social Vulnerability

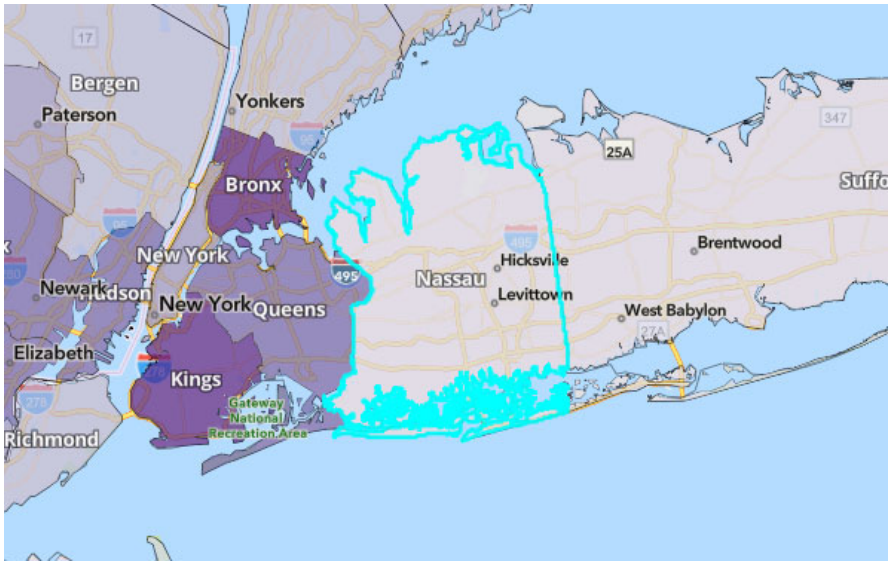
21% of counties in New York have a lower Social Vulnerability

Social Vulnerability Legend

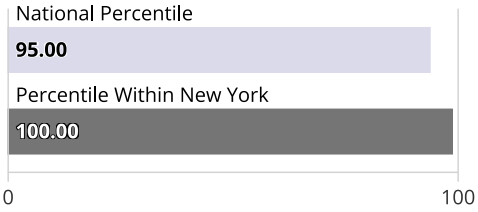
Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low | Data Unavailable

Community Resilience

Communities in **Nassau County, NY** have a **Very High** ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions when compared to the rest of the U.S.



Score **95**



5% of U.S. counties have a higher Community Resilience

0% of counties in New York have a higher Community Resilience

Community Resilience Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low | Data Unavailable

About the National Risk Index

The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability, and Community Resilience to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

Explore the National Risk Index Map at **hazards.fema.gov/nri/map**.

Visit the National Risk Index website at **hazards.fema.gov/nri/learn-more** to access supporting documentation and links.

Calculating the Risk Index

Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and Community Resilience:

Risk Index = Expected Annual Loss × Social Vulnerability ÷ Community Resilience

Risk Index scores are presented as a composite score for all 18 hazard types, as well as individual scores for each hazard type.

For more information, visit **hazards.fema.gov/nri/determining-risk**.

Calculating Expected Annual Loss

Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios for 18 hazard types:

Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio

Expected Annual Loss scores are presented as a composite score for all 18 hazard types, as well as individual scores for each hazard type.

For more information, visit **hazards.fema.gov/nri/expected-annual-loss**.

Calculating Social Vulnerability

Social Vulnerability is measured using the Social Vulnerability Index (SVI) published by the Centers for Disease Control and Prevention (CDC).

For more information, visit **hazards.fema.gov/nri/social-vulnerability**.

Calculating Community Resilience

Community Resilience is measured at the County level using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).

For more information, visit **hazards.fema.gov/nri/community-resilience**.

How to Take Action

There are many ways to reduce natural hazard risk through mitigation. Communities with high National Risk Index scores can take action to reduce risk by decreasing Expected Annual Loss due to natural hazards, decreasing Social Vulnerability, and increasing Community Resilience.

For information about how to take action and reduce your risk, visit **hazards.fema.gov/nri/take-action**.

Disclaimer

The National Risk Index (the Risk Index or the Index) and its associated data are meant for planning purposes only. This tool was created for broad nationwide comparisons and is not a substitute for localized risk assessment analysis. Nationwide datasets used as inputs for the National Risk Index are, in many cases, not as accurate as available local data. Users with access to local data for each National Risk Index risk factor should consider substituting

the Risk Index data with local data to recalculate a more accurate risk index. If you decide to download the National Risk Index data and substitute it with local data, you assume responsibility for the accuracy of the data and any resulting data index. Please visit the **Contact Us** page if you would like to discuss this process further.

The methodology used by the National Risk Index has been reviewed by subject matter experts in the fields of natural hazard risk research, risk analysis, mitigation planning, and emergency management. The processing methods used to create the National Risk Index have produced results similar to those from other natural hazard risk analyses conducted on a smaller scale. The breadth and combination of geographic information systems (GIS) and data processing techniques leveraged by the National Risk Index enable it to incorporate multiple hazard types and risk factors, manage its nationwide scope, and capture what might have been missed using other methods.

The National Risk Index does not consider the intricate economic and physical interdependencies that exist across geographic regions. Keep in mind that hazard impacts in surrounding counties or Census tracts can cause indirect losses in your community regardless of your community's risk profile.

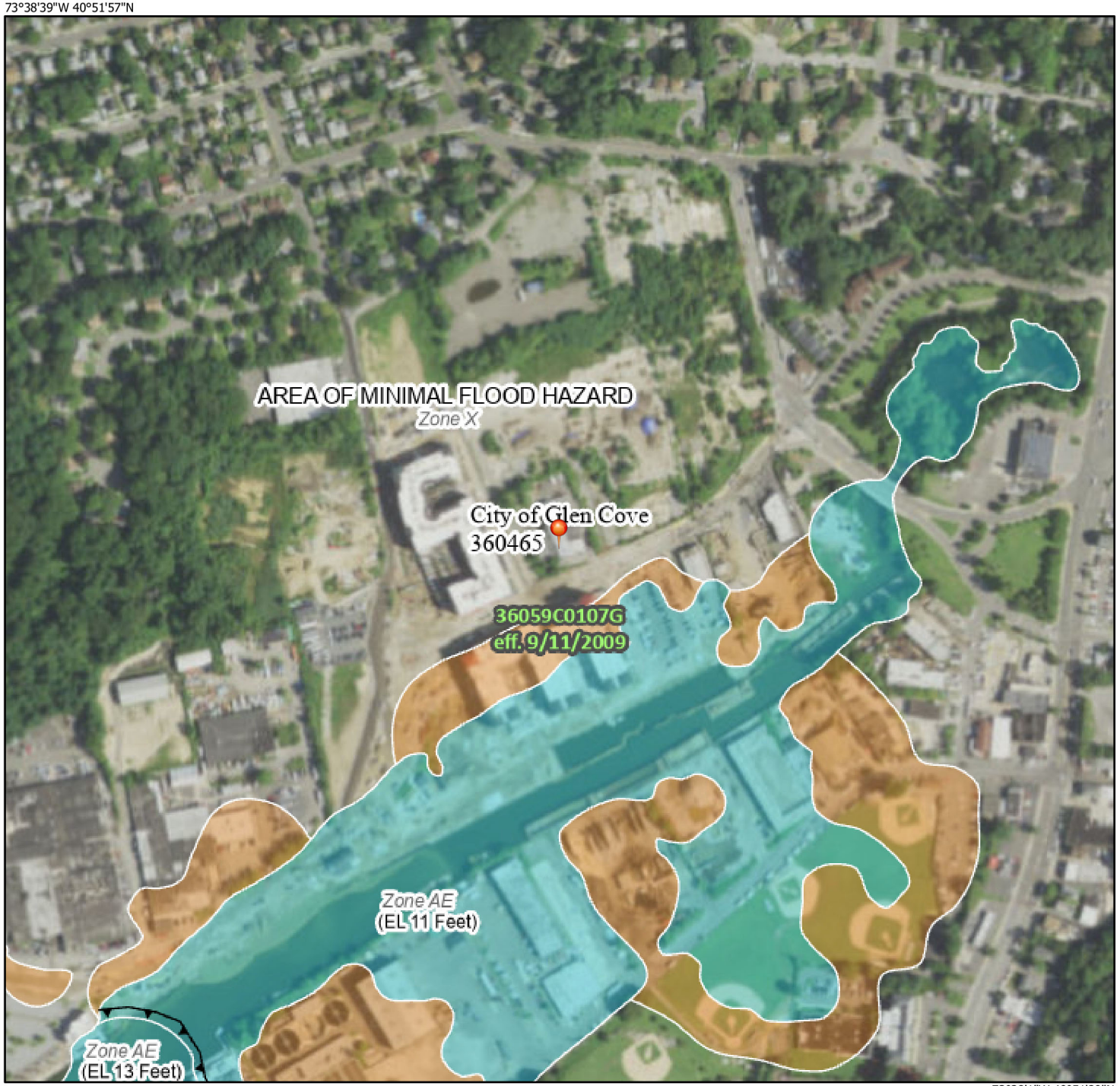
Nationwide data available for some risk factors are rudimentary at this time. The National Risk Index will be continuously updated as new data become available and improved methodologies are identified.

The National Risk Index Contact Us page is available at **hazards.fema.gov/nri/contact-us**.

National Flood Hazard Layer FIRMette

FEMA

73°38'39"W 40°51'57"N



73°38'1"W 40°51'29"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/23/2024 at 3:22 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

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Appendix N.
Remedial System Optimization Report Template

REMEDIAL SYSTEM OPTIMIZATION FOR [Site Name]

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